Effectiveness of Patient Simulations in Dietetic Education and Training

by

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Widely used in teaching various healthcare students, patient simulations are not common in dietetics education. This mixed-methods study investigated effectiveness of patient simulations in two courses (one undergraduate, one graduate) in 2016 and 2017 in Applied Human Nutrition at the University of Guelph. Nutrition students acted as dietitians, and theatre students as patients. 99.8% of undergraduate and 82.6% of graduate nutrition students agreed/strongly agreed that simulations enhanced learning and confidence. Undergraduate students’ competence scores related to physical assessment, patient education, and communication skills improved by 46.9%, and graduate students’ scores related to assessment, patient education, communication and counselling skills, by 27.9% (both \( p < 0.01 \)). Thematic analysis of students’ written reflections and focus group data suggested simulations increased communication and assessment skills, confidence and self-efficacy. Simulation realism, student preparedness, observing, post-simulation debriefing and reflecting increased perceived simulation value. Strengths, limitations, and clinical and pedagogical implications of simulation are discussed.
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List of Abbreviations

AA (abdominal assessment)
ADIME (nutrition care process: assessment, diagnosis, intervention, and monitor/evaluation)
BECCI (behaviour change counselling index)
CCOG (Calgary Cambridge observation guide)
CD (crohn’s disease)
CP (chronic pancreatitis)
Deh (dehydration)
DMI (diabetes mellitus I)
DMII (diabetes mellitus II)
Dys (dysphagia)
ELT (experiential learning theory)
FL (fatty liver)
FRAN*6720 (Practicum in Applied Human Nutrition II, a mandatory course in the Masters of Applied Nutrition program)
H (hypertension)
IBS (irritable bowel syndrome)
IPE (interprofessional education)
LI (lactose intolerance)
MA (medical acting)
MAN (Masters of Applied Nutrition program)
MS (metabolic syndrome)
MSc student pres part 1 (Introduces study and discusses student participation)
MSc student pres part 2 (Collect signed consent forms, allow students to sign up for a focus group time slot, allow students to complete SET (NUTR*4120 and FRAN*6720))
NASH (non-alcoholic steatohepatitus)
NCP (nutrition care process)
NUTR*4120 (Applied Clinical Skills, a fourth year elective in the Applied Human Nutrition undergraduate program)
OSCE (obstructive structured clinical examination)
PDEP (partnership for dietetic education and practice)
RD(s) (registered dietitian(s))
REB (research ethics board)
SD (standard deviation)
SET (simulation effectiveness tool)
SET-M (simulation effectiveness tool-modified)
SGA (subjective global assessment)
SIM (simulation)
SOP (scope of practice)
SP(s) (simulated patient(s))
THST*3630 (Special Studies in Studio Practice, a third year elective in the Theatre Studies program)
VD (vegan diet)
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1.0 Introduction

There is a strong demand for highly skilled workers in Canada; as a result our young adults are among the most highly educated in the world (Canadian Council on Learning, 2008). The percentage of Canadians between the ages of 25 and 44 years with post-secondary credentials increased from 45% to 64% between 1990 and 2005 (Canadian Council on Learning, 2008). However, post-secondary education does not necessarily impart all the skills a workplace demands (Davies & Guppy, 2014). In addition to academic skills and knowledge, employees are required to have job-specific technical skills and soft skills (e.g., interpersonal skills), which are often neglected in post-secondary educational programs (Gray, 2002; Orion, 2001). The conventional lecture style of teaching in relation to a teacher-centered model and passive learning contrasts with the evidence demonstrating that an active learner-centered approach may be more effective for developing critical thinking and problem-solving skills (Freeman et al., 2014; Hofstein & Lunetta, 2004; Prince, 2004; Slavich & Zimbardo, 2012). A learner-centered model allows students the opportunity to actively construct knowledge through guided instruction by the facilitator (Barr & Tagg, 1995; Deksissa, Liang, Behra, & Harkness, 2014).

Nutrition students (i.e., enrolled in accredited Applied Human Nutrition programs on track to become Registered Dietitians) are required to attain an immense amount of detailed knowledge from various disciplines including food science, chemistry, biology, sociology, and psychology in relation to nutritional practices and have the ability to integrate, apply, and communicate their knowledge professionally in public or private settings (Newton, Bettger, Buchholz, & Racey, 2015). Thus it can be argued that the traditional teacher-centered approach may not sufficiently prepare nutrition students with the knowledge and skills they need to effectively apply their education in dietetics practice (working in a professional environment as a
Registered Dietitian). Therefore, introducing learner-centered models into existing dietetics curricula through experiential learning approaches, such as simulation methodology, will help students to integrate and apply the information they have acquired, and become better prepared for the workplace (ACEND, 2013; Nelms & Safii, 2011; Safaii, 2010).

Simulations are “a technique used to replace or amplify real experiences with guided experiences that evoke or replace substantial aspects of the real world in a fully interactive manner” (Levett-Jones & Lapkin, 2014, p. 58). They are considered a high impact educational practice as students incorporate and apply what they have learned (Kuh, 2008). As a result, simulations have become an increasingly popular training tool for educational programs in many healthcare professions such as nursing, medicine, dentistry, and occupational therapy (Buchanan, 2001; Cahill, 2015; Levett-Jones & Lapkin, 2014). Health educators in these fields have found that simulations confer many advantages, including enhancing the quality of patient care and increasing students’ confidence by allowing students to practice their skills in a safe environment before encountering real patients (Henry, Duellman & Smith, 2009; Lundberg, 2008; Nelms & Safii, 2011). Simulations may also improve critical thinking and communication skills, specifically “soft” or “people” skills, which are required when interacting with patients, family members, and other healthcare professionals (Thompson & Gutschall, 2015).

Despite the many advantages of simulations in the education and training of healthcare professionals, simulations are novel in the field of dietetics and nutrition. There is currently a lack of supervised practice sites available for dietetics students in the United States and limited opportunities for experiential learning in dietetics university curricula (White & Beto, 2013). This issue is also relevant in Canada, as only approximately one third of graduating undergraduate nutrition applicants receives internship placements in Ontario (Brady, Hoang,
Incorporating simulation methodology into existing dietetics curricula may allow students the opportunity to gain skills and confidence as a clinician. More research is needed to evaluate the effectiveness of simulations in enhancing the learning and confidence of students in dietetics education programs (Thompson & Gutschall, 2015). For the purpose of this literature review and thesis, the focus will be on simulations that include a live interaction between students/interns and “simulated patients” (SPs) person trained to act as a “patient,” such as actor, volunteer, instructor, etc.).

The primary aim of this study is to evaluate the effectiveness of simulations incorporated into three courses, in enhancing the learning and confidence of the students at the University of Guelph, Ontario, Canada: NUTR*4120 (Applied Clinical Skills, a fourth year elective in the Applied Human Nutrition undergraduate program), FRAN*6720 (Practicum in Applied Human Nutrition II, a mandatory course in the Masters of Applied Nutrition program), and THST*3630 (Special Studies in Studio Practice, a third year elective in the Theatre Studies program). It is anticipated that results of this research may have important implications for curriculum development of dietetics and theatre academic programs.
2.0 Review of the Literature

2.1 Experiential Learning

Experiential learning is simply considered to be learning by doing (Stull & Mayer, 2007). During an experiential learning experience, an individual attaches meaning and constructs knowledge, connecting what was learned to current and future situations (Rutherford-Hemming, 2012). High impact educational practices are types of experiential learning, and are positively associated with student learning and retention (Kuh, 2008). Such practices as service learning (working in the community), internships, and capstones (culminating projects) allow students the opportunity to integrate and apply the knowledge acquired in the classroom. They demand significant time and effort from the students, encourage collaboration with diverse others, facilitate learning outside of the classroom, and require meaningful interactions with peers and faculty. Such practices propel learning and understanding to a deeper level, allowing students the opportunity to become more self-aware of their current knowledge, and areas for growth (Kolb, 1984). Newton and colleagues discussed five educational strategies in nutrition and dietetics (including human patient simulations), that contain characteristics of high impact educational practices in regards to their ability to enhance student learning and the development of critical thinking, problem solving, and teamwork skills (Kuh, 2008; Newton et al., 2015).

Simulated patient scenarios provide an authentic learning experience for students to integrate and apply what they have learned (Kuh, 2008), making them an ideal tool for teaching clinical and counselling skills to nutrition students. Experiential learning is based on various adult-learning theories including Kolb’s theory, constructivist learning theory, and the zone of proximal development (Bradley, 2011; Kolb, 1984; Piaget, 1972; Vygotsky, 1978).

2.1.1 Kolb’s Theory of Experiential Learning
David Kolb is one of the most recognized and cited theorists in relation to experiential learning, and his Experiential Learning Theory (ELT) has been a primary influence in the development of learner-centered education (Dennison, 2009). Kolb (1984), states that learning is a continuous process grounded in experience, and involves a transaction between the person and the environment. The ELT is cyclical in nature and involves four stages, a concrete experience, reflective observation, abstract conceptualization, and active experimentation shown in Figure 1. (Kolb, 1984).

A concrete experience involves being open and fully immersing oneself into a new experience, withholding any bias (Kolb, 1984). This experience would be related to the learned material and designed to bring it to life. Reflective observation involves reflecting on the experience, considering it from various perspectives, and relating it to one's own life, thereby personalizing the experience (Kolb, 1984). Abstract conceptualization encompasses “creating concepts that integrate observations into logically sound theories” (Kolb, 1984, p. 30). The learner integrates the concrete experience into a theory with which they are familiar or can relate. Lastly, active experimentation involves assessing and applying the theory to future situations (Kolb, 1984). Kolb’s ELT model can be used as a tool for instructors of educational programs when incorporating experiential learning activities to help advance and deepen students learning.
2.1.2 Constructivist Learning Theory

Constructivist learning theory states that knowledge is constructed when an individual attaches meaning to an experience or activity (Torre, Daley, Sebastian, & Elnicki, 2006). Constructivist learning is considered an active process that includes dialogue, collaborative and cooperative learning (Merriam, Ceffarella, & Baumgartner, 2007).

Constructivism is thought to occur in two different realms, personally and socially, or internally and externally (Piaget, 1972; Vygotsky, 1978). With Piaget’s (1972) personal or internal constructivism, learning occurs within the individual as one reflects upon the experience and attaches meaning using previous knowledge. According to Piaget, accommodation and assimilation are key processes that occur when an individual constructs new knowledge from an experience (Piaget, 1972). Assimilation refers to incorporating the new information into the students existing mental framework without alerting or reframing it (new information does not change the learners current perspective, only adds to it), thereby enriching their current understanding. Accommodation suggests the learner’s conceptual structures are expanded or reframed to incorporate the new experience (Piaget, 1972).
Vygotsky (1978) strongly influenced social or external constructivism, stating that learning is constructed in a social environment, and emphasizing the importance of social interactions in helping learners construct knowledge. Since then, other theorists have held similar positions, stating knowledge is a product of humans that is socially or culturally constructed (Ernest, 1991; Prawat & Floden, 1994). McMahon (1997) agrees that learning is a social process, adding that learning does not occur exclusively in our minds and that the development of our behaviours are not passively shaped by external influences. He clarifies that meaningful learning only occurs when individuals are completely engaged in social activities. Through active engagement and participation in their social environment, an individual is able to enhance their learning and attach meaning to experiences. Vygotsky (1978) also stated that the most significant learning occurs when speech and practical activity, often two independent forms of development, converge. Such interactions could include individuals conversing about their experience and providing feedback to one another (Vygotsky, 1978).

### 2.1.3 Zone of Proximal Development

An extension of the constructivist learning theory, and of experiential learning, is Vygotsky’s notion of the zone of proximal development (Bradley, 2011; Vygotsky, 1978). The zone of proximal development refers to a learning experience through a social interaction that considers what a learner can do without help, and what the learner can do with assistance, such as guidance and collaboration (scaffolding). In relation to cognitive load theory, scaffolding decreases time the learner would spend on extraneous load (processing unnecessary information provided during learning that does not directly contribute to learning) and reduces the overall cognitive load (total amount of cognitive energy used in working memory at a given time) (Josephsen, 2015; Stull & Mayer, 2007). Within the zone of proximal development, the learner is constantly being challenged with tasks that require skills and knowledge just beyond their
current level of mastery, enhancing their capabilities. This zone heightens the learner’s motivation and builds on previous triumphs to increase confidence (Brownstein, 2001). It is important to note that the task and learning environment should embody the levels of difficulty and complexity at which the learner should be able to comfortably function at learning completion (Derry, 1999). Once the learner has successfully mastered the task, the scaffolding can then be removed, and in theory the learner should be capable of independently completing the task in future situations (Wood, Bruner, & Ross, 1976).

Kolb’s ELT, constructivist learning theory, and the notion of the zone of proximal development elaborate on experiential learning experiences from various angles; however, the foundation of each theory is the same, reinforcing the notion that such practices are important for enhancing deep learning (Kolb, 1984; Piaget, 1972; Vygotsky, 1978). Simulations provide an authentic experiential learning experience for students to integrate and apply what they have learned (Kuh, 2008), making these strategies an ideal education and training tool. Therefore, various forms of simulations have been historically used in a multitude of disciplines to educate and train students/interns in preparation professional practice.

2.2 History of Simulated Patients in Healthcare Education

Although simulation technology has recently gained a wider acceptance in medical education and training, it is a well-established training tool in other disciplines. Simulators are famous for their initial uses in aviation as a method of flight training for pilots and all aircraft staff (Hilmreich, 1997). Furthermore, simulations have been used in war games and training exercises for those in the military, and in the technical operations for nuclear power plants (Ressler, Armstrong, & Forsythe, 1999; Wachtel, 1985). In settings in which a mistake can lead to extensive damage and harm, such as nuclear power, space flight, and petrochemical industries,
simulation-based training has been especially valuable. Each skill can be practiced and perfected in a safe environment before being applied in a real situation. As a result, this style of learning is less stressful for the student and educator, and helps to increase the students’ confidence (Paver-Erzen & Cimerman, 2007).

2.2.1 Healthcare Professions

Since the pivotal work in aviation, military and petrochemical settings, simulations have been adapted in education and training in other professions. A recent review of the literature found that various forms of clinical simulation models are being increasingly used as training tools for educating healthcare professionals (Levett-Jones & Lapkin, 2014). The reduction of clinical student placements in the healthcare industry and heavier financial consequences for errors made by caregivers are contributing factors for increased research conducted on simulation training in healthcare education (Reising, Carr, Shea, & King, 2011; White & Beto, 2013. Furthermore, 70% of clinical complications are caused by mistakes made by healthcare professionals, while technical issues only account for 30%, indicating the need for improved training, such as with the incorporation of simulation experiences (Paver-Erzen & Cimerman, 2007).

The different types of simulations fall under three different fidelity levels; “fidelity” refers to the extent to which the simulation mimics real life (Palagnas, Maxworthy, Epps, & Mancini, 2015). High-fidelity simulations include full-scale scenarios, which are designed to feel as realistic as possible (such as within a hospital or surgical room), with the assistance of life-sized mannequins and for which the instructor controls the computers (e.g., used to train nursing students how to conduct physical assessments on the entire body, and the steps involved in emergency situations, such as when a patient goes into cardiac arrest) (Thompson & Gutschall,
Partial task trainers (or part task trainers) are considered high-fidelity simulations as well; they use a computer-controlled mannequin to replicate a specific part of the body, such as the arm to practice intravenous procedures (Maran & Glavin, 2003). The students have the opportunity to practice interventions on the mannequin using necessary equipment as if it were a real patient. Medium-fidelity simulations include those that are computer based, and which deliver a simulation scenario to the students in a realistic sequential manner (Thompson & Gutschall, 2015). The students are required to apply their knowledge and make decisions throughout the program as they would if the scenario were happening in real life, and then consider the outcomes of their decisions (such as the patient's condition worsens or improves, in some way as a result of an intervention). Low-fidelity simulations include simulated patients, peer-to-peer role-playing, peer-to-instructor role-playing, and unfolding case studies (Thompson & Gutschall, 2015). In a simulated patient scenario, a participant (e.g., instructor, volunteer, paid actor) is trained to act like a patient in a clinical scenario, and the student then counsels, provides education, and/or conducts physical assessments on the “patient” depending on the scenario (Thompson & Gutschall, 2015). Peer-to-peer simulations involve students practicing clinical skills on each other (Thompson & Gutschall, 2015). Finally, unfolding case studies are identical to computer-based scenarios in the sense that the scenario information is delivered in a sequential manner with students having to apply their knowledge and make clinical decisions upon which the outcomes are based, although the scenarios are delivered without the use of computer programs (such as given a patient scenario on a piece of paper that they have to work through, making appropriate decisions by applying their knowledge) (Thompson & Gutschall, 2015).
One of the first simulations used in healthcare was a high-fidelity patient simulator and was developed for the training of anaesthesia residents in the late 1960s (Abrahamson, Denson, & Wolf, 1969). Results showed that the residents using the simulator attained proficiency with fewer trials and in less time in comparison to residents receiving training in the operating room exclusively (Abrahamson et al., 1969). Since then, simulation technology has been effectively applied to a variety of health education areas and specialties, including communication skills, teamwork, critical thinking, and clinical skills within nursing (Hobgood, Sherwood, & Frusk, 2010; Johansson & Wertenberger, 1996; Reising et al., 2011), medicine (Acton, 2015; Good, 2003; Hobgood, Sherwood, & Frusk, 2010; Panzarella et al., 2013; Reising et al., 2011), physical therapy (Silberman, Panzarella & Melzer, 2013), pharmacy (Harris, McCarty, Wilson, Lovin Nealy, Waghel, Coleman, Battise, & Boland, 2018), occupational therapy (Cahill, 2015), and dentistry (Buchanan, 2001). Qualitative and quantitative reviews of the high-fidelity simulation literature, which examined studies between 1969 and 2003, report that simulators achieve optimal learning outcomes under various conditions, such as when feedback is provided and when the simulations increase in difficulty. There is a strong association between hours of simulation practice and standardized learning outcomes (Issenberg, McGaghie, Petrusa, Gordon, & Scalese, 2005; McGaghie, Issenberg, Petrusa, & Scalese, 2006; Roos, Beverly, & Michelle, 2017; Schmitt, Toramanian, Lebas, Mahoudea, & Calon, 2018; Todd, McCarroll, & Nucci, 2016). A 10-year review (1996-2005) of standardized patient simulations in teaching and learning in health education reported similar results, with a majority of studies reviewed deeming simulations to be a valuable training tool (May, Park, & Lee, 2009). In many of the studies examined in the reviews, the students claimed to highly enjoy the simulator training, that it enhanced their clinical skills and was a valuable educational experience (Bond, Kostenbader, &
Simulations used in medicine and nursing have been found to be advantageous to both educators and students, as instructors can focus on student learning rather than patient care, and students gain professional, clinical, and critical thinking skills in a risk-free environment (Azzarello & Wood, 2006; Issenberg et al., 2005; Jeffries, 2005; Johannson & Wertenberger, 1996; Smith & Cole, 2009; Wane & Lotz, 2013; West, Usher, & Delaney, 2012). Team-based simulations (conducted collectively with students from various healthcare sectors) help to promote the development of interprofessional and/or interdisciplinary communication skills (Koo, Idzik, Hammersla, & Windemuth, 2013; Lewis, Strachan, & Smith, 2012). The repeated experiential learning opportunity simulations offer and the immediate feedback received from debriefing help to enhance the quality of students’ education and increase their confidence, which in turn enhances the quality of future patient care (Dreifuerst, 2009; Henry et al., 2009; Levett-Jones & Lapkin, 2014; Lundberg, 2008; McGaghie et al., 2006). Debriefing is a crucial component of simulations, considered vital to optimizing student learning, and refers to the process by which instructors and students collaboratively examine the simulation scenario (generally including critique, correction and evaluation of the scenario and discussion of the experience) (Dreifuerst, 2009; Kable, Arthur, Levett-Jones, & Reid-Searl, 2013).

The educational benefits of simulations have been found across multiple forms including high-fidelity full-scale simulators, medium-fidelity computer based scenarios, and low-fidelity simulated patients, unfolding case studies, and peer-to-peer (Azzarello, & Wood, 2006; Daniels, Arefeh, Clark, Waller, Druzin, & Chueh, 2010; Durmaz, Dicle, Caken, & Cakir, 2012; El Tantawi, Abdelaziz, AbdelRaheem, & Mahrous, 2014; Hampl, Herbold, Schneider, & Sheeley,
The experiential nature of simulations is what allows the experience to be considered a highly successful educational strategy for enhancing learning across healthcare disciplines. Drawing on the experiential learning theories previously discussed, simulations embody a concrete experience, upon which knowledge can be constructed (personally and socially) by attaching meaning to the activity through reflection, conceptualization, and experimentation (Kolb, 1984; Torre et al., 2006; Piaget, 1972; Vygotsky, 1978). The simulations offer a safe and controlled environment for students to learn and advance their knowledge and skills within the zone of proximal development (Vygotsky, 1978).

### 2.2.2 Nutrition and Dietetics

Despite their wide use and demonstrated value in the education and training in other healthcare fields, simulations have been scarcely used in dietetics. Of the simulation studies that have been conducted, the majority contained a live interaction between students/interns and SPs.

Simulations involving simulated patients have been used in dietetics education and training in interdisciplinary and dietetics-specific courses. In the early 1980s, SP scenarios were used to teach dietetics students clinical interviewing skills and clinical nutrition in the United States (Carroll, Hain, Howell, Corsby, & Rombeau, 1983; Sutnick & Carroll, 1981). Carroll et al. (1983) evaluated the use of professional actors in videotaped interdisciplinary (medical and dietetics students) patient simulation sessions (first course offering in 1980: n=29, divided into five interdisciplinary teams, second course offering in 1981: n=34, split into eight interdisciplinary teams) during which the dietetics students practiced interviewing and clinical skills. The students perceived the simulation experience as an effective learning and teaching technique, and the authors concluded that patient simulations could be used to teach and evaluate
dietetics students’ interviewing and counselling skills. However, the evaluations were subjective and based on the students’ personal satisfaction. Objective evaluations by the faculty were unusable due to an inability to reach acceptable inter-rater reliability levels (Carroll et al., 1983).

More recent interdisciplinary and interprofessional studies show similar findings in that simulated patient scenarios are valuable tools for enhancing learning in dietetics education (D’Apice, O’Leary-Kelley, Bawel-Brinkley, Smith, Rogers, Sucher, & Mauldin, 2013; Gibbs, George, Barkley, & Meyer, 2015; Holthaus, Sergakis, Robrig, Wilcox, Thomas, McClerking, Legg, Clutter, & Nabikian-Nelms, 2015; Miles, Friary, Jackson, Sekula, Braakhuis, 2016). D’Apice et al (2013) incorporated interdisciplinary simulation training into an existing didactic dietetics educational program in the United States. This was followed by the administration of a students’ perception survey tool using a 6-point Likert scale (to gauge how receptive students were compared to traditional lab activities). This tool, as well as an interdisciplinary education perceptions survey tool (assessing students collaborative attitudes overall), was administered to 33 dietetics students. The surveys were analyzed using repeated sample t-tests and results showed that the perceptions of learning were significantly higher among students who participated in the simulations than those in the traditional lab activity (moderate to large effect sizes). Results showed that students perceived the simulations as a useful teaching strategy, which suggests that simulations can be used to train students from a variety of disciplines together in a safe and controlled learning environment. Furthermore, simulations could help to guarantee that dietetics students are obtaining training that is consistent with other members of the healthcare team, and allow them to acquire skills needed as an RD (D’Apice et al., 2013).

In additional recent interdisciplinary research, Miles and colleagues incorporated simulation-based training into a hospital environment to teach interprofessional clinical
reasoning regarding dysphagia to dietetics (n=11) and speech pathology (n=20) first year Masters students in New Zealand (Miles et al., 2016). In three interprofessional groups of 10, students participated in two half-day workshops that included orientation, partial-task skill learning, and three simulated clinical assessment scenarios with high-fidelity mannequins, confederates (researchers who participated in the study, in this case as simulated patients), and/or standardized patients (trained medical actors). The students completed a 10-question survey (Likert scale of 1-10, 1: totally not confident, 10: feeling very confident) before and after the workshops self-rating their confidence, preparedness, and knowledge, all of which increased significantly at p < .001 (total mean difference of 3.10 for all survey items). Feedback from the students was positive: 30 out of 31 agreed or strongly agreed that the training content was relevant and helpful. The students also completed a written 15-min clinical vignette (developed by clinical educators and field tested by experienced speech pathologists and dietitians) at 1 month prior to training (vignette one), immediately before the session (vignette two) and immediately following the session (vignette three). The vignettes were evaluated out of 20, with five clinical domains (interprofessional collaboration, client and family centered care, roles and responsibilities, clinical procedural tasks, and clinical reasoning) and scored from a 1-4 (1=minimal, 2=developing, 3=competent, and 4=mastery). The overall scores increased after the simulated experiences (p <.001), with the most significant difference seen between the first (Mean 11.48, SD (standard deviation) 2.36) and final vignette (Mean 14.07, SD 1.08, Z= -3.785, p < .001) and the greatest increase seen in clinical reasoning. The students self-reported an increase in confidence and hospital readiness, and improved their clinical reasoning and knowledge through the case-based vignettes (Miles et al., 2016).

Similarly, an upper-level medical nutrition therapy course at a United States university
incorporated a simulation scenario regarding medical nutrition therapy knowledge, and evaluated the effectiveness of the simulation experience at enhancing the learning of undergraduate nutrition students (Hsiao, Clark, Boothby, & Pajak, 2016). This study utilized a convenience sample of two sections of students in the upper-level medical nutrition therapy course. The first section of students was an experimental group (30 students) participating in an interprofessional simulation experience on dysphagia, including students from nutrition, nursing, and speech-language pathology. The second section of students, the control group (37 students), received a non-dynamic paper-based case study similar to the scenario of the dysphagia simulation. The same didactic instruction on dysphagia was provided for both groups. To measure knowledge on the medical nutrition therapy of dysphagia, a pre and post-test were administered to both groups, and a mixed between-within subjects analysis of variance was conducted to examine the effects of the interventions on knowledge of dysphagia (additional information on the type of pre/post test was not provided, such as if it was completed by students or evaluators). Improvement from the pre-test to the post-test was significantly greater for the experimental group (mean change = 1.7 questions) than for students in the control group given a case study (mean change = 0.3 questions) ($P = 0.002$, partial eta squared = 0.245). The results from this study suggest that nutrition students may benefit from incorporating simulation experiences into a medical nutrition therapy course to reinforce concepts, and promote the use of interprofessional simulation experiences with undergraduate nutrition students (Hsiao et al., 2016).

A study conducted in the United States aiming to analyze whether nutrition students participating in an interprofessional simulation (nursing, nutrition, and speech pathology) found this interprofessional simulation experience to be more effective compared to a simulation containing a single professional group (only nutrition students) (Pajak, Hsiao, Clark, & Boothby,
Both groups participated in the same simulation scenario, a debriefing session and completed the Simulation Effectiveness Tool-Modified (SET-M). This tool measured the students’ confidence and satisfaction following the simulation experience using a Likert scale. Independent t-tests and chi-square analysis were used to compare SET-M scores between the interprofessional group and nutrition students only group. Total SET-M scores between the groups were not significantly different ($P > 0.05$), but questions related to medication understanding and clinical decision making skills were significantly different ($P < 0.05$) (Pajak et al., 2016). A similar, more recent study, conducted at the same university, evaluated whether interprofessional simulations resulted in higher levels of satisfaction for undergraduate nutrition, nursing and speech-pathology students compared to a single profession simulation (nursing students only) (Smith, Hsiao, Clark, & Boothby, 2018). The single professional and the interprofessional groups each separately participated in a simulation, which involved caring for a patient with dysphagia. Following the simulation and debriefing, all students completed the Simulation Effectiveness Tool Modified (SET-M) and t-tests and chi-square analyses were conducted on the results. Total SET-M scores between the two groups were statistically significant ($P = 0.000$), with the interprofessional group scoring higher. Not all questions were considered statistically significant ($P < 0.05$), but those that were, indicated feelings of confidence, empowerment, and preparedness within the interprofessional group (Smith et al., 2018). These two studies demonstrate that interprofessional simulations may be used as an educational tool for nutrition students to enhance clinical knowledge, confidence and preparedness.

Research conducted by Gibbs and colleagues investigated whether multiple-patient simulations could be used to facilitate interprofessional communication between nursing and
graduate dietetics students, thereby improving nutrition care process skills (Gibbs et al., 2015). Dietetics students (16) enrolled in a Medical Nutrition Therapy course (graduate level) in the United States as part of their internship participated in three simulation sessions (two with high-fidelity mannequins and one with a nursing student acting as a simulated patient) followed by a mini debrief and a large class group discussion. The students had the option of completing the pre (6-item) and post (11-item) simulation online surveys (to evaluate their confidence and communication skills) and allowing their ADIME (nutrition care process: assessment, diagnosis, intervention, and monitor/evaluation) case studies for the simulation scenarios to be evaluated for the research study (using formative and summative evaluation checklists with 93% agreement between raters). The pre and post surveys for dietetics students showed that 15 out of 16 students stated the simulations enhanced their interprofessional communication skills, and predicted that the experience would help in future practice by increasing their ability and confidence in communication (n=8). However, not all items on the survey showed improvement after the simulations, as post survey means were lower than pre survey means for five out of the six questions; however, these differences did not reach statistical significance. After the debriefing and group discussion the accuracy of the ADIME notes (in comparison to the checklists) was improved from 53% to 77.5% (not statistically significant). Almost all of the nursing students (95% of n=39) who participated in the simulations with the dietetics students either agreed or strongly agreed that the simulation helped them to better understand the role of the registered dietitians (RDs), compared to 51.2% in the control group (significant at $P < .05$). However, nurses’ scores on the knowledge component decreased from pre to post test, 72.5% to 67.0% (not statistically significant), which the authors suggested could have been due to ceiling effects (initial relatively high scores may not leave much room for improvement) and another
explanation associated with ceiling effects is possible regression to the mean (Gibbs et al., 2015). This study demonstrates that simulations can provide an opportunity for dietetics students to practice clinical care and interacting with other healthcare professionals in a safe environment.

A recent study conducted in the United States conducted by Holthaus et al (2015) also evaluated the impact of interprofessional simulation experiences on dietetics students’ perceptions of communication, decision-making, healthcare professional roles, and self-efficacy. Undergraduate medical dietetics students and first-year dietetics interns were joined by students in nursing, medicine, physical therapy, respiration therapy, occupational therapy, and social work to participate in one two-and-a-half hour interprofessional simulation, followed by a debriefing session. The simulation sessions ran multiple times over three semesters, with 10-15 students in each session and one patient actor and one patient simulator (with a total of 610 interprofessional students and 11 faculty members). Over the three semesters, 70 dietetics students participated in the study by completing a pre- and post-simulation questionnaire based originally on IPE (interprofessional education) national standards, but then replaced by a modified Readiness for Interpersonal Learning Scale including perceptions of teamwork and collaboration, sense of professional identity, and perceptions of patient-centeredness on a 5-point Likert scale (strongly agree to strongly disagree). One week following the simulation, dietetics students had the option of also completing a written reflection on their experience (n=62). Two-tailed paired sample t-tests were used to determine differences between pre- and post-tests and the results showed statistically significant ($P < .05$) increases in students’ understanding of their own role and that of other healthcare professionals. Students demonstrated statistically significant ($P < .05$) increases in self-efficacy (indicating that the shared learning experience would allow them to be a more effective member of the healthcare team); increased ability to understand clinical
problems; increased enjoyment when working on teams; and increased confidence when caring for a ventilated patient. Qualitative analysis of the reflections indicated that the students found the simulation experience useful for enhancing respect and understanding between the various healthcare professionals, practicing effective communication skills, teamwork skills, self-efficacy, confidence, and decision-making (Holthaus et al., 2015).

In addition to interdisciplinary/interprofessional training, simulations have been used in dietetics exclusively to teach students, interns, and RDs how to perform various physical assessments, as learners often desire these skills, but lack the opportunity to gain them. Halasa Esper and colleagues incorporated nutrition focused physical assessment (body composition, anthropometric indices, indirect calorimetry, vital sign measurements, and respiratory system assessment) into clinical practice (two four-hour sessions) for first year students at a Coordinated Dietetics Program in the United States and administered a post-training survey (n=12) (Halasa Esper, Converse, Yacovone, & Pohle-Krauza, 2012). The students rated their interest in the physical assessments and their likelihood of using these techniques in future practice (1-least amount of interest/likelihood to 10-greatest amount of interest/likelihood) and results showed that all students ranked their interest at an “8” or greater and more than 90% of the students ranked their likelihood as “7” or greater. Implementing physical assessment training into existing dietetics programs may enhance nutrition assessment skills and may be useful in future practice, although more objective measures and long term outcomes are needed as this study focused exclusively on the students’ perceived subjective interest and likelihood of using the skills in the future (Halasa Esper et al., 2012).

Similarly, simulation-based training was incorporated into a hospital in the United States to teach RDs (n=6) and dietetics interns (n=6) more about enteral nutrition including placement
techniques, feeding equipment and problem solving for various case situations (Lewis, 2014). Interns and RDs received knowledge training with hands-on visual aids followed by practice sessions and competency assessments with a simulation doll. After session completion the RDs completed a written exam to evaluate their new enteral nutrition knowledge. When those that showed competency in the training sessions and passed the exam then provided appropriate care to 10 real patients, their scope of practice (SOP) was deemed to be advanced. Five out of the six RDs receiving this training desired and advanced their SOP. Furthermore, four out of the six dietetics interns were hired over other applicants based on this training (seen in employer survey feedback). This study demonstrated that simulation-based training may be beneficial for educating RDs and dietetics interns about enteral nutrition practices, although larger-scale studies are needed to confirm these findings (Lewis, 2014).

A study conducted at a dietetic internship program in the United States developed a standardized patient case, and an Objective Structured Clinical Examination (OSCE) simulation, with the goal of increasing interns’ competence and confidence performing skills included in the Nutrition Care Process (NCP) (Roberts, Mullins, Wesley, Roblyer, & Livingston, 2018). At the beginning of their dietetic internship program (following a two week clinical orientation), dietetic interns (n=12) completed the simulation and at the conclusion of their internship program were surveyed to rate their performance (1- unsuccessful or partially successful, 2-successful at a beginner level, or 3-successful at a level beyond expected for beginner) in six skills during clinical rotations. Interns ranked their confidence change in NCP performance using a five-point Likert scale (five being the highest score). All interns indicated their confidence with NCP increased (100% ranked 4 or 5 on five-point Likert scale), and interns self-rated competence in NCP-related skills (establish rapport, perform nutrition-focused physical exam,
implement appropriate nutrition interventions, communicate care plan using a patient-centered approach, etc.) at level 2 or 3. These results demonstrate that dietetic interns perceive standardized patient simulations enhance their confidence and NCP-related skills (Roberts et al., 2018).

A randomized intervention study conducted in the United States evaluated whether a clinical simulation would help increase nutrition students’ ability to perform the nutrition focused physical exam (NFPE) when screening for malnutrition (Ritter Spier, LaSalle, & Hollenbeck, 2018). Nutrition students (n=52) enrolled in a medical nutrition therapy course were randomized into two groups, a control (receiving theory and a video) and intervention group (theory, video and NFPE hands-on practice). Students were evaluated with a 51-item achieved/not achieved checklist that incorporated 6 NFPE domains, while performing the NFPE in a simulated clinical scenario (further information regarding the type of simulation was not provided). Students also completed a pre-and post-Likert Scale questionnaire evaluating their change in confidence. The results showed that the intervention group had higher performance mean score compared to the control group (28 vs 19.7; \( P = 0.000 \)) and students’ confidence scores increased from pre to post-test \( (P < 0.05) \) (Ritter Spier et al., 2018). A similar study, also conducted in the United States, evaluated the effectiveness of incorporating standardized patient simulation into nutrition students’ education and enhancing students’ knowledge and confidence related to malnutrition assessment (Estes-Doetsch, Glimore, Gregory, Ritchey, & Nahikian-Nelms, 2018). The nutrition students (n=39) attended a classroom lecture on malnutrition, then participated in a workshop that included small group sessions on NFPE, followed by practicing NFPE on a partner, then participating in simulation scenarios (applying NFPE and malnutrition diagnosis) using trained actors. Following the simulations the instructors provided feedback, and
the students completed pre and post surveys on their perceived knowledge of malnutrition diagnosis, and confidence in their ability to perform the NFPE. Paired t-test analyses were then conducted and students’ perceived knowledge and confidence scores significantly ($P < .001$) improved (except for functional assessment) following the simulation workshop, as well diagnostic accuracy of etiology increased by 18% (significance level not provided) from pre to post survey (Estes-Doetsch et al., 2018). The results from these studies demonstrate that simulation training with a malnutrition scenario may help increase nutrition students’ confidence and ability to perform NFPE.

Simulated patients have been used in dietetics education and training in an effort to enhance counselling and communication skills (Beshgetoor & Wade, 2007; Hampl et al., 1999; Henry et al., 2009; Gibson & Davidson, 2015). Beshgetoor and Wade (2007) assessed the feasibility of utilizing actors (non-scripted) as SPs for nutritional counselling sessions with dietetics students enrolled in a senior level community nutrition course in the United States and published a “best practices” paper describing their findings. Students enrolled in the fall semester were the control group (participating in peer to peer simulated sessions) and those in spring serving as the intervention group (actors as SPs). Prior to the simulated counselling sessions the dietetics students received descriptions of the patients, three-day food records, and previous nutritional care. The simulations took place in front of the class (who provided written feedback and strategies for improvement), and once the simulations were completed the dietetics student completed an evaluation survey on the experience, including their perceived effectiveness and value of the simulation when thinking about its application to future practice. When the researchers compared the results between intervention and control groups, they found a majority of students in the intervention group reported the simulations to be realistic, 79%, and effective,
73%, compared to 43% and 43% respectively in the control group. However, these findings were not statistically different, possibly due to the small sample size (exact number not given).

Students in the intervention group stated the actors provided an enjoyable experience and the experience was a “perfect” means of learning. Those in the control group stated that it was more challenging playing the patient than the RD and that while counselling the actors would have been more difficult, it would have been more realistic. Results demonstrate that using actors as SPs may be a feasible and more effective method for enhancing learning than peer-to-peer due to its more realistic nature (Beshgetoor & Wade, 2007).

Hampl and colleagues also evaluated students’ perceptions of the incorporation of a simulated patient interview as an educational tool for dietetics students’ (n=14) enrolled in an undergraduate nutrition counselling and communication class in the United States (Hampl et al., 1999). Throughout the semester the dietetics students interviewed and assessed real patients at a nearby medical centre as part of their coursework, then as a final evaluation, they participated in one 15-minute session with a SP to assess the nutritional needs and provide counsel. The SP and instructor would then provide feedback and constructive criticism to the student (the SP gave feedback on how she felt during the session, and the instructor gave feedback on specific counselling and assessing skills). The dietetics students had the option to complete a brief questionnaire after the session composed of open-ended questions regarding their simulation experience. Overall the students positively regarded the simulation scenarios, with one stating “I felt like it was a real situation- better than the hospital visits” (Hampl et al., 1999, p. 1095). They reported that they enjoyed learning in an environment that felt safe (i.e., they felt able to make mistakes), learned a lot from the feedback provided, felt comfortable, and believed that the simulation provided more in-depth education than counselling at the medical centre.
Furthermore, the SP session was used as a final evaluation for the instructors to objectively evaluate the undergraduate dietetics students. An 11-item checklist was developed containing specific actions the students should be taking in relation to the scenario (SP was a 17-year old pregnant female) such as asking about use of prenatal vitamins, however the scores were not used as a part of the research study. The study concluded that SP sessions may be a useful educational strategy for enhancing counselling and communication skills among dietetics students (Hampl et al., 1999).

Similarly, Henry and colleagues evaluated dietetics interns’ (n=10) perceptions of two nutrition-based simulated patient sessions (regarding diabetes and hypertension) designed to enhance their counselling skills in the United States (Henry et al., 2009). The SPs (n=4, first year graduate students in a family therapy program who had previous SP experience) received a two-hour training session regarding the case details, active listening strategies, and how to give helpful feedback. The simulated sessions ranged from 20-55 minutes (depending on the dietetics intern) and once completed the SP left the room to complete a feedback form, then returned to provide feedback to the dietetics intern based on the patients perspective and various counselling approaches. The program was qualitatively evaluated using focus groups with the dietetics interns two months after the simulation experiences. Results from the focus groups revealed that all participants perceived the simulations positively, stating it was a valuable learning experience upon which they gained confidence and awareness in counselling. The interns also stated that the SP feedback was relevant and the simulations provided a safe, yet realistic, atmosphere to explore counselling methods (Henry et al., 2009).

An observational study conducted by Gibson and Davidson (2015) in Australia evaluated the impact of simulations using simulated patients in the teaching of communication skills to
preclinical dietetics students (n=215). Data were collected from four cohorts of third-year dietetics students through OSCEs, which were developed by the academic staff and for which 30 marks pertained to communication skills. The students participated in two simulated patient interviews (with paid actors) two weeks apart, receiving feedback from the assessors and actor, and evaluated in both. Students were required to complete a guided reflection prior to the second simulation session (two weeks after the first) and a subgroup had the option of reviewing their videotaped session. The results showed an average mean improvement in scores of 2.5, SD 4.2, \( P < .001 \) comparing the first and second interview (no observed benefits for those who received their videos). The greatest improvements were seen in those with failing initial interview scores with an average mean improvement of 8.0 (SD 3.7, \( P < .001 \)) and borderline initial interview scores (5.5, SD 3.8, \( P < .001 \)). Interns with higher initial scores may not have seen much change between scores due to ceiling effects. Results demonstrate that dietetics interns’ communication skills may be enhanced through SP simulation training. While improvements in other skills may have occurred, these were not assessed in the study.

Finally, Schwartz and colleagues compared standardized patients (who had received general training and had previous SP experience) and real patients as experiential learning tools in the education and training of dietetics students (n=75) over two years (2011-2013) in a nutrition counselling course in the United States (Schwartz, Rothpletz-Pugila, Denmark, & Byham-Gray, 2015). As per course requirements, students were required to participate in two simulations with one patient. Students were randomly assigned to a simulation with real (n=33) or standardized (n=42) patients, and the simulations were videotaped. If a real patient did not show up, the dietetics students were assigned an SP, which accounting for the uneven group sizes. The students reviewed their videotapes and self-evaluated their communication and
behaviour change counselling skills, then met with their instructor to discuss their self-evaluation and the instructors’ evaluation (students counselling an SP also received immediate feedback from him/her). Two trained raters (4 hours of training by principle investigator) evaluated the videotapes (n=138) using a shortened version of the Calgary Cambridge Observation Guide (CCOG, 28 items, categories included “initiating the session,” “gathering information,” “providing structure to the consultation,” “building a relationship,” “closing the session,” scoring a “0” if skill was not achieved, “1” if skill needs improvement, and “2” if skill was carried out effectively). The videotapes were also evaluated using the Behaviour Change Counseling Index (BECCI, 11 items, measures counselling skills for promoting behaviour change, scoring a “0” for poor, “1” barely passing, “2” fair, “3” good, and “4” excellent). Results demonstrated a significantly greater mean score in the “gathering information” category in the simulated patient groups than in groups in which students interviewed real patients in the first session ($P = 0.020$). There were no other significant differences between the dietetics students counselling real patients and simulated patients in regards to the total change scores, total communication and behaviour change scores, using the CCOG and BECCI. Overall, the ratings were good to excellent in all categories of the CCOG and BECCI for both groups at both encounters. This study demonstrates that simulations using SPs may be an effective educational strategy for dietetics curricula regarding counselling and communication (Schwartz et al., 2015).

2.2.3 Limitations

Despite the limited amount of research on, and use of, simulations in dietetics, evidence thus far demonstrates the potential for simulation-based training as an effective and valuable educational tool. However, many of the reviewed studies contain similar, yet important limitations, such as small sample sizes (Beshgetoor & Wade, 2007; D’Apice et al, 2013; Estes-
Doetsch et al., 2018; Gibbs et al., 2015; Halasa Esper et al., 2012; Hampl et al., 1999; Hsiao et al., 2016; Henry et al., 2009; Lewis, 2014; Miles et al., 2016). In studies containing small sample sizes, the generalizability of the results are reduced and potentially important differences in the data may not reach statistical significance due to a lack of power (Field, 2013). Another limitation is that a few of the reviewed research studies were published in abstract form only (i.e., presented at a conference) and therefore did not provide detailed information, which makes it difficult to fully interpret results and the effectiveness of simulations at enhancing learning of dietetics students, interns, and RDs (D’Apice et al, 2013; Estes-Doetsch et al., 2018; Halasa Esper et al., 2012; Hsiao et al., 2016; Lewis, 2014; Pajak et al., 2016; Ritter Spier et al., 2018; Roberts et al., 2018; Smith et al., 2018; ). Yet another concern is that all the reviewed studies were conducted in countries outside of Canada, such as in the United States, New Zealand and Australia, potentially reducing the generalizability of the findings to dietetics education and training in Canada. Furthermore, the studies utilized a wide variety of outcome measures and tools due to the lack of a validated simulation evaluation tool in dietetics (D’Apice et al, 2013; Estes-Doetsch et al., 2018; Gibbs et al., 2015; Gibson & Davidson, 2015; Halasa Esper et al., 2012; Hampl et al., 1999; Hsiao et al., 2016; Henry et al., 2009; Holthaus et al, 2015; Lewis, 2014; Miles et al., 2016; Pajak et al., 2016; Ritter Spier et al., 2018; Roberts et al., 2018; Smith et al., 2018). The diversity among assessment tools and measures makes it difficult to both compare results between studies and understand the effectiveness of simulations in enhancing the learning and confidence of dietetics students. Finally, most studies were subjective in nature, evaluating students’ self-reported perceived learning and confidence, without evaluating objective learning (Beshgetoor & Wade, 2007; Carroll et al., 1983; D’Apice et al, 2013; Estes-Doetsch et al., 2018; Gibbs et al., 2015; Halasa Esper et al., 2012; Henry et al., 2009; Holthaus et
al, 2015; Miles et al., 2016; Pajak et al., 2016; Roberts et al., 2018; Smith et al., 2018; Sutnick & Carroll, 1981). There may be a variety of expectancies associated with participation in research that can threaten internal validity, such as demand characteristics (McCambridge, de Bruin, & Witton, 2012) whereby participants may self-report increases in learning and confidence because they are aware that the simulations are predicted to improve such outcomes. Social desirability bias can be a concern with self-reported data as participants may answer questions (in surveys, questionnaires, focus groups, etc.) in a manner that will be viewed favourably by other participants and researchers (Monette, Sullivan, & DeJong, 2013).

Although there are limited studies that have objectively measured learning outcomes associated with simulation experiences in the training and education of dietetic interns and nutrition students, the existing studies demonstrate that simulations may help to improve communication skills, assessment skills, and clinical reasoning and/or knowledge (Dietitians of Canada, 2018). A recent call to action has been put forth by the Academy of Nutrition and Dietetics for the inclusion of simulations in existing dietetics curricula and for rigorous research to be conducted to determine the effectiveness of simulation methodology in dietetics education (Thompson & Gutschall, 2015). Thus, the next steps in simulation research in dietetics should include more objective measures of learning and use one or more standardized tools. Ideally, students’ performance should be compared to national competencies designed to assess readiness to practice.
3.0 Rationale, Research Objectives, Questions, and Hypotheses

Rationale

Simulations have been shown to be a valid and useful educational technique in the training of future healthcare professionals. They are consistent with the tenets of high-impact educational practice and therefore confer several training and educational advantages (Kuh, 2008). These advantages include improving the quality of patient care and increasing students’ confidence in interacting with real patients in the future by allowing students to first practice their skills in a risk-free environment (Henry et al., 2009; Lundberg, 2008; Nelms & Safii, 2011). Communication and critical thinking skills may also be enhanced by simulation experiences. These skills are important for clinicians when engaging with patients, family members, and other healthcare professionals, and when making clinical decisions (Thompson & Gutschall, 2015). Incorporating simulations into dietetics education and training may allow students the opportunity to acquire communication and critical thinking skills and enhance their learning and confidence in assessment and counselling of patients. This is especially important considering the limited internships positions available and opportunities for experiential learning in university dietetics curricula (White & Beto, 2013).

Although studies have shown that students in various healthcare professions benefit from simulations, they are still novel in dietetics. As simulations have been widely researched and found to benefit learning in nursing, and since both dietetics and nursing are competency-based disciplines, it can be argued that simulations would be equally useful at enhancing learning in dietetics students (Thompson & Gutschall, 2015). Indeed, preliminary findings suggest that nutrition students positively receive simulations, and deem simulations as realistic, effective, and beneficial for enhancing competence and confidence as a clinician (Beshgetoor & Wade, 2007;
Hampl et al., 1999; Henry et al., 2009). However, more research (particularly using objective measures of learning) is needed to evaluate effectiveness of simulations in the training and education of future nutrition healthcare professionals. The present study used a mixed-methods approach that combined quantitative and qualitative analyses, and objective and subjective measures, to assess clinical simulations in dietetic education.

**Research Objectives**

The overall goal of this research was to evaluate the effectiveness of clinical simulations in enhancing the learning and confidence of undergraduate students in the Applied Human Nutrition program and graduate students in the Masters of Applied Nutrition program, and undergraduate students in the Theatre Studies program, at the University of Guelph in Ontario Canada.

**Research Questions**

In order to achieve this overall goal, the primary research questions asked about the impact of patient simulations on nutrition students’ self-reported and “other”- reported learning and confidence with respect to patient communication (both undergraduate and graduate students), physical assessment (undergraduate), and counselling (graduate) skills. The secondary research questions asked about the impact of patient simulations on theatre students’ learning and confidence with respect to improvisation and medical acting skills. Information about the subjective experience of participating in the simulations, and recommendations for improving learning was gathered for both nutrition and theatre students.

**Hypotheses**

With respect to the quantitative analyses, we hypothesized that participating in simulations would enhance the learning and confidence of students enrolled in NUTR*4120
(Applied Clinical Skills, a fourth year elective in Applied Human Nutrition program), FRAN*6720 (mandatory course in the Masters of Applied Nutrition program), and THST*3630 (Special Studies in Studio Practice, a third year elective in the Theatre Studies program).

Specifically, we hypothesized that graduate nutrition students (FRAN*6720) would gain skills and confidence in using various counselling skills while interacting with challenging patients. We also hypothesized that undergraduate nutrition students (NUTR*4120) would gain skills and confidence in communicating with, and performing physical assessments on, patients. Finally, we hypothesized that the theatre students (THST*3630) would gain medical acting and improvisation skills while acting as simulated patients.
4.0 Methods

4.1 Academic Programs and Courses

This study took place at the University of Guelph in Ontario, Canada, during the winter semesters of 2016 and 2017. The University of Guelph is a mid-size, comprehensive university in southwestern Ontario, Canada with approximately 30,000 students.

Data were collected from three different courses involving students enrolled in three academic programs. Courses included the elective undergraduate nutrition course Applied Clinical Skills, NUTR*4120 (part of the accredited (by Partnership for Dietetic Education and Practice- PDEP) Applied Human Nutrition program), the required graduate nutrition course Practicum in the Applied Human Nutrition II, FRAN*6720 (part of the accredited and combined practicum (coursework and supervised practice), Masters of Applied Nutrition program) and the elective undergraduate theatre course Special Studies in Studio Practice, THST*3630 (part of the Bachelor of Arts, Theatre Studies program).

The Applied Human Nutrition program is 4 years in length (8 semesters) comprising approximately 325 students around the time of this study and focuses on the social and biological aspects of human nutrition in relation to health maintenance and disease treatment and prevention (University of Guelph, 2016a). The Masters of Applied Nutrition (MAN) program lasts one year (three semesters) and was comprised of nine students during 2015-2016 and contained 15 during the 2016-2017 school year. The MAN program includes “advanced professional course work and competency-based practice experience” that meets the professional practice guidelines for becoming an RD (University of Guelph, 2016b, p.1/para no.1). The Theatre Studies program is a degree major option within the Bachelor of Arts and is four years in
length (eight semesters) comprising of approximately 90 students focusing on the “academic and practical applications of drama and theatre” (University of Guelph, 2016c, p1/para no.1.).

Data were collected in two phases: Phase 1 took place in winter 2016, and Phase 2 in winter 2017.

4.2 Phase 1

4.2.1 Recruitment and Eligibility

A total of 37 students enrolled in the three previously described courses: 23 in NUTR*4120 (Applied Clinical Skills), nine in FRAN*6720 (Practicum in the Applied Human Nutrition II) and five in THST*3630 (Special Studies in Studio Practice). Of these, 36 students (97.3%) participated in Phase 1 of the study. The sample sizes for each component of Phase 1 are outlined in Table 1. Students were recruited through presentations delivered by me (the Masters student graduate research assistant), at the beginning class during weeks 8-12. To be eligible for participation, the students had to be enrolled in one of the three courses during winter 2016. All study procedures were administered at the University of Guelph after the participants gave written, informed consent (see Appendix A). The first phase of the study was approved by the University of Guelph Research Ethics Board (REB# 15SE006).

Table 1. Phase 1 Study Analytic Sample, winter 2016

<table>
<thead>
<tr>
<th>Course</th>
<th>Enrolment</th>
<th>SET Tool*</th>
<th>Reflection</th>
<th>Focus Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRAN*6720</td>
<td>9 (8F/1M)</td>
<td>9 (8F/1M)</td>
<td>8 (7F/1M)</td>
<td>9 (8F/1M)</td>
</tr>
<tr>
<td>NUTR*4120</td>
<td>23 (23F)</td>
<td>22</td>
<td>21</td>
<td>8</td>
</tr>
<tr>
<td>THST*3630</td>
<td>5 (5F)</td>
<td>N/A</td>
<td>5</td>
<td>4</td>
</tr>
</tbody>
</table>

*Adapted Simulation Effectiveness Tool (Elfrink Cordi, Leighton, Ryan-Wenger, Doyle, & Ravert, 2012)
### 4.2.2 Phase 1 Simulations

Table 2. Phase 1 Study Timeline for NUTR*4120, FRAN*6720, and THST*3630 During 12-Week Winter 2016 Semester

<table>
<thead>
<tr>
<th>Week</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUTR*4120 (total of 4 Sims)</td>
<td></td>
<td></td>
<td></td>
<td>SIM: (SGA)</td>
<td></td>
<td></td>
<td>SIM: (DPN/Deh)</td>
<td></td>
<td>SIM: (Dys)</td>
<td>MSc student pres part 1</td>
<td>SIM: (AA)</td>
<td>MSc student pres part 2</td>
</tr>
<tr>
<td>FRAN*6720 (total of 3 Sims)</td>
<td></td>
<td></td>
<td>SIM: (Cancer, DMII, GERD)</td>
<td></td>
<td>SIM: (MS, CP, VD)</td>
<td></td>
<td></td>
<td></td>
<td>MSc student pres part 1</td>
<td>MSc student pres part 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>THST*3630 (total of 7 Sims)</td>
<td>Meeting with FRAN*6720 prof to prep for week 3 SIM</td>
<td></td>
<td>MA: Cancer, DMII, GERD</td>
<td>MA: CD, Cancer</td>
<td>MA: IBS, NASH/FL, H</td>
<td>MA: MS, CP, VD</td>
<td>MA: DMII, LI</td>
<td>Meeting with NUTR*4120 prof to prep for week 7 SIM</td>
<td>Meeting with NUTR*4120 prof to prep for week 9 SIM</td>
<td>Meeting with NUTR*4120 prof to prep for week 11 SIM</td>
<td>MA: CD</td>
<td></td>
</tr>
</tbody>
</table>

Legend:
- AA: abdominal assessment
- CD: crohn’s disease
- CP: chronic pancreatitis
- Deh: Dehydration
- Dys: Dysphagia
- DMII: diabetes mellitus II
- FL: fatty liver
- H: hypertension
- LI: lactose intolerance
- IBS: irritable bowel syndrome
- MA: medical acting
- MS: metabolic syndrome
- MSc student pres part 1: Introduces study and discusses student participation
- MSc student pres part 2: Collect signed consent forms, allow students to sign up for a focus group time slot, allow students to complete SET (NUTR*4120 and FRAN*6720)
- NASH: non-alcoholic steatohepatitis
- SGA: subjective global assessment
- SIM: simulation
- VD: vegan diet
Table 2 presents the structure of the undergraduate (NUTR*4120) and graduate (FRAN*6720) nutrition courses as well as the undergraduate theatre (THST*3630) course during Phase 1 of the study throughout the winter 2016 semester.

Throughout the 12-week winter semester in 2016, undergraduate nutrition and theatre students engaged in four simulations, consistent with a “concrete experience” in Kolb’s (1984) ELT. During these simulations, nutrition students practiced communicating with the simulated patients (SPs, theatre students) and conducting physical assessments. The physical assessments included a subjective global assessment (nutritional assessment tool used to identify nutrition-related complications and malnutrition), skin assessment (diabetic peripheral neuropathy, dehydration), dysphagia assessment (difficulty swallowing) and abdominal assessment. The SPs were endowed with various health conditions in these simulations, including Crohn’s disease, cancer, type 1 and 2 diabetes, lactose intolerance, and stroke. An example of a simulation scenario can be found in Appendix B. Consistent with the theatre and nutrition students’ changing zones of proximal development, the complexity of the scenarios increased as the semester progressed, with regards to personality characteristics of SPs, invasiveness of the physical assessment and, in some cases, the medical condition. During the first week, all the SPs were instructed to have a friendly and “neutral” personality (cooperative, friendly), while as the semester progressed the SPs were differentially endowed with various personality characteristics (e.g., being a talkative or quiet patient, possessing English as a second language, etc.).

Applied Clinical Skills was offered in a three-hour time block once each week, with simulations occurring on four out of the 12 weeks. The theatre students prepared for one scenario for each of the four simulation weeks, and repeated that scenario approximately six times on the simulation day, with different teams (seven groups of three, one group of two) of nutrition
students. The simulations lasted approximately 10-20 minutes and were held in classrooms and small meeting rooms with the use of tables, chairs, privacy screens, and other necessary equipment appropriate to that assessment (such as a tongue depressor, flashlight, and food and drinks with various textures and consistencies for the dysphagia assessment). On each simulation day, each nutrition student acted as the clinician in one scenario and observed two other classmates’ scenarios. The clinician interacted with the patient and conducted the physical assessment, while the observers completed an observer checklist form and provided additional comments and feedback, shown in Appendix F. After each simulation, the student clinicians completed a “first impressions” reflection (Appendix G) noting some initial thoughts on the simulation experience. The graduate teaching assistant (registered dietitian) observed the simulations to provide valuable clinical feedback. The simulations were also observed by me (graduate research assistant) to gather information on the implementation of the intervention and to provide feedback, as I am a former undergraduate student who has previously taken the course. At the conclusion of all simulations, the nutrition and theatre students, as well as the instructors (of both nutrition and theatre students), graduate teaching assistant and myself engaged in a group debriefing session to discuss the simulation experiences and to provide formative feedback to one another, consistent with “reflective observation” in Kolb’s ELT and social constructivism (Kolb, 1984; Vygotsky, 1978).

During the simulations in the graduate nutrition course, the MAN students practiced counselling the patients and testing various counselling theories, including motivational interviewing, social cognitive theory, solution focused therapy, the transtheoretical model, person-centered therapy, and decisional counselling. The SPs had various conditions in these simulations, including cancer, gastroesophageal reflux disease, irritable bowel syndrome, non-
alcoholic steatohepatitis/fatty liver, hypertension, metabolic syndrome, chronic pancreatitis and being a vegan. An example of a simulation scenario can be found in Appendix B. The scenarios were designed with attempts to remain relatively consistent (with regards to difficulty in terms of medical complexity) for all three simulations, but with distinct and different patient personality traits such as being tired, stressed, overwhelmed and uncooperative or unmotivated to change. The SPs also had a “secret,” such as lacking cooking skills and resistance to new recipes, that they were instructed not to reveal unless directly prompted by the clinician.

Practicum in Applied Human Nutrition II was also offered in a three-hour time block once each week, with simulations occurring on three out of the 12 weeks. The theatre students prepared for one scenario for each of the three simulation weeks, and repeated that scenario twice on the simulation day with different teams (four groups of two, one group of one) of nutrition students. The simulations lasted approximately 45 minutes and were held in classrooms and meeting rooms with the use of tables, chairs, and other necessary equipment appropriate to that specific assessment, such as a body weight scale and food models. Each graduate nutrition student acted as the clinician in one scenario and observed a second scenario on each simulation day. The clinician conducted the counselling session, while the observer completed an observer checklist form, shown in Appendix F. I (graduate research assistant) observed several of the simulations to gather information on the simulation intervention and to complete the observer checklist form (when the graduate nutrition student was in a group of one, lacking an observer). Immediately after each simulation the observer and SP provided feedback to the counsellor based on observer form and questions shown in Appendix F and H. At the conclusion of all simulations, the graduate nutrition and theatre students, as well as the instructor of the MAN
students and I, engaged in a brief group discussion to discuss how the simulations went and to provide general feedback to one another.

The theatre course, Special Studies in Studio Practice, convened twice a week, once for three hours on simulation days, and again later that same week for one hour to prepare for the following week’s simulation. During the one-hour meeting, the nutrition professor of the following week’s simulation course met with the theatre students to discuss the assigned scenarios (including assigned medical condition, personality trait), briefly teach the medical condition, and answer any questions students may have had regarding their character’s personality and/or medical condition. Theatre students were given more information than the nutrition students regarding their personality and the content of responses to particular anticipated questions and were instructed to do research on their own to help further develop their character, including physical and emotional presentations. The theatre students prepared for a total of seven simulation days during the winter 2016 semester, four with the undergraduate nutrition students, and three with the graduate nutrition students. An example of simulation scenarios can be found in Appendix B. For each simulation week, the theatre students only had to prepare for one scenario. However, that scenario was repeated twice with the graduate nutrition students and approximately six times with the undergraduate nutrition students. Nutrition and theatre students were not evaluated on their performances during the simulations as the focus was instead on personal growth with regards to communication, physical assessment, counselling, medical acting, and improvisation skills. Rather, students were evaluated on their reflections of their performance by the instructor of their respective course.

The simulation scenarios were designed to create a collaborative interactive learning experience by which meaning is attached to an experience through activities that include
dialogue, collaboration and cooperative learning, consistent with constructivist learning theory (Merriam et al., 2007; Torre et al., 2006).

4.2.3 Data Collection Procedures

After visiting the classrooms and discussing the study with the students during weeks 8 and 10 of the 12-week semester, I (graduate research assistant) returned to the classes in the following two weeks, 9 and 12, to collect signed consent forms from those wishing to participate. On the consent form students could select their desired level of participation pertaining to the three components of the study, described in the following section.

4.2.4 Measures

Phase 1 of the study included quantitative and qualitative data collection. Quantitative data were collected using an adapted version of the Simulation Effectiveness Tool (SET, Elfrink Cordi et al., 2012), and qualitative data via focus groups and written self-reflections. These are described below.

Simulation Effectiveness

We adapted the Simulation Effectiveness Tool (SET), a reliable and validated tool for measuring human patient simulation effectiveness in nursing (Elfrink Cordi et al., 2012). The original tool had 13 items, eight pertaining to learning and five to confidence. The two subscales had Cronbach’s alpha values of .87 (learning) and .88 (confidence). The overall 13-item tool had a Cronbach’s alpha value of .93. Because the original SET was designed to evaluate effectiveness of simulations in nursing students, we modified, eliminated, and added items to fit the dietetics context. Our adapted SET was an 11-item tool designed to measure whether the simulation experiences enhanced the nutrition students’ learning and confidence pertaining to their physical assessment, patient communication, and counselling skills. Subsequent to the
modifications, we beta-tested the adapted SET with five thesis-based graduate nutrition students (none from MAN program) and one faculty co-investigator. Some items were then further modified for greater clarity and to avoid repetitiveness. To maintain its psychometric integrity and to facilitate potential comparability across studies, we tried to keep the SET as close to its original, validated form as possible. The final SET used in Phase 1 of our study contained a total of 11 items. Eight of these pertained to learning and three to confidence for NUTR*4120, and seven for learning and four for confidence for FRAN*6720. Each item was rated on a 3-point ordinal scale, “Do not agree,” “Somewhat agree” or “Strongly agree.” The original and adapted SET tools used in this study are presented in Appendix C.

**Focus Groups**

To gather in-depth information on the simulation experiences and to contextualize the quantitative findings generated by the SET, focus groups were held for students in each of the three courses, either directly after the final class, in the case of the undergraduate nutrition course (NUTR*4120), or within the following week. Due to the varying class sizes, one focus group each was held for the theatre (n=4) and graduate nutrition students (n=9), and two for the undergraduate nutrition students (n=5, n=3). The focus groups were conducted using semi-structured interviews and were moderated by me (graduate research assistant). I was assisted by an undergraduate research assistant who took notes during the focus group with the theatre students (only available for this focus group due to scheduling conflicts) on nonverbal communication such as facial expressions and hand gestures, which were incorporated into the transcription. The duration of the focus groups ranged from 30-60 minutes and sessions were audio recorded with two devices, a laptop and digital audio recorder, in case of technical difficulties. The focus groups were held during the eleventh and twelfth weeks of the semester in
classrooms and seminar rooms at the University of Guelph. The questions were grounded in constructivist learning theory (e.g., “Did your simulation experiences help you to understand the classroom information better?”; followed by: “What course material do you feel benefited most from the simulation experiences in regards to enhancing your understanding?”; “Are there any aspects of the course that you think would have benefitted from additional SP interaction to enhance your understanding of the material?”) and the SET (e.g., “Did your interaction with the SPs increase your confidence in assessing the overall nutritional needs of real patients?”; followed by: “If so, did your confidence level change as the semester progressed?, If no, why?”). We added a question regarding students feeling nervous or anxious during simulations (e.g., “Were you nervous/anxious when first interacting with the SPs?” followed by: “If so, did your anxiety level change as the semester progressed?” “If no, what do you think helped you to avoid having those feelings?”). That question was used in a previous study evaluating computer simulation experiences for dietetics interns (Turner, Evers, Wood, Lehman, & Peck, 2000). The focus group guides are presented in Appendix D.

**Written Reflection Assignment**

To further capture students’ impressions of their simulation experiences, written self-reflections were required of all students as part of their course expectations. However, we collected for research purposes reflections only from those who consented to participate in this aspect of the study (n=34). The undergraduate nutrition students completed four mini-reflections after each simulation and a meta-reflection at the end of the semester reflecting on their simulation experiences as a whole in which they highlighted their strengths and areas for improvement as regards patient communication and physical assessment. At the end of the semester, following the simulations, the graduate nutrition students were instructed to reflect on
their simulation experiences and how these may have influenced their personal counselling style. Furthermore, the graduate nutrition students were instructed to discuss various counselling theories that they utilized in their sessions. The theatre students were instructed for their course to write a paper at the beginning of the semester discussing their expectation of the simulations, and a reflection paper at the conclusion of the semester regarding the realism of the simulations, the challenges they faced, and what they learned in the process. The reflection assignments allow the students an opportunity to conceptualize the simulation experiences and think about how to apply their new knowledge and skills to future situations, consistent with “abstract conceptualization” and “active experimentation” from Kolb’s (1984) ELT. The reflection assignments were consistent with personal constructivism as the students reflected on the simulation experiences and attached meaning using their previous knowledge (Piaget, 1972).

For our research study, the meta-reflection for the undergraduate nutrition students (NUTR*4120, n=21), personal counselling style paper for the graduate nutrition students (FRAN*6720, n=8), and final reflection assignment for the theatre students (THST*3630, n=5) were collected from those who consented. The participants emailed their completed reflection to me, the graduate research assistant. See Appendix E for an outline of the reflection assignments.

4.2.5 Data Analysis

Quantitative and qualitative analytics were used to analyze findings from Phase 1 of this study. To analyze the quantitative data from the adapted SET, we ran frequency statistics using Excel (to organize data) and SPSS 23 (to analyze data), Statistical Package for the Social Sciences (2015). The frequency of the responses selected for each item on the tool was analyzed for each course. Cronbach’s alpha score was also calculated with the combined SETs from both phases using SPSS 24 (2016).
A thematic analysis was conducted on the qualitative data collected from the focus groups and written self-reflections, following the six stages recommended by Braun and Clarke (2006) after all qualitative data were collected from both Phase 1 and 2. Further descriptions of this analysis can be found in 4.3.5 Data Analysis.

4.3 Phase 2

Phase 1 of the study collected data on students’ self-reported perceived learning, confidence, and skill progression. To provide a more objective measure of student learning Phase 2 utilized the Integrated Competencies for Dietetic Education and Practice (Partnership for Dietetic Education and Practice, 2013) to evaluate and compare the nutrition students’ performance during their first and final simulation of the winter 2017 semester. The SET was also used to collect data from the undergraduate and graduate nutrition students and a focus group was conducted for graduate students in Phase 2.

4.3.1 Recruitment and Eligibility

A total of 32 students participated in Phase 2 of the research study, 17 enrolled in NUTR*4120 (Applied Clinical Skills) and 15 enrolled in FRAN*6720 (Practicum in the Applied Human Nutrition II). Of these, 32 students (100%) participated in Phase 2 of the study. The sample sizes of each component of Phase 2 are outlined in Table 3. Students were recruited through presentations delivered by me, the graduate research assistant, at the beginning of their classes during weeks 6-12. To be eligible for participation, the students had to be enrolled in one of the two courses during winter 2017. All study procedures were administered at the University of Guelph after the participants gave written, informed consent. The second phase of the study was approved by the University of Guelph Research Ethics Board (REB# 15SE006).

Table 3. Phase 2 Study Analytic Sample, winter 2017

<table>
<thead>
<tr>
<th>Course</th>
<th>Enrolment</th>
<th>SET Tool*</th>
<th>Competencies Tool</th>
<th>Focus Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Course Code</td>
<td>Credit 1</td>
<td>Credit 2</td>
<td>Credit 3</td>
<td>Credit 4</td>
</tr>
<tr>
<td>-------------</td>
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<td>----------</td>
</tr>
<tr>
<td>FRAN*6720</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>NUTR*4120</td>
<td>17</td>
<td>17</td>
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<td>N/A</td>
</tr>
</tbody>
</table>

*Adapted Simulation Effectiveness Tool (Elfrink Cordi et al., 2012)
### Table 4. Phase 2 Study Timeline for NUTR*4120, FRAN*6720, and THST*3630 During 12-Week Winter 2017 Semester

<table>
<thead>
<tr>
<th>Week</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUTR*4120</td>
<td></td>
<td></td>
<td></td>
<td>SIM: (SGA)</td>
<td>SIM: (DPN/Deh)</td>
<td>SIM: (Dys)</td>
<td>SIM: (AA) MSc student pres part 1</td>
<td>SIM: (SGA) MSc student pres part 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRAN*6720</td>
<td>SIM: (Cancer, DMII, GERD)</td>
<td>SIM: (IBS, NASH, H)</td>
<td>SIM: (MS, CP, VD) MSc student pres part 1</td>
<td>MSc student pres part 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>THST*3630</td>
<td>Meeting with FRAN*6720 prof to prep for week 3 SIM</td>
<td>MA: Cancer, DMII, GERD Meeting with NUTR*4120 prof to prep for week 4 SIM</td>
<td>MA: CD, Cancer Meeting with FRAN*6720 prof to prep for week 5 and 6 SIM</td>
<td>MA: IBS, NASH, H</td>
<td>MA: MS, CP, VD Meeting with NUTR*4120 prof to prep for week 7 SIM</td>
<td>MA: DMI, DMII, LI Meeting with NUTR*4120 prof to prep for week 9 SIM</td>
<td>MA: Stroke, Cancer Meeting with NUTR*4120 prof to prep for week 11 SIM</td>
<td>MA: CD Meeting with NUTR*4120 prof to prep for week 12 SIM</td>
<td>MA: CD, Cancer</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Legend**
- AA: abdominal assessment
- CD: Crohn’s disease
- CP: chronic pancreatitis
- Deh: Dehydration
- Dys: Dysphagia
- DMII: diabetes mellitus II
- DMIII: diabetes mellitus III
- H: hypertension
- LI: lactose intolerance
- IBS: irritable bowel syndrome
- MA: medical acting
- MS: metabolic syndrome
- MSc student pres part 1: Introduces study and discusses student participation
- MSc student pres part 2: Collect signed consent forms, allow students to sign up for a focus group time slot, allow students to complete SET (NUTR*4120 and FRAN*6720)
- NASH: non-alcoholic steatohepatitis
- SGA: subjective global assessment
- SIM: simulation
- VD: vegan diet
Table 4 presents the structure of the undergraduate (NUTR*4120) and graduate (FRAN*6720) nutrition courses as well as the undergraduate theatre (THST*3630) course during Phase 2 of the study throughout the winter 2017 semester. The structure of these three courses is similar to that of the courses in the winter 2016 semester, which was previously described. The differences include: MSc student presented part 1 to undergraduate nutrition students (NUTR*4120) in week 11 rather than week 10; MSc student presented part 1 and 2 to graduate nutrition students (FRAN*6720) in weeks 6 and 7 rather than 8 and 9; FL (fatty liver) was removed from week 5 scenarios for undergraduate theatre students (THST*3630) to act in graduate nutrition students’ simulations; MSc student did not present part 1 and 2 to undergraduate theatre students as data were not collected from theatre students in Phase 2; and there was an additional week of simulations (week 12: repeating week 4 of Subjective Global Assessment to collect Time 2 of Competencies Tool) for the undergraduate nutrition students, resulting in an additional week of preparation (week 11) and medical acting (week 12) for the theatre students.

4.3.3 Data Collection Procedures

After visiting the classrooms and discussing the study with the students during weeks 6 and 11, I (graduate research assistant) returned to the classes within following two weeks, 7 and 12, to collect signed consent forms from those wishing to participate. On the consent form (see Appendix A) the nutrition students had the option of selecting their desired level of participation pertaining to the various components of the study, described below.

4.3.4 Measures
Phase 2 of the study included quantitative and qualitative data collection. Quantitative data were collected using the SET, Competencies Tool, and qualitative data via a focus group. These are described below.

**Simulation Effectiveness**

The adapted SET, previously described in section 4.2.4, was used to collect data from the undergraduate (NUTR*4120) graduate nutrition students (FRAN*6720) in Phase 2. The original and adapted SET tools used in this study, are presented in Appendix C.

**Competencies Tool**

To measure and collect objective data regarding student learning, Phase 2 utilized the Integrated Competencies for Dietetic Education and Practice to evaluate and compare the nutrition students (undergraduate and graduate) during their first and final simulation (Partnership for Dietetic Education and Practice, 2013). These competencies are used in combined practicum Masters programs and internships for professors and preceptors to evaluate dietetics students/interns on their mastery of skills required for professional practice. Competency items from the original Integrated Competencies for Dietetic Education and Practice document were selected based on relevance to physical assessments and communication for the undergraduate Applied Clinical Skills course and counselling and communication in the graduate Practicum in Applied Human Nutrition II course, establishing two separate evaluation forms (presented in Appendix I).

Prior to Phase 2 data collection, the Competencies Tool was edited and finalized, used during a “calibration scenario” as a training tool for evaluators. During this meeting, two MSc students in the Family Relations and Applied Nutrition programs created a mock nutritional assessment simulation scenario to which evaluators were blinded. The scenario was designed to be between
a registered dietitian (acted by MSc student and registered dietitian) and a patient (acted by MSc student) regarding low iron levels. All six evaluators (MSc student in Family Relations and Applied Nutrition; MSc student in Family Relations and Applied Nutrition and Registered Dietitian; Faculty member in Family Relations and Applied Nutrition Department and co-investigator; Faculty member in Family Relations and Applied Nutrition, principle investigator, and Registered Dietitian; MAN graduate and Registered Dietitian; MAN program coordinator) and a back-up evaluator, viewed the 15-minute simulated scenario behind a two-way mirror in real time, and completed the Competencies Tool created for the FRAN*6720 students (as seen in Appendix I), as it is longer and more inclusive. Following the simulation was a debrief discussion to assure items were similarly scored, as well as discussed appropriate tool amendments prior to data collection.

**Focus Groups**

To gather in-depth information on the simulation experiences of the graduate nutrition students and to contextualize the quantitative findings generated by the SET and competencies tool, two focus groups were held. The focus groups were conducted using a semi-structured interview format moderated by me, the graduate research assistant. The duration of the focus groups was approximately 45 minutes and each session was audio recorded with a laptop and digital audio recorder. The focus groups were held during the 8th and 10th week of the semester in a seminar room at the University of Guelph. The same questions used in Phase 1 were used in Phase 2; these were previously described in section 4.2.4, and are presented in Appendix D.

**4.3.5 Data Analysis**

Quantitative analytics were used to analyze findings from Phase 2 of this study, using Excel and SPSS (version 24, Armonk, New York, 2016). To analyze the quantitative data from
the adapted SET, we ran frequency statistics. A Cronbach’s alpha score (most common measure
of internal consistency) was calculated for the undergraduate and graduate nutrition students
with the combined SETs from Phases 1 and 2 using SPSS 24 (2016). A nonparametric
independent t-test (Mann-Whitney U test) was used to compare data between Phases 1 and 2.
Matched pair t-tests were used to analyze and compare the initial and final Competencies Tool.
Normality testing (Shapiro Wilk) was conducted on the Time 1 and Time 2 data from the
Competencies Tool. ANOVA was used to compare scores of the Competencies Tool between
evaluators and scenarios for undergraduate students, and evaluators only for graduate students
(scenarios were inconsistent between Time 1 and 2 for graduate students). Post hoc analyses
were used to evaluate significant differences found between evaluators scoring of the
Competencies Tool. Note that a performance indicator (3.01ee) was collected on the
Competencies Tool during Phase 2 as part of the 21 nutrition care performance indicators for the
graduate students, but was removed from analyses as this competency was not included in any
scenario. Therefore, 20 nutrition care competencies were analyzed for the graduate students (as
indicated in Appendix I).

A thematic analysis was conducted on the qualitative data collected from the written reflections gathered in Phase 1 and
focus groups conducted in Phases 1 and 2, using thematic analysis guidelines (Braun & Clarke, 2006; Braun & Clarke, 2013). During the first stage of thematic analysis, I (graduate student research assistant) familiarized myself with the data by transcribing the focus group data and
reading through the transcriptions and reflections several times. The second stage entailed coding
the data relevant to the research questions, using NVivo qualitative data analysis software for
management of data and analyses (version 11, QSR International, 2016). Approximately 400
lines of text were coded from written reflections and focus groups in the initial coding phase.
Focus group transcripts and written reflections were combined for analyses due to strongly overlapping codes that emerged during the second stage. The third stage involved identifying emerging patterns among the codes, and organizing these into candidate themes and subthemes. The initial codes were originally organized into four overarching themes (Learning, Confidence, Satisfaction with Experience, Ways to Improve Course). The Learning theme contained two subthemes. The first of these, Skills Learned, contained Patient Communication (Verbal and Nonverbal), and Nutrition Assessment (Time Management, Gathering Information, Critical Thinking, Professionalism), and Aided in Learning (Realism, Preparation, Observing, Debriefing, Reflection). In the fourth stage, themes were reviewed and refined by me, the graduate student research assistant, and by my co-advisors, merging some themes together and deleting others when necessary. The original four themes became two, Simulations are Valuable, and Facilitators and Barriers Impacting Value, each containing several subthemes (see Figure 2). Themes were defined and named in the fifth stage by me and my co-advisors, and a thematic map was produced and refined (see Figure 2). Results were reported in the final and sixth phase (Braun & Clarke, 2006; Braun & Clarke, 2013).
5.0 Results

The overall goal of this study was to evaluate the effectiveness of simulations in enhancing the competence, learning and confidence of undergraduate and graduate nutrition students. A mixed-methods approach was used. The quantitative results from statistical analysis of the Simulation Effectiveness Tool (SET) and Competencies Tool will be presented first, followed by the qualitative results from the thematic analysis of focus group data and written reflections.

5.1 Quantitative Findings

5.1.1 Simulation Effectiveness for Undergraduate Students

The reliability of the Simulation Effectiveness Tool (SET) was determined using the Cronbach’s alpha internal consistency value calculated through SPSS. The Cronbach’s alpha for the undergraduate students was 0.483 (Phase 1 and 2 combined).

Table 5 outlines the results from the SET in Phase 1 and 2 (W16 and W17 semesters, respectively) for the undergraduate nutrition students enrolled in the Applied Clinical Skills course. With all items combined, students selected “do not agree” 0.41% and 0%, “somewhat agree” 11.16% and 3.74%, and “strongly agree” 88.4% and 96.3% of the time in Phase 1 and Phase 2, respectively, with Phase 2 indicating higher levels of perceived simulation value (fewer “do not agree” and “somewhat agree” responses and more “strongly agree”). There was a statistically significant difference for all items between Phase 1 and Phase 2 \((P = 0.031)\).

With respect to the confidence items, students selected “do not agree” 0% and 0%, “somewhat agree” 18.20% and 7.80%, and “strongly agree” 81.8% and 92.2% of the time in Phase 1 and 2, respectively, with students in Phase 2 indicating higher levels of perceived simulation value (fewer “somewhat agree” responses and more “strongly agree”). However, the
difference between the Phase 1 and 2 responses related to confidence items was not significantly different \( (P = 0.319) \).

For the learning items, students selected “do not agree” 0.57% and 0%, “somewhat agree” 8.52% and 2.21%, and “strongly agree” 90.9% and 97.8% of the time in Phase 1 and 2, respectively, with Phase 2 indicating higher levels of perceived simulation value (fewer “do not agree” and “somewhat agree” responses and more “strongly agree”). The difference between the Phase 1 and 2 responses pertaining to learning items was marginally significant \( (P = 0.055) \).

The learning items category can be subdivided into “Skill Development,” “Learning of Clinical Conditions” and “Value of Observing and Debriefing” items. For the skill development items, the students selected “do not agree” 0% and 0%, “somewhat agree” 3% and 0%, and “strongly agree” 97% and 100% of the time in Phase 1 and 2, respectively, with Phase 2 indicating higher levels of perceived simulation value (fewer “somewhat agree” responses and more “strongly agree”). The difference between the Phase 1 and 2 responses pertaining to skill development items was not significantly different \( (P = 0.644) \). In the clinical conditions section, the students selected “do not agree” 0% and 0%, “somewhat agree” 13.6% and 3.9%, and “strongly agree” 86.4% and 96.1% of the time in Phase 1 and 2, respectively, with Phase 2 indicating higher levels of perceived simulation value (fewer “somewhat agree” responses and more “strongly agree”). The difference between the Phase 1 and 2 responses related to clinical conditions items was not significantly different \( (P = 0.190) \). With respect to the perceived value of observing and debriefing, the students selected “do not agree” 2.3% and 0%, “somewhat agree” 9.1% and 2.9%, and “strongly agree” 88.6% and 97.1% of the time in Phase 1 and 2, respectively, with Phase 2 indicated higher levels of perceived simulation value (fewer “do not agree” and “somewhat agree” responses and more “strongly agree”). The difference between the
Phase 1 and 2 responses pertaining to the perceived value of observing and debriefing items was not significantly different ($P = 0.377$).
Table 5. Undergraduate Nutrition Students’ Responses on the Simulation Effectiveness Tool: Phase 1 (2016) and 2 (2017)

<table>
<thead>
<tr>
<th></th>
<th>Do Not Agree</th>
<th>Somewhat Agree</th>
<th>Strongly Agree</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Both phases</td>
<td>2016</td>
<td>2017</td>
<td>% Change</td>
</tr>
<tr>
<td>All Items</td>
<td>All Items</td>
<td>0.23%</td>
<td>0.41%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Confidence Items</td>
<td>Confidence Items</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>I feel better prepared to physically</td>
<td>I feel better prepared to physically assess real patients</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>I feel more confident in my clinical</td>
<td>I feel more confident in my clinical decision-making skills</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>I am more confident in my ability to</td>
<td>I am more confident in my ability to comprehensively assess the nutritional status of real patients</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Learning Items</td>
<td>Learning Items</td>
<td>0.32%</td>
<td>0.57%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Skill Development</td>
<td>Skill Development</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>The simulations helped me to think</td>
<td>The simulations helped me to think critically about practitioner-patient interactions</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>My physical assessment skills</td>
<td>My physical assessment skills improved</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>My patient communication skills</td>
<td>My patient communication skills improved</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Learning of Clinical Conditions</td>
<td>Learning of Clinical Conditions</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>I developed a better understanding</td>
<td>I developed a better understanding of the conditions featured in the simulations</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>of the conditions featured in the</td>
<td>I developed a better understanding of the physical signs and/or symptoms of the conditions featured in the simulations</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>simulations</td>
<td>Completing the simulations helped me understand the classroom information better</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Value of Observing/Debriefing</td>
<td>Value of Observing/Debriefing</td>
<td>1.28%</td>
<td>2.30%</td>
<td>0.00%</td>
</tr>
<tr>
<td>I learned as much from observing</td>
<td>I learned as much from observing my peers as I did when I was interacting with the simulated patients</td>
<td>2.56%</td>
<td>4.50%</td>
<td>0.00%</td>
</tr>
<tr>
<td>my peers as I did when I was</td>
<td>Debriefing and group discussions were valuable</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>interacting with the simulated</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5.1.2 Simulation Effectiveness for Graduate Students

The reliability of the Simulation Effectiveness Tool was determined using the Cronbach’s alpha internal consistency value calculated through SPSS. The Cronbach’s alpha value was 0.917 for the graduate students (Phase 1 and 2 combined).

Table 6 outlines the detailed results from the SET in Phase 1 and 2 (W16 and W17 semesters) for the graduate nutrition students enrolled in the Practicum in Applied Human Nutrition II course. With all items combined, students selected “do not agree” 32.32% and 2.42%, “somewhat agree” 29.29% and 35.76%, and “strongly agree” 38.39% and 61.82% of the time in Phase 1 and Phase 2, respectively, with Phase 2 indicating higher levels of perceived simulation value (fewer “do not agree” responses and more “somewhat agree” and “strongly agree”). The difference between the Phase 1 and 2 responses pertaining to all items was not significant ($P = 0.064$).

With regard to the confidence items, students selected “do not agree” 38.9% and 5%, “somewhat agree” 22.2% and 36.7%, and “strongly agree” 38.9% and 58.2% of the time in Phase 1 and 2, respectively, with Phase 2 indicating higher levels of perceived simulation value (fewer “do not agree” responses and more “somewhat agree” and “strongly agree”). The difference between the Phase 1 and 2 responses related to confidence items was not significantly different ($P = 0.155$).

With respect to the learning items, students selected “do not agree” 28.6% and 0.97%, “somewhat agree” 33.3% and 35.2%, and “strongly agree” 38.1% and 63.8% of the time in Phase 1 and 2, respectively, with Phase 2 indicating higher levels of perceived simulation value (fewer “do not agree” responses and more “somewhat agree” and “strongly agree”). There was a
statistically significant difference between learning items comparing Phase 1 and Phase 2 ($P = 0.041$).

Similar to the undergraduate nutrition students, the learning items category was further subdivided into “Skill Development,” “Learning of Clinical Conditions” and “Value of Observing and Debriefing” items. On the skill development items, the students selected “do not agree” 18.5% and 0%, “somewhat agree” 37% and 26.7%, and “strongly agree” 44.4% and 73.3% of the time in Phase 1 and 2, respectively, with Phase 2 indicating higher levels of perceived simulation value (less “do not agree” and “somewhat agree” responses and more “strongly agree”). The difference between the Phase 1 and 2 responses pertaining to skill development was not significantly different ($P = 0.138$). For the clinical conditions section, the students selected “do not agree” 38.9% and 3.3%, “somewhat agree” 22.2% and 43.3%, and “strongly agree” 38.9% and 53.3% of the time in Phase 1 and 2, respectively, with Phase 2 indicating higher levels of perceived simulation value (fewer “do not agree” responses and more “somewhat agree” and “strongly agree”). The difference between the Phase 1 and 2 responses pertaining to clinical conditions was not significantly different ($P = 0.155$). For the perceived value of observing and debriefing, the students selected “do not agree” 33.3% and 0%, “somewhat agree” 38.9% and 40%, and “strongly agree” 27.8% and 60% of the time in Phase 1 and 2, respectively, with Phase 2 indicating higher levels of perceived simulation value (fewer “do not agree” responses and more “somewhat agree” and “strongly agree”). There was a statistically significant difference between the perceived value of observing and debriefing items between Phase 1 and Phase 2 ($P = 0.018$).
<table>
<thead>
<tr>
<th>Table 6. Graduate Nutrition Students’ Responses on the Simulation Effectiveness Tool: Phase 1 (2016) and 2 (2017)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>All Items</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>All Items</td>
</tr>
<tr>
<td><strong>Confidence Items</strong></td>
</tr>
<tr>
<td>I feel better prepared to counsel challenging patients</td>
</tr>
<tr>
<td>I feel more confident in my decision-making skills pertaining to developing a client education or support plan following the simulation</td>
</tr>
<tr>
<td>The counseling sessions have increased my confidence in my ability to assess the overall nutritional needs of real patients</td>
</tr>
<tr>
<td>I feel confident that I will be able to obtain and interpret relevant assessment data from real patients</td>
</tr>
<tr>
<td><strong>Learning Items</strong></td>
</tr>
<tr>
<td>The simulations helped me to think critically about practitioner-patient interactions</td>
</tr>
<tr>
<td>I developed a better understanding of how to obtain assessment data from patients featured in the simulations</td>
</tr>
<tr>
<td>My counselling skills improved</td>
</tr>
<tr>
<td><strong>Learning of Clinical Conditions</strong></td>
</tr>
<tr>
<td>I developed a better understanding of the conditions featured in the simulations</td>
</tr>
<tr>
<td>I have a better understanding of how to better apply counselling theories</td>
</tr>
<tr>
<td><strong>Value of Observing/Debriefing</strong></td>
</tr>
<tr>
<td>I learned as much from observing my peers as I did when I was interacting with the simulated patients</td>
</tr>
<tr>
<td>Debriefing and group discussions were valuable</td>
</tr>
</tbody>
</table>
5.1.3 Undergraduate Students’ Competency Development

Non-parametric normality testing was conducted (Shapiro Wilk was used due to having less than 2000 observations); all p values were greater than 0.05 (Communication Time 1: 0.682; Communication Time 2: 0.370; Nutrition Care Time 1: 0.089; Nutrition Care Time 2: 0.200) indicating normal distribution. This allowed matched pair t-tests to be used, as normality is an assumption of that test.

There were no significant differences between mean PI change scores across the different malnutrition screening scenarios between Time 1 and Time 2 (communication PI: $F(2, 12) = 1.295, P = 0.309$; nutrition care PI: $F(2, 12) = 0.165, P = 0.850$), indicating that the complexity of the scenarios did not differ. There were no significant differences between evaluators’ change scores for communication PIs ($F(3, 11) = 2.629, P = 0.103$). Change scores for nutrition care PIs differed between evaluators ($F(3, 11) = 5.375, P = 0.016$).

Table 7 outlines the detailed results from Time 1 and Time 2 of the Competencies Tool in Phase 2 (W17 semester) for the undergraduate nutrition students enrolled in the Applied Clinical Skills course. Means and standard deviations of each performance indicator are displayed, as well as the grand means of both categories of indicators; communication and collaboration ($P < .001$), and nutrition care ($P < .001$). Students’ scores of competence in nutrition related to physical assessment, education, and communication skills (all PIs) improved by 46.9%.
Table 7. Performance Indicators\textsuperscript{a} and Scores\textsuperscript{b} for n = 15 Pairs of Undergraduate Students At Time 1 and Time 2 (mean ± SD)

<table>
<thead>
<tr>
<th>Communication and Collaboration Performance Indicators</th>
<th>Time 1 scores</th>
<th>Time 2 scores</th>
<th>Change (Time 2-Time 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.01d Use appropriate communication technique(s)</td>
<td>2.13±0.640</td>
<td>3.00±0.00</td>
<td>0.867±0.640</td>
</tr>
<tr>
<td>2.01e Demonstrate knowledge of medical and dietetics-related terminology</td>
<td>1.92±0.277</td>
<td>3.00±0.00</td>
<td>1.08±0.277</td>
</tr>
<tr>
<td>2.01g Use appropriate terminology</td>
<td>1.54±0.519</td>
<td>2.85±0.376</td>
<td>1.31±0.630</td>
</tr>
<tr>
<td>2.03b Speak clearly and concisely in a manner responsive to the need(s) of the listener(s)</td>
<td>1.93±0.704</td>
<td>2.73±0.458</td>
<td>0.800±0.676</td>
</tr>
<tr>
<td>2.03d Use appropriate tone of voice and body language</td>
<td>2.00±0.535</td>
<td>2.73±0.458</td>
<td>0.733±0.594</td>
</tr>
<tr>
<td>2.03e Recognize and respond appropriately to non-verbal communication</td>
<td>1.92±0.669</td>
<td>3.00±0.00</td>
<td>1.08±0.669</td>
</tr>
<tr>
<td>2.04b Utilize active listening</td>
<td>2.00±0.655</td>
<td>2.87±0.352</td>
<td>0.867±0.743</td>
</tr>
<tr>
<td>2.04d Communicate in a respectful manner</td>
<td>2.07±0.704</td>
<td>3.00±0.00</td>
<td>0.933±0.704</td>
</tr>
<tr>
<td>2.04f Demonstrate empathy</td>
<td>1.40±0.507</td>
<td>2.20±0.676</td>
<td>0.800±0.676</td>
</tr>
<tr>
<td>2.04h Establish rapport</td>
<td>1.47±0.516</td>
<td>2.20±0.775</td>
<td>0.733±0.799</td>
</tr>
<tr>
<td>2.04n Seek, respond to, and provide feedback</td>
<td>2.00±0.655</td>
<td>2.73±0.704</td>
<td>0.733±0.594</td>
</tr>
<tr>
<td><strong>Grand mean</strong></td>
<td><strong>1.83±0.389</strong></td>
<td><strong>2.74±0.188</strong></td>
<td><strong>0.909±0.355\textsuperscript{c}</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nutrition Care Performance Indicators</th>
<th>Time 1 scores</th>
<th>Time 2 scores</th>
<th>Change (Time 2-Time 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.01b Use appropriate nutrition risk screening strategies</td>
<td>2.47±0.640</td>
<td>2.87±0.352</td>
<td>0.400±0.632</td>
</tr>
<tr>
<td>3.01f Obtain perspective of client, family or relevant others</td>
<td>1.80±0.414</td>
<td>2.73±0.458</td>
<td>0.933±0.594</td>
</tr>
<tr>
<td>3.01i Obtain and interpret medical history</td>
<td>1.60±0.507</td>
<td>2.67±0.488</td>
<td>1.07±0.799</td>
</tr>
<tr>
<td>3.01l Obtain and interpret demographic, psycho-social and health behaviour history</td>
<td>1.60±0.507</td>
<td>2.53±0.516</td>
<td>0.933±0.458</td>
</tr>
<tr>
<td>3.01n Obtain and interpret food and nutrient intake data</td>
<td>2.07±0.594</td>
<td>2.73±0.458</td>
<td>0.667±0.488</td>
</tr>
<tr>
<td>3.01x Identify signs and symptoms of nutrient deficiencies or excesses</td>
<td>1.73±0.594</td>
<td>2.87±0.352</td>
<td>1.13±0.640</td>
</tr>
<tr>
<td>3.01z Obtain and interpret nutrition-focused physical observation data</td>
<td>1.67±0.488</td>
<td>2.47±0.516</td>
<td>0.800±0.775</td>
</tr>
<tr>
<td><strong>Grand mean</strong></td>
<td><strong>1.85±0.322</strong></td>
<td><strong>2.70±0.234</strong></td>
<td><strong>0.848±0.226\textsuperscript{c}</strong></td>
</tr>
</tbody>
</table>

\textsuperscript{a}Integrated Competencies for Dietetic Education and Practice (PDEP, 2013)
\textsuperscript{b}1=novice, 2=advanced beginner, 3=competent, 0=not applicable
\textsuperscript{c}Grand mean of Time 1 and Time 2 PI scores compared using paired t-tests; both \( P<.001 \)
5.1.4. Graduate Students’ Competency Development

Non-parametric normality testing was conducted (Shapiro Wilk was used due to having less than 2000 observations); all p values were greater than 0.05 (Communication Time 1: 0.524; Communication Time 2: 0.663; Nutrition Care Time 1: 0.280; Nutrition Care Time 2: 0.107) indicating normal distribution. This allowed matched pair t-tests to be used, as normality is an assumption of that test.

There were no significant differences between evaluators’ change scores for communication PIs ($F(4, 10) = 1.994, P = 0.172$). Change scores for nutrition care PIs were marginally significantly different between evaluators ($F(4, 10) = 3.463, P = 0.051$).

Table 8 outlines the detailed results from Time 1 and Time 2 of the Competencies Tool in Phase 2 (W17 semester) for the graduate nutrition students enrolled in the Applied Clinical Skills course. Means and standard deviations of each performance indicator are displayed, as well as the grand means of both categories of indicators, communication and collaboration ($P = 0.002$), and nutrition care ($P < .001$). Evaluators’ scores of competence in nutrition related to assessment, education, communication and counselling skills of graduate nutrition students improved by 27.9%.
Table 8. Performance Indicators\(^a\) and Scores\(^b\) for \(n = 15\) Pairs of Masters of Applied Nutrition Students at Time 1 and Time 2 (mean ± SD)

<table>
<thead>
<tr>
<th>Communication and Collaboration Performance Indicators</th>
<th>Time 1 scores</th>
<th>Time 2 scores</th>
<th>Change (Time 2-Time 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.01d Use appropriate communication technique(s)</td>
<td>2.20±0.775</td>
<td>2.87±0.352</td>
<td>0.667±0.816</td>
</tr>
<tr>
<td>2.01e Demonstrate knowledge of medical and dietetics-related terminology</td>
<td>2.27±0.458</td>
<td>2.60±0.507</td>
<td>0.333±0.617</td>
</tr>
<tr>
<td>2.01g Use appropriate terminology</td>
<td>2.40±0.632</td>
<td>2.73±0.458</td>
<td>0.333±0.617</td>
</tr>
<tr>
<td>2.03b Speak clearly and concisely in a manner responsive to the need(s) of the listener(s)</td>
<td>2.33±0.724</td>
<td>2.87±0.352</td>
<td>0.533±0.915</td>
</tr>
<tr>
<td>2.03d Use appropriate tone of voice and body language</td>
<td>2.40±0.910</td>
<td>2.80±0.414</td>
<td>0.400±0.986</td>
</tr>
<tr>
<td>2.03e Recognize and respond appropriately to non-verbal communication</td>
<td>2.07±0.884</td>
<td>2.53±0.516</td>
<td>0.467±1.06</td>
</tr>
<tr>
<td>2.04b Utilize active listening</td>
<td>2.33±0.724</td>
<td>2.73±0.458</td>
<td>0.400±0.737</td>
</tr>
<tr>
<td>2.04d Communicate in a respectful manner</td>
<td>2.87±0.352</td>
<td>2.93±0.258</td>
<td>0.067±0.438</td>
</tr>
<tr>
<td>2.04f Demonstrate empathy</td>
<td>2.27±0.799</td>
<td>2.53±0.516</td>
<td>0.267±0.799</td>
</tr>
<tr>
<td>2.04h Establish rapport</td>
<td>2.20±0.775</td>
<td>2.67±0.488</td>
<td>0.467±0.516</td>
</tr>
<tr>
<td>2.04j Apply counselling principles</td>
<td>2.27±0.458</td>
<td>2.73±0.458</td>
<td>0.467±0.640</td>
</tr>
<tr>
<td>2.04l Apply principles of negotiation and conflict management</td>
<td>1.87±0.834</td>
<td>2.67±0.488</td>
<td>0.800±0.775</td>
</tr>
<tr>
<td>2.04n Seek, respond to, and provide feedback</td>
<td>2.40±0.632</td>
<td>2.73±0.594</td>
<td>0.333±0.617</td>
</tr>
<tr>
<td></td>
<td><strong>Grand mean</strong></td>
<td><strong>2.30±0.488</strong></td>
<td><strong>2.72±0.179</strong></td>
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<tr>
<th>Nutrition Care Performance Indicators</th>
<th>Time 1 scores</th>
<th>Time 2 scores</th>
<th>Change (Time 2-Time 1)</th>
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<tr>
<td>3.01b Use appropriate nutrition risk screening strategies</td>
<td>1.64±0.674</td>
<td>2.64±0.505</td>
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<td>3.01d Identify relevant assessment data to collect</td>
<td>1.22±0.441</td>
<td>2.67±0.500</td>
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<td>3.01f Obtain perspective of client, family or relevant others</td>
<td>2.00±0.535</td>
<td>2.60±0.507</td>
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<td>3.01i Obtain and interpret medical history</td>
<td>1.40±0.632</td>
<td>2.60±0.507</td>
<td>1.20±0.775</td>
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<td>3.01l Obtain and interpret demographic, psycho-social and health behaviour history</td>
<td>1.93±0.594</td>
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<td>3.01p Identify client learning needs related to food and nutrition</td>
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<td>3.01r Obtain and interpret anthropometric data</td>
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<td>3.01x Identify signs and symptoms of nutrient deficiencies or excesses</td>
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<tr>
<td>3.01hh Integrate assessment findings to identify nutrition problems</td>
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<td>3.04c Identify necessary changes to nutrition care plan</td>
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<td>2.50±0.707</td>
<td>0.25^d</td>
</tr>
<tr>
<td>3.04d Implement changes to nutrition care plan</td>
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<td><strong>2.62±0.329</strong></td>
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^a Integrated Competencies for Dietetic Education and Practice (PDEP, 2013)

^b 1=novice, 2=advanced beginner, 3=competent, 0=not applicable

^c Grand mean of Time 1 and Time 2 PI scores compared using paired t-tests \( P=0.002 \) for Communication and Collaboration; \( P<.001 \) for Nutrition Care

^d The SD could not be computed because the standard error of the difference was 0
5.2 Qualitative Findings

Analysis of the qualitative data from Phases 1 and 2 (written reflections and focus groups) produced two overarching themes: *Simulations are Valuable*, and *Facilitators and Barriers Impacting Value*. These are shown as white ovals in the thematic map in Figure 2. All other themes contained within the main overarching themes are represented by rectangles of various colours according to their levels (white: first level of subthemes; light grey: second level of subthemes under white themes; dark grey: third level of subthemes under light grey themes).

*Simulations are Valuable* contains three subthemes, *Patient Communication Skills*, *Assessment Skills* and *Self Efficacy*. *Facilitators and Barriers Impacting Value* contains five subthemes, *Preparation*, *Observing*, *Reflection*, *Debriefing* and *Realism*. *Patient Communication Skills* contain two subthemes, *Interpersonal skills* (containing *Building Clinician/Patient Relationship* and *Positioning Patient as Person*), and *Clinical Information Sharing Skills* (containing *Education* and *Gathering Information*). *Assessment Skills* contains two subthemes, *Clinical Information Sharing Skills* (containing *Education* and *Gathering Information*) and *Physical Assessment Skills* (containing *Comfort in Touching Patients* and *Technical Skills*). *Self-Efficacy* contains two subthemes, *Confidence*, and *Growth and Development* (the latter containing *Critical Thinking* and *Professionalism*). For clarity of presentation, all themes and subthemes will be presented in italics in subsequent passages.

As seen in Figure 2, the arrows between themes represent relationships. A single-headed arrow indicates a theme that influences another in a unidirectional fashion, while a double-headed arrow indicates two themes that influence each other.

Within one of the main overarching themes, labelled *Facilitators and Barriers Impacting Value*, are the factors that impacted the effectiveness of the simulations in enhancing the learning
and confidence of the undergraduate and graduate nutrition students. Therefore a single-headed arrow connects Facilitators and Barriers Impacting Value with the other main overarching theme, Simulations are Valuable.

Both Patient Communication Skills and Assessment Skills are connected to Self-Efficacy with double-headed arrows because there was a positive, bidirectional association among these themes. As patient communication and assessment skills improved or increased, self-efficacy increased (or vice versa).

Similarly, Clinical Information Sharing Skills and Physical Assessment Skills are connected to Interpersonal Skills with double-headed arrows based on a presumed bidirectional association among the themes. When a student demonstrates developed interpersonal skills, and a rapport and relationship with the patient, the student’s ability to gather and share information from the patient may improve as the patient feels more comfortable opening up and is more receptive to receiving nutrition education. The physical assessment portion of a nutritional assessment will also go more smoothly when the patient feels comfortable with the clinician and has developed a rapport and relationship. Similarly, if the clinician conducts a physical assessment professionally and appropriately, using proper techniques, the trust and relationship between patient and clinician may be strengthened.

Building Clinician/Patient Relationship and Positioning Patient as Person is connected by a double-headed arrow as there was presumed to be a positive bidirectional association among these themes. Once the clinician has developed a rapport and relationship with the patient, it is easier to position the patient as a person, and have empathy for their situation as the clinician will have a better understanding of the patient’s perspective. Similarly, treating the patient as a person, and displaying empathy, will help to strengthen the clinician-patient relationship.
There is a single-headed arrow connecting Critical Thinking to Professionalism.

Critically thinking about the simulation experiences as a whole, and preparing, observing peers, reflecting and debriefing allowed the nutrition students to become more aware of their strengths, areas and strategies for improvement, and their personal and professional style as a clinician to prepare for future professional dietetic practice.

Finally there is a single-headed arrow connecting Comfort in Touching Patient to Technical Skills. In order to improve technical skills while conducting a physical assessment, nutrition students need to first be comfortable touching a patient. Once the comfort level is enhanced, the nutrition students can focus on improving their technical skills.
Ovals: Overarching themes
Rectangles: Subthemes
White: First level
Light grey: Second level
Dark grey: Third level

**Figure 2.** Thematic Map of Simulation Value in Dietetic Education and Training
5.2.1. Simulations are Valuable

Thematic analysis conducted on the qualitative data (student focus groups and reflective writing on the experience of simulations) underscored that simulations were valuable as an educational tool for these nutrition students. Thus, an overarching theme identified during analysis was Simulations are Valuable. Specifically, simulations were found to be valuable in enhancing Patient Communication Skills, Assessment Skills, and Self Efficacy, which formed the three themes under Simulations are Valuable.

5.2.1.1 Patient Communication Skills

The theme of Patient Communication Skills is discussed first, along with its subthemes, Interpersonal Skills and Clinical Information Sharing Skills. Interpersonal Skills in this context subsumes Building Clinician/Patient Relationship[s], including rapport building, and Positioning [the] Patient as [a] Person, which was grounded in students’ frequent descriptions of having empathy for the patient. The thematic analysis revealed that the undergraduate and graduate nutrition students perceived improvement in their ability to develop rapport and Build[ing] the Clinician/Patient Relationship with the simulated patients. Undergraduate students, however, were more nervous than the graduate students prior to their first simulations, as many stated they had not had opportunities to interact with patients prior to enrolling in the course. Therefore, undergraduate students expressed greater increased comfort and confidence in building rapport and relationships with simulated patients as the semester progressed. Moreover, undergraduate students discussed the importance of body language awareness and non-verbal communication, as well as avoiding use of medical jargon, using appropriate tone and careful word choice to communicate clearly and avoid infantilizing patients and unintentionally delivering the wrong message:

In terms of my patient interaction skills, I think I have improved when initiating the session and establishing rapport. During my first session with the simulated patient, I was very nervous so I
jumped right into the physical assessment after introducing myself. Since then I have learned to ask questions about the weather, or pull information from the patient chart to establish rapport before beginning the session. (Excerpt 1, undergraduate nutrition student, ID: 14, reflection assignment, Phase 1)

As previously mentioned, the graduate nutrition students in Phase 1 and 2 described how the simulation experiences allowed them to gain practice in rapport building and developing a relationship with the patient. Similar to the undergraduate students, graduate students identified various techniques, skills, and strategies involved in this process, such as using language consistent with literacy levels and prior education of the patient, and avoiding medical jargon. The graduate students, however, went into more detail regarding counselling strategies and theories, stating that engaging in small talk, asking open-ended questions, and summarizing/paraphrasing patients’ responses throughout the session allowed patients to feel as though the clinician valued their story and perspectives, and helped to foster the relationship, which in turn helped the counselling session to be more valuable for the patient. Graduate students also specifically discussed tactics from the micro skills hierarchy, active listening, and non-verbal communication (tone of voice, eye contact, body position, smiling) as techniques for building the rapport and relationship to help the patient to feel comfortable, relaxed, and welcome (Ivey, Ivey & Zalaquett, 2010):

In delivering counselling sessions, I am mindful of asking questions in a non-judgmental manner. I ask questions that are open-ended where possible, and often expand or elaborate on the conversation by paraphrasing what I have heard in the first few minutes to help the patient or client feel at ease while talking to me. (Excerpt 2, graduate nutrition student, ID: 27, reflection assignment, Phase 1)

Since the graduate student simulations were longer and included counselling, the graduate students appreciated receiving feedback from the simulated patients, declaring that patients wanted the clinician to build rapport and engage in “small talk” prior to starting the counselling session as illustrated in the following quotation:
I think it was mentioned about building rapport, how they value that so much, even though, …we might think maybe the patient just wants me to get in the room, say the questions and be done with it, but hearing that the patients do actually want to get to know their health professionals is helpful feedback for us. (Excerpt 3, graduate nutrition student, ID: 21, reflection assignment, Phase 1)

Both undergraduate and graduate nutrition students discussed the importance of building and maintaining a relationship with the patient to ensure patients trust the clinician and provide the clinician with the necessary information needed to conduct a nutritional assessment or counselling session to help meet individual needs and goals. Undergraduate and graduate nutrition students emphasized the importance of Positioning Patient as Person, and being empathetic to their condition and situation. Both undergraduate and graduate students described how being empathic with a patient helps to strengthen the trust and relationship between the clinician and patient:

…one of the most relevant teachings I had from the sessions is that taking my time and being empathetic and considerate of the patient’s feelings not only builds trust but also a relationship that promotes healing. I believe that the best line of care comes from being friendly and completely plunging into someone else’s symptoms and feelings to fully understand what they are going through. (Excerpt 4, undergraduate nutrition student, ID: 6, reflection assignment, Phase 1)

Often during nutrition counseling we have many conversations with patients about difficult family situations, stress, addictions, frustration with an inability to see changes in their weight. As a professional I use this as an opportunity to express my empathy, to try to communicate that I have some shared understanding of how they feel…recognize the difficulty by saying “I’m sorry, that sounds very difficult and stressful, I am sorry you had to go through that.” (Excerpt 5, graduate nutrition student, ID: 28, reflection assignment, Phase 1)

Students reported that ensuring that a patient is treated as a person can be shown in various ways. For example, treating the patient as an equal - rather than as inferior - is imperative. This can be accomplished by considering the physical environment, including talking at eye level with the patient, and removing physical barriers between patient and clinician. These actions help to ensure the patient feels more “equal” with the clinician. Furthermore,
undergraduate nutrition students discussed the significance of treating each patient as a unique individual, as patients with similar diseases and conditions may have different capabilities, symptoms, backgrounds and perspectives:

Something else that I’ve learned throughout the semester is the importance of not making assumptions about patients. When working with the simulated patient who had just undergone a stroke, the patient was determined to feed herself during the dysphagia screening. I could have assumed incorrectly that the patient was too weak to feed herself and fed her myself, causing the patient to lose a sense of dignity. (Excerpt 6, undergraduate nutrition student, ID: 5, reflection assignment, Phase 1)

Some students remarked that each patient will also have a different level of education, knowledge and understanding about their condition, and therefore assessments and counselling strategies need to be tailored accordingly:

The saying “patients are people before they are patients” has really stuck with me throughout the sessions and has helped me realize the importance of building rapport with your patients. Asking the patient a question about their personal life or complimenting them at the beginning of a session can have a huge impact for setting the tone and showing them you care…This way they will feel comfortable telling you private information later on. (Excerpt 7, undergraduate nutrition student, ID: 1, reflection assignment, Phase 1)

In relation to patient communication skills, *Clinical Information Sharing Skills* is considered a subtheme as previously mentioned, with *Gathering Information* and *Education* as another level of sub-theme nested in the thematic analysis. *Clinical Information Sharing Skills* refers to the interpersonal skills gained and then utilized while gathering clinical information and educating the simulated patients. The undergraduate and graduate nutrition students described patient communication techniques they practiced with the simulated patients to help patients feel sufficiently comfortable to reveal information to the clinician. The types of information solicited in the category of *Gather[ing] Information* related to diet, symptoms, knowledge, beliefs, attitudes, lifestyle, concerns, etc.

The undergraduate nutrition students discussed patient communication strategies used to gather information from the simulated patients. For instance, the students looked for non-verbal
cues, such as patient fatigue or confusion. In such instances, students identified being prompted to ask further questions for clarity on the information provided by the patient, such as asking whether the patient understood the information provided. Furthermore, undergraduate nutrition students discussed the importance of avoiding medical jargon when gathering information to facilitate patient understanding and to help solicit accurate information. Students described using gestures and pictures when gathering information from a patient for whom English was a second language, and open-ended questions as well as non-verbal communication (nodding, smiling, silence) to encourage the patient to elaborate.

The undergraduate nutrition students also considered the importance of adjusting patient communication techniques based on the patients’ personality to ensure all essential information needed as a dietetic clinician is gathered:

This course also helped me develop skills to manage unique personality traits in a professional manner…managing personality traits (such as a very talkative patient, or a very inquisitive patient) is crucial to keeping the session on track. Without management of these traits, it can be difficult to gather the correct information from a patient and maintain structure to the session…The simulated sessions throughout this course gave me experience managing many different types of patients in the context of a dietary setting, which I believe will help me be a successful Registered Dietitian. (Excerpt 8, undergraduate nutrition student, ID: 3, reflection assignment, Phase 1)

The graduate nutrition students in Phase 1 and 2 referred to various counselling techniques they practiced during the simulations, such as patient-centered, solution-focused, and motivational interviewing as strategies for gathering information from patients:

Throughout the session I used motivational interviewing strategies such as open-ended questions, affirmations, summaries, and reflective listening (Bauer & Liou, 2014). Through reflective listening and observing her body language, I identified that the client appeared stressed when she was telling me about her typical day. I told her that I noticed that she appeared to be stressed out and if that was correct. She reported that she commonly experienced anxiety when she has diarrhea at work and on many occasions would avoid eating food. (Excerpt 9, graduate nutrition student, ID: 23, reflection assignment, Phase 1)

During the Education portion of the simulated sessions, the undergraduate and graduate nutrition students described various patient communication skills they used to ensure the
information was being received and understood by the patient. Similar to patient communication techniques used to gather information, undergraduate nutrition students described techniques (such as simplifying or adjusting language) as ensuring that the information is both understood by patients, and consistent with the patients’ prior knowledge and education:

By the third session, I was feeling comfortable and confident enough to take on my role as the clinician and educate my patient (where appropriate) about dysphagia and its complications. I have worked hard to develop the skill to translate complicated concepts into language that is easily understood, something that I think many patients appreciate (Excerpt 10, undergraduate nutrition student, ID: 9, reflection assignment, Phase 1)

The graduate students identified various techniques they tested, such as analogies, modifying terminology based on patients’ prior knowledge, and integrating various counselling theories. Students discussed learning strategies they want to continue using and improve on in future counselling sessions:

I was able to provide detailed information to the client that was at an appropriate level of understanding for the client. For an example, when talking about insulin and insulin resistance I used the analogy that your cells are like smart phones; a brand new phone will charge very quickly and to full capacity but as it ages it becomes resistant to the charge (i.e. insulin). I also frequently checked in with the client to determine if they had any questions. However, to improve I should ask the client to report back and summarize the education material in order to determine their receptiveness. (Excerpt 11, graduate nutrition student, ID: 25, reflection assignment, Phase 1)

Graduate nutrition students indicated that through this experience they learned that not all patients would be receptive to the same style of counselling and nutrition education. For instance, some patients wanted direct advice and strategies for change, while others wanted to determine what changes they wish to make on their own. Therefore, students stated that it is important to adjust patient communication techniques accordingly.

5.2.1.2 Assessment Skills

The theme of Assessment Skills is now discussed, along with its subthemes, Clinical Information Sharing Skills and Physical Assessment Skills. Clinical Information Sharing Skills in this
study refers to the skills gained and utilized while learning appropriate questions for completing a nutritional physical assessment or counselling session pertaining to specific conditions and diseases, as well as appropriate information and resources to present when educating the patients. This theme is composed of two subthemes, *Gathering Information* and *Education*.

The undergraduate and graduate nutrition students discovered that preparing for the simulations was helpful when considering types of questions to ask the simulated patients contingent on their disease/condition when *Gathering Information* (assessment). The undergraduate nutrition students learned how to best order their assessment questions to improve the flow of the session (such as starting with less invasive questions) and to ensure they gathered accurate information and resources to aid in the process; the graduate nutrition students discussed the process of preparing for counselling sessions (considering questions to ask patients that were relevant to their disease/condition, and background information):

Another important lesson I’ve learned is how beneficial having a well-designed screening assessment tool is. Through learning from the first two sessions, I came equipped with and an easy-to-follow tool, clipboard, and relevant additional materials (e.g. Bristol stool chart) for the final two sessions. As a result, my thoughts and notes were more organized. (Excerpt 12, undergraduate nutrition student, ID: 5, reflection assignment, Phase 1)

I think another aspect of the nutrition assessment part is getting their knowledge and attitudes, and so, if you didn’t really assess these in the patients you wouldn’t have gotten some of the important points, for my hypertension patient, she thought that you should not drink dairy…which the DASH diet recommends lots of dairy, so if I didn’t ask her about that, I wouldn’t have gotten her kind of knowledge and attitudes towards dairy products and I wouldn’t have been able to fix that, so it was good to assess those things there, and getting the practice doing that. (Excerpt 13, graduate nutrition student, ID: 59, focus group, Phase 2)

The undergraduate students also stated that they wanted to improve their ability to ask additional questions that may not be on their assessment tool to gain a better understanding of their patients’ nutritional situation and needs:
During the sessions carried out by my groupmates, I noticed that they are always able to think of other things that their patients did not mention and ask more questions to obtain extra information, for example, asking if there is any food that trigger the stomach cramps in the abdominal assessment session to make sure the stomach cramps is due to Crohn’s disease. I think this is really important to give the right recommendation. (Excerpt 14, undergraduate nutrition student, ID: 8, reflection assignment, Phase 1)

Similarly, the graduate students reported practicing incorporation of various theories depending on the type of nutritional assessment information they were trying to gather and learning when various theories were most appropriate. They appreciated having the opportunity to experiment with diverse phrases and styles of questions on simulated patients, before interacting with real patients in future practice:

During the session I attempted to use scaling, exception, coping, and miracle questions, which are common questions used in solution-focused therapy as they allow clients to realize their own strengths and past successes (Beaton, 2015). I found the scaling questions were used well because I was able to determine the severity of her symptoms and how the symptoms were affecting her quality of life….I also used the scaling questions to assess her confidence in making changes in her diet, in which she rated a low score because she said many of the foods she commonly eats are foods that can exacerbate GERD symptoms. I also attempted to use the exception question “When was the last time you did not experience any heartburn and what did you do differently?” and a coping question, “Tell me about a time when your symptoms were bothering you, and how did you manage your symptoms”… (Excerpt 15, graduate nutrition student, ID: 23, reflection assignment, Phase 1)

The subtheme Education was derived from both the undergraduate and graduate nutrition students reporting that they valued the opportunity to practice providing nutrition education to the simulated patients on different topics, depending on their disease/condition. This experience provided students the chance to prepare various resources and develop a plan regarding what nutritional information they wanted the patient to understand by the end of the session. Students then practiced delivering that information and reflect on what went well, and what they would change when encountering similar patients in future practice, an example being educating patients on dysphagia:
During my session with the dysphagia patient, I felt very confident when explaining to her the differences between each thickened beverage and the risks and complications of impaired swallowing. I hope that I can continue to polish this skill as I continue down my path of becoming a registered dietitian. (Excerpt 16, undergraduate nutrition student, ID: 9, reflection assignment, Phase 1)

The undergraduate nutrition students had shorter simulation sessions than the graduate students, and therefore described having limited time for the educational piece, as the main focus was conducting a physical assessment. They reported that they did not feel as confident providing nutritional education as conducting the physical assessment and expressed hope that, with more practice, they would gain confidence educating patients:

… I always felt like my conclusion was rushed and felt like I did a poor job summarizing the session. I think this is mainly because I have not yet developed the confidence to quickly consolidate all of my findings and come up with a conclusion without pausing to think it over first. Improving this will require practice in assessing many different patients in order to become familiar with the different ways that symptoms of nutritional concern can present in the clinical setting and how to interpret these findings. (Excerpt 17, undergraduate nutrition student, ID: 11, reflection assignment, Phase 1)

*Physical Assessment Skills* is the second subtheme under *Assessment Skills*, and refers to the technical skills involved in performing a physical nutritional assessment and the comfort involved in touching a patient. It subsumes *Comfort in Touching Patients* and *Technical Skills* under it. This subtheme was derived from analysis of data contributed by only the undergraduate nutrition students, as graduate nutrition students did not perform any physical assessments on the simulated patients. *Comfort in Touching Patients* captured the undergraduate nutrition students’ increased ease and confidence in making physical contact with patients and in performing physical assessments in general:

One of my strengths in terms of my clinical skills is that I feel very confident when performing the physical assessments and very comfortable performing them on other people. Whether it was the foot, intraoral, or abdominal assessments I felt comfortable during each one. (Excerpt 18, undergraduate nutrition student, ID: 14, reflection...
assignment, Phase 1)

Each physical assessment performed by the undergraduate students was different because they had exposure to different simulated patients with different presenting medical concerns. *Technical Skills* describes the variety of techniques that students reported gaining from conducting physical assessments on simulated patients. However, the students stated that they still wanted to practice these techniques on various populations and body types to help improve their skills:

One area that I would like to improve on is first and foremost my technical skills when performing physical assessments. This is especially true for assessing pedal pulses in the DPN screening, distinguishing between normal from abnormal bowel sounds and percussing the abdomen. The only way that I can see myself improving my clinical skills is by practicing as much as I can, on as many different bodies as I can. (Excerpt 19, undergraduate nutrition student, ID: 9, reflection assignment, Phase 1)

5.2.1.3 Self-Efficacy

*Self-Efficacy*, the third and final theme that emerged under the overarching theme *Simulations are Valuable*, includes the subthemes *Confidence* and *Growth and Development*. The thematic analysis revealed that both undergraduate and graduate nutrition students perceived enhanced self-efficacy, an increasing sense of their effectiveness as budding clinicians, as a result of the simulations: increased mastery in interacting with patients, building relationships, gathering information, educating, counselling and performing physical assessments.

Undergraduate students discussed increased *Confidence* in conducting physical assessments, but recognized that the technical skills involved would take more practice and experience to perfect. Most of the graduate students from Phase 1 described how their comfort and *Confidence* counselling patients and utilizing various counselling theories in their practice increased as a result of the simulation experience. The subtheme *Confidence* describes one of the outcomes of undergraduate students’ observations of improvements in their own skills when interacting with patients, developing rapport, and building relationships as a result of the simulation experiences:
Over the semester I think one of the greatest strengths I developed was confidence. From my first session to my last session I noticed a change in the way I communicated with patients, exuding confidence in both the information I was presenting, and my delivery of it. (Excerpt 20, undergraduate nutrition student, ID: 15, reflection assignment, Phase 1)

However, a few graduate students from Phase 1 indicated that the simulations lacked complexity in comparison to their previous experiences in paid and volunteer work and placements; therefore, they did not feel the simulations were effective in building more sophisticated skill levels and increasing their confidence when thinking about interacting with real patients in future practice.

The graduate students from Phase 2 reported the simulations to be of appropriate complexity to enhance their confidence in counselling patients. However they would have preferred more simulations to further enhance their confidence, and a stronger focus on the educational aspect of the counselling session, as they felt less confident in that area compared to their confidence with motivational interviewing techniques and building a relationship with the patient:

And I think just getting…the actual clients feedback,…they said they wanted to develop more of a rapport with us, so obviously a typical client wouldn’t say that…that was something helpful and I think helped me to feel more prepared to counsel real patients. (Excerpt 21, graduate nutrition student, ID: 60, focus group, Phase 2)

The second subtheme under Self-Efficacy, Growth and Development, includes the categories of Critical Thinking and Professionalism as particular areas in which students observed self-improvement. The undergraduate and graduate nutrition students discussed the critical thinking that occurred during the simulation experiences overall, and in various components specifically, such as during the preparation prior to the simulation and during the debriefing and reflection that followed the simulations, and how critical thinking enhanced their Growth and Development as a maturing dietetic professional. The graduate students specifically discussed having to critically think about appropriate questions, resources and counselling theory for each patient depending on the patient’s condition and background information. The category
of Critical Thinking refers to undergraduate and graduate students’ descriptions of simulation-related improvements in being adaptable and flexible while interacting with the simulated patient and “thinking on your feet.” They recognized that, frequently, the nutritional assessment may not proceed according to a script (i.e., the outline created by the student prior to the simulation) and that appropriately responding to a patient in the moment is an imperative skill to learn. After the simulations, students critically reflected on their strengths, weaknesses, and strategies for improvement and for the graduate students specifically, on their personal counselling style, after receiving feedback from observers, peers, simulated patients, and nutrition professor during the debriefing and while writing their written reflection assignments:

One of the main things I learned through this experience is the importance of being adaptable as a clinician. This means being flexible in dealing with a variety of patient personalities and moods, adjusting the session plan based on information the patient provides, as well adapting to conversation. (Excerpt 22, undergraduate nutrition student, ID: 15, reflection assignment, Phase 1)

Through reflecting on my experiences during the simulated counselling sessions, I discovered that I preferred incorporating motivational interviewing into my initial sessions with clients, and using solution-focused therapy with my follow-up client. I found that motivational interviewing was more successful with initial clients because it supported them to gain motivation and confidence to create goals, and I believe they would be better prepared and encouraged when they left from the session. (Excerpt 23, graduate nutrition student, ID: 23, reflection assignment, Phase 1)

The category of Critical Thinking involved improvements in the undergraduate and graduate nutrition students’ awareness of their current capabilities and style as a dietetic clinician, and the development of new strategies for reaching their goals as professionals. The category of Professionalism involved students’ descriptions of how the simulation experience was a helpful learning opportunity assisting them on their journey of becoming dietetic professionals. The students emphasized the significance of remaining professional as part of gaining the patient’s trust and building a relationship. They valued having the opportunity to
practice acting as health care professionals while conducting physical assessments (undergraduate) and thorough nutritional counselling session (graduate) on simulated patients with various conditions and personalities; they also discovered areas for improvement in future practice. The undergraduate students focused specifically on the qualities, actions, and mannerisms involved in professional practice as embodied by a health care professional, such as using appropriate language, introducing yourself and the goal of the assessment, asking permission before touching a patient, making appropriate eye contact, taking your time during an assessment, avoiding positive reinforcement (such as “great” or “perfect”), using hand sanitizer, and acting confident in your knowledge and technical skills as a clinician. The graduate nutrition students explained how the critical thinking that occurred at numerous points during the simulation experiences helped them become aware of their personal counselling style and what theories work best for them:

I personally believe that these simulated sessions were invaluable to my education. As a future Registered Dietitian, I found this course was a great way to not only apply our education, but also to get a sense for the role Registered Dietitians play within the healthcare system. This course has better prepared me for what to expect in my internship and has given me the chance to practice many skills that I will have to use throughout my internship. (Excerpt 24, undergraduate nutrition student, ID: 3, reflection assignment, Phase 1)

Upon reflection of my experience as a dietetic intern thus far, I have realized that my personal counselling style has been evolving. Throughout this time, greater exposure to a wide diversity of clients has also led to my use of a combination of various counselling styles…Furthermore, as a result of continuous feedback from my mentors and peers, I have been able to identify and analyze the strengths and weaknesses of my counselling. I am also determined to capitalize on my strengths and mend my weaknesses, in order to enhance my professional self-development, and provide the best support for my future clients. (Excerpt 25, graduate nutrition student, ID: 24, reflection assignment, Phase 1)

5.2.2 Facilitators and Barriers Impacting Value of Simulations

While one of the overarching themes which emerged from qualitative analyses is that Simulations are Valuable, various facilitators and barriers to the effectiveness of the simulations
emerged, forming the second overarching theme, *Facilitators and Barriers Impacting Value*. Five themes were subsumed under *Facilitators and Barriers Impacting Value*, including *Preparation* (that took place prior to participating in simulation activities), *Observing* (observing classmates and receiving feedback from observers), *Reflection* (“first impression” reflection notes, “mini” and “meta” reflection assignments completed by undergraduate nutrition students and a reflection assignment regarding personal counselling style completed by graduate nutrition students), *Debriefing* (sessions following simulations), and the *Realism* of the simulations.

### 5.2.2.1 Preparation

*Preparation* in the context of this research had two meanings. One meaning referred to the objective process of preparation that nutrition students engaged in prior to the simulation sessions, such as practicing physical assessments and gathering resources. Secondly, preparation is referred to as the subjective state of students: how prepared they felt, as a result of the simulation experience, when thinking about engaging in future dietetic counselling and assessment sessions with real patients.

Students valued practice and preparation in helping to ensure the simulations were as valuable a learning experience as possible. In relation to the physical assessments, the undergraduate students stated that having the opportunity to practice assessment skills on family, friends, and peers and ask the professor outstanding questions prior to the simulations helped them to feel more confident and prepared prior to the simulations, allowing the experience to be more valuable and instrumental in their learning. Also, for the physical assessments that lacked a validated assessment tool, the students found creating their own tool was very valuable for fully understanding the assessment and preparing for the simulation. Furthermore, previous knowledge gained through undergraduate courses, and work/volunteer experiences, was
described as helpful in preparing the undergraduate students for the simulations; in turn, the simulation experience was reported as helping the undergraduate students to feel more prepared for assessing real patients in future practice:

I think also with the stethoscope, like being able to bring that home and practice on other people, cause I had never really used one…just getting experience was good…I think also having the week before, like we would have Dr. B and she would show us everything, and you’re very unsure about if you’re doing it correctly, but she’s right there to kind of guide you…and then you’re able to take those skills home, practice, and then feel more confident for the ((pause)) actual session, that was really helpful…(Excerpt 26, undergraduate nutrition student, ID: 10, focus group, Phase 1)

The undergraduate students would have also liked to see an example of a “gold standard” physical assessment session prior to beginning the simulations, and to have had more simulation sessions to further practice improving their communication and physical assessment skills. Additionally, the students said they liked having information on each patient to read through ahead of time in preparation for the session, but that they would have liked to have more biochemical information to help prepare for future clinical chart notes in dietetic practice:

I think you know it would be nice to have another practice, like kind of have, like I know there are time restraints with the course, but if you would have had two go’s at it, like it would kind of give you the first one to explore, and decide where the errors are that you made, and then in the second one you would probably do a lot better, and feel more confident at the end of it…(Excerpt 27, undergraduate nutrition student, ID: 11, focus group, Phase 1)

[You could visually see it, before trying it, it would be helpful, I don’t know how she could fit it in…during the class maybe, the week before…adding a mini simulation just in front of the class the week before, so we could just look at it, like what a situation with a patient would be…(Excerpt 28, undergraduate nutrition student, ID: 14, focus group, Phase 1)

The graduate students in Phase 1 stated that preparing for the simulations was instrumental in their learning, as they had to critically think about what tools and resources they were going to use in the counselling session, as well as what information-gathering questions would be most appropriate to ask the patient:
…what really helped me really think critically about the situation was the deciding and preparing before the simulated interview, like deciding what counselling style I was going to try, or you know what tactics I was going to experiment with…(Excerpt 29, graduate nutrition student, ID: 23, focus group, Phase 1)

Approximately half of the students stated that the simulation sessions helped to prepare them for real practice: “As a result of my very limited counselling experience, I found the simulated patient counselling sessions to be extremely beneficial” (Excerpt 30, graduate nutrition student, ID: 26, reflection assignment, Phase 1). Conversely, the other half inferred that the simulations were too simple and did not prepare students for counselling real patients, given that these students had previous volunteer and work experiences with patients, “…it was almost like elementary since we’ve already done this so often” (Excerpt 31, graduate nutrition student, ID: 31, focus group, Phase 1). The graduate students from Phase 1 would have preferred the simulation sessions take place in first semester before their placements to use it as practice and preparation for counselling and interacting with patients prior to real life experiences:

[It]…would have been more helpful for placements if it was in first semester, as a nice introduction to counselling …like if we did it right from the beginning, it would have been like our first counselling experience, and we would have learned more from it, and it could have been more helpful in our placements (Excerpt 32, graduate nutrition student, ID: 28, focus group, Phase 1)

The graduate students in Phase 1 also indicated that they would have preferred to learn more about the counselling theories to attempt these in the simulation sessions. A student suggested learning one theory per week, and then having all students try to apply that same theory in the simulation session, then discuss what they liked and did not like about that theory, then try a different one for the following simulation and so on.

The graduate students in Phase 2 stated that preparing for the simulations was helpful for critically thinking about what resources and tools are needed to have a successful counselling
session and these practices have carried to their placements when preparing for interacting with real patients:

It was good exposure to different, health conditions of clients that we might not be able to see in placement as well, so being able to do a bit of prep work ahead of time, learning about that condition and what you would do in a motivational interviewing education…I think was valuable (Excerpt 33, graduate nutrition student, ID: 21, focus group, Phase 2)

None of the Phase 2 graduate students suggested that the simulations were too basic, reporting the simulations instead to be appropriately complex. However, graduate students said they would have preferred to have been better prepared for the simulations, in contrast to Phase 1 graduate students. The Phase 2 graduate students stated that they would have preferred to have more simulation sessions, with a focus on motivational interviewing during the first sessions, and gradually learning to address more intensive clinical information in subsequent sessions once they were more comfortable with motivational interviewing. Similarly, the students would have preferred the patient not have any endowed emotional characteristics in the first session (i.e., for the patient to be emotionally “neutral”) to allow themselves to focus on their assessment and counselling skills without having to worry about interacting with difficult or emotional personalities. They said that they would have liked to have a session to introduce the process of simulations. Their vision included discussing the overall outline of a nutritional counselling assessment to be refreshed on the various steps involved, such as types of questions to ask, information that needs to be gathered, education, and goal setting and possibly practice going through a session with a peer. Extending this, the Phase 2 graduate students stated that they would have liked to see an example of a “good” counselling session, perhaps performed by the nutrition and theatre professors, or watch a nutrition-related video and then debrief together afterwards, with the simulated patients, to ensure that everyone was on the same page with regards to expectations and objectives.
5.2.2.2 Observing

The theme of Observing was derived from both undergraduate and graduate students’ statements that the observer notes and checklist forms generated by those observing the simulation activities were helpful to students when reflecting on their simulations and critically thinking about what they did well and what they missed or could improve in the future. In turn, being observers of peers’ simulations was also beneficial for learning how others handle certain situations and thinking of how to incorporate similar strategies and techniques into their own practice. Students stated that completing the checklist form several times allowed the various techniques included as part of nutritional assessments and motivational interviewing to become more familiar, resulting in students feeling more comfortable using those skills during their own sessions. They also noted that they liked having more than one observer to gain more suggestions and perspectives:

…I definitely learned from observing someone, umm, and seeing, like comparing it to what I just did, and comparing it to what I’m about to do, umm even though it might have been a different type of patient, umm ((pause)) it was still helpful, and like how they approach the patient, and approaching the physical assessment… (Excerpt 34, undergraduate nutrition student, ID: 15, focus group, Phase 1)

…we had the opportunity to be the dietitian and the observer, and I found being the observer really helpful as well…because everyone has their own statements that work really well, so you kind of learn ((pause)) like umm maybe I’m going to try that next time… (Excerpt 35, graduate nutrition student, ID: 23, focus group, Phase 1)

Although the students found the observer notes and feedback to be helpful, they wanted more constructive criticism to help advance their professional growth as a clinician, “I felt like I wanted my observers to be more critical…because I would read it after and be like, aww these are all really nice ((laughs)) but like its not really helping me become a better clinician” (Excerpt 36, undergraduate nutrition student, ID: 4, focus group, Phase 1).

The graduate students also stated that initially, the observers made them more nervous and added pressure to the simulation to make a connection with the patient and ensure all items on the
observer checklist form were completed. However, students stated that the feedback provided from observers was worth the additional pressure, and that they quickly forgot the observers’ presence. The graduate students would have preferred the observer checklist form to have more room to provide comments on each skill, rather than just having a box to check, and to have the same peer observer in every simulation to receive feedback on their progress. The graduate students found the observer feedback revolved mostly around communication related competencies; as a result, they highlighted wishing they had more “clinical observers”, such as dietitians, to provide more feedback on their clinical assessment and education skills:

…I think that’s where having more of again that clinical half of things, right, having somebody who’s familiar with what the assessment process should look like, or what the overall format of an interview should look like, right, to give you feedback on whether or not your assessment was thorough enough, because a lot of the time, the emphasis was just on did you get the hidden cue or not, and did you build rapport, and that’s just a very small portion of really what we were trying to do, umm, and develop ourselves in, all other skills (Excerpt 37, ID: 2, graduate nutrition student, focus group, Phase 2)

5.2.2.3 Reflection

The theme of Reflection was derived from students’ descriptions of self-reflection exercises associated with the simulations and their contribution to the learning experience. The undergraduate students indicated that they found the “first impression” reflection notes, the mini-reflections and meta-reflection valuable and instrumental to the learning process. The students enjoyed having to reflect on each simulation experience after it was completed, to critically think about what went well and what they could strive to improve for subsequent simulations. They stated that setting goals and developing strategies to achieve those goals was instrumental in their growth over the course of the semester. Writing the final meta-reflection helped to boost their confidence as they were asked to consider their previous reflections and their progress:

…I think it really instilled everything I learned from like every aspect of being in the session, from the debrief, and then just like remembering it all and formatting it into your
new goals...you can really like pinpoint too, like what is best for you, even too when I was like oh I want to work like on rapport building...then the next week I was like okay I’m going to think of questions before I go into the session...sometimes it takes a couple of times...it’s such a learning process, but those reflections like allowed me to come to the end goal, of like getting through that...it pulls it all together (Excerpt 38, undergraduate nutrition student, ID: 1, focus group, Phase 1)

The graduate nutrition students in Phase 1 and 2 had differing opinions about the value of the reflection assignments completed at the conclusion of the semester simulations. Students from Phase 1 stated that the assignment was too formal, and did not believe that researching various counselling theories and relating them to their experience was instrumental to their learning. Phase 1 graduate students stated they would have preferred to learn more about the different theories prior to the simulations, and perhaps write a paper on them at that point. They suggested that after the simulations, they reflect on what counselling theories they actually utilized and what worked best for them; alternatively, they suggested reflecting on their experience without relating their experiences to theories.

The simulations in Phase 2 vs. Phase 1 focused more on motivational interviewing and the reflection assignment focused less on researching a number of counselling theories. Not surprisingly, based on Phase 1 students’ feedback, Phase 2 students were more receptive to the assignment and found it to be beneficial to their learning and in the conceptualization of their personal counselling style:

…it did really make me think about my counselling style, cause that’s not something that we talked about, umm, during debrief...so for that I think it was good, cause it made me really think about like oh this is what I do, this is what’s important to me, umm, here is some areas I can make that stronger, so I thought that was good (Excerpt 39, graduate nutrition student, ID: 57, focus group, Phase 2)

Nonetheless, Phase 2 graduate students still said they would have preferred the format of the assignment be less formal and research based, and more “free style” to allow them to focus on their individualized experience, their strengths, style and strategies for improvement. Furthermore, they
stated that instead of a written reflection, they would have rather participated in a longer group
debriefing session or completed a short presentation for the class. This presentation would include
what they learned from their simulation experiences, and allow the opportunity to ask outstanding
questions to learn from each other rather than consulting the literature:

   It felt almost too formal, like trying to draw theories into it…like maybe a page to say
what your strengths are…and some areas for improvement, but making it formal I don’t
think, is going to necessarily improve my counselling or motivational interviewing,…or
even like a three minute presentation to the class or something on your strengths, areas to
improve, and maybe a few examples from your experience, that way the class can hear
from everyone else and sort of figure out what we want to work on,…and you can learn
from each other (Excerpt 40, graduate nutrition student, ID: 58, focus group, Phase 2)

5.2.2.4 Debriefing

Debriefing referred to descriptions of the educational value of the debriefing sessions. There
was a debriefing session immediately following the simulation, with the simulated patient, observer
and clinician for the graduate nutrition students, and a second, large group debrief with all nutrition
students, observers, and simulated patients for both undergraduate and graduate nutrition students
respectively. The undergraduate and graduate students found the debriefing sessions to be instrumental
in their learning. They especially appreciated getting the patient’s perspective as to what effect
students’ words and actions had throughout the simulations, and learning their strengths and areas for
improvement. The undergraduate students also appreciated having the feedback from the peer
observers and teaching assistant of the course, as they found the simulated patients focused more on
communication skills, while the other observers could offer suggestions related to technical and
clinical skills:

   I think this simulation exercise offered the unique experience for us to truly see the
importance of the client’s perspective. I have not had a similar chance to ask someone
about my demeanour in a clinical setting and had such thorough feedback on my actions.
While talking about these assessment processes in class, it’s easy to memorize the theory
and procedure, but the delivery is a whole different animal with cues written in between
the lines. (Excerpt 41, undergraduate nutrition student, ID: 2, reflection assignment, Phase 1)

…I think the most valuable portion was after the interview was done, then you sit there and you get feedback from the observers, and from the client, so then that really encourages critical thinking because now you’re not only thinking of what you thought about it, you’re also getting other people’s perspective,…how to evaluate your performance (Excerpt 42, graduate nutrition student, ID: 2, focus group, Phase 2)

The students suggested the debriefing sessions immediately following the simulations be longer, as often there were only a few seconds to chat, if any, before having to move on to the next simulation. The undergraduate students stated the class debriefing session that took place at the end of all simulations each time were very helpful and well structured, although they would have preferred individualized feedback from the observers and simulated patients, which would have been possible if there were more time to debrief between simulations:

…we do have the debrief at the end, which is so perfect, but maybe like right after if both the clinician and the simulated patients got out of character and just had a two to three minute conversation… it would be so personalized…because sometimes my theatre student would be saying things about their like clinicians they had, and I would just be thinking, did I do that, am I the one they’re talking about?… (Excerpt 43, undergraduate nutrition student, ID: 1, focus group, Phase 1)

The graduate students also stated that the debriefing sessions provided the opportunity to reflect on the feedback to help develop their personal counselling style and professional identity, instilling greater confidence when using these techniques with future patients, “One of the key feedback points that I received from both my ‘observer’ and ‘patient’ in the simulations, is that I am very client-centered in my approach.” (Excerpt 44, graduate nutrition student, ID: 27, reflection assignment, phase 1)

Although both undergraduate and graduate nutrition students found the debriefing sessions to be valuable, graduate students had suggestions to improve overall effectiveness of the simulations. The students suggested that at times the simulated patients may have been “too nice” and were possibly
holding back on their constructive criticism to avoid hurting students’ feelings. An anonymous written evaluation form was suggested, in addition to the verbal feedback, as an outlet for simulated patients and observers to provide additional comments that they may not feel comfortable addressing out loud. The graduate students suggested that additional time in the debriefing sessions would be helpful to obtain more individualized feedback and concrete examples of where and how improvements could be made, specifically in the sessions that took place immediately after the simulations. Furthermore, it was suggested that the large group debriefing discussions be more structured, such as having the instructor ask the class specific questions, promoting discussion of various aspects of the simulations rather than the more open unstructured approach of allowing anyone to comment on any thoughts they had. The students stated that this latter format was intimidating; they found it uncomfortable at times to discuss their concerns or ask their questions. They suggested that specific questions asked by the instructor would help initiate the discussion. Additionally, the graduate students expressed a belief the simulated patients should have been better informed of the various objectives of each simulation, which would have allowed the simulated patients to provide more focused feedback. As an alternative, graduate students suggested having more clinical observers, such as dietitians, who could focus on those aspects. Moreover, the graduate students felt that the simulated patients thought the primary focus of the simulations was motivational interviewing and communication skills, and therefore most of their feedback revolved around how well the clinician was able to build rapport with the patient and how comfortable they felt during the session. Graduate students indicated they felt there was a slight disconnect between their goals and those of the simulated patients, resulting in a lack of feedback regarding the nutritional assessment, education, or counselling portion of the simulation:

…I think our approach is that we want to do both, like we want to use our motivational interviewing skills, like develop those skills, but we also want to become comfortable with the clinical side of it ((general mhmm)), whereas I think their agenda was more, like, focusing on motivational interviewing….so maybe that’s, the, disconnection, umm, between what our
expectations were going in versus what they would be giving to us… (Excerpt 45, graduate nutrition student, ID: 55, focus group, Phase 2)

5.2.2.5 Realism

The theme of Realism was derived from students’ evaluations of the believability of the simulations, the degree of correspondence between the simulation actors and simulations and real-life patients and clinical situations. The undergraduate and graduate nutrition students stated the simulations felt “real” and provided a unique learning opportunity to apply their knowledge and practice communicating with patients, perform physical assessments, practice various counselling techniques and help determine their personal counselling style in a safe environment. This experience helped the students feel confident and more prepared when thinking about interacting with patients in future practice as a dietitian:

…it did feel very real, I was listening to the patient, and putting all the different pieces together…really helped with my confidence, in actually diagnosing, or you know, assessing a patient…(Except 46, undergraduate nutrition student, ID: 10, focus group, Phase 1)

To help make the simulations more realistic, some undergraduate students requested that the patients have more challenging personalities. However, most suggested the current level of complexity was appropriate because it did not distract from the importance of practicing conducting a thorough physical assessment. Furthermore, undergraduate students would have preferred having more detailed information about the patients prior to the simulations, such as biochemical data, to help enhance the realism. The undergraduates also found that at times the simulations did not feel real as the appearance of the simulated patients was inconsistent with that expected from the assigned diagnosis. Nonetheless, working with apparently healthy individuals did not seem to detract from the value of the simulation sessions:

Yeah like I think sometimes its hard because they’re all very healthy individuals… they don’t actually have the disease type of thing, but ((pause)) at the same time I think that’s
like focusing on like the communication part of it…you’re walking in, you’re meeting a new person,…even going through the motions of like performing the assessment, its just super super beneficial (Excerpt 47, undergraduate nutrition student, ID: 1, focus group, Phase 1)

Although the overall consensus of the graduate students was that the simulations felt “real” enough to offer value as an educational tool, the results from graduate students in Phase 1 and 2 differed slightly. More students from Phase 1 than Phase 2 suggested that there was much room for improvement with regards to making the simulations feel more real, and therefore to increase their value. Students stated that at times the simulated patients were “too nice” and not complex or emotional enough compared to what they have seen from previous counselling sessions.

Versus like if you piss off a real patient they’re mad, and you know they’re mad ((laughs)) like they don’t hide that, whereas here for one, they don’t have the actual disease, and two I feel like because ((pause)) it’s not real, I feel like they are just like nicer (Excerpt 48, graduate nutrition student, ID: 27, focus group, Phase 1)

Phase 1 graduate students also found it unrealistic that they did not have chart notes or more detailed information on the patient to read through prior to the simulation as they would in real life. The students also stated that at times the simulated patients provided responses that were inconsistent with their symptomology, reducing the realism of the simulation session. Similarly, Phase 2 graduate students stated that at times the responses provided by the simulated patients were inconsistent with what was expected given the patients’ diagnoses, indicating that they may not have had all the necessary information needed to accurately portray their characters:

…I found that a little challenging just because they didn’t have that nutrition background, so, for example I was counselling someone on metabolic syndrome, and when I was asking for height, weight, like those sorts of things, none of it was what a typical metabolic syndrome patient would be… (Excerpt 49, graduate nutrition student, ID: 57, focus group, Phase 2)
The graduate students in Phase 2 did however find the simulations sufficiently real so as to provide the opportunity to practice skills and techniques in a safe environment without feeling the pressure of knowing it is a real patient:

… I feel like it was helpful, because you got to practice, and like figure out what specific questions is appropriate for that, umm, condition,…you can learn what questions to ask for what conditions, so that was really helpful…it was a good experience again to think on your toes and practice going through an assessment,…I do feel more confident in that sense. (Excerpt 50, graduate nutrition student, ID: 59, focus group, Phase 2)

In contrast to the Phase 1 graduate students, the Phase 2 graduate students did not report the simulations to be lacking emotion or complexity. On the contrary, students stated that as a way to help them ease into the simulation experience before tackling more complex scenarios, they would have preferred to have an introductory session with a patient who did not exhibit excess emotion or difficult personality traits. Furthermore, in some instances, students felt the simulated patient seemed unrealistically resistant, and stated that, in practice, if a patient was so resistant to change then they usually would not attend the session at all. Students identified that some resistance is realistic; however, too much is not. Thus, simulations in which the simulated patients were overly resistant detracted from the learning opportunity:

… a lot of the times the client was very very resistant right, and a lot of times in practice, if you’re facing a client that’s very resistant you can only really do what you can, but here we are still expected to go a step further beyond that…being reasonable with the resistance, I think is something that could be improved upon, cause if your client is not really saying anything,…like in practice would you have time for this?, would this really be something reasonable?, again, you know it’s great to have this practice here in a lower stakes environment…but at the same time it’s also being kind of reasonable in what we can really achieve. (Excerpt 51, graduate nutrition student, ID: 2, focus group, Phase 2)

5.2.3. Theatre Students

The theatre students who acted as simulated patients in the physical assessment and counselling sessions with the undergraduate and graduate nutrition students during Phase 1 expressed deriving value from the experience. Students described acquiring critical thinking skills while preparing for the
simulations, considering how their character would act and feel with their given disease/condition and when asked various questions during the assessment. Theatre students reported gaining confidence in their improvisational acting skills. In the past, most of the theatre students only had experience performing in plays and having to memorize lines. This experience was unique, as they frequently had to improvise while remaining consistent with their character and disease/condition: “Participating in this course as a standardized patient for nutrition students brought on some challenges and new situations that helped me to improve my acting and improvisation skills.” (Excerpt 52, theatre student, ID: 33, reflection assignment, Phase 1)

The theatre students also stated that through the simulation experience they felt more comfortable being touched and became more receptive to medical acting as a possibility in their future:

I am also excited to know that now that I have experienced patient simulation acting, and I have gained these specific skills needed to succeed, I can actually get a job at a teaching hospital if I wanted and continue learning about this process in a more professional setting. (Excerpt 53, theatre student, ID: 32, reflection assignment, Phase 1)

In terms of feedback designed to improve the course and enhance the learning opportunities it provides, the theatre students stated that they would have liked learning more about various acting theories and techniques prior to engaging in the simulations. They also wished to have the opportunity to practice what they learned in class in the simulations, and then discuss their experiences afterwards with their classmates and professor. The theatre students suggested having a peer or theatre professor (someone knowledgeable in acting techniques and theories) observe their performance in the simulations and receive feedback from the observer afterwards. Additionally, they would have liked to have a more thorough debriefing session after the simulations to gain feedback and constructive criticism on their acting skills. Finally, the theatre students stated that the reflection assignment was helpful for critically thinking about what they gained from the experience. However they would have
preferred to have additional smaller reflection assignments throughout the course, as it was hard to remember each simulation session by the end of the semester:

I am not sure if it would be helpful (or possible) to solicit feedback from the nutrition students or the observers, as their expertise does not lie in acting. I do wonder if it would be possible to include another observer in the sessions— even occasionally, someone who could provide feedback to the acting students so that we may get even more out of the experience… I am sure it would be helpful, as feedback is a valuable learning tool in people’s development as actors.

(Excerpt 54, theatre student, ID: 33, reflection assignment, Phase 1)
6.0 Discussion

This mixed-methods study involving quantitative and qualitative research methods investigated the impact of patient simulations on nutrition students’ self-reported and “other”-reported learning and confidence in regards to patient communication (undergraduate and graduate students), physical assessment (undergraduate), and counselling (graduate) skills. It also investigated the impact of patient simulations on theatre students’ learning and confidence related to improvisation and medical acting skills.

The hypothesis of the quantitative study was that participating in patient simulations would enhance the learning and confidence of undergraduate nutrition students enrolled in NUTR*4120 (Applied Clinical Skills, a fourth year elective in Applied Human Nutrition program), FRAN*6720 (mandatory course in the Masters of Applied Nutrition (MAN) program), and THST*3630 (Special Studies in Studio Practice, a third year elective in the Theatre Studies program). Specifically, we hypothesized that graduate nutrition students (FRAN*6720) would gain skills and confidence in using various counselling skills while interacting with challenging patients, and that undergraduate nutrition students (NUTR*4120) would gain skills and confidence in communicating with, and performing physical assessments on, simulated patients. Finally, we hypothesized that the theatre students (THST*3630) would gain medical acting and improvisation skills as simulated patients. While the nutrition and theatre students all suggested strategies to improve the simulation experiences, each group found that overall the simulations had a positive impact on their learning, confidence, and skills. The results of the quantitative and qualitative analyses are discussed in detail in the following sections in terms of patient communication skills, assessment skills and self-efficacy, as well as facilitators and barriers.
impacting simulation value. The results of the analysis of the focus group data with the theatre students are also discussed.

6.1 Patient Communication Skills

A ten-year review of standardized patient simulations in teaching and learning of health education found that standardized patients are most commonly used for teaching communication skills (May et al., 2009). Indeed, published studies have reported simulations to be useful in developing patient communication skills in dietetic students (Gibson & Davidson, 2015; Holthaus et al., 2015). In other areas of study, such as nursing, simulations with standardized patients have been deemed helpful for developing communication skills while completing an interview, performing a physical assessment and creating a plan for a patient (Decker, Sportsman, Puettz, & Billings, 2008).

In our study, the simulation experiences enhanced undergraduate and graduate nutrition students’ patient communication skills and competence, as captured quantitatively by student self-reports and evaluator assessments, and qualitatively by thematic analysis of focus group data and written reflections. Results suggest that simulations may enhance communication skills by allowing students the opportunity to practice interacting with a “patient” as a “dietitian,” and receive feedback for improving their communication skills in effectively gathering from, and providing appropriate information to, patients. Simulations also provide an opportunity to practice using counselling theories and building a relationship with the patient through verbal and nonverbal communication.

This study demonstrates that students perceive the simulations as being helpful in enhancing communication skills. Indeed, the theme Patient Communication Skills, which derived from students’ description of their improved communication skills as a result of interacting with
the simulated patients, was an integral part of the overarching theme, *Simulations are Valuable*. Quantitative and qualitative findings suggest that simulations provided an opportunity for students to practice interacting with strangers and gather nutrition information; such skills are most effectively developed with practice. Indeed, simulation models provide an authentic learning experience and an opportunity to integrate and apply the information acquired (Kuh, 2008). This has been reported in dietetics literature. Simulation experiences have been found to help to improve communication skills and allow dietetic students to be feel more prepared for the workplace, and to interact with patients, family members, and other health care professionals (ACEND, 2013; Nelms; Safii, 2011; Safaii, 2010; & Thompson & Gutschall, 2015).

Across Phase 1 and 2, and relative to the graduate students, the undergraduate students showed more consistent improvements in self-reported and “other”-reported patient communication skills and competence, which may reflect similarities in the number of baseline experiences interacting with patients to date among undergraduate students. Given their stage of training and education, most undergraduate students would not have had opportunities to interact with patients, or if they had, it most likely would not have been focused on conducting nutrition focused physical assessments. The simulations may have more appropriately placed the undergraduate nutrition students in their zone of proximal development than graduate nutrition students, which were reflected in the patient communication results (Vygotsky, 1978).

Conversely, graduate nutrition students may have had more prior opportunities than undergraduate students to enhance their communication skills through volunteering, employment, and placements within the MAN program, therefore making their baseline scores greater than those of the undergraduate students, and resulting in smaller improvements from Time 1 to 2. Perhaps if offered during the first semester of their program, rather than the second,
simulations may be more beneficial in enhancing students’ learning, helping to ensure students are in their zone of proximal development (Vygotsky, 1978). It is imperative that the learner be challenged with tasks that require skills and knowledge just beyond their current level of mastery to enhance learning (Bradley, 2011; Vygotsky, 1978). In this zone, the learner’s motivation is heightened and builds on previous triumphs to increase confidence (Brownstein, 2001). However, if the situation is not sufficiently challenging, or is too challenging, the opposite can result: decreased motivation and confidence, respectively. Some graduate students in Phase 1 expressed that the simulations were not sufficiently challenging, having experienced more “difficult” patient personalities and emotions in real life scenarios, such as in their placements. As a result, the simulations may have not reached their maximum potential for enhancing patient communication skills and confidence. However, each student will have different experiences and perspectives entering into the simulations, as other graduate students in both phases thought the simulations were appropriately challenging, and some even suggested having an “easy” first simulation without any personality “quirks” to help ease them into the simulation experience. Our results demonstrate the challenge of designing simulations that will place each student in their optimal zone of development. However, offering the simulations earlier in the program for the graduate students could help to enhance the patient communication skills gained and confidence associated with those skills.

6.2 Assessment Skills

Similar to patient communication skills, analysis of undergraduate and graduate nutrition students’ responses of the SET measure suggested that the students perceived that the simulation experiences helped to enhance their assessment skills and improve their understanding of the clinical conditions in the various simulation scenarios as seen in the quantitative (SET) and
qualitative (focus groups and reflections) results. Having a better understanding of the conditions will help nutrition students make clinical decisions with regards to what assessment data are relevant to gather, and what information would be most appropriate to include in patient education. After the simulations, the undergraduate nutrition students reported feeling more confident in clinical decision-making skills and their ability to comprehensively assess the nutritional status of real patients, to have developed a better understanding of the physical signs and/or symptoms of the conditions featured in the simulations, to have understood the classroom information better, and to feel better prepared to physically assess real patients. Similarly, the graduate nutrition students reported feeling more confident in decision-making skills in developing a client education or support plan, in assessing the overall nutritional needs of real patients, and in their ability to obtain and interpret relevant assessment data from real patients. Furthermore, they reported developing a better understanding of the conditions featured in the simulations, and how to better apply counselling theories.

These results were also reflected in the thematic analysis of qualitative data from the focus groups and written self-reflections as themes were produced capturing a perceived improvement in the undergraduate and graduate nutrition students’ assessment skills as one way in which the simulations had educational value. The theme of improvement in Assessment Skills contributed to development of the overarching theme of Simulations are Valuable. The Assessment Skills theme included the subtheme of Clinical Information Sharing Skills, which included nutrition Education (incorporating various counselling styles and techniques practiced by graduate nutrition students) and Gathering Information, which involved students gathering relevant information from the patient to complete a thorough assessment specific to the patient’s condition. The subtheme of Physical Assessment Skills was nested under the theme Assessment Skills.
Skills and was grounded in the thematic analysis specifically for undergraduate nutrition students, whose simulation learning outcomes included improving technical skills and becoming more comfortable touching a patient.

The finding of the thematic analysis indicating improvement in assessment skills with regards to gathering information, educating (and counselling for graduate nutrition students), and conducting physical assessments as a result of simulation experiences was supported by the Competencies Tool data that was “other”- reported by the evaluators. Nutrition care-related competency scores related to assessment improved from their first to final simulation in both undergraduate and graduate nutrition students. Simulations may be effective at enhancing these assessment skills because they are considered a high-impact educational practice allowing students an opportunity to integrate and apply information they have acquired in their educational programs, assisting with learning, retention and confidence for similar future scenarios (Kuh, 2008). The undergraduate students learned about conducting nutrition focused physical assessments, and the graduate students about counselling, then given the opportunity to apply their knowledge into practice through the simulations.

However, similar to communication skills, greater improvements in assessment skills and competence were found in the undergraduate nutrition students than in the graduate nutrition students in the quantitative analyses. This difference may be due to differential previous experiences (graduate students’ work, volunteer, placement experiences, etc.) resulting in greater baseline scores for graduate students as compared to undergraduate students and may possibly be explained by the zone of proximal development (Vygotsky, 1978). The undergraduate students showed more consistent improvements in their assessment skills and associated confidence due to the simulation exercises. Clear improvements in undergraduate students’ assessment skills
may have been the result of their similar lack of previous experience with conducting nutrition assessments; almost no undergraduate student would have had prior experience or exposure. The graduate students may have had more previous experience counselling and conducting nutrition assessments through their placements in the program as well as work/volunteer experiences and may be at different levels with regards to these skills and confidence within their cohort based on when they will have their clinical nutrition placement. As a result, it becomes more challenging to design simulations that will place each graduate student in their appropriate zone of proximal development. Offering the simulations close to the beginning of the program, such as during first semester, may help to ensure as many students as possible are in the zone of proximal development to gain maximum benefits from the simulations and enhance their assessment skills and confidence related to those skills. Moreover, there was more variability between the clinical scenarios with the graduate nutrition students making it more difficult to compare scores within each person between Time 1 and 2, as not all competencies may have been applicable. The variability may have reduced the within-student increase in nutrition-care related competencies from Time 1 to 2.

Our overall assessment findings, that simulations may be beneficial for enhancing learners’ assessment skills and confidence, are reflected in published simulation research in dietetics. Carroll et al (1983), Gibbs et al (2015) and Schwartz et al (2015) found that patient simulations could be used to teach and evaluate dietetic students’ interviewing, communication, and counselling skills. Gibbs et al (2015) and Schwartz et al (2015) found simulations to be helpful for dietetics students to have the opportunity to practice completing the Nutrition Care Process (assessment, diagnosis, intervention, monitoring and evaluation) and completing a full assessment with a patient (including initiating a session, gathering information, providing
Simulations were also found to be beneficial for increasing dietetics students’ exposure to, and understanding of, physical assessments, such as body composition, anthropometric measures and enteral nutrition practices (Halasa Esper et al., 2012; Lewis, 2014). While the results of these studies were mostly self-reported and subjective, together the findings suggest that simulations provide strong potential for increasing nutrition students/interns assessment skills with regards to clinical nutrition by helping them gain exposure, confidence, communication and nutrition-care related competencies.

The students’ learning experiences in the study and the results are informed by Kolb’s (1984) ELT as simulations act as the concrete experience that brings the class material to life. Following the simulations, the students had an opportunity to reflect (reflective observation) on the simulation experience (reflective assignments) and discuss the experience with their peers, observers, professors and simulated patients (SPs). Therefore, the reflections and debriefing sessions may have helped students to conceptualize (abstract conceptualization) the experience. In future situations the students can then apply their new knowledge and skills (active experimentation), producing feelings of enhanced confidence and perceived improved skill and actual increased skill seen through “other”- reported data collection measures.

Similarly, constructivist learning theory states that knowledge is constructed when an individual attaches meaning to an experience or activity and when the learning is an active process that includes dialogue, collaborative and cooperative learning (Merriam et al., 2007; Torre et al., 2006). Constructivist learning theory can occur in two realms, personal (internal) or social (external), both of which can be applied to simulations (Piaget, 1972; Vygotsky, 1978). Since simulations are active and interactive experiences, the students are constructing new knowledge personally (internally) through reflection (reflection assignments) and attaching
meaning using previous knowledge (accommodation) and incorporating it into their existing mental frameworks (assimilation), thereby enhancing their understanding and knowledge related to nutrition assessments (Piaget, 1972). Simulations would be considered a social interaction, as learning is being constructed socially, or externally (Vygotsky, 1978). Vygotsky (1978) stated that the most significant learning occurs when speech and practical activity converge. Such interactions could include simulations and students discussing their experience and providing feedback to one another during the debriefing sessions (Vygotsky, 1978). Simulations allow for internal and external learning to take place; therefore, constructivist learning theory can help to explain the results with regards to nutrition students gaining assessment skills and confidence in relation to those skills.

The simulations offer an opportunity for repetitive practice, which is one of the features that allow simulations to be effective at enhancing learning in medical education and may be applied to dietetics education (McGaghie et al, 2006). Having the opportunity to practice conducting nutrition assessments and counselling skills on several occasions may contribute to the demonstrated perceived and objective improvements in assessment skills and associated confidence. While the types of physical assessments, medical conditions and patients changed in each simulation, consistent aspects of a nutrition assessment, such as asking appropriate questions and gathering relevant information were common to all simulations, allowing the nutrition students the opportunity to build on those skills with each SP interaction.

6.3 Self-Efficacy

Nutrition students in our study perceived their self-efficacy to improve as a result of simulation experiences. Self-efficacy refers to one’s belief in their ability to accomplish something or succeed (Bandura, 1977). Bandura states that those with higher self-efficacy are
more likely to attempt mastering difficult tasks rather than to avoid them (Bandura, 1977). Self-efficacy is described as having strategies or tools for success and feeling confident (Skinner, Wellborn & Connell, 1990; Dweck, 1986). In this study, self-efficacy encompassed confidence, critical thinking and professionalism, themes that emerged consistently across quantitative (SET) and qualitative (focus groups, written reflections) analyses.

The SET demonstrated that undergraduate nutrition students perceived simulations to enhance their confidence in physically assessing real patients, clinical decision-making skills, and ability to comprehensively assess the nutritional status of real patients. Similarly, the results from the SET demonstrated that graduate nutrition students perceived simulations to enhance their ability to counsel challenging patients, decision-making skills pertaining to developing a client education or support plan following the simulation, ability to assess the overall nutritional needs of real patients, and ability to obtain and interpret relevant assessment data from real patients. The theme of Self-Efficacy was developed from the thematic analysis of focus groups and written reflections, which revealed undergraduate and nutrition students’ perceptions of enhanced confidence and comfort communicating and building relationships with patients as well as conducting physical assessments. Graduate nutrition students described an increase in their confidence and comfort counselling patients and utilizing various counselling theories. Our findings with regards to self-efficacy are consistent with those of previous dietetic simulation research in which nutrition students and dietetic interns reported that simulation experiences increased their self-efficacy and confidence in understanding clinical problems and interacting with, and counselling, patients (Gibbs et al., 2015; Henry et al., 2009; Holthaus et al., 2015; Miles et al., 2016; Nelms & Safii, 2011; Thompson & Gutscall, 2015). Studies conducted in other healthcare fields, such as medicine and nursing, have found that simulations helped to
enhance students’ confidence in future patient care (Khalaila, 2014; Levett-Jones & Lapkin, 2014; Lundberg, 2008; May, et al., 2009).

The simulation experiences may help to increase self-efficacy because students have the opportunity to practice skills in a low-risk environment, without the pressure or responsibility that may be associated with interacting with real patients. In support of this, McGahie and colleagues (2006) discuss the critical features that allow simulations to be effective at enhancing learning in medical education, stating that “simulations work best in controlled educational settings where learners can make, detect and correct patient care errors without negative consequences” (p. 793). In this type of environment, the students are able to feel more relaxed, and know that there will be minimal consequences for mistakes. In fact, mistakes are encouraged as they help students actively learn and grow as well as reduce the likelihood of making similar future mistakes. The low risk and controlled features of the simulation environment may be why simulations enhance students’ self-efficacy and confidence in their patient communication and assessment skills as future dietetic professionals.

Increasing the complexity of the simulations slowly allows the learner to be challenged with tasks just beyond their current level of mastery, resulting in students gaining more confidence in their skills by operating within the zone of proximal development (Vygotsky, 1978). The undergraduate students were exposed to different nutrition physical assessments over the trajectory of their course, with each subsequent one slowly becoming longer and more challenging medically and with respect to simulated patients’ personality characteristics. The graduate students were exposed to different personality characteristics and various medical conditions in the simulated patients; graduate students challenged themselves to try altering counselling theories/techniques and practiced educating patients on nutrition material pertaining
to the respective medical condition. Although there was an increase in self-efficacy and confidence in both undergraduate and graduate students, the increase was greater in the undergraduates. Moving the simulations to first semester, before the graduate students would have had any clinical placements, and increasing in complexity slowly with each simulation with regards to medical conditions and personality could have helped the simulations be more effective at enhancing the graduate students’ self-efficacy and confidence when thinking about interacting with real future patients.

The graduate students indicated wanting a stronger emphasis on the educational portion of the simulation; their increased confidence related mostly to their communication and counselling skills rather than the more clinical skills, such as knowledge surrounding the medical conditions and resources and strategies for providing nutrition education. The undergraduate nutrition students learned about communication skills and each physical assessment in great detail, and then were able to directly apply that knowledge in the simulations. The graduate nutrition students stated that they did not learn about how to provide nutrition education on these various medical conditions or various counselling theories during their coursework explicitly. An important feature of simulation success is that the simulations be integrated into the curriculum and complement the existing education and knowledge provided, which helps deepen students’ understanding of concepts (McGaghie et al., 2006; McGaghie et al., 2010). As compared with undergraduate students, the graduate students may have found the simulations to be less effective at enhancing their self-efficacy and confidence because they had not received adequate information surrounding nutrition education for the medical conditions during class time prior to simulation experiences.

Analysis of the SET scores demonstrated that both undergraduate and graduate nutrition
students perceived simulations to enhance their critical thinking in regards to practitioner-patient interactions. Thematic analyses of the focus groups and written reflections revealed that nutrition students perceived simulations to enhance their critical thinking (i.e., “thinking on the spot”) and increase their adaptability and flexibility while interacting with the simulated patients. They found their critical thinking was also enhanced due to the simulation-related activities, such as preparing for the simulations (considering appropriate resources, questions to ask; and in the case of graduate students, determining which counselling theories to utilize), reflecting on their simulation experiences, and receiving feedback from observers, peers, simulated patients, and professor. These activities provided opportunities for students to critically think about their personal counselling style, strengths and weaknesses as a clinician, and how to improve in future practice. Similarly, previous dietetic research has found that simulations help nutrition students and dietetic interns improve their critical thinking skills, clinical reasoning and knowledge (Miles et al., 2016; Thompson & Gutscall, 2015). Other studies in various healthcare fields, such as nursing and medicine, have also found simulations to be beneficial at enhancing critical thinking skills when adapting care for various “patients” ranging in medical conditions during simulated scenarios (Acton, 2015; Wane & Lotz, 2013).

Constructivist learning theory can help to explain the increase in critical thinking as a result of the simulations. As previously described, knowledge is constructed when meaning is attached to an experience or activity and when the learning is an active process (involving dialogue, collaborative and cooperative learning), such as simulations, and occurs through internal (personal) and external (social) realms (Merriam et al., 2007; Piaget, 1972; Torre et al., 2006; Vygotsky, 1978). Critical thinking can be produced as a result of reflection (internal construction of knowledge) and debriefing (external construction of knowledge), demonstrating
the realms of constructivist learning theory through simulation experiences. Gathering feedback, which occurs during the debriefing sessions (the external/social aspect of simulations) from observers, peers, simulated patients, and professor, has been cited in two studies as the most important component of medical simulations to ensure they are providing maximum educational benefit and may play a critical role in enhanced critical thinking as discussed by the nutrition students (McGaghie et al., 2006; McGaghie et al., 2010).

Thematic analysis of the focus group and written reflection data also revealed that nutrition students perceived the simulation experiences, and critical thinking involved, to enhance their professionalism and assist on their journey towards becoming a dietetic professional. Students appreciated having the opportunity to practice embodying a dietetic professional, and therefore discussed realizing their strengths and improvement areas. Professionalism was described by undergraduate students as the specific qualities, actions, and mannerisms of health care professionals, and by graduate students as becoming aware of one’s personal counselling style and remaining professional in a nutritional counselling session as well as interacting with patients with different diseases/conditions and personality characteristics. Ours is the first study to describe professionalism outcomes as a result of simulations in dietetics, making it difficult to contextualize our findings relative to others. However, preliminary studies have reported dietetic students and interns perceive simulation experiences to be beneficial in understanding their professional role in a health care team (Gibbs et al., 2015; Holthaus et al., 2015). Other healthcare fields, such as veterinary medicine, human medicine, and nursing, have found simulations to be effective in enhancing professionalism of students, which was seen through demonstrating commitment to professional ethics and having appropriate attitudes, behaviours and values towards patients to enhance their care (Baillie, Pierce, & May, 2010;
6.4 Facilitators and Barriers Impacting Value of Simulations

Thematic analysis identified various factors that may facilitate or impede a successful simulation session. Preparation for the simulations through previous knowledge gained from work and volunteer experiences, school courses, as well as researching their patient’s condition, gathering resources, and practicing with friends and family, was highlighted by undergraduate and graduate students (for graduate students specifically, prior placements were included). At times the students stated they would have liked more scenario information/knowledge surrounding various counselling theories and medical conditions, how to best provide nutrition education, and would have benefited from a demonstration illustrating what the assessment/counselling session should look like. As previously mentioned, an important design feature of simulations that enhances learning and confidence is ensuring that the simulations are integrated into the curriculum and complement existing education provided; these features allow students the opportunity to deepen their understanding of concepts (McGaghie et al., 2006; McGaghie et al., 2010). Therefore, the simulations may have been more beneficial for the graduate students if they received prior knowledge about counselling theories, medical conditions and nutrition education strategies. Similarly, both undergraduate and graduate students may have benefited from a demonstration of an assessment/counselling session prior to their first simulation. While the students expressed feeling more prepared for future assessment/counselling sessions after their simulation experiences, they stated wanting additional simulation experiences to feel more prepared for future situations. Some graduate nutrition students would have also liked more complex and emotional scenarios to help feel better prepared for communicating with real patients.
The results of this study found that students observing their peers was beneficial for learning different techniques and strategies and for gaining feedback on their strengths and ways to improve for future professional practice. On the SET, undergraduate and graduate nutrition students self-reported that they learned as much from observing their peers as they did when they interacted with the simulated patients (Table 5, undergraduate; 94.44% and Table 6, graduate; 83.33% somewhat and strongly agreed overall in both phases). Observing may allow students the opportunity to gain strategies and ideas for approaching different situations and help students feel more comfortable and confident entering their own simulations. Observing peers in the simulations may help students feel less intimidated, therefore placing the simulations within their zone of proximal development, just beyond their level of mastery, rather than perceiving the requirements of the simulations as unattainable and too challenging (Bradley, 2011; Vygotsky, 1978). Within this zone, students’ learning is enhanced and motivation is increased due to building on previous successes. Outside of the zone of proximal development, in the case of simulations which students perceive as too challenging, the result could be decreased motivation and confidence (Brownstein, 2001). The nutrition students, however, stated they felt their observers were “holding back,” and would have liked to receive more constructive criticism to advance their professional growth as clinicians.

Opportunities for reflection were found in this study to facilitate simulation value, as nutrition students described the benefits of reflecting on their simulation experiences during the “first impression” reflection notes, mini and meta reflection assignments (undergraduate nutrition students), and the personal counselling style reflection assignment (graduate nutrition students). These activities allowed the students to consider what they learned, their personal style and approach as a clinician, their strengths, areas and strategies for improvements. Constructivist
learning theory can help to explain how reflecting can potentially increase the effectiveness of simulations. Reflecting is a form of internal (personal) construction of knowledge and may have helped to enhance the effectiveness of the simulations at enhancing the students’ learning and confidence (Piaget, 1972). However, many of the graduate students would have preferred the assignment be less formal and research based, and to permit more personal reflection and discussion of various aspects of the simulations, rather than focusing solely on counselling theories.

Debriefing after the simulations was viewed as a positive aspect of simulation-related learning experiences, with respect to obtaining the patients’ perspective (e.g., on the students’ communication skills and ability to build the clinician-patient relationship), and receiving further feedback from peer observers, TAs, and professors regarding technical and clinical skills. The debriefing sessions provided an opportunity for students to ask each other questions and learn strategies and techniques, along with ways to improve. Both undergraduate and graduate nutrition students identified wishing to have more debriefing time immediately after the simulations to receive individualized feedback, and the graduate students would have preferred the large group debriefings to be more structured and receive additional clinical feedback. As previously mentioned, gathering feedback has been cited as the most important component of medical simulations to ensure they are providing maximum educational benefit (McGaghie et al., 2006; McGaghie et al., 2010); feedback may have played a critical role in the enhanced learning and confidence of the nutrition students found in this study. Indeed, students find feedback to be helpful, encouraging, and informative and that simulations provide an opportunity to practice concepts learned in program curricula and gather immediate feedback and knowledge regarding how to best reach their goals in future similar situations (Aronson et al., 1997; Gates, Fitzwater
& Telintelo, 2001; Gordon & Pawlowski, 2002; Hampl et al., 1999; Jeffries, 2005; Peterson & Bechtel, 2000). The immediate feedback received from debriefing reinforces the positive aspects of the experience, encourages reflective learning by allowing the student to link theory to practice, allows critical thinking, to enhances the quality of students’ education, and increases their confidence (Dreifuerst, 2009; Henry et al., 2009; Jeffries, 2005; Levett-Jones & Lapkin, 2014; Lundberg, 2008; McGaghie et al., 2006; Rauen, 2001).

To help further enhance the effectiveness of the simulations, the debriefing sessions and methods of providing feedback could be improved to allow for more individualized, rather than group, feedback. The debriefing sessions for the graduate students could be improved by providing more structure, which may help to ensure all aspects of the simulations are discussed, including clinical components. Rudolph et al (2008) proposed a four-step method for debriefing sessions to help ensure they are used most effectively, and may be applied to improve debriefing following dietetic simulations. The first step is highlighting the performance gaps associated with the predetermined objectives, and the second step is providing feedback related to those gaps. The third step is exploring the source of the gaps and investigating the “frames and emotions contributing to the current performance level” and the final step focuses on “closing the performance gap through discussion or targeted instruction about principles and skills relevant to performance” (Rudolph et al., 2008, p. 1010).

Finally, this study demonstrated the importance of the realism of simulations in their overall effectiveness as learning experiences. Students indicated the simulations felt real and provided a unique learning opportunity to apply their knowledge, and practice their communication, counselling, and physical assessment skills. However, at times both the undergraduate and graduate nutrition students found that the simulations could have been more
realistic by changing the scenarios/patients in various ways, such as patients having more challenging personalities, being more emotional, less resistant to change, and more consistent in their responses appropriately aligning with their given diagnoses. Some undergraduate and graduate nutrition students would have liked more detailed information about scenario patients, such as biochemical data, and chart notes to more realistically mimic a patient they may see in practice. An important feature of simulation success is simulation fidelity, that is, how “real” it feels and how accurately it represents clinical practice (McGaghie et al., 2006; McGaghie et al., 2010). It is important that simulations be authentic and include as many realistic environmental factors as possible and although a completely realistic simulation is rare, it is best to get as close an approximation as possible to promote better learning outcomes (Aronson et al., 1997; Cioffi, 2001; Hampl et al., 1999; Hotchkiss, Biddle & Fallacaro, 2002; Peterson & Bechtel, 2000). Therefore, the realism of the simulations may have contributed to their effectiveness at enhancing learning and confidence of nutrition students. If the realism is further improved it may help enhance future simulations, such as ensuring the theatre students have accurate information regarding appropriate symptoms and responses for their assigned medical conditions.

6.5 Theatre Students

Thus far, this thesis has focused primarily on the nutrition students’ experiences, but it is important to discuss the theatre students, as they were the simulated patients and therefore, the “intervention” for this study. While both undergraduate and graduate nutrition students benefitted from simulation experiences, the theatre students also expressed deriving value from acting as simulated patients. They identified gaining critical thinking skills during the preparation phase (when researching the medical conditions and thinking about how a patient would feel/act in that scenario with the given medical condition, and what communication and
counselling styles would be appropriate), gaining confidence in their improvisational acting skills during the simulations, and becoming more comfortable being touched, and more receptive to future medical acting.

As previously discussed with regards to the nutrition students, the zone of proximal development may aid in the explanation of these results. The theatre students may have been placed in their optimal zone and challenged with tasks that require skills and knowledge just beyond their current level of mastery, enhancing their critical thinking and confidence in improvisation skills and in their ability to do medical acting in the future (Bradley, 2011; Vygotsky, 1978; Brownstein, 2001).

Theatre students were reported to have benefited from SP acting in an article discussing the use of simulations in nursing education (Hart & Chilcote, 2015). The theatre students are presented with a unique opportunity to improve their medical acting and improvisational skills and gain experience that can be used towards future SP acting (Hart & Chilcote, 2015). The theatre students in our study recommended more structure and focus on their learning regarding various acting techniques and to receive more constructive criticism on their performances.

6.6 Study Limitations

While there are study strengths, discussed in the subsequent section, this research project is not without limitations, including threats to reliability, internal validity, and external validity. Reliability is the extent to which results could be generated again (in a different context, by another researcher, etc.) (Braun & Clarke, 2013). With respect to quantitative analyses of the undergraduate student data, the reliability of the Simulation Effectiveness Tool should be interpreted with caution, as the Cronbach’s alpha internal consistency value (Phase 1 and 2 combined) was lower (0.483) than the “acceptable” coefficient (0.70) in most social science
research (Field, 2013). This could be due to the small number of items, small sample size, lack of variability in participant responses, and/or the unrelatedness of tool items. Items should be related in that participants have similar responses for each question; drastically different responses between questions can suggest items are unrelated, decreasing the tool’s internal consistency (Field, 2013). However, since an almost identical tool was used with the graduate students, and the sample size was larger for the undergraduate students, it seems as though the lack of variability in the undergraduate students’ responses (typically “Strongly agree” or “somewhat agree”) may have resulted in low Cronbach’s alpha values.

Braun and Clarke (2013) discuss the reliability or, more appropriately in the context of qualitative research, the “trustworthiness” or “dependability” of qualitative methods, stating the “researcher inevitably influences the research process and knowledge produced” (p. 279) due to engagement with study participants and in the analyses. Trying to minimize the influence of the researcher, however, would negate the benefits of qualitative methods; qualitative researchers are often interested in individual subjective experiences (in this study, the impact of simulations on students’ learning and confidence and any suggestions students had for enhancing simulation effectiveness). Attempting to calculate the “inter-rater reliability” for qualitative coding, for example, can be problematic because that assumes that coding is objective. However, a strategy for calculating “inter-rater” reliability would be to have two or more researchers coding data independently, comparing codes, and calculating the level of agreement (using Cohen’s Kappa; Braun & Clarke, 2013). In this study, qualitative data analyses, and the generation of themes were reviewed by me and my co-advisors. However, I was the only researcher who coded the qualitative data (as opposed to having another coder and determining the level of agreement). I was also the sole researcher conducting the thematic analyses, making it difficult to determine
the reliability. It is important to acknowledge that results of the qualitative data analyses (and themes produced) depend on the standpoint and experience of the researcher, impacting the ability of results to be replicated in future studies.

However, the thematic analysis was inductive (i.e., grounded in participants’ transcribed experiences) and focused not on latent content but on semantic content (i.e., concerned with representing participants’ explicitly demonstrated experiences and meanings; Braun & Clarke, 2006, 2013). I adhered closely to the analytic steps outlined by Braun and Clarke and included illustrative quotations in the thesis intended to demonstrate not only the trustworthiness of the findings but also their credibility (which is the qualitative equivalent of internal validity (Braun & Clarke, 2013).

With respect to the quantitative results, there may also be threats to internal validity, which concerns whether results found are caused by the variables in question, rather than by other confounding factors (Braun & Clarke, 2013). Existing simulation literature suggests that dietetic simulations enhance students’ learning and confidence (D’Apice et al., 2013; Gibbs et al., 2015; Holthaus et al., 2015; Miles et al., 2016). Given that it would therefore have been unethical to deprive students of the simulation experiences we did not have a control group. This made it difficult to attribute results to simulations alone. Randomizing students to an experimental group and a control group, would have enabled us to attribute changes in student outcomes to the intervention (simulation experiences).

It is possible that maturation of students and history (changes due to the passage of time and experiences outside of simulations, such as other courses and placements) contributed to increased confidence and learning (Neuman, 2014). However, maturation and history may apply less to the graduate students, and more to undergraduate students participating in simulations.
throughout the semester, with months between the initial and final simulation. The graduate students participated in the simulations over a shorter time period, with a few weeks between initial and final simulations.

Instrumentation is a potential threat to internal validity when possible systematic errors are made in either what is being measured, in the observer, or in the recording device (Neuman, 2014). In this study, it is possible that systematic errors (which are due to a specific cause and which fall in one direction, rather than random errors that are usually not due to one specific cause and are presumed to cancel each other out) were made by the observers due to inconsistencies in the application of the Competencies Tool across observation points at Time 1 and 2. Scoring completed by the evaluators was significantly different across evaluators for the nutrition-related competencies (discussed in more detail in subsequent Strengths section). Compared to communication-related competencies, nutrition-related competencies may have been more challenging to assess as each evaluator may have had different experiences and level of knowledge pertaining to dietetics. These different experiences may explain scoring inconsistencies in the competency tool application. Based on these findings, it may be valuable to consider having only registered dietitians evaluating nutrition-care competencies in future simulations used in the training and education of nutrition students. However, it is important to note that despite evaluator differences, specifically the difference in one of the evaluator’s scores (decreasing overall scores from Time 1 to Time 2), compared to all other evaluators (all others evaluators had increasing overall scores from Time 1 to 2), this would not have increased the risk of Type 1 error in this study, which is that our findings are “false positive”; such that simulations were found to be effective in enhancing confidence and learning, when in actuality they are not. Rather, this evaluator difference could be potentially increasing Type II error, which are “false
negative” findings; such that simulations were found to be ineffective when in actuality they are in enhancing learning and confidence among nutrition students.

The graduate student simulations were also inconsistent due to the wider variety of medical conditions, resulting in a longer assessment tool to include all possible applicable competencies. Therefore “Not applicable” was selected inconsistently between evaluators, potentially causing the significant scoring differences (selecting “not applicable” resulted in “0” points awarded for that competency item, rather than “1”, “2” or “3” for “novice”, “advanced beginner” and “competent,” respectively).

Despite mixed-methods design advantages and collecting “other”-reported data, most data were self-reported (SET tool, focus groups, reflections). Self-reported data can be a limitation as we cannot be sure students were honest and self-aware of their development during the semester and across simulation experiences. Participant awareness of being in a research study, termed the Hawthorne effect, may have also impacted results (Franke & Kaul, 1978). The students may have felt pressured to report improvements in their responses (i.e., expectancy-related response bias) supporting learning benefits of simulations.

Finally, the sample size was relatively small (total of 69 students), and in studies containing small sample sizes, the ability to reach statistical significance can be impacted due to lack of power (Field, 2013). However, with our sample, some statistically significant results were still found in the quantitative analyses despite our sample size.

In addition to internal validity threats, there have been threats to external validity, which considers whether the study results can be generalized from the sample to a wider population (Braun & Clarke, 2013). The study population comprised a convenience sample of students enrolled in three courses, two of which (Applied Clinical Skills, Special Studies in Studio
Practice) were electives. Therefore, the sample was not randomized and results may have been affected by self-selection bias (Neuman, 2014), impacting generalizability to other undergraduate and graduate nutrition programs. Furthermore, the relatively small study sample (total of 69 students), affects external validity (in addition to internal validity) as generalizability of results to a larger population of undergraduate and graduate nutrition students is reduced (Field, 2013). Finally, the tools used to evaluate simulation effectiveness were adapted or created, as a validated simulation evaluation tool does not exist in dietetics. Therefore it was difficult to compare our results to those of other studies.

An additional limitation is the use of focus groups as a data collection measure. Focus groups differ from other methods because interactions between group members in a controlled environment can affect the results (Smithson, 2000). Therefore the discussions cannot be analyzed as if they are naturally occurring. Focus group data may have one (or several) dominant members, resulting in only certain opinions being heard. However, to try and reduce the effects of this limitation, I (the moderator and MSc student in Family Relations and Applied Nutrition), encouraged each focus group member to share an opinion on each question (Smithson, 2000). In this study, the goal was not to reach a consensus, but to have members share their experiences, and suggestions for simulation improvements. The focus group data was therefore not analyzed as a collective voice, but instead highlighted conflicting views and opinions. Smithson (2000) states that focus groups tend to reproduce normative discourses, implying that members express views that would be considered “normal” or “standard.” In this study, a “normative” opinion could be that simulations are valuable for educating nutrition students, and help to enhance learning and confidence. However, results of the focus group data analyses did not appear to demonstrate reservations from focus group participants regarding
opinions and suggestions for simulation improvements to enhance effectiveness. The focus group members had previously established a rapport with one another (were in the same class, NUTR*4120 for undergraduate students and FRAN*6720 for graduate students), which may have helped the students feel inclined to share “non-normative” ideas.

The moderator can also affect the group interaction (constructing the “other”), a strategy suggested for minimizing this bias is having a moderator of similar background to participants, helping increase comfort expressing their ideas and opinions (Smithson, 2000). In this study I was the moderator, and I was similar to the group members. At the time of focus group moderation, I was a MSc student in Family Relations and Applied Nutrition, with a Bachelor of Applied Science (Applied Human Nutrition) from the University of Guelph. I also previously took the Applied Clinical Skills course (NUTR*4120). Although this study made an effort to reduce limitations associated with focus group data and analyses, the results should still be interpreted with caution.

Finally, our study did not have multiple experimental/intervention conditions have to compare live simulation-based learning experiences and other forms of simulations, such as virtual. Nor did we have different conditions associated with the live simulation-based learning experiences to help determine the relative effectiveness of different aspects of the exercises on learning outcomes. As a result, we cannot be sure which aspects of the simulation experience (the enactment itself, observing, reflection, types of feedback and when, etc.) contributed most to objective student outcomes.

6.7 Study Strengths

The strengths of this study will now be discussed. First, this study addresses the call issued by the U.S. Academy of Nutrition and Dietetics for simulations in dietetics education (Thompson
and Gutschall, 2015). This call has been put forth due to the successful history of simulations used in training/education of other healthcare professionals, and the lack of supervised practice sites available for dietetics students, an issue in the United States and Canada (Brady et al., 2012; White & Beto, 2013). There is currently limited research that objectively evaluates simulation effectiveness in educating/training dietetic students/interns, although existing literature demonstrates that simulations may improve students’ and interns’ knowledge and/or clinical reasoning, communication skills and assessment skills (Dietitians of Canada, 2018). Therefore, more research, particularly using objective learning measures, is needed to evaluate simulation effectiveness in dietetics education/training to aid in future curricula incorporation. Our study in part addresses this gap.

Secondly, we used a mixed-methods approach (both quantitative and qualitative methodologies) and various means to answer our quantitative hypotheses. Specifically, our study involved the most commonly used mixed-methods approach: convergent parallel design (Creswell & Clark, 2011; Teddie & Tashakkori, 2009; Zoellner & Harris, 2017). Both quantitative and qualitative data are prioritized equally and timed to ensure data collection occurs during the same research phases. The quantitative and qualitative data are first analyzed independently, then merged to demonstrate how results are convergent or divergent. In this study, findings are convergent, as both sets of results complement and support one another, demonstrating simulation value in nutrition education/training. Mixed-method approaches are beneficial because weaknesses in each design are compensated by strengths in the other. For instance, quantitative study designs are generally considered objective and factual, while qualitative approaches assume subjective aspects due to unique perspectives and experiences. Therefore, through controlled experiments and probability sampling, quantitative designs allow...
for generalizations to larger populations, and inference of cause and effect. Alternatively, qualitative designs inductively incorporate the context and processes, and provide detailed descriptions including unique perceptions and overall experiences (Zoellner & Harris, 2017). In our study, the qualitative inquiry explored the experience of students as learners during simulation exercises to contextualize the quantitative analyses results. One method of data collection alone may not have provided this level and depth of information regarding simulation effectiveness in dietetics.

In this study, we collected “other”-reported data (evaluator-completed Competencies Tool) in addition to self-reported data (SET Tool, focus groups, written reflection). Within our self-reported data, the Cronbach’s alpha value for the graduate students’ SET was 0.917, indicating high reliability. The “other”-reported data helped to reduce subjectivity and social desirability bias to which self-reported data can be susceptible. This data gathered through the Competencies Tool, was further strengthened through a “calibration scenario” completed by evaluators to increase inter-rater reliability (as previously discussed in section 4.3.4). Inter-rater differences for study (as previously discussed in section 5.1.3 and 5.1.4) revealed no significant differences for communication related competencies in undergraduate and graduate nutrition students’ competency delta scores in Time 1 and 2. However, there were inter-rater differences for nutrition-care related competencies. Communication-related competencies are skills that remain consistent across scenarios and can be rated fairly by evaluators from different disciplines, thereby increasing our confidence in the assessment of communication-related competencies across evaluators. However, nutrition care-related competencies differ between scenarios, and require-evaluators familiar with nutrition care; therefore, it may be beneficial to
have evaluators with dietetics experience and knowledge, preferably RDs, to evaluate these performance indicators.

An additional study strength is the inclusion of pre- and post-simulation data/measures (quantitative study). This helped strengthen the likelihood that the simulations and their learning activities caused the self-reported and observed increases in students’ learning and confidence. Having baseline scores allowed for a comparison between where students started and their development following simulation experiences. Although definitive claims about causality cannot be made (see “Limitations” above), having pre and post data increases the likelihood that simulations caused the increase in learning and confidence compared to only post data. Furthermore, we studied both undergraduate and graduate nutrition students and discovered that simulations are beneficial at both stages of training.

Students’ performances during simulations were evaluated against practice competencies used nationally, “The Integrated Competencies for Dietetic Education and Practice” (Partnership for Dietetic Education and Practice, 2013). These competencies are used in combined practicum Masters programs and internships for professors/preceptors to evaluate dietetics students/interns on mastery of skills required for professional practice. Simulations, therefore, can help nutrition students gain competencies required to become dietetic professionals. Students were evaluated in a manner consistent with dietetic internships evaluations; that is, evaluated “authentically.” Authentic evaluation is an assessment of particular skills that closely resemble actual situations where those abilities are used, thereby helping to demonstrate meaningful application (Wiggins, 1993). Authentic assessment can help students see the relevance and importance of tasks and how it applies to future situations, compared to standardized testing that often includes memorizing facts for multiple choice exams (Mueller, 2008). This style of assessment can help
improve teaching and learning, requiring students to analyze, synthesize and apply what they have learned, often resulting in students creating new meaning in the construction of knowledge (Mueller, 2008).

Finally, while this study mainly focused on evaluating the effectiveness of simulations for dietetic education, data was also collected on the SPs (theatre students) to help improve their course structure/format to ensure learning is being maximized through medical acting in the simulations.

6.8 Recommendations for Simulations in Curriculum Development

Our study contributes to the growing body of literature supporting the effectiveness of patient simulations in dietetic education and training. Our findings suggest that dietetics students/interns perceive patient simulations positively, and as a valuable strategy for enhancing learning (patient communication skills, assessment skills), self-efficacy and confidence. Despite study limitations, analyses of all four measures of data collection, quantitative and qualitative, produced positive results that align with existing simulation literature.

To help ensure that simulations are as effective as possible, there are several recommendations for future simulations used in the training and education of nutrition students based on these study findings. Firstly, the material included in the simulations should be covered didactically in prior coursework to allow the simulations to deepen learning and existing knowledge. Second, for graduate programs that include placements, the simulations should be placed early in the curriculum to help ensure they will benefit as many students as possible. This helps to place simulations in students’ optimal zone of proximal development and serve as practice and preparation prior to placements with real patients. Third, both nutrition and theatre students highly valued feedback and the debriefing sessions; therefore, it is important to ensure
optimal time for debriefing and outlets for students to receive individualized feedback. The theatre students specifically wished to have more feedback and constructive criticism specific to acting skill and techniques. Fourth, the reflection assignments were valued by nutrition and theatre students, and are a beneficial when combined with simulations to ensure students are critically thinking about their strengths and areas for improvement. Finally, making efforts to ensure that the simulations feel as “real” as possible with regards to the simulated patients and design/complexity of the scenarios is important. This allows the nutrition students to feel like dietetic professionals. A commitment to realism helps students gain learning and confidence regarding communication and nutrition-care related competencies and allows the simulated patients to get into character as “real” patients, benefitting the learning of both parties.

While our study contributes to this growing literature, more studies are needed on simulations in dietetics education and training. These studies should include objective and validated tools to measure the effectiveness of simulations, and randomized control group designs. Currently, most studies existing in the dietetic simulation literature demonstrate subjective self-reported data and use varied non-validated tools to collect their data, making it challenging to compare findings and generalize results (Beshgetoor & Wade, 2007; Carroll et al., 1983; D’Apice et al, 2013; Estes-Doetsch et al., 2018; Gibbs et al., 2015; Gibson & Davidson, 2015; Halasa Esper et al., 2012; Hampl et al., 1999; Henry et al., 2009; Hsiao et al., 2016; Holthaus et al, 2015; Lewis, 2014; Miles et al., 2016; Pajak et al., 2016; Ritter Spier et al., 2018; Roberts et al., 2018; Smith et al., 2018; Sutnick & Carroll, 1981).

In the meantime, however, the findings of the present study support the value of incorporating simulations into existing dietetics curricula. Educators may be encouraged to incorporate patient simulations in the university classroom of existing undergraduate and
graduate courses focused on clinical nutrition as well as communication and counselling skills to educate students regarding nutrition focused physical assessments, nutritional counselling, communication, and clinical skills. Given the importance of applied learning in the sciences and the arts, and the expense of hiring professional SPs, the use of theatre students as simulated patients may be a practical and feasible option, allowing both groups of students to benefit from the experience.

Hart and Chilcote (2015) stated that the use of simulated patients is a well-established teaching strategy for developing nursing skills as it increases the realism of scenarios. However, barriers to using this educational tool include SP recruitment, scheduling issues, financial limitations, and quality of SP performances (Hart & Chilcote, 2015). Therefore, recommendations for future practice include creating an interdisciplinary course. One that encompasses students from different programs is mutually beneficial, which in the case of the Hart and Chilcote (2015) study involved theatre and nursing students (which can potentially be applied to theatre and nutrition students). Such a course can help decrease the financial and human resource barriers and improve the quality of simulation experiences (Hart & Chilcote, 2015). Hart and Chilcote (2015) suggested five learning outcomes for theatre students enrolled in simulated patient courses (four of which may apply to dietetics simulations): “development of techniques to create believable characters based on specific health care issues, development of techniques to foster improvisational skills, identification of the performance standards necessary for professional practice, and demonstration of professional etiquette in all performances” (p. 169).
7.0 Conclusions and Future Directions

In conclusion, this study demonstrates that simulated patient simulations are a valuable educational tool for nutrition students and interns to help increase confidence and competence in nutrition care and communication. Simulations are most effective if realistic, and if students have the opportunity to adequately prepare, observe, receive feedback through debriefing, and reflect. This method of education can be low-tech and cost-effective, but can also be time-consuming to design and implement. More research is needed to confirm the effectiveness of simulations in dietetic education, although this study, along with existing literature, suggest positive outcomes for enhancing learning and confidence.

Future simulation studies in dietetics should aim to use evaluators with similar dietetics knowledge, consistent scenarios and concise data collection tools, a control group, a validated tool, multiple experiential/intervention conditions, and possibly follow nutrition students further into their careers as dietetic professionals. Using evaluators with similar dietetics knowledge and experience allows for greater consistency, such as RDs for evaluating nutrition-care related competencies and the evaluators should receive adequate training to assess the relevant performance indicators. Future studies should aim to have the same scenario from Time 1 to 2, and a concise Competencies Tool, including only relevant items to that scenario. A comparison could be made using a comparable school as a control group in future studies, one that contains similar undergraduate and graduate nutrition programs, but does not include simulations as an educational strategy. A validated tool should be developed for evaluating simulation effectiveness in dietetics to make it easier to compare and generalize the results. Utilizing multiple experiential/intervention conditions to analyze other types of simulations (such as virtual) for education and training in dietetics, as well as isolating various aspects of the
simulation process to discover which sections contribute most to objective student learning outcomes. Finally, following nutrition students further into their careers as dietetic professionals may help to discover if the simulation experiences helped to aid in preparation for professional practice and usefulness for RDs, other dietetic professionals, and suggestions for improvements. As a result, it would become more apparent which aspects of the simulation experience (the enactment itself, observing, reflection, types of feedback and when, etc.) contributed most to objective student outcomes.
8.0 References


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9.0 Appendices

Appendix A: Consent Forms

Phase 1

Consent Form for Students Enrolled in NUTR*4120 and FRAN*6720:

Active and Authentic Learning: An Interdisciplinary Model for Applied Human Nutrition and Theatre Studies

Consent to Participate in Research

You are being asked to participate in a research study conducted by Dr. Andrea Buchholz, Dr. Clare MacMartin, Alexia Prescod, and Kaitlyn Vanderleest, all of the Department of Family Relations and Applied Nutrition, and Dr. Alan Filewod of the School of English and Theatre Studies. The study is being conducted as part of Kaitlyn’s MSc thesis.

PURPOSE OF THE STUDY
The purpose of this study is to evaluate the impact of patient simulations on the learning of undergraduate students in the Applied Human Nutrition and Student School of English and Theatre Studies programs, and of Masters of Applied Nutrition students.

PROCEDURES
If you volunteer to participate in this study, we would ask you to do the following:
- Read and sign this consent form
- Complete an adapted version of the Simulation Effectiveness Tool (approx. 15 min)
- Participate in an audio-recorded focus group with other students to discuss your simulation experiences (approx. 60 min) and allow the researchers to use direct quotes in data analysis for this study
- Allow the researchers to use excerpts from your written reflective papers, possibly direct quotes submitted as part of your course, in data analysis for this study. You will email Kaitlyn your written reflection without the grade you received as neither the grades nor the quality of your papers will be analyzed.

POTENTIAL RISKS AND DISCOMFORTS
The potential risk involved with participating in this research project is low. Filling out the Simulation Effectiveness Tool and discussing your simulation experiences in the focus group might make you feel nervous, embarrassed, or uncomfortable. You can decline to answer any questions. Should you feel the need to withdraw from the study for any reason, you may do so without consequences. Choosing to
participate or not to participate in this study will have no impact on your grades or standing in the course as the professor and TA will never know who participated in this study.

POTENTIAL BENEFITS TO PARTICIPANTS/SOCIETY
As a participant, you will have the opportunity to share your patient simulation experiences and help to improve the learning of undergraduate students in the Applied Human Nutrition and School of English and Theatre Studies programs. You will gain experience with the research process for possible future roles for you as a researcher.

We will also email you a copy of the group results from the Simulation Effectiveness Tool.

PROJECT INCENTIVES
If you participate in the focus group, you will receive a $10 gift card at the conclusion of the focus group. We will ask you to sign a document indicating that you have received the gift card. There are no other incentives for participating in any component of this study.

CONFIDENTIALITY
The research team will not use your name in any publications or presentations related to the data collected as part of this project. The participants in this focus group are asked not to discuss what was said during the sessions or who attended. Please note that focus groups are essentially a public process. Do not say anything you would not be comfortable saying in public. The instructors and TAs will never know who participated, as Kaitlyn will be the only one that ever has access to identified data. Data collected from this study will be used as part of a graduate student project and findings will be presented at an academic conference and submitted for publication in a scholarly journal. The hard copy of the research materials such as consent forms and questionnaires will be kept in Kaitlyn’s locker at the University of Guelph, which is located in a locked graduate student office in the Macdonald Stewart Hall building. After the publication of the results (anticipated to be Summer 2018) these documents will be destroyed following approved procedures. Electronic data will be stored on Kaitlyn’s encrypted computer, and will be deleted in Summer 2018.

PARTICIPATION AND WITHDRAWAL
You can choose whether or not to participate in this study. If you choose to participate, you can withdraw at any time without consequences. You may refuse to answer questions on the Simulation Effectiveness Tool survey and during the focus group and still remain in the study. You may also ask the student investigator to remove your Simulation Effectiveness Tool responses, and your written reflective papers, from the study dataset. Once focus groups are finished, however, your responses will remain in the transcript and subsequent analyses.

You will receive a scanned copy of this signed consent form, via email.

RIGHTS OF RESEARCH PARTICPANTS
You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, right or remedies because of your participation in this research project. This study has been reviewed and received ethics clearance through the University of Guelph Research Ethics Board. If you have any questions of your rights as a research participant, please contact the Director of Research Ethics, Sandy Auld, at 437 University Centre, Guelph, ON N1G 2W1. Phone: 519-824-4120
RESEARCH INSTITUTE AND RESEARCHERS
The researchers at the University of Guelph who are conducting this project are listed below. Please feel free to contact any of us at any time with questions:
- Dr. Andrea Buchholz, Principal Investigator, Department of Family Relations and Applied Nutrition, University of Guelph, 519-824-4120 ext. 52347; abuchhol@uoguelph.ca
- Dr. Clare MacMartin, Co-Investigator, Department of Family Relations and Applied Nutrition, University of Guelph, 519-824-4120 ext. 52419; cmacmart@uoguelph.ca
- Professor Alexia Prescod, Co-Investigator, Department of Family Relations and Applied Nutrition, University of Guelph, 519-824-4120 ext. 52611; aprescod@uoguelph.ca
- Dr. Alan Filewod, Co-Investigator, School of English and Theatre Studies, University of Guelph, 519-824-4120 ext. 53881; afilewod@uoguelph.ca

The graduate student research assistant at the University of Guelph involved in this project is listed below. Please feel free to contact her at any time with questions.
- Kaitlyn Vanderleest, BASc, MSc Student, Research Assistant, Department of Family Relations and Applied Nutrition; vanderlk@mail.uoguelph.ca

SIGNATURE OF RESEARCH PARTICIPANT
I have read the information provided for the study “Active and Authentic Learning: An Interdisciplinary Model for Applied Human Nutrition and Theatre Studies.” My questions have been answered to my satisfaction and I agree to participate in the following components of this study (check all that apply):

☐ I agree to complete the adapted version of the Simulation Effectiveness Tool
☐ I grant permission for the researchers to use excerpts from my reflective paper, possibly direct quotes, submitted as part of the curriculum for this course in publications and at academic conference presentations
☐ I agree to participate in an audio recorded 60-minute focus group to discuss my simulation experiences and allow the researchers to use direct quotes in data analysis for this study and possibly in publications and at academic conference presentations

Name of Participant (please print)

___________________________________
Signature of Participant

Date

SIGNATURE OF WITNESS

Name of Witness (please print)

___________________________________
Signature of Witness

Date
Active and Authentic Learning: An Interdisciplinary Model for Applied Human Nutrition and Theatre Studies

Consent to Participate in Research

You are being asked to participate in a research study conducted by Dr. Andrea Buchholz, Dr. Clare MacMartin, Alexia Prescod, and Kaitlyn Vanderleest, all of the Department of Family Relations and Applied Nutrition, and Dr. Alan Filewod of the School of English and Theatre Studies. The study is being conducted as part of Kaitlyn’s MSc thesis.

PURPOSE OF THE STUDY
The purpose of this study is to evaluate the impact of patient simulations on the learning of undergraduate students in the Applied Human Nutrition and Student School of English and Theatre Studies programs, and of Masters of Applied Nutrition students.

PROCEDURES
If you volunteer to participate in this study, we would ask you to do the following:
- Read and sign this consent form
- Participate in an audio-recorded focus group with other students to discuss your simulation experiences (approx. 60 min) and allow the researchers to use direct quotes in data analysis for this study
- Allow the researchers to use excerpts from your written reflective papers, possibly direct quotes submitted as part of your course, in data analysis for this study. You will email Kaitlyn your written reflection without the grade you received as neither the grades nor the quality of your papers will be analyzed.

POTENTIAL RISKS AND DISCOMFORTS
The potential risk involved with participating in this research project is low. Discussing your simulation experiences in the focus group might make you feel nervous, embarrassed, or uncomfortable. You can decline to answer any questions. Should you feel the need to withdraw from the study for any reason, you may do so without consequences. Choosing to participate or not to participate in this study will have no impact on your grades or standing in the course as the professor and TA will never know who participated in this study.

POTENTIAL BENEFITS TO PARTICIPANTS/SOCIETY
As a participant, you will have the opportunity to share your patient simulation experiences and help to improve the learning of undergraduate students in the Applied Human Nutrition and School of English and Theatre Studies programs. You will gain experience with the research process for possible future roles for you as a researcher.

PROJECT INCENTIVES
If you participate in the focus group, you will receive a $10 gift card at the conclusion of the focus group. We will ask you to sign a document indicating that you have received the gift card. There are no other incentives for participating in any component of this study.

CONFIDENTIALITY
The research team will not use your name in any publications or presentations related to the data collected as part of this project. The participants in this focus group are asked not to discuss what was said during the sessions or who attended. Please note that focus groups are essentially a public process. Do not say anything you would not be comfortable saying in public. The instructors and TAs will never know who participated, as Kaitlyn will be the only one that ever has access to identified data. Data collected from this study will be used as part of a graduate student project and findings will be presented at an academic conference and submitted for publication in a scholarly journal. The hard copy of the research materials such as consent forms and questionnaires will be kept in Kaitlyn’s locker at the University of Guelph, which is located in a locked graduate student office in the Macdonald Stewart Hall building. After the publication of the results (anticipated to be Summer 2018) these documents will be destroyed following approved procedures. Electronic data will be stored on Kaitlyn’s encrypted computer, and will be deleted in Summer 2018.

PARTICIPATION AND WITHDRAWAL
You can choose whether or not to participate in this study. If you choose to participate, you can withdraw at any time without consequences. You may refuse to answer questions during the focus group and still remain in the study. You may also ask the student investigator to remove your Simulation Effectiveness Tool responses, and your written reflective papers, from the study dataset. Once focus groups are finished, however, your responses will remain in the transcript and subsequent analyses.

You will receive a scanned copy of this signed consent form, via email.

RIGHTS OF RESEARCH PARTICPANTS
You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, right or remedies because of your participation in this research project. This study has been reviewed and received ethics clearance through the University of Guelph Research Ethics Board. If you have any questions of your rights as a research participant, please contact the Director of Research Ethics, Sandy Auld, at 437 University Centre, Guelph, ON N1G 2W1. Phone: 519-824-4120 ext. 56606; FAX: 519-821-5236; Email: reb@uoguelph.ca

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- Professor Alexia Prescod, Co-Investigator, Department of Family Relations and Applied Nutrition, University of Guelph, 519-824-4120 ext. 52611; aprescod@uoguelph.ca
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The graduate student research assistant at the University of Guelph involved in this project is listed below. Please feel free to contact her at any time with questions.
- Kaitlyn Vanderleest, BASc, MSc Student, Research Assistant, Department of Family Relations and Applied Nutrition; vanderlk@mail.uoguelph.ca

SIGNATURE OF RESEARCH PARTICIPANT
I have read the information provided for the study “Active and Authentic Learning: An Interdisciplinary Model for Applied Human Nutrition and Theatre Studies.” My questions have been answered to my satisfaction and I agree to participate in the following components of this study (check all that apply):

☐ I grant permission for the researchers to use excerpts from my reflective paper, possibly direct quotes, submitted as part of the curriculum for this course in publications and at academic conference presentations
☐ I agree to participate in an audio recorded 60-minute focus group to discuss my simulation experiences and allow the researchers to use direct quotes in data analysis for this study and possibly in publications and at academic conference presentations

___________________________________
Name of Participant (please print)

___________________________________                      _______________
Signature of Participant                                        Date

SIGNATURE OF WITNESS

___________________________________
Name of Witness (please print)

___________________________________                      _______________
Signature of Witness                                             Date
Active and Authentic Learning: An Interdisciplinary Model for Applied Human Nutrition and Theatre Studies

Consent to Participate in Research-FRAN*6720

You are being asked to participate in a research study conducted by Dr. Andrea Buchholz, Dr. Clare MacMartin, Alexia Prescod, and Kaitlyn Vanderleest, all of the Department of Family Relations and Applied Nutrition, and Dr. Alan Filewod of the School of English and Theatre Studies. The study is being conducted as part of Kaitlyn’s MSc thesis.

PURPOSE OF THE STUDY
The purpose of this study is to evaluate the impact of patient simulations on the learning of undergraduate students in the Applied Human Nutrition and of Masters of Applied Nutrition students.

PROCEDURES
If you volunteer to participate in this study, we would ask you to do the following:
- Read and sign this consent form
- Complete an adapted version of the Simulation Effectiveness Tool (approx. 15 min)
- Participate in an audio-recorded focus group with other students to discuss your simulation experiences (approx. 60 min) and allow the researchers to use direct quotes in data analysis for this study
- Allow the researchers to use your evaluation forms that were completed during your first and final simulations in data analysis for this study

POTENTIAL RISKS AND DISCOMFORTS
The potential risk involved with participating in this research project is low. Filling out the Simulation Effectiveness Tool, allowing Kaitlyn (graduate research assistant) to view your evaluation forms and discussing your simulation experiences in the focus group might make you feel nervous, embarrassed, or uncomfortable. You can decline to answer any questions. Should you feel the need to withdraw from the study for any reason, you may do so without consequences. Choosing to participate or not to participate in this study will have no impact on your grades or standing in the course as the professor and TA will never know who participated in this study.

POTENTIAL BENEFITS TO PARTICIPANTS/SOCIETY
As a participant, you will have the opportunity to share your patient simulation experiences and help to improve the learning of undergraduate students in the Applied Human Nutrition. You will gain experience with the research process for possible future roles for you as a researcher.
We will also email you a copy of the group results from the Simulation Effectiveness Tool and evaluation forms.

**PROJECT INCENTIVES**
If you participate in the focus group, you will receive a $10 gift card at the conclusion of the focus group. We will ask you to sign a document indicating that you have received the gift card. There are no other incentives for participating in any component of this study.

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The researchers at the University of Guelph who are conducting this project are listed below. Please feel free to contact any of us at any time with questions:
- Dr. Andrea Buchholz, Principal Investigator, Department of Family Relations and Applied Nutrition, University of Guelph, 519-824-4120 ext. 52347; abuchhol@uoguelph.ca
- Dr. Clare MacMartin, Co-Investigator, Department of Family Relations and Applied Nutrition, University
The graduate student research assistant at the University of Guelph involved in this project is listed below. Please feel free to contact her at any time with questions.

- Kaitlyn Vanderleest, BASc, MSc Student, Research Assistant, Department of Family Relations and Applied Nutrition; vanderlk@mail.uoguelph.ca

SIGNATURE OF RESEARCH PARTICIPANT
I have read the information provided for the study “Active and Authentic Learning: An Interdisciplinary Model for Applied Human Nutrition and Theatre Studies.” My questions have been answered to my satisfaction and I agree to participate in the following components of this study (check all that apply):

☐ I agree to complete the adapted version of the Simulation Effectiveness Tool
☐ I grant permission for Kaitlyn Vanderleest (graduate student researcher) to use my evaluation forms that were completed as part of the curriculum for this course in publications and at academic conference presentations
☐ I agree to participate in an audio recorded 60-minute focus group to discuss my simulation experiences and allow the researchers to use direct quotes in data analysis for this study and possibly in publications and at academic conference presentations

___________________________________
Name of Participant (please print)

___________________________________                                      _______________
Signature of Participant                                                                       Date

SIGNATURE OF WITNESS

___________________________________
Name of Witness (please print)

___________________________________                                      _______________
Signature of Witness                                                                       Date
Active and Authentic Learning: An Interdisciplinary Model for Applied Human Nutrition and Theatre Studies

Consent to Participate in Research-NUTR*4120

You are being asked to participate in a research study conducted by Dr. Andrea Buchholz, Dr. Clare MacMartin, Alexia Prescod, and Kaitlyn Vanderleest, all of the Department of Family Relations and Applied Nutrition, and Dr. Alan Filewood of the School of English and Theatre Studies. The study is being conducted as part of Kaitlyn’s MSc thesis.

PURPOSE OF THE STUDY
The purpose of this study is to evaluate the impact of patient simulations on the learning of undergraduate students in the Applied Human Nutrition and of Masters of Applied Nutrition students.

PROCEDURES
If you volunteer to participate in this study, we would ask you to do the following:
- Read and sign this consent form
- Allow the researchers to use the evaluation forms that were completed during your first and final simulations in data analysis for this study.

POTENTIAL RISKS AND DISCOMFORTS
The potential risk involved with participating in this research project is low. Allowing the researcher to view your evaluation forms might make you feel nervous, embarrassed, or uncomfortable. Should you feel the need to withdraw from the study for any reason, you may do so without consequences. Choosing to participate or not to participate in this study will have no impact on your grades or standing in the course as the professor and TA will never know who participated in this study.

POTENTIAL BENEFITS TO PARTICIPANTS/SOCIETY
As a participant, you will have the opportunity to share your patient simulation experiences and help to improve the learning of undergraduate students in the Applied Human Nutrition. You will gain experience with the research process for possible future roles for you as a researcher.

We will also email you a copy of the group results from the evaluation forms.

PROJECT INCENTIVES
There are no incentives for participating in any component of this study.

CONFIDENTIALITY
The research team will not use your name in any publications or presentations related to the data.
collected as part of this project. The instructors and TAs will never know who participated, as Kaitlyn will be the only one that ever has access to identified data. Data collected from this study will be used as part of a graduate student project and findings will be presented at an academic conference and submitted for publication in a scholarly journal. The hard copy of the research materials such as consent forms will be kept in Kaitlyn’s locker at the University of Guelph, which is located in a locked graduate student office in the Macdonald Stewart Hall building. After the publication of the results (anticipated to be Summer 2018) these documents will be destroyed following approved procedures. Electronic data will be stored on Kaitlyn’s encrypted computer, and will be deleted in Summer 2018.

PARTICIPATION AND WITHDRAWAL
You can choose whether or not to participate in this study. If you choose to participate, you can withdraw at any time without consequences. You may ask the student investigator to remove your evaluation forms from the study dataset.

You will receive a scanned copy of this signed consent form, via email.

RIGHTS OF RESEARCH PARTICIPANTS
You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, right or remedies because of your participation in this research project. This study has been reviewed and received ethics clearance through the University of Guelph Research Ethics Board. If you have any questions of your rights as a research participant, please contact the Director of Research Ethics, Sandy Auld, at 437 University Centre, Guelph, ON N1G 2W1. Phone: 519-824-4120 ext. 56606; FAX: 519-821-5236; Email: reb@uoguelph.ca

RESEARCH INSTITUTE AND RESEARCHERS
The researchers at the University of Guelph who are conducting this project are listed below. Please feel free to contact any of us at any time with questions:
- Dr. Andrea Buchholz, Principal Investigator, Department of Family Relations and Applied Nutrition, University of Guelph, 519-824-4120 ext. 52347; abuchhol@uoguelph.ca
- Dr. Clare MacMartin, Co-Investigator, Department of Family Relations and Applied Nutrition, University of Guelph, 519-824-4120 ext. 52419; cmacmart@uoguelph.ca
- Professor Alexia Prescod, Co-Investigator, Department of Family Relations and Applied Nutrition, University of Guelph, 519-824-4120 ext. 52611; aprescod@uoguelph.ca
- Dr. Alan Filewod, Co-Investigator, School of English and Theatre Studies, University of Guelph, 519-824-4120 ext. 53881; afilewod@uoguelph.ca

The graduate student research assistant at the University of Guelph involved in this project is listed below. Please feel free to contact her at any time with questions.
- Kaitlyn Vanderleest, BASc, MSc Student, Research Assistant, Department of Family Relations and Applied Nutrition; vanderlk@mail.uoguelph.ca

SIGNATURE OF RESEARCH PARTICIPANT
I have read the information provided for the study “Active and Authentic Learning: An Interdisciplinary Model for Applied Human Nutrition and Theatre Studies.” My questions have been answered to my satisfaction and I agree to participate in the following components of this study (check all that apply):
☐ I grant permission for Kaitlyn Vanderleest (graduate student researcher) to use my evaluation forms that were completed as part of the curriculum for this course in publications and at academic conference presentations.

Name of Participant (please print)

Signature of Participant ___________________________ Date

SIGNATURE OF WITNESS

Name of Witness (please print)

Signature of Witness ___________________________ Date
Appendix B: Sample Simulation Scenarios

NUTR*4120

Simulation scenario description provided to undergraduate nutrition students:

**Subjective Global Assessment (SGA) Scenario I**

**Feb 1**

<table>
<thead>
<tr>
<th>Patient profile</th>
<th>Pt has Crohn’s disease, first Dx at age 18. Was hospitalized over Christmas w/ a flare-up. Underwent partial resection of small bowel (part of jejunum, some distal duodenum). Discharged home in early January, on a soft diet. Is wishing to return to work next week. Meds: Salofalk (anti-inflammatory), sulphasalazine (antibiotic) and Metamucil (stool bulking agent).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>25 years old</td>
</tr>
<tr>
<td>Gender</td>
<td>F</td>
</tr>
<tr>
<td>SES background</td>
<td>Computer programmer</td>
</tr>
<tr>
<td>Reason for patient interacting with the clinician</td>
<td>Is at the GI outpatient clinic to check in with the dietitian to review symptoms, and for SGA. Last SGA screening, done in hospital, revealed level C (severely malnourished).</td>
</tr>
<tr>
<td>Any other relevant factors (e.g., mobility issues, eating disorder, etc.)</td>
<td>Lives in Toronto. Takes the TTC to work. Lives with her partner, who is supportive.</td>
</tr>
<tr>
<td>Few words describing response to clinician</td>
<td>(BLINDED)</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Desired outcome of this scenario</td>
<td>Nutrition students should be able to rate the patient at SGA ______ by asking probing questions and doing a basic physical exam.</td>
</tr>
</tbody>
</table>

Simulation scenario description provided to theatre students:

**Subjective Global Assessment (SGA) Scenario I (for SP)**

**Feb 1**

<table>
<thead>
<tr>
<th>Patient profile</th>
<th>Patient has Crohn's disease, first diagnosed at age 18. Was hospitalized over Christmas with a flare-up. Underwent partial resection of small bowel (partial jejunum, partial duodenum). Discharged home in early January, on a soft diet. Is wishing to return to work next week. Patient currently taking Salofalk (anti-inflammatory), sulphasalazine (antibiotic) and Metamucil (stool bulking agent).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>25 years old</td>
</tr>
<tr>
<td>Gender</td>
<td>F</td>
</tr>
<tr>
<td>SES background</td>
<td>Computer programmer</td>
</tr>
<tr>
<td>----------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Reason for patient interacting with the clinician</td>
<td>Is at the GI outpatient clinic to check in with the dietitian to review symptoms, and for SGA assessment. Last SGA screening, done in hospital, revealed level C (severely malnourished).</td>
</tr>
<tr>
<td>Any other relevant factors (e.g., mobility issues, eating disorder, etc.)</td>
<td>Lives in Toronto. Takes the TTC to work. Lives with her partner, who is supportive.</td>
</tr>
<tr>
<td>Few words describing response to clinician</td>
<td>[You are pleasant and cooperative]</td>
</tr>
<tr>
<td></td>
<td>(See accompanying SGA form)</td>
</tr>
</tbody>
</table>

**Dietary Intake**
Your food intake has improved since coming home from the hospital. You’re consuming mostly soft foods (eggs, pasta, yogurt, applesauce, etc.) and liquids. A few days ago, you introduced more solid foods - some meat and raw fruits and vegetables. So far, you’re feeling OK, but you’re also a little nervous about returning to a regular diet because you don’t want to get sick again, so you’re not eating quite as much as you did before the flare-up.

**Weight**
You will be weighed by the nutrition student. You have “gained” 5 lbs since you were discharged from the hospital, but you’re still not up to your usual pre-flare-up weight [if asked your usual weight, add 10 lbs to your actual current weight].

**Symptoms**
- Overall, your appetite is not great, and you get full quickly when you eat. This has been getting better over the past week or two - that’s why you’re trying some more solid foods.
- You have some diarrhea, but your stools in the past few days have become more formed.

**Functional Capacity**
While you’re not back at the gym quite yet, you take your dog for short walks, do the groceries, light housekeeping, etc. You can feel yourself getting stronger. You plan on doing a yoga class with your partner later this week.

**Physical Examination**
The nutrition student will do a brief physical exam, and which may include feeling your temples, and looking at your shoulders, collar bone, back, hips, hands, arms, thighs and knees.

| Desired outcome of this scenario | Nutrition students should be able to rate the patient at SGA level B (moderately malnourished) by asking probing questions and doing a basic physical exam. |

FRAN*6720

Title: Recent DM 2 Diagnoses
Objective: Build rapport with a client and goal setting

Simulation scenario description provided to graduate nutrition students:

<table>
<thead>
<tr>
<th>Profile for Client</th>
<th>B.T.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>30</td>
</tr>
<tr>
<td>Gender</td>
<td>Female</td>
</tr>
<tr>
<td>SES background</td>
<td>Legal secretary family law office; married with 2 children</td>
</tr>
<tr>
<td>Reason for client referral</td>
<td>Referred by MD due to recent diagnosed with Type II Diabetes Mellitus Diet education for DM</td>
</tr>
<tr>
<td>Labs</td>
<td>Total Cholesterol: 4.5 mmol/L LDL Cholesterol: 2.6 mmol/L HDL Cholesterol: 1.2 mmol/L Triglycerides: 2.3 mmol/L</td>
</tr>
</tbody>
</table>

Simulation scenario description provided to theatre students:

<table>
<thead>
<tr>
<th>Profile for Client</th>
<th>B.T.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>30</td>
</tr>
<tr>
<td>Gender</td>
<td>Female</td>
</tr>
<tr>
<td>SES background</td>
<td>Legal secretary family law office; married with 2 children</td>
</tr>
<tr>
<td>Reason for client interacting with the</td>
<td>Referred by MD due to recent diagnosed with Type II Diabetes Mellitus. Has read information on the Canadian</td>
</tr>
<tr>
<td>clinician</td>
<td>Diabetes website <a href="https://www.diabetes.ca/about-diabetes">https://www.diabetes.ca/about-diabetes</a>, but does not understand what A1C means and not sure how to make all the changes recommended. Recently cut out all desserts and is limiting bad carbs (only desserts, potatoes and rice). She hasn't made any other changes as her schedule dictates her meal timing and choice.</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Any other relevant factors (e.g., mobility issues, eating disorder, etc.)</td>
<td>* don't reveal lack of cooking skills and resistance to new recipes until prompted by RD. B.T. has a hectic lifestyle and is always on the go with work and chauffeuring her kids to various activities. Her and her family often go for walks to the park with their Golden Retriever Molly. B.T.’s husband, A.T. works varying shifts as a police officer and is infrequently home for dinner. <strong>A.T. does most cooking when at home and does have good cooking skills.</strong> B.T. is very resistant to learning new recipes or cooking ideas. She feels that even if she did learn her children would not eat the new &amp; healthier foods. Every other Tuesday she attends a yoga class with her girlfriends usually followed by a trip to a local cafe for snacks and a latte.</td>
</tr>
<tr>
<td>Few words describing response to clinician</td>
<td>B.T. is having trouble figuring out what to do after reading about DM. She see many barriers to change….ie. time, expense, hassle, fear, “I know I need to, but …”)</td>
</tr>
<tr>
<td>What is the outcome which you, as instructors, want for your students from the exchange with the SP?</td>
<td>Build rapport with client Increase client’s self-confidence to adopt new behaviours Discuss and resolve barriers Encourage support networks</td>
</tr>
<tr>
<td>Prep for simulation</td>
<td><strong>Bring a written 3-day food record that reflects a diet of take out meals and meals prepared from frozen (lasagne or chicken fingers etc) that do not include sweets and ‘bad crabs’</strong></td>
</tr>
</tbody>
</table>
Appendix C: Simulation Effectiveness Tool

Original Simulation Effectiveness Tool (Elfrink Cordi et al., 2012)

Please circle the number that best reflects your opinion about your simulation experience.

<table>
<thead>
<tr>
<th></th>
<th>Do Not Agree</th>
<th>Somewhat Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>The instructors questions helped me to critically think</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>I feel better prepared to care for real patients</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>I developed a better understanding of the pathophysiology of the conditions in the SCE</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>I developed a better understanding of the medications that were in the SCE</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>I feel more confident in my decision making skills</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>I am more confident in determining what to tell the healthcare provider</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>My assessment skills improved</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>I feel more confident that I will be able to recognize changes in my real patient’s condition</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>I am able to better predict what changes may occur with my real patients</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Completing the SCE helped me understand classroom information better</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>I was challenged in my thinking and decision-making skills</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>I learned as much from observing my peers as I did when I was actively involved in caring for the simulated patient</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Debriefing and group discussions were valuable</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Adaptation of the Simulation Effectiveness Tool

<table>
<thead>
<tr>
<th>Original SET Item</th>
<th>Original Modifications for NUTR<em>4120 and FRAN</em>6720</th>
<th>Justification for Modification</th>
<th>Modifications after Beta-Testing</th>
<th>Construct Measured</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4120: The simulations helped me to think critically</td>
<td>Students will not be working through any questions from the instructor while interacting with the standardized patients, therefore we want to know if the simulation experiences helped the students to think</td>
<td>4120: The simulations helped me to think critically about practitioner-patient interactions</td>
<td>Learning</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
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<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td></td>
<td>more critically.</td>
<td></td>
<td>helped me to think critically about practitioner-patient interactions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>While participating in simulations the MAN students would have the opportunity to practice their counselling skills and to receive feedback from the patient’s perspective on how well the session worked. This offers students a chance to challenge their assumptions about their counselling skills.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>I feel better prepared to care for real patients</td>
<td>4120: I feel better prepared to physically assess real patients 6720: I feel better prepared to counsel challenging patients</td>
<td>We are not “caring” for patients in the way that nurses do, the NUTR 4120 students are physically assessing the SPs and the MAN students are focusing on challenging counselling sessions.</td>
<td>4120: I feel better prepared to physically assess real patients 6720: I feel better prepared to counsel challenging patients</td>
</tr>
<tr>
<td>3</td>
<td>I developed a better understanding of the pathophysiology of the conditions in the SCE</td>
<td>4120/6720: I developed a better understanding of the pathophysiology of the conditions in the simulations</td>
<td>While interacting with the SPs the students will be gaining a better understanding of the pathophysiology related to the simulation conditions.</td>
<td>4120/6720: I developed a better understanding of the pathophysiology of the conditions featured in the simulations</td>
</tr>
<tr>
<td>4</td>
<td>I developed a better understanding of the physical signs and/or symptoms of</td>
<td>In NUTR 4120 the students are focusing on the physical signs and</td>
<td>4120: I developed a better understanding of</td>
<td>Learning</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>159</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>I feel more confident in my decision-making skills</td>
<td>4120: I feel more confident in my clinical decision-making skills</td>
<td>For our SP interactions, it was important to keep a confidence item related to decision making skills, however this item had to be adjusted to highlight the differences between the type of decision making that is required in NUTR 4120 and with the MAN students.</td>
<td>4120: I feel more confident in my clinical decision-making skills</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6720: I feel more confident in my decision-making skills pertaining to developing a client education or support plan following the simulation.</td>
<td></td>
<td>6720: I feel more confident in my clinical decision-making skills</td>
</tr>
</tbody>
</table>

| 6 | I am more confident in determining what to tell the healthcare provider | 4120: I am more confident in my ability to comprehensively assess the nutritional status of real patients. | Instead of the original item regarding what to tell the healthcare provider, we wanted to include an item that gets at whether the students felt that their interaction with the SPs enhanced their overall nutritional assessment of the patient and | 4120: I am more confident in my ability to comprehensively assess the nutritional status of real patients | Confidence |
|  |  | 6720: The counselling sessions have increased my confidence in my ability to assess the overall nutritional |  | 6720: The counselling sessions have increased my confidence in my ability to assess the overall nutritional |  |

6720: I developed a better understanding of how to obtain assessment data from challenging patients.

Symptoms rather than medications.

The MAN students are focused on the counselling relationship and learning how to approach interactions with challenging patients.

The physical signs and/or symptoms of the conditions featured in the simulations.

I feel more confident in my decision-making skills pertaining to developing a client education or support plan following the simulation.
<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>My assessment skills improved</td>
<td>needs of real patients significantly contributed to their nutritional practice.</td>
<td>the overall nutritional needs of real patients</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4120: My physical assessment skills improved</td>
<td></td>
<td>Learning</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6720: My counselling skills improved</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4120:</td>
<td>This item is appropriate for the NUTR 4120 students as they are interacting with the SPs through physical assessments, but “assessment” will be changed to “counselling” for the MAN students.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>I feel more confident that I will be able to recognize changes in my real patient’s condition</td>
<td>4120: [Delete] 6720: I feel more confident that I will be able to obtain and interpret relevant assessment data from real patients</td>
<td>After interacting with the SPs, the students should gain confidence in their ability to obtain and interpret assessment data.</td>
<td>Confidence</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4120: My patient communication skills improved 6720: My counselling skills improved</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4120:</td>
<td>One of the gaps in the AHN curriculum is a lack of emphasis on communication skills.</td>
<td></td>
<td>Learning</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 (new)</td>
<td>I am able to better predict what changes may occur with my real patients</td>
<td>Delete</td>
<td>The students should be able to recognize changes, rather than predict changes in real patients; therefore this item will be removed.</td>
<td>Confidence</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4120: Compl</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6720: Completing the simulations helped me understand classroom information better</td>
<td>6720: Completing the simulations helped me understand classroom information better</td>
<td>The simulation experiences are based on classroom material, and simulation experiences should help to enhance the</td>
<td>Learning</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>I was challenged in my thinking and decision-making skills</td>
<td>4120/6720: I was challenged in my thinking and decision-making skills</td>
<td>Applying classroom information to a simulation experience will challenge the students to take their thinking and decision-making skills to a higher level.</td>
<td>Delete</td>
</tr>
<tr>
<td>12</td>
<td>I learned as much from observing my peers as I did when I was actively involved in caring for the simulated patient</td>
<td>4120/6720: I learned as much from observing my peers as I did when I was interacting with the simulated patients</td>
<td>The students are not going to be caring for the simulated patients in the way that nurses do, instead we are interacting with them either through physical assessments or counselling sessions. When the students are not personally interacting with the SPs themselves, they will be observing their peers and we want to know if they feel as though they are still gaining valuable knowledge in those situations.</td>
<td>4120/6720: I learned as much from observing my peers as I did when I was interacting with the simulated patients</td>
</tr>
<tr>
<td>13</td>
<td>Debriefing and group discussion</td>
<td>4120/6720: Debriefing and group discussion</td>
<td>After each interaction with the SPs, the instructor</td>
<td>4120/6720: Debriefing and group discussion</td>
</tr>
</tbody>
</table>
were valuable were valuable will debrief with the students about their simulation experience, and we want to know if the students find this class discussion to be valuable and helpful.

**Simulation Effectiveness Questionnaire**

This questionnaire is designed to analyze the effectiveness of simulation experiences, please think about your interactions with the standardized patients while answering the following questions. Please add a ☐ to the box that best represents how you feel for each item and provide only one ☐ per item.

<table>
<thead>
<tr>
<th>Item</th>
<th>Do Not Agree</th>
<th>Somewhat Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The simulations helped me to think critically about practitioner-patient interactions</td>
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<tr>
<td>2. I feel better prepared to physically assess real patients</td>
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<tr>
<td>3. I developed a better understanding of the conditions featured in the simulations</td>
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<tr>
<td>4. I developed a better understanding of the physical signs and/or symptoms of the conditions featured in the simulations</td>
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<tr>
<td>5. I feel more confident in my clinical decision-making skills</td>
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<tr>
<td>6. I am more confident in my ability to comprehensively assess the nutritional status of real patients</td>
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<tr>
<td>7. My physical assessment skills improved</td>
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</table>

Administered SET Winter 2016

NUTR*4120
My patient communication skills improved

Completing the simulations helped me understand the classroom information better

I learned as much from observing my peers as I did when I was interacting with the simulated patients

Debriefing and group discussions were valuable

**Simulation Effectiveness Questionnaire**

This questionnaire is designed to analyze the effectiveness of simulation experiences, please think about your interactions with the standardized patients while answering the following questions.

Please add a ☐ to the box that best represents how you feel for each item and provide only one ☐ per item.

<table>
<thead>
<tr>
<th>Item</th>
<th>Do Not Agree</th>
<th>Somewhat Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The simulations helped me to think critically about practitioner-patient interactions</td>
<td></td>
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<tr>
<td>2</td>
<td>I feel better prepared to counsel challenging patients</td>
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<tr>
<td>3</td>
<td>I developed a better understanding of the conditions featured in the simulations</td>
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<tr>
<td>4</td>
<td>I developed a better understanding of how to obtain assessment data from patients featured in the simulations</td>
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<tr>
<td>5</td>
<td>I feel more confident in my decision-making skills pertaining to developing a client education or support plan following the simulation</td>
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<tr>
<td>6</td>
<td>The counselling sessions have increased my confidence in my ability to assess the overall</td>
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<tr>
<td></td>
<td>nutritional needs of real patients</td>
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<tr>
<td>7</td>
<td>My counselling skills improved</td>
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<tr>
<td>8</td>
<td>I feel more confident that I will be able to obtain and interpret relevant assessment data from real patients</td>
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<tr>
<td>9</td>
<td>I have a better understanding of how to better apply counselling theories</td>
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<td>10</td>
<td>I learned as much from observing my peers as I did when I was interacting with the simulated patients</td>
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<tr>
<td>11</td>
<td>Debriefing and group discussions were valuable</td>
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</table>
Appendix D: Focus Group Guides

Legend:
SET=Simulation Effectiveness Tool; CLT=Constructivist Learning Theory; SP= Standardized patient

Semi-Structured Interview Guide for Focus Groups for AHN Students

Introduction/Welcome
- Turn on recorder
- Welcome participants. Introduce moderator and associates.
- Go around room and ask:
  - What is your name?
  - What animal best describes you and why?
- Explain that the purpose of the discussion group today is to gain information about everyone’s experience with the simulations and how it impacted their learning
- Remind everyone about the information consent form that they previously signed and go over the main points. Remind them about their rights to leave the discussion at any time and withdraw from the research project without any consequences. You can also ask us to destroy your data from the Simulation Effectiveness questionnaire you completed, if you no longer wish for your data to be part of the study, however, your focus group data will remain part of the study. Neither you nor your responses will be identified to your course instructors/TA(s) and your participation in this study will not have any impact on your final grades.
- Discuss “rules” (ex. Be respectful; do not interrupt others, ect.)
- Assure group that the discussion is “safe” (confidential) and that the voice recordings will be held in a locker in a locked graduate student office at the University, and transferred onto an encrypted computer within 24 hours and then deleted off the recording device. Identified data will not be used or released. Remind participants to not discuss what was said during the focus group or who attended, as the research team will keep your identities confidential but we cant guarantee complete confidentiality.
- Encourage everyone to share their opinions (no right or wrong answer)
- Allow the group to ask any questions before we get started

Discussion
- 1) Did you find that the simulation experiences helped you to think more critically? (SET Item 1-learning) (CLT-learning is active process including dialogue, collaborative learning and cooperative learning)
  - If so, in what ways?
  - If not, why do you think that is? Do you think there’s anything you would change about the experience that would increase critical thinking?
- 2) Do you feel better prepared to physically assess/counsel real patients? (SET Item 2-confidence)
  - If yes, can you describe what aspect of the SP interaction allowed you to feel more prepared?
- 3) Did your interaction with the SPs increase your confidence in assessing the overall nutritional needs of real patients? (SET Item 6-confidence)
  - If so, did your confidence level change as the semester progressed?
  - If no, why?

- 4) Did your simulation experiences help you to understand the classroom information better? (SET Item 10-learning) (CLT-Construction of knowledge- students are attaching meaning to the classroom information through the simulation experience and connecting knowledge to a current or future situation with a patient)
  - What course material do you feel benefited most from the simulation experiences in regards to enhancing your understanding?
  - Are there any aspects of the course that you think would have benefited from additional SP interaction to enhance your understanding of the material?

- 5) Did you find the debriefing and group discussion at the end of each simulation class to be valuable? (SET Item 13-learning) (CLT-Debriefing is included in the theory as it states that debriefing after the simulation experience can give a student or group of students the opportunity to recall the encounter, reflect on what happened, review what was learned from the experience and contemplate what could have been done in other ways)
  - If yes, in what way?
  - If no, why not?

- 6) Did you find the written self-reflections valuable to your experience with the simulations and instrumental in your learning? (CLT-Reflective Practice Model branches off from Experiential learning which is learning by doing, believes that learning from experience involves a concrete experience with a reflective observation, cognition and behaviour and reflecting is considered an internal process of learning)
  - If yes, in what way?
  - If no, why?

- 7) Were you nervous/anxious when first interacting with the SPs? (Added from article regarding evaluating computer simulation experiences for dietetic interns (Turner et al., 2000))
  - If so, did your anxiety level change as the semester progressed?
  - If no, what do you think helped you to avoid having those feelings?

- 8) If you could change anything about the interaction with the SPs, what would it be?
  - If you wouldn’t change anything, what did you like best about the experience?

Wrapping Up
- Identify main themes
- Reflect key ideas back to group for confirmation
- Summarize group responses, but also highlight individual differences
- Open the door for later contact, remind them that my email is on the information consent form and they can email me at any time
- Turn off recorder when last person leaves

De-briefing
- Note any observations made during discussion

Semi-Structured Interview Guide for Focus Groups for Theatre Students

Introduction/Welcome
- Turn on recorder
- Welcome participants. Introduce moderator and associates.
- Go around room and ask:
  - What is your name?
  - What animal best describes you and why?
- Explain that the purpose of the discussion group today is to gain information about everyone’s experience acting as a standardized patient and how it impacted their learning
- Remind everyone about the information consent form that they previously signed and go over the main points. Remind them about their rights to leave the discussion at any time and withdraw from the research project without any consequences. Neither you nor your responses will be identified to your course instructors and your participation in this study will not have any impact on your final grades.
- Discuss “rules” (ex. Be respectful; do not interrupt others, ect.)
- Assure group that the discussion is “safe” (confidential) and that the voice recordings will be held in a locker in a locked graduate student office at the University, and on an encrypted computer within 24 hours and then deleted off the recording device. Identified data will not be used or released. Remind participants to not discuss what was said during the focus group or who attended, as the research team will keep your identities confidential but we cant guarantee complete confidentiality.
- Encourage everyone to share their opinions (no right or wrong answer)
- Allow the group to ask any questions before we get started

Discussion
- 1) Did you find that acting as a SP helped you to think more critically? (SET Item 1-learning) (CLT-learning is active process including dialogue, collaborative learning and cooperative learning)
  - If so, in what ways?
  - If not, why do you think that is? Do you think there’s anything you would change about the experience that would increase critical thinking?
- 2) Do you feel better prepared to engage in medical acting for the various medical diagnoses covered in this course? (SET Item 2-confidence)
  - If yes, can you describe what aspect of the experience allowed you to feel more prepared?
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- 3) Did your experience acting as a SP increase your confidence in your improvisation skills? (SET Item 6-confidence)
  o If so, did your confidence level change as the semester progressed?
  o If no, why?

- 4) Did your simulation experiences help you to understand the classroom information better? (SET Item 10-learning) (CLT-Construction of knowledge- students are attaching meaning to the classroom information through the simulation experience and connecting knowledge to a current or future situation with a patient)
  o What course material do you feel benefited most from the simulation experiences in regards to enhancing your understanding?
  o Are there any aspects of the course that you think would have benefited from additional SP acting to enhance your understanding of the material?

- 5) Did you find the debriefing and group discussion at the end of each simulation class to be valuable? (SET Item 13-learning) (CLT-Debriefing is included in the theory as it states that debriefing after the simulation experience can give a student or group of students the opportunity to recall the encounter, reflect on what happened, review what was learned from the experience and contemplate what could have been done in other ways)
  o If yes, in what way?
  o If no, why not?

- 6) Did you find the written self-reflections valuable to your experience as a SP and were instrumental in your learning? (CLT-Reflective Practice Model branches off from Experiential learning which is learning by doing, believes that learning from experience involves a concrete experience with a reflective observation, cognition and behaviour and reflecting is considered an internal process of learning)
  o If yes, in what way?
  o If no, why?

- 7) Were you nervous/anxious when acting as a SP? (Added from article regarding evaluating computer simulation experiences for dietetic interns (Turner et al., 2000))
  o If so, did your anxiety level change as the semester progressed?
  o If no, what do you think helped you to avoid having those feelings?

- 8) If you could change anything about acting as a SP, what would it be?
  o If you wouldn’t change anything, what did you like best about the experience?

Wrapping Up
  - Identify main themes
  - Reflect key ideas back to group for confirmation
  - Summarize group responses, but also highlight individual differences
- Open the door for later contact, remind them that my email is on the information consent form and they can email me at any time
- Turn off recorder when last person leaves

De-briefing
- Note any observations made during discussion
Appendix E: Reflection Assignments

NUTR*4120

Meta-Reflection on All Sessions with Simulated Patients

In looking back on all your sessions with the simulated patients over the semester, answer the following questions. Draw from all sources in your responses, including the Session Observer Checklists given to you by your observers, First Impression Reflections and Mini-Reflections.

1) What do you see as strengths with respect to your clinical and patient communication skills? Explain. If you feel that aspects of your clinical and patient communication skills improved over the semester, identify and explain these.

2) What do you see as areas for improvement with respect to your clinical and patient communication skills? How do you think you can address or work on these areas?

3) From your perspective, what are the most important and relevant things you learned as a result of the patient simulation sessions? E.g., about yourself as a clinician, about clinical care, about the various health conditions, etc. Explain.

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For this assignment you will utilize personal filed notes as well as feedback from peers and simulated clients to critically reflect on your personal counselling style. Counselling style is a dynamic complex multifaceted phenomenon. As such it is important to reflect on this facet of your professional development and to document its evolution. To this end you, will compose a statement that illustrates your personal counselling style to date. You will also reflect on the origins of your personal counselling style statement as well as analyze the strengths and weakness of your counselling and identify a plan for development that is grounded in the literature and your experiences to date.

THST*3630

For this assignment you will write a reflection paper at the conclusion of the semester. In this paper discuss the challenges you faced acting as a simulated patient in the simulations and what you learned in the process.
## Appendix F: Observer Checklists

### NUTR*4120: Session Observer Checklist

Session: __________________________ Clinician: __________________________

<table>
<thead>
<tr>
<th>Y</th>
<th>N</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>Initiating the Session</strong>: Did the clinician....</td>
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<tr>
<td></td>
<td></td>
<td>Establish initial rapport?</td>
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<td></td>
<td></td>
<td>Identify reason(s) for consult?</td>
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<td></td>
<td><strong>Gathering Information</strong>: Did the clinician explore the problem...</td>
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<td>From patient’s perspective?</td>
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<td>From biomedical perspective?</td>
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<td></td>
<td></td>
<td>By obtaining background information/context?</td>
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<td></td>
<td></td>
<td><strong>Physical Examination</strong>: Did the clinician...</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Perform exam with skill?</td>
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<tr>
<td></td>
<td></td>
<td>Perform exam with confidence?</td>
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<tr>
<td></td>
<td></td>
<td>Do all the steps?</td>
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<tr>
<td></td>
<td></td>
<td><strong>Explanation and Planning</strong>: Did the clinician... <em>(THIS MAY BE MORE APPLICABLE TO SOME SCENARIOS MORE THAN OTHERS)</em></td>
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<tr>
<td></td>
<td></td>
<td>Provide correct amount and type of information?</td>
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<td></td>
<td></td>
<td>Aid accurate recall &amp; understanding?</td>
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<td>Share decision making with patient?</td>
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<td></td>
<td></td>
<td><strong>Closing the Session</strong>: Did the clinician...</td>
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<tr>
<td>Ensure appropriate point of closure?</td>
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<tr>
<td>Do forward planning with patient?</td>
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<tr>
<td><strong>Throughout:</strong> Did the clinician…</td>
<td></td>
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<tr>
<td>Provide structure to session?</td>
<td></td>
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<tr>
<td>Build the relationship?</td>
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</tbody>
</table>

**Additional Comments:**
FRAN*6720

DIET-COMM tool: Modified for Feedback Post Simulation

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<th>Item #</th>
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<th>Partly Achieved</th>
<th>Fully Achieved</th>
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<tr>
<td>1</td>
<td>Greeting and introductions</td>
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<tr>
<td>2</td>
<td>Establishes what led up to and clarifies reason for consultation</td>
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<td>3</td>
<td>Outlines what to expect from the visit</td>
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<tr>
<td>4</td>
<td>Listening to and demonstrating understanding of the client’s story</td>
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<tr>
<td>5</td>
<td>Establishes rapport</td>
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<tr>
<td>6</td>
<td>Checks understanding of medical condition</td>
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<td>7</td>
<td>Offers information on how food relates to the condition</td>
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<tr>
<td>8</td>
<td>Completes (clinical, behavioural and dietary) assessment</td>
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<td>9</td>
<td>Works in partnership with client to identify possible dietary changes.</td>
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<td>10</td>
<td>Checks understanding and agreement on client determined goals.</td>
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<tr>
<td>11</td>
<td>Offers written information to reinforce verbal</td>
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<tr>
<td>12</td>
<td>Agrees next steps with the client</td>
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<tr>
<td>13</td>
<td>Interview structured in a logical sequence</td>
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<tr>
<td>14</td>
<td>Interview completed in a timely fashion</td>
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<tr>
<td>15</td>
<td>Uses active listening skills (including appropriate questions) to check joint understanding throughout interview</td>
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<tr>
<td>16</td>
<td>Maintains non-judgmental attitude</td>
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<tr>
<td>17</td>
<td>Acknowledges clients views and feelings</td>
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<tr>
<td>18</td>
<td>Uses appropriate nonverbal communication throughout</td>
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<tr>
<td>19</td>
<td>Uses appropriate language throughout.</td>
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<tr>
<td>20</td>
<td>Summarizes appropriately throughout the consultation</td>
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Total

Adapted from K. A. Whitehead et al. (2013) J.Hum Nutr Dietetics
Appendix G: Immediate Reflection Post Simulation for NUTR*4120

**NUTR*4120: First Impressions on Session**

Session: ___________________________________________________________

**Overall, I think that went (circle one):**
- Really Well
- Pretty Well
- It was just OK
- Ugh!

<table>
<thead>
<tr>
<th>What went well</th>
<th>What did not go well</th>
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</table>

Thoughts/comments/observations/questions/concerns

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Appendix H: Immediate Feedback Post Simulation from Theatre Students to FRAN*6720 students

During the debriefing time following the simulated counselling session, please provide feedback to the RD on the following areas (as appropriate):

- How well the RD developed rapport?
  - As the client did you feel comfortable with the RD?
- Was the RD organized during the interview?
  - As the client did you feel that there was a clear structure to the interaction with the RD?
- Did the RD demonstrate effective interviewing techniques for gathering information?
  - As the client did you feel that the RD was able to appropriately get you to reveal information (facts, feelings, concerns etc) during the interview?
- Was the rationale for any interventions suggested by the RD, clear and at an appropriate language level?
  - As the client did you understand what and why a particular intervention was suggested by the RD?
Appendix I: Adaptation of the Integrated Competencies for Dietetic Education and Practice

Name:

**Active and Authentic Learning:**
An Interdisciplinary Model for Applied Human Nutrition and Theatre Studies

**NUTR*4120**

<table>
<thead>
<tr>
<th>Competency</th>
<th>Novice*</th>
<th>Advanced Beginner**</th>
<th>Competent ***</th>
<th>N/A</th>
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</thead>
<tbody>
<tr>
<td>2.01d- Use appropriate communication technique(s)</td>
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<tr>
<td>2.01e- Demonstrate knowledge of medical and dietetics-relate terminology</td>
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<tr>
<td>2.01g- Use appropriate terminology</td>
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<tr>
<td>2.03b- Speak clearly and concisely in a manner responsive to the needs of the listener(s)</td>
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<tr>
<td>2.03d- Use appropriate tone of voice and body language</td>
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<tr>
<td>2.03e- Recognize and respond appropriately to non-verbal communication</td>
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<tr>
<td>2.04b- Utilize active listening</td>
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<tr>
<td>2.04d- Communicate in a respectful manner</td>
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<td>2.04f- Demonstrate empathy</td>
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<tr>
<td>2.04n- Seek, respond to, and provide feedback</td>
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<tr>
<td>3.01b- Use appropriate nutrition risk screening strategies</td>
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<tr>
<td>3.01f- Obtain perspective of client, family and/or relevant others</td>
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<tr>
<td>3.01i- Obtain and interpret medical history</td>
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<tr>
<td>3.01l- Obtain and interpret demographic, psychosocial and health behaviour history</td>
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<tr>
<td>3.01n- Obtain and interpret food and nutrient intake data</td>
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<tr>
<td>3.01x- Identify signs and symptoms of nutrient deficiencies or excesses</td>
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<tr>
<td>3.01z- Obtain and interpret nutrition-focused physical observation data</td>
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</tbody>
</table>

*The student is a novice learner, may have made numerous mistakes or omissions. Student may rush or take unduly long to complete the session.

**The student is no longer a novice learner but is not ready to enter practice. S/he may identify most relevant details, but may lack speed and/or flexibility. Student may still rush or take unduly long to complete the session.

***The student is considered entry-level to practice. Student is able to demonstrate critical thinking and to identify/interpret key aspects of an issue or situation. The objective was completed in a fashion that is not a threat to the public. The student is able to achieve goals/established outcomes within a reasonable timeframe, with minimal errors or omissions. The student may still lack speed and/or flexibility.
Name:

Active and Authentic Learning: An Interdisciplinary Model for Applied Human Nutrition and Theatre Studies

**FRAN*6720**

<table>
<thead>
<tr>
<th>Competency</th>
<th>Novice*</th>
<th>Advanced Beginner**</th>
<th>Competent ***</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.01d- Use appropriate communication technique(s)</td>
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<tr>
<td>2.01e- Demonstrate knowledge of medical and dietetics-related terminology</td>
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<td>2.01g- Use appropriate terminology</td>
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<tr>
<td>2.03b- Speak clearly and concisely in a manner responsive to the needs of the listener(s)</td>
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<tr>
<td>2.03d- Use appropriate tone of voice and body language</td>
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<tr>
<td>2.03e- Recognize and respond appropriately to non-verbal communication</td>
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<td>2.04b- Utilize active listening</td>
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<td>2.04d- Communicate in a respectful manner</td>
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<td>2.04f- Demonstrate empathy</td>
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<td>2.04h- Establish rapport</td>
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<td>2.04j- Apply counselling principles</td>
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<td>2.04l- Apply principles of negotiation and conflict management</td>
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<td>2.04n- Seek, respond to, and provide feedback</td>
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<tr>
<td>3.01b- Use appropriate nutrition risk screening strategies</td>
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<tr>
<td>3.01d- Identify relevant assessment data to collect</td>
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<td>3.01f- Obtain perspective of client, family and/or relevant others</td>
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<td>3.01i- Obtain and interpret medical history</td>
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<td>3.01l- Obtain and interpret demographic, psychosocial and health behaviour history</td>
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<td>3.01n- Obtain and interpret food and nutrient intake data</td>
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<td>3.01p- Identify client learning needs related to food and nutrition</td>
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<td>3.01r- Obtain and interpret anthropometric data</td>
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<td>3.01u- Obtain and interpret biochemical data and results from medical tests and procedures</td>
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<td>3.01x- Identify signs and symptoms of nutrient deficiencies or excesses</td>
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<td>3.01ee- Perform calculations to determine nutritional requirements****</td>
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<td>3.01ff</td>
<td>Determine client nutritional requirements</td>
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<td>3.01hh</td>
<td>Integrate assessment findings to identify nutrition problem(s)</td>
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<td>3.02b</td>
<td>Prioritize nutrition care goals based upon risk and available resources</td>
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<td>3.02d</td>
<td>Select appropriate nutrition interventions</td>
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<td>3.02f</td>
<td>Select appropriate textural and therapeutic diet modifications</td>
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<td>3.02h</td>
<td>Develop or modify meal plans</td>
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<td>3.03f</td>
<td>Provide nutrition education and counselling</td>
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<td>3.04a</td>
<td>Evaluate client progress in achieving plan outcomes</td>
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<td>3.04c</td>
<td>Identify necessary changes to nutrition care plan</td>
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<td>3.04d</td>
<td>Implement changes to nutrition care plan</td>
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</table>

*The student is a novice learner, may have made numerous mistakes or omissions. Student may rush or take unduly long to complete the session.  
** The student is no longer a novice learner but is not ready to enter practice. S/he may identify most relevant details, but may lack speed and/or flexibility. Student may still rush or take unduly long to complete the session.  
***The student is considered entry-level to practice. Student is able to demonstrate critical thinking and to identify/interpret key aspects of an issue or situation. The objective was completed in a fashion that is not a threat to the public. The student is able to achieve goals/established outcomes within a reasonable timeframe, with minimal errors or omissions. The student may still lack speed and/or flexibility.  
****Performance indicator was included in data collection but removed during analysis as this item was not included in any scenario during Time 1.