

Experiences Contributing to Professional Identity Transformation among Medical Laboratory Professional Students

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Abstract

Despite the importance of medical laboratory professionals (MLPs) to the field of health care, there has been little research published on the education of MLP students or attempts to understand their development. In particular, there is a lack of attention to the MLP students' professional identity, learning, and the professional socialization processes that are important aspects of their professional training. This paper provides insights regarding these dimensions of MLP student training, focusing on the situations that supported transformative learning in their professional identity development. It reports on a study that explored changes in MLP students' identity during a contemporary medical laboratory education program in Canada. Data obtained through interviews were analyzed from an emergent, thematic perspective to identify situations that affected the development of, or shift in, the students' professional identity. Findings suggest that the shifts in the participants' identities were affected by a collection of reflections, experiences, pre-established ideas, and concepts formed throughout the educational process.

Keywords: Professional identity, identity transformation, medical laboratory profession, medical laboratory students

Introduction

While the field of research on the education of medical students and nurses is well established, the situation for the medical laboratory professional (MLP) students is very different, despite their importance to the field of health care. There has been little published research on MLP practitioners or students. In particular, there has been little attention on the MLP students' professional identity, learning, and professional socialization processes. Hence, little is known about how and which experiences during their training affect their learning and lead to a transformation of their professional identity. However, with the growing demand for new MLPs, insights into such experiences could be helpful to MLP training programs to better support students' learning. This paper reports on a study that offers such insights regarding transformative learning in MLP students' education. The study sought to identify key experiences in the MLP education program that affected the development or shifted MLP students' professional identity related to becoming a beginning MLP practitioner.

Background Literature

In this section, we address the three key ideas or contexts that provide the theoretical bases underlying the study: transformative learning, professional identity, and research related to MLP professional identity.

Transformative Learning

According to Mezirow (2003): “Transformative learning...transforms problematic frames of reference—sets of fixed assumptions and expectations (habits of mind, meaning perspectives, mindsets)—to make them more inclusive, discriminating, open, reflective, and emotionally able to change” (p. 58). Mezirow proposed that every individual has a view of the world based on a set of assumptions derived from the individual’s upbringing, life experiences, culture, or education, and thus he developed an approach to learning primed by a shift in this worldview (Christie et al., 2015; Kitchenham, 2008; Mezirow, 1981, 1991, 1997, 2012). This shift in worldview falls in line with Mezirow’s ideas relating to the human search for meaning, understanding, and coherence in the individual experience (Fleisher, 2006). Mezirow developed a linear model that procedurally laid out his view of transformative learning, including ten initial phases incorporating aspects of a disorienting dilemma, critical assessment, exploration of options, acquisition of knowledge, and the reintegration of perspective (Kitchenham, 2008; Mezirow, 2012). In addition, while experience may be considered the trigger for many forms of transformative learning, fundamental to Mezirow’s perspective is the notion of reflective practice (Kitchenham, 2008; Mezirow, 1981, 2012; Taylor & Cranton, 2013). Critical reflection allows learners to reflect on those experiences that one cannot accommodate into their prior life structure (Merriam et al., 2007). Fundamentally, such reflection involves a critical evaluation of events that allows us to incorporate new concepts within our perceptions. Individuals navigate a series of personal negotiations with varying levels of difficulty as they work to acquire new aspects of their identity (Crues et al., 2015).

Connected with the social constructivism and experiential learning that can occur within occupational contexts, transformative learning offers one way to consider the outcome as individuals respond to professional socialization processes through a series of personal negotiations and build their professional identity (Skorikov & Vondracek, 2011). Thus, in this study, which is connected to an occupational context, the MLP students’ engagement in experiential learning and interactions with their mentors in their contemporary medical laboratory education program provided them with opportunities to change or broaden their identity as they transitioned from students to MLPs. Based on Mezirow’s perspectives of transformative learning, this change could result from disorienting dilemmas, problematic assumptions and expectations, exploration of a situation/event, and acquisition of knowledge during the medical laboratory program. Such factors provide the theoretical basis for identifying transformative learning experiences that affected the MLP students’ professional identity.

Professional Identity

Within the broader literature of professional identity, there are different interpretations of professional identity (Beijaard et al., 2004; Gee, 2001; Gibson, 2013; Gur, 2014; Hitlin, 2003; Rogers & Scott, 2008). However, there are commonalities in these interpretations that provided the basis for our thinking about MLP students’ professional identity.

Professional identity is a way of being or relating to how individuals see themselves in reference to a group of occupational or institutional peers (Hayden, 2015) or a sub-identity that emerges due to condensation of individual and social perceptions around themes that are related to a specific occupational environment (Gur, 2014). It is something that individuals shape through reflection, a complex and dynamic equilibrium between personal self-image and roles one feels obliged to play, and a percolated understanding and acceptance of a series of competing and sometimes contradictory values, behaviors, and attitudes ground in the life experiences of the individual (Beijaard et al., 2004; Samuel & Stephens, 2000; Volkmann & Anderson, 1998). Gecas and Burke (1995) noted that a central aspect of identity is its fixing of an individual’s place in society or culture through relationships to others, while Slay and Smith (2012) extended this notion, indicating that membership in a profession influences self-definition and shows how others think about an individual. Illeris (2014) describes the concept of part-identities, including the professional/occupational identity, as one component of the individual’s total identity,

which develops under specific conditions. Moreover, Illeris (2014) draws direct connections between identity and transformative learning, arguing that “learning which implies change in the identity of the learner” *is* the mark of transformative learning (p. 40).

A professional identity is also one that, while internalized by the individual, can be considered relative to a social group. It may be considered an identity within the multi-identity in which individuals construct an image of who they are as a professional (Slay & Smith, 2011). It is “an attitude of personal responsibility regarding one’s role in the profession, a commitment to behave ethically and morally, and the development of feelings of pride for the profession” (Bruss & Kopala, 1993, p. 686) and an important cognitive mechanism that affects workers’ attitudes and behaviours in work settings and beyond (Caza & Creary, 2016).

Professional identity can further be defined as attributes, beliefs, and values people use to define themselves within the specialized skill and education-based occupations (Benveniste, 1987; Ibarra, 1999; Schein, 1978). Ibarra (1999) further indicated that individuals adjust and adapt their professional identity during periods of career transition due to the professional discourse of which they are exposed, while Wenger (1998) noted that the professional socialization experiences through a community of practice are of specific importance in professional identity development.

In this study, MLP students’ professional identity was considered to include the way they viewed themselves, the way they viewed others, the way they viewed their medical laboratory work and their program; and fundamentally explored how the reframing of perspectives, values, and thoughts occurred based on their experience during their clinical practicum.

Studies Related to MLP Students’ Professional Identity

A few studies that addressed the learning and development of MLP students indirectly offer some insights regarding their professional identity. For example, Latshaw and Honeycutt (2010) investigated MLP students’ perceptions regarding professionalism at various stages throughout their educational program. Findings based on the students’ reflective reports throughout their educational program indicated that their professional perceptions expanded following service-learning participation. These perceptions included that MLPs should take personal responsibility to collaborate with other health care professionals, educate the community, and exhibit pride in the medical laboratory profession. With a different focus, Isabel (2016) examined the learning perspectives of MLP students completing their clinical education. The eight participants were interviewed before and after their exposure to the clinical community of practice and were observed during their clinical field experience. Findings indicated that the clinical preceptor (mentor) was a central factor of MLS student learning. Successful learning during clinical practicum depended on the student’s ability to be organized, be focused, and maintain a positive attitude throughout the program.

Concerning education and training programs, Nasr and Jackson-Harris (2016) investigated the factors that influenced student success rates in clinical laboratory science programs. They found that 57% of respondents indicated that the greatest strength of their program was the quality of the internship that they were required to complete, suggesting that the clinical practicum was a central aspect of the successful completion of their program. In addition, McClure (2009) and Beck and Doig (2007) indicated that many students entering the clinical laboratory science profession did not see the profession as their final career choice but as a stepping stone to other health care fields, suggesting a poorly developed professional identity.

These studies touched on some aspects of identity involving MLT students’ professional perception, learning perspective, view of their program’s strength, and attitude to the profession. In comparison, this study explicitly addressed professional identity with more depth from the participants’ perspectives of their experiences, learning, and change during clinical practicum. This broad focus on the MLTs’ perspectives also allowed for an examination of transformative learning, which has not been investigated in other studies. Thus, this study offers a unique understanding of the relationship between the MLTs’ clinical program and their transition from students to beginning MLPs.

Research Methods

An exploratory single case study (Yin, 2009) was used to allow for qualitative depth in investigating the collective changes in the MLP students' professional identity at the end of their clinical practicum and education program. It is exploratory because the intention is to gain initial insights of their identity development as an under-researched area in the field of MLP education.

Participants' MLP Education Program

MLPs perform applied diagnostic tests on human specimens spanning numerous fields to assist in the diagnosis and treatment of disease. The MLP training programs in Canada are guided by the expected competencies of entry-level practitioners, consisting mainly of technical aspects of the profession, to ensure the basic understanding of the practice can be demonstrated (Canadian Society for Medical Laboratory Science (CSMLS), 2015). Specific to this study, the participants were in a medical laboratory technology program (a specialization within the MLP field), a three-year (10 semesters) diploma program consisting of classroom training, simulated clinical laboratory training, and applied clinical practicum training. This study focused on the program's final year, where students are exposed to simulated clinical laboratory environments for 15 weeks, followed by a final workplace-based semester consisting of a 15-week clinical practicum. This practicum consisted of five consecutive three-week rotations with preceptor (mentor) medical laboratory technologists at a clinical site(s) in various laboratory practice areas. The practicum constituted the first robust exposure to the clinical laboratory environment and a point in which students were assessed by preceptors and future peers in the field. This study focused on the students' identity influenced by this workplace-based practicum.

Participants

The participants were recruited from a cohort of MLP students in their final year of study at a polytechnic college in Canada. They were in their third year of an accredited medical laboratory technology program, of which completion and subsequent certification allow for entry to practice as a medical laboratory technologist (MLT) in all Canadian jurisdictions. Eight of the students who consented and were available to be interviewed in a timely manner became the participants. They were broadly representative of the demographic profile of students of the laboratory profession in Canada.

Data Collection

The main sources of data to determine transformative learning and identity development were semi-structured interviews prior to and at the end of the clinical practicum. While initial interviews allowed for the establishment of a baseline picture of the participants, including elements linked with personal and biographical factors that attracted them to the field, developing professional relationships that had occurred throughout their didactic training, and their level of engagement with professional rhetoric and norms of the profession, the post-practicum interviews are central to this analysis.

These interviews required the participants to draw on their experiences with the clinical practicum to share their perspective of aspects of their identity associated with the medical laboratory field and how they had shifted from their pre-practicum state. The interviews addressed their perspective of, for example, their experience with their clinical practicum; the field of MLP; "good" or "bad" characteristics/behaviour of MLPs they observed; changes to how they viewed themselves; how they viewed themselves as health professionals; positioning regarding the relationship between MLP, teamwork, and health care teams; their feelings about the medical laboratory profession overall and being an MLP; experiences that made them think differently about their role and future as an MLP; and experiences on their practicum that they felt had a lasting impression on them. The interviews included open questions that required participants to share stories of their experiences on the clinical practicum that conveyed aspects of their identity and those experiences that they felt most significantly affected them,

for example, stories about best and worst experiences, what made them memorable, and how they made them feel about the medical laboratory profession. The 16 interviews occurred immediately before and following the completion of the full 15-week clinical semester and averaged approximately 50 minutes. Each interview was recorded and transcribed, and field notes were made, focusing mainly on expressions and emotions. Interview questions were semi-structured and open ended and allowed participants to explore the guiding questions freely.

Data Analysis

Data analysis followed an approach, wherein coding of the interview transcripts consisted of the digitization of files, a close reading of the textual data, and creation and reduction of textual segments into primary themes (Creswell, 2012), followed by a comparison of the emerging themes as series in time. The analysis was guided by the theoretical perspectives of transformative learning and professional identity described above. Each interview transcript was scrutinized and coded to identify statements by the participants that suggested characteristics of their identity (e.g., statements of beliefs, views, what value, judgment, feelings) and situations affecting development or transformation in identity (e.g., disorienting dilemmas, problematic assumptions and expectations, exploration of a situation/event, and knowledge acquired during the medical laboratory program). Similar statements and situations were grouped for each participant. The groups were then compared across the participants to establish common groupings, which became the themes and labelled to reflect different aspects of their professional identity and transformation. The themes were identified by the first author/researcher and reviewed by the second author to independently check their relationship to the data. Any discrepancies were discussed, clarified, and revised. While this did not change the themes, it resulted in removing or reclassifying some statements. The four themes that represent the experiences that supported transformative learning formed the findings being reported here.

Findings

Each participant was exposed to similar practice areas at various clinical laboratory sites during the clinical phase of training. For example, each participant was required to complete a 3-week rotation in microbiology and perform key competencies defined by the education program. While the experiences that participants had were varied and diverse, significant commonalities in experiences also existed that relate to clinical practice. Following analysis of the data, four broad themes emerged as those situations within the clinical practice that most significantly led to transformative learning as defined by a modification of the meaning perspectives that students had constructed: experiences involving patients, experiences with autopsy, experiences involving mistakes; and experiences related to workplace culture.

Experiences Involving Patients

All but one of the participants described detailed direct or indirect patient experiences that appeared to affect them through an emotional or caring response. These responses were deeply meaningful but fundamentally ranged from concern to sadness to disbelief in the reality of health care. Notably, that health care professions can include interaction with the critically ill. One of the stories shared was that of Blake, who, during a routine blood collection procedure at a patient's bedside, described an experience with a young man who was gravely ill. As Blake described,

I had never seen someone so sick in my life. He was this young man—I am the same age as this guy, and it could just as well have been me in the bed there. He could not move, he could not lift his arm out, his mom was sitting there looking at him, and I was... [Long pause]. There was that moment of apprehension where I did not know if I wanted to touch him. I have never seen someone in such a sorry state.

This experience appeared to be a powerful one for Blake, evoking a visible reaction during the recollection of the event. Blake demonstrated a sombre tone and thoughtfulness during the description. Other participants shared similar stories of how their patient encounters affected them. For example, Blaine's experience with a patient focused on being "on-call" with a supervising technologist. Laboratory environments often employ call shifts, much like other fields wherein technologists are off-site and called in when needed. On-call MLPs often find themselves in clinical areas like the emergency room, intensive care unit, or other patient areas. As follows, Blaine described in detail this first on-call experience and how this experience seemed to impact the view of the role,

I was on call one night with one of the techs, and it was crazy that night. This person, we went to emerge, and the person was pale as a ghost, and she could not really talk to us, but she was moaning, and she was so upset, but she could not show any emotion. She was cold and clammy. I was just like, man, you are so sick, and [while searching for a vein] I could not feel anything. Her blood pressure was almost non-existent, and I could not feel a vein to save a life. Anyway, I got the tech to [collect blood], and she got it or whatever. I was just like, man, this person is so sick, and it really hit me.

This experience occurred near the end of Blaine's practicum, and by Blaine's description, it was a moving event evoking a sense of difference in perception and feelings of responsibility. In many ways, this level of caring was somewhat counterintuitive in that MLPs are taught to consider the patient in an overtly scientific manner with a focus on analytic variables. However, Blaine's view of patients had become very humanized. As the following excerpt illustrates, these feelings were not unique to Blaine as Kelly experienced worry about a patient who had just undergone a bone marrow aspiration. In this instance, the patient was unaware of Kelly's involvement, and the circumstance resembles looking at a person through a one-way mirror:

Seeing him [a patient] obviously in pain, no doubt [during the bone marrow aspiration], and then going to lunch and seeing him sitting down in the hospital [cafeteria], I was just kind of like, I do not want to say "worried about him," but, whenever I saw a sample come down from hematology, I knew his name. He always has units in the blood bank. Just things like that, to see a face with it, that is what makes things different.

These patient experiences extended beyond those accompanied by actual patient contact. For example, Blake, Casey, and Jess noted patient test results as particularly significant, despite having no direct contact with the patient. In one instance, Blake shared a story relating to a likely terminal diagnosis from a peripheral blood smear stating,

It just totally caught me off guard. I did not understand that what I was looking at was the end of someone's life; that this was the science, there was nothing that you can do, this person is old enough now that any course of action was not going to—like, it might have given him like a couple of months just to get their affairs in order—but it was not going to save their life.

Others believed that the communication of critical results to the appropriate care provider was highly significant. For context, within the field of laboratory medicine, a critical or panic value is typically a test result with the potential for immediate impact on patient care and is communicated to the primary care team immediately. Several examples of this were shared as follows:

We were always getting something. You see a chloride that was off the charts, or you see a blood gas result that had a critical, maybe like a critical CO₂, or maybe a bicarb was low, and then they were looking at me well, you have to phone them. It is a critical result; make sure you get that across to them. (Blake)

When QC came in, we ran the specimen, and it was still within the hour for the STAT specimen, but then when we called the critical, the patient had already died. You realize how important your results are; it was a critical potassium result. (Jess)

After you call a result or see someone who had a [high] critical result and then they are gone way down [in subsequent testing]. You are like, oh, that is good, and you were part of helping them because you got and called the results. (Hunter)

It appeared that a significant moment within the practicum was the realization that, at times, they are responsible for what can be life or death decisions and/or actions. They were no longer students, and their actions had the potential for grave consequences.

Experiences with Autopsy

While not all participants had an opportunity to participate in an autopsy, those that did, emphasized that the experience was especially significant. When asked what they felt was the most memorable experience, all five participants who participated indicated the autopsy stood out. Participants fixated on the abstract aspects of death and the nuances of working with cadavers. As the following comments illustrate, the participants' responses to autopsy were diverse, and in some cases, the participants were unsure about how they felt when confronted with the juxtaposition of caring and detachment:

I was mind blown. I was just like, I just seen someone's entire body, inside and outside. I guess it makes you think about the repercussions of not staying in good health. (Jess)

Surprisingly, we had the autopsy just before lunch and, I had no problem [eating] (laughter), and I did not know if I would. I was weirdly able to detach what was in the room, what was going on, and then when I left, you know, being able to just put it behind me kind of thing. (Kelly)

While participants had mixed emotions regarding autopsy, they unanimously considered it a significantly positive learning experience. It appears the autopsy left them with a different sense of appreciation for the work and those performing the autopsy.

Experiences Involving Mistakes

Along with the emotional experiences involving patients and bodies, most participants indicated a heightened sense of concern around the impact of errors within the laboratory. Several participants described an error of which they were at least partially at fault or witnessed. Jamie shared a lengthy story about a critical error that resulted in patient harm during the clinical practicum. While Jamie was not responsible for the error, it involved the release of an inaccurate result by another MLT whom Jamie was working with and in which the patient received incorrect treatment following the error. Jamie focused on the emotional turmoil that the MLT that made the error demonstrated, stating,

The patient lived, and they were fine, but I do not know; I think that was just scary. That stuck with me because I would be the same way if [I made the mistake]. I feel like that would just hit me hard, especially if anything were to happen to the patient. (Jamie)

Participants detailed several instances of mistakes, with responses tending to move between those tied to their sense of fault, the evoked emotions, and how their errors were visible by others. Blaine and Jamie, for example, each described an error that had minimal impact in which the quality control for the tests they were performing was incorrectly performed. Despite their minimal impact, they were each significantly affected by the mistake:

I did not click the specific QC because I forgot we had to. It reran the whole QC, and everything was almost [out of acceptable range]; the whole screen was pretty much red which means we could not report any of the patients' results regardless of what our QC was that morning. So, I was like, oh my god! There were four stats up there, and I just screwed all this up! (Blaine)
So [QC] ran, and it was coming up errors, so I saw the error, and I put it back on, and I did not tell anyone that I put it back on, which was so stupid. One of the techs who just graduated from here works there, and she was just like, did you put that on? That was flashing, and you did not tell anyone! I said, I just thought you were running the second one for the patient control. Then she just completely [she was very upset] (Jamie)

Other participants tended to focus on the idea of ownership and the potential permanence of mistakes made. As the following comments demonstrate, this realization appeared to be an important one for them:

[If I made a mistake] I would say I am the least experienced, the least experienced person here; I believe I am the one who made that mistake. (Blake)

I found it was a lot more if you screwed up, there is no fixing it. Especially when it came to precious specimens, you know there was no going back if you ran out of the specimen. There was no fixing that. (Daryl)

Experiences Related to Workplace Culture

In addition to the experiences relating to results, patients, and their own internalized feelings surrounding these experiences, participants appeared cautious regarding workplace conflict and were apprehensive when it occurred. Five participants described circumstances in which they observed conflict or tension in the workplace and indicated a particular aversion to what we have categorized as "office politics." Moreover, the participants often perceived those who engaged in these behaviours (office politics) as those they deemed less than ideal in their working ability. Unlike the more emotional aspects of the previous experiences, much of this focus on workplace culture seemed to inform the participants' understanding of the ideal characteristics of the MLPs. Blaine, for example, described surprise upon realizing that there may be discontent in the workplace, stating:

One day, there was a big argument, and I did not even know what to do, and I just kind of sat there. And it was against the core lab and histology, and I did not realize there was [tension] between those.

It appeared that the participants had a general discomfort with conflict. It is possible that this discomfort was associated with their relative inexperience with the clinical realm, or it may have indicated a more significant discomfort with others. As the following comments illustrate, the participants were significantly surprised and affected by such conflict:

You hear about something that happened a few weeks ago, and there was like a big outburst, and you are like, what the hell man? Generally, it was not directed at me, just interoffice politics garbage, attacking behind people's backs. (Casey)

[I dislike] people who get so caught up in the politics of what is happening in their surroundings that it now lacks patient care. People were caring more about what if something were to happen or what will happen because they are not getting along with so-and-so. And instead of trying to confront things one on one or trying to resolve issues, they let it boil up, and finally, that just consumes them, and I see that a lot. (Daryl)

I found in the core lab, there was one person in chemistry, one person in hematology, the person in hematology, did not do any work, and they left at eight, so the person who was there until like twelve had so much other work to do because that person did not want to do it and so that is a really big thing. (Blaine)

Discussion

The findings of the study indicated four categories of experiences during the clinical practicum that significantly affected the participants' meaning perspectives and developing professional identity and suggesting that transformative learning occurred. This section discusses these findings based on three themes associated with them: (i) *interactions with patients and the reality of health care* associated with the patients and autopsy experiences); (ii) *validation of developing knowledge* associated with the mistakes experiences; and (iii) *support from preceptors and mentors* associated with the workplace culture experiences. In addition, the theme of *embracing reflection* is addressed as an important underlying process supporting their transformative learning.

Interactions with Patients and the Reality of Health Care

A significant finding from the research was the role of real patients and their specimens on the participants' developing professional identity. This role is related to the transformative learning that occurred. The participants' shift in identity was significantly impacted by those practicum experiences that exposed them to situations with an emotional element. For example, observing a patient during a cardiac event or seeing a patient's face when they find out they have months left to live resulted in a form of "reality shock" that influenced their transformation. In this case, the influence can be related to MacCurdy's (1943) psychological concept of "near-miss" and "remote-miss" regarding how individuals who were far removed from the bombing in London during the Second World War internalized these events differently than those close to the destruction. It offers an analogy to the concept of "reality shock" that can come with being close to events that do not fit within pre-existing concepts. Following various events during practicum, participants had to reconsider many of their "remote" (initial) views, convictions, values, and ideas.

Participants witnessed trauma, suffering, and pain of others, which they likely did not fully realize was possible until their exposure (proximity) to clinical practice—a situation that contributed to their transformative learning. It is valuable in discussing this point further to revisit the experiences of Blaine, Blake, and Jess as they stood out as particularly meaningful, emotional, and clear situations of coming face to face with the reality of patient care that generated personal responses that they did not expect.

Blaine's experience centred on being on-call with one of the supervising technologists and the events in an emergency room. Blaine described in detail the patient's condition recalling sights, sounds, and feelings in the room at the time, and displayed apprehension and a genuine concern for the individual's well-being. Thus, we view Blaine's emotional response as being insightful, in that MLPs are often taught (perhaps to their detriment) to consider the patient in an overtly scientific manner with a focus on analytic variables and the correlation of these variables with clinical conditions. The experience was an opportunity for Blaine to apply the learning that had occurred within a high-stress environment. Still, it allowed for a reconsideration of the MLP role and the relationship with the patient. This reconsideration resulted in Blaine obtaining a balance between the technical and holistic views embracing the emotional, social, and cognitive dimensions of learning (Illeris, 2004; Mezirow, 2012.)

In Blake's case, it was a terminal test result and the recognition of its repercussions to the patient that served as a similar learning experience. Over time, skilled MLPs can easily distinguish between non-consequential, pathologic, and even terminal results and are commonly aware of the diagnosis and prognosis of disease well before the patient, and in many cases, even before the physician. While all participants referred to reflecting on this somehow, for Blake, this realization seemed to trigger

considerable thought, reflection, and emotion related to the transformative learning process. For Blake and Blaine, the transformation was catalyzed with what they considered to be an “it really hit me” (Blaine) moment. This moment for them, observed similarly but less obviously among other participants, was a central event in their shift in the conceptualization of their role and the role of the field. The participants had to grasp that the reality of their work brought them face to face with mortality. Their work links them closely to patients who are gravely or terminally ill, and that the weight of the knowledge that their actions are meaningful. These moments required them to reframe their ideas and perspectives; ideas, and perspectives missing from their classroom experiences. However, while the study participants viewed these experiences as positive, they can be profoundly traumatic.

Touching on the potentially traumatic nature of the participants’ experiences leading to transformation was Jess’s experience regarding a patient who had already died. All participants who engaged in autopsy had complicated feelings around it. These feelings ranged from incredible fascination to being horrified. Jess seemed to be the most personally impacted by the experience, and in many instances, seemed significantly unnerved by the process of an autopsy. Jess used strong language in the discussion of the autopsy and demonstrated an aspect of desire for dignity for the body. Troubled by the experience, Jess expressed a strong sense of empathy for the deceased’s family. Among the participants, Jess also demonstrated the most respect and admiration for those performing the autopsy, indicating a personal inability to perform this work as there would be too much potential for emotional attachment.

Each of these examples of participants’ transforming experiences highlights our conclusion that situations involving actual patients in the clinical practicum that generated strong emotions for participants have significant potential for learning and reflection; they are transformative in participants’ developing a professional identity and supported by Mezirow’s initial categorization of transformational learning when we consider the fundamental aspect of a dramatic shift or disjuncture (Kitchenham, 2008; Jarvis, 2008). Essentially these moments served as a form of disorienting dilemma. Unlike the classroom experience, or experiences involving technical skill development, the learning and emotional turmoil during these experiences created an opportunity for deep reflection. They involved a more holistic aspect of the learning processes, necessitating modifying pre-established meaning perspectives.

Validation of Developing Knowledge

In addition to their experiences with patient care, a second significant influencer emerged relating to how the participants’ applied their growing knowledge in formal and informal circumstances. In many instances, the participants were challenged to use their knowledge inside and outside the clinical realm allowing them to develop and demonstrate their growing professional identity and alter their relationship with others. This challenge served as a vital point of validation or reaffirmation, which like the experiences with patients, helped catalyze the transformational changes underway.

Throughout the post-practicum interview, it was evident that the participants had become considerably more confident and competent in the technical aspects of the field, as highlighted by their perceptions surrounding the possibility and consequences of mistakes. All participants described various experiences throughout their clinical practicum, which allowed them to demonstrate their growing competence, and these were significant moments. Some participants, for example, described feelings of accomplishment following the completion of a high-level task such as a complex antibody investigation, while others expressed genuine satisfaction in realizing simple concepts about human pathogens, such as being able to distinguish select bacteria based on smell. Each participant described experiences within the clinical setting that allowed them to validate their knowledge internally and demonstrate this to their peers.

Moreover, each participant encountered various forms of technical decision-making and had to accept the consequences of their professional judgments. In this regard, participants often referred to the experiences in which they were given heightened autonomy and where the potential for mistakes was left solely on their shoulders. It appeared that increased levels of independent thinking and work were particularly important in validating their knowledge; thus, contributing to the transformational change. Several of the stories shared related to making such judgments and demonstrating their growing

competence to their peers. However, the participants were required to demonstrate clinical decisions and were confronted with the realization that they would inevitably have to live with and reflect upon those decisions (i.e., another reality shock), thus contributing to the shift in professional identity. Fundamentally, much like the impact of real patient experiences, the building of confidence and competence and recognition of the potential for error was a central event in the participants' shift in the conceptualization of themselves within the field.

It also is important to recognize that participants had developed comfort in sharing their growing knowledge base. This comfort with new knowledge extends beyond the instrumental learning associated with the increased technical knowledge and speaks to their positionality within the field and as a presentation of their identity to their family. Again, these moments of validation provided an opportunity to develop new understandings of themselves and their positions within the field and highlight our conclusion that situations involving the validation of knowledge create significant potential for learning and reflection contributing to transformative identity development.

Support from Preceptors and Mentors.

The third set of experiences affecting the participants relates to the support they received from their preceptors and the socialization processes this fostered. Professional socialization can be understood as how individuals acquire the values, attitudes, interests, skills, and knowledge of a group they are or seek to be members of (Waugaman & Lohrer, 2000; Weidman et al., 2001). Within the participants' MLP practicum, professional socialization seemed to be a relatively unstructured and informal experience resultant from the guidance of preceptor technologists and interaction with the practice. Nevertheless, through their preceptors and mentors and the working culture/environment, the participants were able to ground many of their learning experiences. Following their practicum, participants strongly identified with the concept of knowledge and understanding, resulting from their exposure to highly competent MLPs. This conclusion was most evident in the participants' relatively high regard for senior technologists serving as informal mentors. The value of experience on the part of the preceptor was universally recognized, and several of the participants indicated they wished to be (something) that many of the senior technologists were. Each participant shared several stories of how observing and interacting with their preceptors and mentors during clinical practice were valuable points of socializing and learning for them. Furthermore, throughout the interviews, we noted that in each of the most significant events that participants described, a preceptor was present and served as a guiding light in their navigation and reflection of the experience. Ranging from Blake's experience with a terminal diagnosis to Kelly's autopsy experience, a mentor appeared to be vital for the participants' reflections to Jamie's self-described mentor in routine hematology.

While literature related to the significance of active preceptors is both broad and comprehensive (Johnson et al., 2012; Löfmarka et al., 2012; Madavanpraphakaran et al., 2014), the role MLP preceptors play in the formation of the professional identity is much less explored. For the participants, the identification and influence of preceptors and mentors related to aspects of age, experience, and even focus area within the laboratory environment. All participants accepted the value that the experience of the senior technologists held and had established a level of respect towards them. This research supports the idea that mentorship received is a vital aspect of professional identity development within the participants' curriculum, contributing positively to the transformational shift in identity that is underway. For the participants, the informal mentorship was crucial as it allowed them to relate to the profession meaningfully, creating, in many instances, a sounding board on which they could navigate their ongoing identity shift.

Embracing Reflection.

The previous sub-sections highlighted the importance of select experiences for the participants' transformational learning. However, reflection is key to transformative learning (Merriam et al., 2007), and requires specific discussion in relation to this group. Fostering reflection and reflective practices is a common idea in health care professional identity research (Mann et al., 2009; Wald et al., 2015).

Reflective practices and how to learn from clinical experiences instead of broader reflection is a much more focused approach to health professional education (Mann et al, 2009). In this instance, the participants' broad reflections concerning relationships and their positionality within the field served to foster meaningful change.

While the participants had likely engaged in reflective practices related to their technical abilities, during their clinical practicum, they had an opportunity to reflect on their shifting positionality within the field, thus modifying their narrative—for example, the beginning transition from student to practitioner. Furthermore, following the practicum, there was a considerable shift in the participants' confidence in becoming good MLPs in the future. However, in many instances, participants identified humility surrounding their realizations regarding their limited skills compared to others. Though the participants were considered competent (relating to completing their clinical practicum and its directed curriculum), they realized that their learning was far from complete. Further complementing this realization was a growing understanding of the knowledge of their mentors and the realization that many of their preconceptions of the field proved different than they expected. Fundamentally, the participants' broad reflections regarding the practice proved influential in shaping their relationship with the field, further contributing to their transformational learning.

Notably, while the participants had embraced the value of reflection during their clinical practicum, there was little formal focus on the importance of reflection within their program. Most Canadian MLP professional training programs focus specifically on highly technical, workplace-focused tasks with minimal attention placed on any form of reflective practice, and there is little formal consideration of professional identity development outside of limited aspects of professionalism and professional practice. The CNA program the participants completed necessarily developed a curriculum that focuses explicitly on the outcomes required by the CSMLS competency profile. This profile makes only a single reference to reflective practice and one oriented towards technical practice instead of self-reflection (CSMLS, 2015).

This lack of reflection within the curriculum raises several questions regarding whether incorporating increased reflective practice and reflection within the Canadian MLP curriculum could allow for easier transformational change in the professional identity. Most of the participants, for example, identified significant levels of personal struggle when confronted with their emotional responses indicating they may have been ill-prepared for the transformative learning underway.

Conclusions

As we discussed in the previous section, this research supports the conclusion that the transformational learning which occurred was the result of events throughout the participants' clinical practicum, and transformational learning was not limited to a single event or moment in time. Instead, the participants' identity shift was affected by a collective of reflections, experiences, pre-established ideas, and concepts formed throughout the educational process.

Figure 1 provides a representation of those factors which contributed significantly to the professional identity development of the participants and serves as a starting point for future research regarding factors influencing MLP professional identity development.

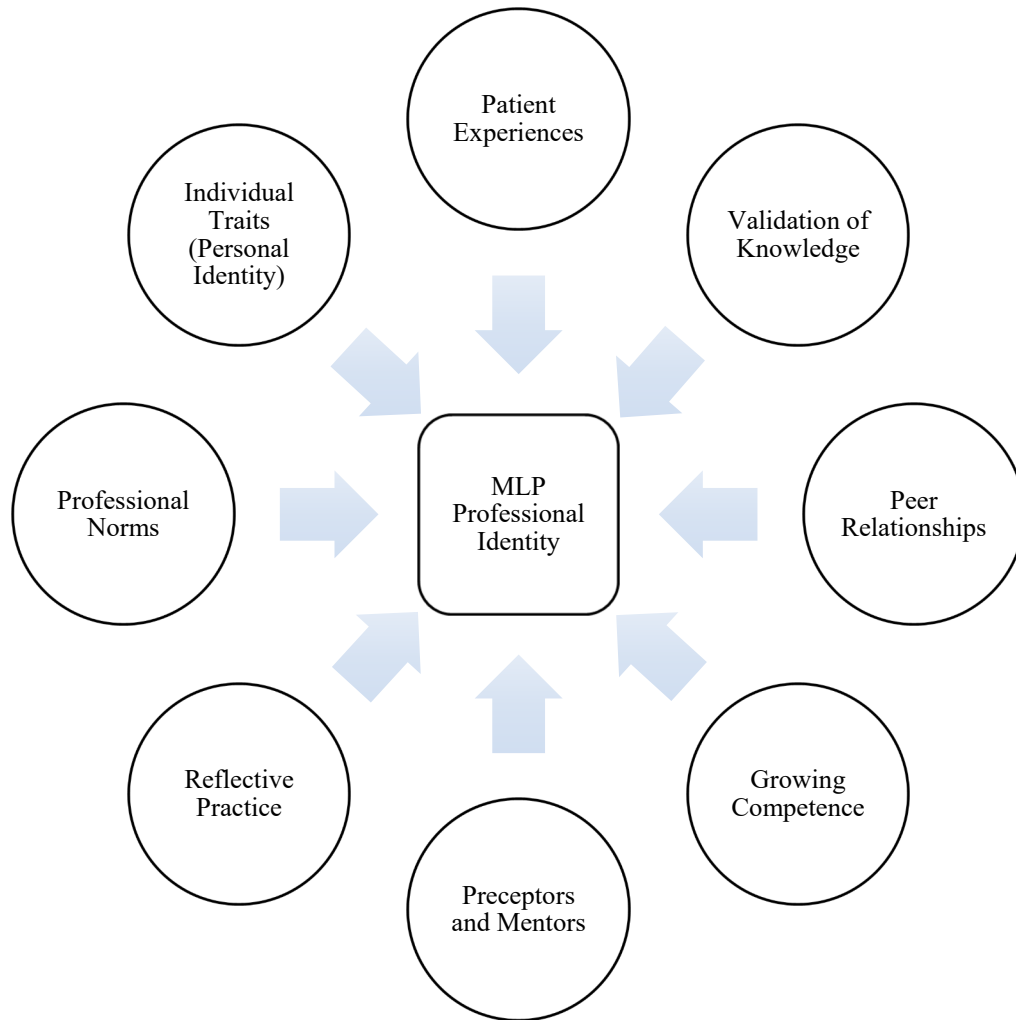


Figure 1. Factors contributing to the transformation of the MLP professional identity

Note: It is important to note that the factors indicated in Figure 1 are not meant to capture all of those influencers that may have impacted the participant but emphasize those evident throughout the research approach. Thus, additional factors outside of those highlighted, such as gender, social class, or ethnicity, likely contributed to the development of MLP professional identity but were beyond the scope of this study which explored the factors within the clinical practicum experiences.

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