MOTIVATION AND TECHNOLOGICAL READINESS

IN THE USE OF HIGH-FIDELITY SIMULATION:

A DESCRIPTIVE COMPARATIVE

STUDY OF NURSE EDUCATORS

by

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ABSTRACT

There are many driving forces to increase the use of high-fidelity simulation (HFS) in nursing education, as well as many factors that may influence the implementation of this teaching strategy. These include the motivation of nurse educators to use HFS, the technological readiness of nurse educators to use HFS and the changing demographics of the nurse educator workforce. The purpose of this study is to address the significant gaps in the literature in the nurse educators' perspective of the use of HFS, technological readiness and the motivational factors that may influence the incorporation of this technology into curricula.

A national survey of nurse educators was completed with 662 participants; however, only 576 completed the entire survey. In addition to demographic information, participants were asked to complete the Revised Motivation at Work Survey (R-MAWS) and the Technological Readiness Index (TRI). Information was also obtained regarding the self-identified level of expertise in using HFS and the training to use this technology.

Findings included perceptions of barriers and facilitators to the use of HFS, which corresponded closely with published literature. Self-identified novices had higher amotivation levels than those who did not use HFS, those identified as competent or expert. This finding supports the use of mentors to develop the skills of self-identified novices. Nurse educators are most highly motivated by the value they place on their work, as well as the intrinsic pleasure obtained from the work. Nurse educators have a high level of technological readiness; however

neither technological readiness nor work motivation appear to play a large role in the use of HFS.

Recommendations for further study include research to determine what other factors play a role in the use of HFS, studies to determine if the benefits of HFS are superior to other teaching strategies warranting the time and financial commitment. Validated evaluation tools must be developed particularly if HFS is used for high-stakes evaluation.

DEDICATION

This dissertation is dedicated to my children for their unwavering support during this process, to Wayne K. Duvall who was the first person to encourage me to attempt this step in my education, and to Donna E. Beuk for her constant encouragement and friendship. None of this would have been possible without each of you.

LIST OF ABBREVIATIONS AND SYMBOLS

df	Degrees of freedom: number of values free to vary after certain restrictions have been placed on the data
F	Fisher's *F* ratio: A ratio of two variances
h^2	Eta^2 which is the portion of total variance that is attributed to an effect
M	Mean: the sum of a set of measurements divided by the number of measurements in the set
MS	Mean square
n	Number of cases in a subsample
N	Total number of cases
p	Probability associated with the occurrence under the null hypothesis of a value as extreme as or more extreme than the observed value
r	Pearson product-moment correlation
R	Multiple correlation
R^2	Multiple correlation squared: a measure of the strength of association
SS	Sums of squares
<	Less than

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CHAPTER 1

INTRODUCTION

In 2003, the National League for Nursing (NLN) issued a position statement that nurse educators must create "learning environments that facilitate students' critical thinking, self-reflection and prepare graduates for practice in a complex, dynamic health care environment" (p.1-2). A major responsibility of nurse educators is to prepare competent practitioners of nursing. Competence in nursing involves the mastery of relevant knowledge, the development of psychomotor skills and the ability to apply the knowledge and skills appropriately in a given context (Decker, Sportsman, Puetz & Billings, 2008). These positions are among many supporting the use of technology in nursing education and have resulted in an increasing and rapid demand to incorporate technology in the curriculum. The release of the first version of Power Point® for Microsoft® in 1990 revolutionized the lecture format and changed the classroom setting (Hewitt, 2008). With the advances in technology, the growth in distance and online learning has been explosive, reaching students who otherwise may have never been able to pursue higher education. As well, technologies have entered the classroom and clinical setting, including podcasting, student response systems, and personal digital assistants (PDAs). Nursing laboratories have changed and are much more advanced. The inclusion of mid and high fidelity simulators allows nursing students to practice psychomotor and clinical decision-making in the nursing laboratory.

Now in the 21st century, the skills to effectively use technology in nursing education are expected by students, educators and higher education administration to provide and make available the most up to date education using advanced technologies to enhance learning for students. The increased use of technology in nursing education has created challenges for nurse educators. The average age of doctorate-prepared faculty ranges from 51.5 years for assistant professors to 60.5 years for full professors; masters-prepared faculty average 50.9 years to 57.7 years (AACN, 2012). These nurse educators did not grow up during the computer age or may not have been taught to use technology as a tool for education (Axley, 2008). As a result, the nurse educators may not feel adequate in using technology in the classroom. Some faculty members lack the motivation to use technology and are not motivated to learn about using technology in the classroom or clinical setting, yet are expected to use the platform to teach.

Technology in education changes rapidly and it is likely that technology will continue to become more sophisticated over time (Doutrich, Hoeksel, Wykoff & Thiele, 2005). The use of technology in nursing may be impacted by motivation or readiness to use technology in the nursing curricula and may depend on faculty demographics, including age, education, level of faculty expertise, geographical region and type of nursing program (associate degree, baccalaureate degree or graduate program). This study will examine one of the newer technologies in nursing education, high-fidelity simulation (HFS), and describe motivation and technology readiness of nursing faculty who use or do not use HFS.

High-fidelity Simulation

The use of HFS is a teaching strategy that nurse educators use to provide a controlled learning environment simulating true life experiences. HFS can be manipulated to enhance skill development and clinical decision-making (Lassater, 2007; Horan, 2009; Fero et al., 2010;

Schlairet, 2010). There are many driving forces behind the increased utilization of high-fidelity simulation (HFS) in nursing education. The Institute of Medicine in *The Future of Nursing* (IOM, 2010) has encouraged the continued use of technology, like HFS, as an essential component of nursing education. Development of technological skills that foster clinical problem solving and critical thinking is a vital element to educate adequate numbers of well-trained, competent nurses that improve health outcomes of all persons in the country.

There are three levels of fidelity of simulators used in nursing education. Low-fidelity simulators are task trainers that have been in existence for decades. Medium fidelity simulators have vital signs, heart and breath sounds but do not have a monitor of physiological measurements or the ability to speak. Medium fidelity simulators are often used in the introductory nursing classes, such as health assessment and fundamentals, where basic skills are being taught and assessed. HFS allows students to experience and practice high-risk situations in a safe environment before practicing in a clinical setting on "live" patients (Founds, Zewe, & Scheurer, 2011) and uses computerized mannequins that mimic the physiological responses of a human to interventions performed by the students. The simulator exhibits heart sounds, breath sounds, vital signs, palpable pulses and is able to vocalize in response to actions by the students. HFS offers a possible solution to the problem of limited clinical placement opportunities (IOM, 2010).

HFS has been shown to be an effective teaching/learning strategy (Harder, 2010). Students perceive HFS to increase confidence and self-efficacy (Bambini, Washburn, & Perkins, 2009). Abdo and Ravert (2005) completed a study of 48 baccalaureate students in a medical-surgical course who attended five, one-hour simulations. Of 17 students who agreed to complete a satisfaction survey, all reported that the experiences increased technical and decision-making

skills. Anxiety levels of students who had a simulated experience prior to their first clinical experience had a significantly decreased level of anxiety (p=0.1) when compared with a control group with no prior simulation experience (11 $\pm$ 2.8 vs. 13 $\pm$ 3.4; no standard deviation reported) (Gore, Hunt, Parker, & Raines, 2010).

While some nurse educators have embraced this technology, others remain hesitant about the use of HFS in nursing education. The factors that impact the adoption of HFS are largely unknown. Are there motivational factors that encourage the nurse educator to expend the time and energy to learn to use HFS? Are nurse educators who are self-described as technologically savvy more likely to use HFS? Is the pressure from driving forces such as health care consumers and governmental agencies increasing the adoption of this technology? There is a dearth of research on the nurse educators' perspective on the use of HFS in nursing education.

Theoretical Framework

The theoretical framework for this study is the Self-determination Theory (Deci & Ryan, 2000) which describes different levels of motivation. For this study, the concept of technological readiness will be embedded in the concept of motivation.

Self-determination Theory (SDT)

SDT developed by Deci and Ryan in 2000 offers a conceptualization that allows the measurement of the level and type of motivation. The theory was developed from five mini-theories. Each of these theories was designed to help explain a set of motivational phenomena that emerged from their research. Each mini-theory addresses one aspect of motivation or personality functioning.

1. The Cognitive Evaluation Theory (CET) focuses in intrinsic motivation and highlights the critical roles of competence and autonomy in developing intrinsic motivation.

2. The Organismic Integration Theory (OIT) has its focus on extrinsic motivation and the properties, determinants and consequences of this type of motivation. This represents outcomes of the behavior. The OIT highlights the need for autonomy and relatedness and as these increases, the level of extrinsic motivation increases.
3. The Causality Orientations Theory (COT) describes how people regulate and orient their behaviors. There are three levels of causality orientation.
    a. Autonomy Orientation is when people act out of interest in or valuation of what is occurring.
    b. Control Orientation focuses on rewards and approval.
    c. Impersonal or Amotivated Orientation focuses on anxiety that results from a sense of a lack of competence.
4. The Basic Psychological Needs Theory (BPNT) elaborates on the relationship of evolved psychological needs and psychological health and well-being and forms the fourth mini-theory. Optimal functioning is dependent upon autonomy, competence and relatedness.
5. Goals Contents Theory (GCT) grew out of the distinctions between extrinsic and intrinsic goals and the resulting impact on wellness and motivation ("Self-Determination Theory," 2011).

There are three major types of motivation: intrinsic, extrinsic and amotivation. Intrinsic motivation emerged from the Cognitive Evaluation Theory (CET) and has an internal locus of control. Extrinsic motivation begins with an external locus of control and as it approaches integrated regulation becomes an internal locus. Amotivation is non-regulated and has an impersonal locus of control (Deci & Ryan, 2000).

To be motivated means an individual is moved to do something (Ryan & Deci, 2000). Motivation is a continuum from amotivation to intrinsic motivation. Depending on the situation, an individual has both extrinsic and intrinsic motivators (Deci & Ryan, 2000). There is variation in the level of motivation as well as the type of motivation. The orientation or the type of motivation concerns the underlying goals and attitudes that give rise to action (Ryan & Deci, 2000). While it is unlikely that an individual's motivation can be altered, awareness of the continuum of motivation does have implications for nursing education. It is unclear whether motivation is a trait or a state: however, since the level of motivation changes it is most likely a state. The ability to identify the motivation for performing a task can have implications for teaching assignments. If an individual has insecurity or discomfort regarding technology, it is unlikely that the individual will be motivated to incorporate technology into nursing education. Likewise, those individuals who are optimistic regarding the benefits of technology and are innovative in the approach to nursing education are much more likely to be motivated to use the newest technologies.

Intrinsic motivation. Intrinsic motivation is defined as doing something for its own sake because it is interesting and enjoyable. Intrinsic motivation is autonomous. Two concepts that are intrinsically motivated are optimism and innovativeness, which are identified as being contributors to technological readiness (Parasuraman & Colby, 2000). Intrinsic motivation is highly associated with the basic psychological needs of autonomy, competence, and relatedness. The need for autonomy is related to the universal urge to be causal agents, to experience free choice and to act in accordance with interests and values. To be autonomous does not mean to be independent of others but rather to feel a sense of choice when acting. Actions can be independently initiated or can be in response to a request from others (Deci & Vansteenkiste,

2004). In the SDT, autonomy retains its primary meaning of "self-governance or rule by the self" (Ryan & Deci, 2006 p.1562). The theory specifically differentiates autonomy from independence. An individual can be autonomously dependent or forced into independence. If fact, often people are more prone to be dependent upon those who support their autonomy (Ryan & Deci, 2006). The need for competence reflects the individual's inborn desire to be effective in dealing with the environment. The need for relatedness concerns the universal desire to interact with, to be connected to and to experience caring for others (Deci & Vansteenkiste, 2004).

Although in one sense intrinsic motivation exists within the individual, it also exists in the relationship between the individual and the task. From birth, healthy humans are inquisitive, active and curious beings who display a readiness to explore and learn without extrinsic rewards. This natural motivation plays a role in cognitive, physical and social development. The inclination to remain interested in novelty is not limited to infancy and childhood, but rather it affects performance, well-being and persistence across the life span (Ryan & Deci, 2000).

Extrinsic motivation. The SDT proposes that there are varied types of extrinsic motivation and they exist on a continuum from a very impoverished form of motivation to an active, autonomous form of motivation (Ryan & Deci, 2000). Extrinsic motivation is defined as doing something for instrumental reasons or specific outcomes. The reasons differ depending upon how internalized the motivation has become. Internalization is taking in a regulation that was once regulated by external factors, like rewards and punishments, and thereby regulating it internally. Extrinsic motivation can be completely externally motivated or can be partially or completely internally regulated (Gagne, Forest, Gilbert, Aube, Morin & Malorni, 2010).

An individual can perform extrinsically motivated actions with resentment, disinterest or resistance or with an attitude of willingness that reflects the inner acceptance of the value of a

task. This is an important concept because educators or supervisors cannot always rely on intrinsic motivation to foster performance. Many tasks in daily work are not inherently interesting or enjoyable, but knowing how to promote more active forms of extrinsic motivation has significant implications for supervisors or educators (Ryan & Deci, 2000).

The lowest level of extrinsic motivation is known as external regulation. This is doing an activity to avoid punishment or to obtain rewards. This type of motivation is completely non-internalized and is either a social or material regulation. For example, this could be doing a task for the reimbursement or to please a supervisor. A nurse educator might be mandated to develop a simulation program by a supervisor or a salary stipend; however, there may be a lack of a sense of innovativeness or optimism that would contribute to the educator's technological readiness. External regulation has an external locus of control.

Introjected regulation is doing an activity through self-worth regulation, such as guilt or ego-involvement. Introjected people engage in a behavior or perform an activity out of guilt, compulsion, or to maintain a sense of self-worth. Introjected regulation also has an external locus of control and therefore is not autonomous.

Identified regulation is doing an activity because one identifies with the value or meaning of the activity. The activity then becomes autonomously regulated. These behaviors or activities are completed because of the perceived meaning or relation to personal goals. Identified regulation is a more autonomous driven form of extrinsic motivation (Ryan & Deci, 2000).

Integrated regulation refers to doing an activity and identifying with its value to the point that it becomes part of the person's habitual functioning and a part of the person's sense of self. An example of an integrated activity in nursing would be changing a large, odiferous wound dressing to make a client more comfortable and to improve his outcome. It is not intrinsically

motivated because it is not enjoyable however it is part of the integrated nurse's sense of self especially if the nurse views nursing as a vocation (Gagne et al. 2010). This is the most autonomous type of extrinsic motivation (Deci & Ryan, 2000). Identification and integration are driven by values and goals, whereas intrinsic motivation is driven by emotions that emerge while doing the activity (Gagne et al., 2010).

Amotivation. Amotivation is a state in which there is a lack of intention to act. Amotivation results from a lack of valuing the activity, not feeling competent to do the activity or not feeling that a desired outcome will be achieved. Amotivation is not internalized and is completely non-autonomous (Ryan & Deci, 2000). Inhibitors to technological readiness are insecurity and discomfort (Parasuraman & Colby, 2000). The inhibitors to technological readiness can result in amotivation.

The conceptual model for this study is the Motivation and Technology Readiness Model which was adapted from Taxonomy of Human Motivation (Ryan & Deci, 2000) that is part of the SDT, and the Technology Readiness Model (Parasuraman & Colby, 2001). The model illustrates the continuum from amotivation to intrinsic motivation. As one moves from left to right on the model, the motivation becomes less externally regulated until reaching intrinsic motivation, which is entirely internally regulated. An individual may have multiple motivators depending upon the situation. For example, even if a job is extremely enjoyable, most individuals also work for financial reasons. Optimism and innovativeness are contributors to the adoption of technology and relate to intrinsic motivation, while insecurity and discomfort, the inhibitors to technological readiness, are more closely related to amotivation. As one moves from right to left on the model, the technology readiness decreases.

Motivation and Technology Readiness Model

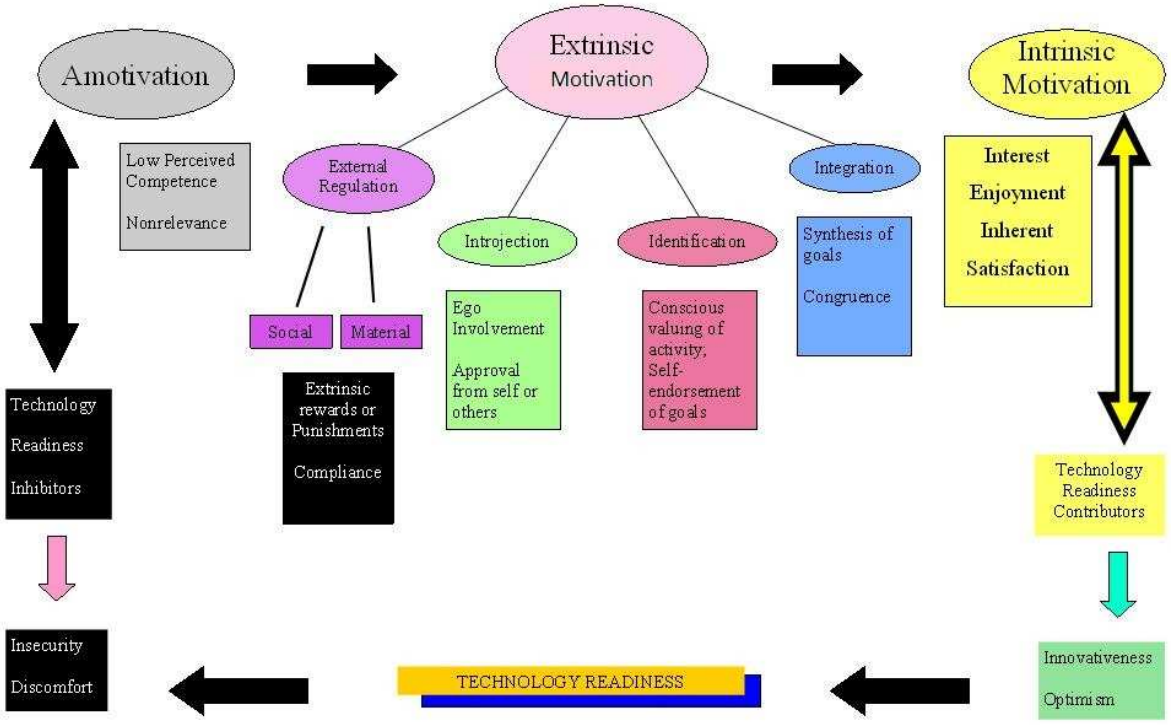

Figure 1: Adapted from Taxonomy of Human Motivation (Ryan & Deci, 2000) and the Technology Readiness Model (Parasuraman & Colby, 2001).

Problem Statement

In the midst of all the driving forces to increase the use of HFS in nursing education, there are many factors that may influence the implementation of HFS. These include the motivation of nurse educators to use HFS, the technological readiness of nurse educators to use HFS, and the training and continuing education required to incorporate HFS into curricula. The changing demographics of the nurse educator workforce that can also influence the implementation of HFS include age, educational preparation, geographical region and levels of nursing programs. There is a significant lack of research evaluating the faculty perspective for the use of HFS. There is a gap in the literature identifying the technological readiness of nurse

educators in the use of HFS and motivational factors that may influence the decision to incorporate HFS into the curriculum. The impetus to incorporate technology, such as HFS must include faculty readiness and motivation to enhance education to ensure that the students receive optimal benefit from technological advances like HFS.

Purpose

The purpose of this study is to compare nurse educators' motivation and technological readiness of those who do and do not use HFS.

Research Questions

The study will answer the following questions: Is there a difference in nurse educators on:

1. Motivation (using the Revised Motivation at Work Scale [R-MAWS]) based on levels of expertise (not using, novice, competent, or expert) and the type of HFS training (none, self-taught, on-the-job, or formal training)?
2. Technology readiness (using the Technology Readiness Index [TRI]) based on levels of expertise (not using, novice, competent, or expert) and the type of HFS training (none, self-taught, on-the-job, or formal training)?
3. Demographic factors (age, gender, educational level, years of experience, geographical location, levels of expertise [not using, novice, competent, or expert]) and the type of HFS training (none, self-taught, on-the-job, or formal training) and the R-MAWS or TRI?
4. Demographic factors (age, gender, educational level, years of experience, and geographical location) based on motivation?

5. Demographic factors (age, gender, educational level, years of experience, and geographical location) based on technological readiness?

Definitions

For the purposes of this study the following terms will be conceptually and operationally defined: simulation, fidelity, high-fidelity simulation, technology readiness, motivation, levels of expertise, and HFS training.

Simulation

Conceptual definition: "A pedagogy using one or more typologies to promote, improve and/or validate a participant's progression" (p. S6) in cognitive and psychomotor skills (International Nursing Association for Clinical Simulation and Learning [INACSL] Board of Directors, 2011).

Operational definition: Simulation will refer to a pedagogy utilizing the HFS in patient scenarios.

Fidelity

Conceptual definition: "Believability, or the degree to which a simulated experience approaches reality; as fidelity increases, realism increases" (INACSL Board of Directors, 2011, p. S6).

Operational definition: Use of a high-fidelity simulator to represent a "live" patient with as much realism as technologically possible.

High-fidelity Simulation (HFS)

Conceptual definition: Resembles reality and is an attempt to mimic clinical situations. It is a tool that can be used repeatedly by students in order to improve skills and develop clinical reasoning skills (Jeffries, 2007).

Operational definition: HFS is a type of simulation that closely mimics reality by providing cosmetic fidelity (realistic appearance) and response fidelity (the ability to simulate actual patient responses to interventions). HFS mannequins actually breathe, talk, have eye movements, palpable pulses and other features that resemble physiological features of "live" patients (Seropian et al., 2004a).

Motivation

Conceptual definition: Internal and external factors that stimulate desire and energy in people to be interested and committed to a job, role or subject (businessdictionary.com, 2011).

Operational definition: For this study the measurement of the level and type of motivation will be measured using the R-MAWS (Gagne et al., 2012), a 19-item Likert-type scale with six subscales: extrinsic regulation-social, extrinsic regulation-material, introjected regulation, identified regulation, intrinsic motivation and amotivation, as reflected in Figure 1.

Technology Readiness

Conceptual definition: Technology readiness is a person's tendency to adopt and use new technologies (Parasuraman, 2000), in this case HFS.

Operational definition: For the purpose of this study technological readiness will be measured using a 36-item Technological Readiness Index with its four subscales: optimism, innovativeness, discomfort and insecurity, as reflected in Figure 1 (Parasuraman, 2000).

Levels of Expertise

Conceptual definition: Patricia Benner's Novice to Expert model based on Dreyfus and Dreyfus' model of skill acquisition. Benner's five stages are novice, advanced beginner, competent, proficient and expert (Benner, 1984).

Operational definition: For this study the levels of expertise will be described using four stages. These are: a) not using, b) novice, c) competent and d) expert.

HFS Training

Conceptual definition: The training a faculty member has received to operate the high-fidelity simulator.

Operational definition: For the purpose of this study training will be defined as none, self-taught, on-the-job training, or formal training.

Summary

HFS is a teaching strategy that is becoming well entrenched in our world and is rapidly expanding in nursing education due to the changing health care environment. The effective use of HFS is dependent upon the preparation of the faculty using HFS, the motivation that exists regarding implementation of the technology and the readiness to incorporate this technology into teaching. It is imperative to identify factors that promote the adoption of innovative technologies, such as HFS, which can impact nursing education, have implications for hiring and attrition of nursing faculty, and improve student learning outcomes in nursing education.

CHAPTER 2

REVIEW OF THE LITERATURE

A review of the literature was undertaken using the following databases: Academic Search Premier, CINAHL, PsychInfo, and ProQuest, as well as reference lists from retrieved articles. Search terms included simulation, history of simulation, high-fidelity simulation, human patient simulator, nursing education, faculty perceived barriers and facilitators to HFS, instructional strategies, teaching strategies, self-determination theory, intrinsic and extrinsic motivation, motivation at work, technology, technological readiness and change theory. One hundred and thirty-two articles were reviewed, as well as two dissertations, three national reports, a textbook and a website. The majority of these articles provided background information.

History of Simulation

The first ground-based flight simulator was invented in 1929 by Ed Link. Mr. Link had a passion to learn to fly but could not afford the cost of plane rental and lessons. So, he spent all his spare time developing a pilot trainer that eventually ushered in the multi-billion dollar industry of simulation (L-3 Communications, 2009). Flight simulators are still used by the airline industry and the military to maintain pilot's performance skills during emergencies (Hays, Jacobs, Prince & Salas, 1992). Simulation has also been used by the automobile industry, the space program and the nuclear power industry to conduct tests that would be too dangerous or too costly to perform in the real world (Bradley, 2006).

In 1911, the earliest patient simulator was put into use for nursing. Mrs. Chase was a life-sized mannequin with moveable joints. Over the years the mannequin was updated to include various body orifices and modern hairstyles. Mrs. Chase was used to train student nurses in bathing, positioning and performing nursing procedures (Nickerson & Pollard, 2010). In the late 1960s, Denson and Abrahamson developed the first high-fidelity simulator. The simulator was called "Sim-One" and was designed to be used for anesthesiology. Due to the excessive cost, only one model was produced. In 1974, a partial body simulator that mimicked cardiac conditions was developed. This simulator was called "Harvey" and, with updates, is still used for teaching heart and lung sounds (Gaba & DeAnda, 1988). Over the next decades the technology advanced until the current high-fidelity simulators were developed in the mid 1990s. These mannequins are computerized and provide life-like physiological indices in real time. With this development, scenarios can be developed that can represent different conditions, including those high-risk, rare occurrence events (Nehring, Ellis & Lashely, 2002). Nursing faculty are able to run scenarios that enable students to experience "what if" conditions in a safe environment (Nehring, 2008).

Simulation as a Teaching Strategy in Nursing

Some researchers have demonstrated that there are increased gains in knowledge for groups that had simulation in addition to other teaching strategies (Aliner, Hunt, & Harwood, 2006; Brannan, White, & Bezanson, 2008; Cant & Cooper, 2009; Elfrink, Kirkpatrick, & Schubert, 2010; Fero, et al., 2010; Schlairet & Pollack, 2010). However, other researchers found no difference in knowledge gains for those participating in simulation (Blum, Borglund, & Parcells, 2010; Horan, 2009; Jeffries & Rizzolo, 2006; McKeon, Norris, Cordell, & Britt, 2009; Radhakrishnan, Roche, & Cunningham, 2007; Ravert, 2008). The different findings can be

partially explained by the various methodologies utilized to measure knowledge gain, the generally small sample sizes, lack of randomization or control groups, and the lack of a standardized evaluation tool for HFS.

Nurse Educator Perceptions of HFS

There have been few studies evaluating nurse educator perceptions and the use of HFS. There have only been 10 published studies that evaluate nurse educators' response to and issues with the use of HFS. In an international survey completed in 2004 by Nehring and Lashley faculty perceptions regarding HFS were measured. This survey was limited in that only 33 nursing schools in the United States and one in Japan responded. Information was also obtained from six simulation centers located in Australia, England, Texas, New Zealand and two centers in Germany. Thirty of the nursing schools indicated that 25% or less of the faculty used HFS. Interestingly, community colleges were most likely to use the technology. The most likely explanation for this was that community colleges were the recipients of grant money due to the many allied health programs on the community college campus. Factors that limited the use of HFS included fear of technology, the belief that this technology was too advanced, and the time needed to learn the technology (Nehring & Lashley, 2004).

King, Moseley, Hindenlang and Kuritz (2008) addressed factors that limited the use of HFS by faculty members. Faculty reports indicated that 62% (n=21) of the faculty had little training to use the HFS and 73% had not attended any educational program to use HFS. In a qualitative component of the study using open-ended questions, many faculty stated that they did not have a positive attitude toward the technology and had a lack of confidence in their ability to use HFS. The researchers found that faculty attitudes toward technology were the most important factor in integrating HFS. This study identified many of the challenges nurse

educators face when trying to adopt HFS into the curriculum, including lack of time, lack of support, lack of education and the need for a small faculty/student ratio. While this was a small study (*n*=34) it was one of the few studies to address the limitations of HFS (King, Moseley, Hindenlang, & Kuritz, 2008).

Starkweather and Kardong-Edgren (2008) described efforts to bring the use of simulation into a large multi-site nursing program in Washington. The theory of diffusion of innovation was used to guide the expansion of the simulation program. The authors determined that developing faculty interest and enthusiasm provided the stimulus to increase the acceptance and utilization of HFS in their nursing programs (Starkweather & Kardong-Edgren, 2008).

Nurse educators have described barriers and facilitators in the use of HFS. Some of the barriers to adoption of this technology include the cost of the simulators (Harlow & Sportsman, 2007), lack of space for simulation labs, and the lack of training of faculty to run the simulators and develop scenarios (Seropian, Brown, Gavilanes, & Driggers, 2004; Decker, 2008). It has been estimated that the cost of implementing a simulation lab ranges from $200,000 to $1.6 million and that there is a minimum of $15,000 needed annually for maintenance (Tuoriniemi & Schoot-Baer, 2008). Considering the cost of HFS, it is imperative that barriers and facilitators to the use of HFS be identified and addressed so that more nurse educators will be comfortable using the simulator.

Additional barriers include such obstacles as lack of time, lack of training, lack of space or equipment, funding, staffing, and lack of support (Adamson, 2010; Jansen, Johnson, Larson, Berry, & Brenner, 2009). Other challenges include knowing how to incorporate simulation into the curriculum, how to operate the complex equipment, faculty technology fears, the intense time commitment and large class sizes (Jansen, Berry, Brenner, Johnson & Larson, 2010). A study to

evaluate nurse educators' comfort levels with HFS was completed in 2007 *(n*=29). The researchers found that overall, nurse educators indicated they were not comfortable in utilizing HFS as a teaching strategy. On a 1-5 Likert-type scale with 1 being no comfort and 5 being totally comfortable, the highest mean was 3.03 as a strategy to provide active feedback. The lowest level of comfort was a mean of 1.9 to use HFS to replace lecture and a mean of 1.62 regarding HFS as a replacement of clinical hours (Jones & Hegge, 2007).

In a study examining nurse educators' perceptions of time commitment (*n*=29), 55.2% reported a belief that it would require a release time of 0.50 fulltime equivalent (FTE) to plan for the utilization of simulation and 44.8% believed it would require a 0.50 FTE release time to implement HFS. A majority of the educators surveyed (60.7%) felt a release time of 0.25 FTE would be required (Jones & Hegge, 2008). A lack of faculty interest can be one of the more challenging obstacles to overcome (Jansen, Berry, Brenner, Johnson, & Larson, 2010). In summary, identified barriers to the use of HFS include the lack of: time, training, support, comfort and interest.

As part of a national survey in 2010 by the National Council of State Boards of Nursing (NCSBN) of 1,729 nursing programs in the United States, eight questions were included that asked about a program's use of simulation and opinions regarding simulation. Findings included the opinion that educators should be using more simulation (81%). Faculty training was cited as one of the major needs. A concern expressed was that most of the training of faculty was done by simulation vendors. These vendors are salespeople and not experts in education. While growth in simulation use has increased, it is slowed by lack of training of faculty as well as lack of funding for continuing education needs and increased use of disposable equipment.

Administrators need to address the increased costs of teaching with simulation (Kardong-Edgren, Willhaus, Bennett, & Hayden, 2012).

A descriptive study of nurse educators at a simulation conference reported that the preferred learning method for acquiring simulation skills is practice with feedback from someone who is skilled at simulation (52%) while observation was preferred by 7%. Of those completing the survey, 95% were using simulation (*n*=58) and most reported proficiency at linking simulation activities to program objectives (67%), linking simulation to course objectives (74%) and managing the simulation experience (71%). Respondents were less proficient at programming scenarios (33%) and writing scenarios (57%). This study was targeted to users of simulation (Anderson, Bond, Holmes, & Cason, 2012).

Halstead, Phillips, Hardin, Porter and Dwyer (2011) published the results of a descriptive, exploratory study of nursing faculty who developed a consortium to achieve common goals, define best practices, and promote collaboration. Findings included the belief of nurse educators that simulation has the potential to positively impact the development of clinical decision-making of students. The use of HFS required a large investment of time and fiscal resources. If partnerships were formed between academia and practice institutions, it could lead to more efficient use of resources. The authors recommended the use of a consortium model to improve the relationship between academia and practice, which may reduce competition and promote collaboration to best meet the needs of both the academic and practice institutions.

Facilitators to the use of HFS include thorough and intense training, individual interest in the technology and support from colleagues and administration (Adamson, 2010). An additional facilitator is the formation of partnerships between academe and practice (Halstead et al., 2011).

Motivation

The SDT describes three main categories of motivation: amotivation, extrinsic motivation, and intrinsic motivation. Extrinsic motivation is further broken down into four subparts: external regulation, introjection, identification and integrated motivation. One of the central components of the SDT is the distinction between autonomous motivation and controlled motivation. Intrinsically motivated behavior is highly autonomous. Activities that are not of themselves interesting require a certain amount of extrinsic motivation. As extrinsic motivation moves from external regulation toward integration, it becomes more autonomously controlled. External regulation is highly controlled while identified and integrated extrinsic motivation is more highly autonomous (Gagne & Deci, 2005).

There are very limited studies on intrinsic and extrinsic motivation in nursing. A survey of 1,477 nurses in Australia was completed in 2003. The researchers identified intrinsic work values as emotional challenges, physical demands, work stress, and morale and autonomy. Extrinsic work values were identified as remuneration, reward for skills and experience, working conditions and perceptions of nursing as a career. Findings included 81% of nurses reported nursing as extremely or quite emotionally challenging, 63% believed nursing was physically demanding, and 48% believed morale was extremely or quite poor. Autonomy was extremely or quite discouraged as reported by 19%, but over 30% reported it is extremely or quite encouraged. Remuneration was viewed as extremely or quite poor by 53% of aged-care sector nurses, 40% in the private-sector and 29% in the public sector. The nurses perceived that skills and experience were extremely or quite unrewarded (36-42%). Overall 38% of the nurses reported collegial support and teamwork as extremely or quite evident in the workplace. Twenty-three percent believed nursing career prospects were extremely or quite good, while 34% believed they were

extremely or quite limited. The overall results indicated that intrinsic and extrinsic work values do impact job satisfaction and intent to leave employment (Hegney, Plank, & Parker, 2006).

A study was undertaken to examine what motivates individuals to pursue a career in nursing. This was a qualitative study of 29 undergraduate students, 25 RNs, 6 nurse managers and 4 directors of nursing in Australia. The researchers identified four themes that were common to all participants. These were a desire to help, caring, a sense of achievement and self-validation (Newton, Kelly, Kremser, Jolly, & Billett, 2009). These themes appear related to identified or integrated extrinsic motivation and intrinsic motivation.

Nursing faculty in Florida were participants in a study examining job satisfaction. There were 10 open-ended questions. The number of respondents ranged from 63-76 depending upon the question. Of the identified motivational factors, the ones that received the most comments were about the responsibility and the work itself. Faculty reported a love of their job and a sense of achievement, as well as the sense that the work was making a difference. The motivational factor of the work itself was found to be the highest predictor of job satisfaction. (Lane, Esser, Holte, & McCusker, 2010). There have been no studies reported in the literature on the motivation of nurse educators and the use of HFS.

A study of adolescent star athletes' motivational profiles uncovered four clusters of autonomous-controlled motivation. The clusters included high autonomy-high control, moderate autonomy-low control, high autonomy-moderate control and moderate autonomy-high control. The group with the least self-determined motivational profile (moderate autonomy and high control) had the lowest level of performance. These student athletes lost 11-12% more matches than the other three clusters. One of the more striking findings in this study was the lack of a truly self-determined motivational cluster which would have been represented as high autonomy-

low control. The authors hypothesized that highly competitive, achievement driven and potentially controlling activities may not be achieved with high levels of pure self-determination (Gillet, Vallerand, & Rosnet, 2009). This has implications for nursing since there is the need for control and rules in the practice of nursing. It would not be possible to be completely autonomous as a nurse. Nurses are reliant upon a team, written orders and protocols and must comply with standards of practice, so the work is subject to a high level of control. Intrinsic need satisfaction results from the nurses' sense of competence, relatedness as a team member and the autonomy to develop the clients nursing plan of care.

Authors of studies in two work settings (59 employees of a major bank and 698 first-line employees from a major investment bank) examined the relevance of the self-determination theory to motivation in the workplace. Findings included that performance on the job was influenced by a person's satisfaction of the intrinsic needs for competence, autonomy, and relatedness on the job. Work performance was positively influenced by managers who were thought of as autonomy supportive (Baard, Deci, & Ryan, 2004).

A study of 119 employees of the administrative staff of a Flemish community was completed to examine the association of an extrinsic work value orientation and positive job outcomes. Adopting an extrinsic work value orientation as opposed to an intrinsic work value orientation resulted in a more negative job outcome (satisfaction, dedication and vitality) and positively predicted emotional exhaustion, intention to leave the company, and work-family conflict. Employees who value a job because it allows material success, status, and control over others are less likely to experience basic need satisfaction at work. Employees with an intrinsic work value orientation had higher levels of autonomy, competence, and relatedness (Vansteenkiste, Neyrinck, Niemiec, DeWitte, & Van den Broeck, 2007).

As part of studies to validate the motivation at work scale (MAWS), four sectors of employees participated from four categories of increasingly autonomous positions using a 1-4 Likert-type scale. It was found that service workers were more externally regulated than healthcare/education workers (M=2.68 to M=2.43). Manual/technical workers had lower identified and intrinsic motivation scores than healthcare/education employees (M=2.84 to M=3.21). Need satisfaction of autonomy, competence and relatedness was more strongly related to identified regulation and intrinsic motivation. Need satisfaction was not strongly related to external and introjected regulation. Autonomous motivation was related to satisfaction of needs for autonomy, competence and relatedness, as well as perceived organizational support, and optimism. Controlled motivation was not related to these antecedents. Autonomous motivation was related to job satisfaction, well-being, and commitment to the job (Gagne et al., 2010).

Technology Readiness

According to Parasuraman (2000) technology readiness describes "people's propensity to embrace and use new technologies for accomplishing goals in home life or work" (p. 308). There is a combination of positive and negative feelings regarding technology that can impact a person's willing to embrace a new technology. Parasuraman found that although people are generally optimistic about technology, there is also a great deal of insecurity about the role of technology. Even technology optimists and innovators experience technology driven anxieties (Parasuraman, 2000).

One study was found on technology readiness in nursing students using the Technology Readiness Index. Rural nursing students were more insecure regarding technology than those from urban areas (mean rural 3.7188 vs. urban 3.3295, t value 2.02, p = 0.0497); male medical students had a higher innovation score (mean 3.3056 vs. 2.9424, t value-2.04, p=0.0470) and a

higher technological readiness attitude than female medical students (mean 0.0662 vs. -0.187, *p*=0.0280); and medical students older than 25 had a negative technology readiness score than younger medical students (mean 0.0163 vs. -0.359, *p*=0.0034) (Caison, Bulman, Pai, & Neville, 2008).

The TRI of 169 nursing faculty was measured at two simulation conferences. A significant negative correlation between years teaching and the innovation and optimism levels was measured (*r* = -2.13, *p*=0.007 [innovation], *r* = -.233. *p*=0.003 [optimism]). A weak negative correlation was found between the age of faculty and innovation *(r* = -.173, *p*=0.027). While this was a small convenience sample, it is recognized that a bias may have existed with expectations of a higher technology readiness index in faculty who attended a simulation conference than faculty who may not attend these conferences (Peterson, 2008).

A survey completed by Nguyen, Zierler and Nguyen in 2011 evaluated the nursing faculty needs for training in the use of technology. The authors surveyed 193 respondents about four technologies (distance education, simulation, telehealth and informatics). While 65% of respondents reported they were competent in the use of informatics and computer fundamentals and 59% were competent in distance learning technologies, 70% reported they were novices or advanced beginners in simulation and 68% were novices or advanced beginners in telehealth. Faculty reported a need for further training and greater financial and technology support. The researchers found that faculty age, educational level, or teaching institution were not associated with the frequency of use or knowledge of simulation technology. Faculty reported that the availability of training was positively associated with greater use.

In summary, the review of the literature demonstrated a significant lack of research on nurse educators and HFS. As the pressures to increase the use of HFS in nursing education

continue to grow, it is imperative that more research be completed evaluating HFS from the perspective of nurse educators.

CHAPTER 3

METHODS

The purpose of this study is to compare nurse educators' motivation and technological readiness of those who do and do not use HFS. This chapter describes the process of answering the research questions. The following components will be addressed: study design, sample and setting, procedures, instruments, data analysis, human subjects and study limitations.

Study Design

This study used a descriptive comparative design. An online survey was selected to provide access to reach the greatest number of nurse educators and to provide a rapid turn-around time (Creswell, 2009). Electronic surveys allow for various question formats. These include multiple choice, multiple response, Likert-type scales, and open-ended questions. One advantage to an online survey is the tendency for respondents to respond more completely too open-ended questions (Rita, 2011). Other advantages include the speed of transmission, the low cost, which can be 50% less expensive than mailed surveys, and the survey can be viewed as more environmentally friendly (Rita, 2011). The survey consisted of demographic data and the completion of two instruments. The questions appeared one to a page and answers were chosen by clicking a radio button. It was estimated that it would take 15 minutes to complete the survey (see Appendix A).

Sample and Setting

The cluster sample was randomized, blinded by using an anonymous survey link and consisted of nursing faculty in programs that are accredited. The programs are accredited by

either the National League for Nursing Accrediting Commission (NLNAC) or the Commission of Collegiate Nursing Education (CCNE). There are currently an estimated 1,200 schools that are accredited by NLNAC and 664 baccalaureate programs that are accredited by CCNE. Since some nursing programs are accredited by both, duplicates were excluded. In 2004, there was an estimated 48,600 nursing faculty in the United States (Siela, Twibell & Keller, 2009).

Procedure

A list of the deans/directors of nursing programs who are accredited by NLNAC and CCNE was obtained from the directories on the professional websites. Once the list of deans and directors was obtained they were stratified by region. The United States was divided into six regions by the United States Census Bureau. The regions are: 1) Northeast (ME, NH, VT, MA, RI, CT, NY, PA, NJ); 2) South Atlantic (DE, MD, DC, VA, WV, NC, SC, GA, FL); 3) Midwest (WI, MI, IL, IN, OH, ND, SD, NE, MN, IA); 4) South Central (KY, TN, MS, AL, OK, TX, AR, LA); 5) Mountain West (ID, MT, WY, NV, UT, CO, AZ, NM); and Pacific West (AK, WA, CA, OR, HI) (US Census Bureau, 2011). A lottery was used to randomly select a sample to ensure each of the six regions was represented. A total of 600 nursing programs were selected, 100 programs from each region.

The web-based survey was emailed to the nursing programs that were chosen randomly using Qualtrics®. An anonymous link to the survey was imbedded in the welcome email (See Appendix B). There were no names associated with the participants who responded. They were identified only by self-identified region. The welcome email explained the purpose of the survey and emphasized the ease of responding (Dillman, 2000, p. 377). The email also contained the consent form to participate. It took approximately 15 minutes to complete the survey. Each dean or director was requested to forward the survey link to all faculty with no consideration of

the faculty members use of HFS. This resulted in the survey being forwarded to over 6000 nursing faculty members. Since responses to surveys are typically low (10-20%), the sample size will be expected to be about 600-1200. Demographic data were collected as well as motivation levels (using the R-MAWS) and technology readiness (using the TRI). Due to the anonymous nature of data collection, it was not possible to send reminder emails. The survey remained open for three weeks.

The actual sample size was 662, however only 576 completed the entire survey. This represented a 10% response rate. If it had been possible to access nurse educators directly, offer an incentive to complete the survey and send reminder emails, it is likely the response rate would have been higher. The author was unable to obtain individual nurse educators' email addresses and had to rely on contacting nursing programs.

Instruments

The initial part of the survey consisted of demographic data collection. The age, gender, ethnicity, race, level of education, years in nursing, years as an educator, geographical region, as well as type of program/school was determined. A text box for comments was included at the end of the survey. The following instruments were used in the study: the Revised Motivation at Work Scale (R-MAWS) and the Technology Readiness Index (TRI).

R-MAWS

The R-MAWS assesses work motivation at the domain level, which assesses the work domain within the person's life. This differs from other work motivation scales which measure motivation at the task level. Items were created to measure different work-related behavioral regulations that represented the continuum of motivation to do a particular job (Gagne et al. under review, 2012).

The convergent and discriminant validity was examined by looking at correlations between the motivation subscales with antecedents and outcomes and was found to be good (Gagne et al., 2011). Autonomous motivation was related to hypothesized antecedents such as satisfaction with competence, relatedness and autonomy as well as perceived organizational support and optimism. Autonomous motivation was also positively related to outcomes such as job satisfaction, well-being and commitment and negatively related to turnover intentions and psychological distress. Controlled motivation was unrelated to these antecedents or outcomes. The only outcome that was related to controlled motivation was continuance commitment (Gagne et al., 2011).

The revised version of the MAWS included subscales for external regulation, introjected, identified and intrinsic motivation, as well as a subscale to measure amotivation. The 19-item scale has been tested on a total of 4,783 employees and was validated in 10 languages (French, English, Spanish, Italian, Dutch, Norwegian, Greek, German, Chinese and Indonesian). Out of 50 alpha coefficients (5 subscales in 10 languages), only four (identified and introjected regulation in Italian and German) were below the Cronbach alpha standard of .70. Alpha coefficients ranged from .74-.88 in French, .70-.90 in English, .80-.91 in Spanish, .62-.79 in Italian, .70-.91 in Dutch, .79-.95 in Norwegian, .72-.88 in Greek, .55-.93 in German, .77-.89 in Chinese, .and 82-.94 in Indonesian. For all languages combined, the alpha coefficients were intrinsic (.89), identified (.80), introjected (.73), extrinsic (.79) and amotivation (.84).

The R-MAWS was scored on a 1-7 Likert-type scale. The stem was "Why do you or would you put efforts into your current job?" and is accompanied by the scale: 1 = not at all, 2 = very little, 3 = a little, 4 = moderately, 5 = strongly, 6 = very strongly, and 7 = completely. Statements 1 through 3 measure extrinsic regulation-social, 4-6 measure extrinsic regulation-

material, 7-10 measure introjected regulation, 11-13 measure identified regulation, 14-16 measure intrinsic motivation, and statements 17-19 measure amotivation (Gagne et al., 2012).

TRI

The Technology Readiness Index (TRI) measured the nurse educators' readiness to use technology. The TRI was originally developed for use in marketing research. It was developed in collaboration between Rockbridge Associates (a company specializing in technology research and service) and Dr. A. Parasuraman in 2000. The TRI was copyrighted by A. Parasuraman and Rockbridge Associates, Inc. in 1999. The scale was duplicated with written permission from the authors (See Appendix D).

The TRI consists of a 36-item survey that was slightly modified with permission of the author. The modifications included minor wording changes to focus the items toward a healthcare setting, rather than a business environment. The instrument ranked participants on their optimism, innovativeness, discomfort and insecurity regarding technology. Optimism is defined as "a positive view of technology and a belief that it offers people increased control, flexibility and efficiency in their lives." Innovativeness is "a tendency to be a technology pioneer and thought leader." Discomfort is "a perceived lack of control over technology and a feeling of being overwhelmed by it," insecurity is "distrust of technology and skepticism about its ability to work properly" (Parasuraman, 2000, p. 311). These four dimensions are considered to be independent of each other. An individual could have both contributor and inhibitor feelings toward technology (Meng, Elliott, & Hall, 2010).

The instrument was completed using a 5-point Likert-type scale, with 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, and 5 = strongly agree. There were 10 questions that measured optimism (Statements 1, 6, 8, 10, 13, 16, 21, 25, 29, and 33); 7

that measured innovativeness (Statements 3, 15, 20, 23, 27, 31, and 35); 10 that measured discomfort (Statements 4, 5, 9, 12, 17, 19, 22, 26, 32, and 36); and 9 that measured insecurity (Statements 2, 7, 11, 14, 18, 24, 28, 30, and 34). Statement 15 is reverse scored (Parasuraman, 2000). Scores were obtained for all four subscales as well as the total TRI score. The overall TRI was obtained by combining the means of optimism, innovativeness and reverse scoring the means of discomfort and insecurity. Reverse scoring was accomplished by subtracting the subscale score from 6. The formula for overall TRI was Optimism + Innovativeness + (6 - Discomfort) + (6 – Insecurity) = TRI. The combination of the individual scores on the TRI represented the person's overall technology readiness and the subscales represented contributors and inhibitors to technology readiness (Parasuraman & Colby, 2001). Cronbach's alpha for studies conducted by Parasuraman ranged from 0.74 for insecurity subscale to 0.81 for the optimism subscale for the final 36-item TRI (Parasuraman, 2000).

The TRI emerged from an extensive multiphasic research program. It began with qualitative research to identify the construct's domain followed by a series of studies to refine and further augment the domain (Parasuraman, 2000). Construct validity included a measurement's content and predictive validity. Evaluation of the TRI's construct validity involved the examination of the association between a person's TRI score and answers to his/her experience with and perception of various technology-based services and products. The TRI was found to be a strong measure of the technology readiness construct. It was able to discriminate between users and nonusers of high technology devices and services (Parasuraman, 2000).

Data Analysis

The data were analyzed using SPSS® Version 19. The demographic variables were at the nominal level (gender, ethnicity, type of preparation to use the HFS, and type of

program/school), ordinal level (responses on Likert-type scale, self-identified level of expertise, level of education, years in nursing, and years as an educator) and ratio (age). Nominal and ordinal data were described as frequency and percentages. Interval and ratio data were described using range, mean, and standard deviation. See Table 1 for how each research question was analyzed and Table 2 for how variables were statistically analyzed.

Table 1

Research Questions, IV, DV and Statistical Analysis

Research Question	Independent Variable	Dependent Variable	Statistical Analysis
Is there a difference in nurse educators on motivation based on levels of expertise and type of HFS training?	Level of expertise Type of training	R-MAWS	6 separate 4x4 two-way 6 subscales
Is there a difference in TR using the TRI based on levels of expertise and the type of HFS training?	Level of expertise Type of training	TRI	5 separate 4x4 two-way factorial ANOVAs based on 4 subscales and overall TRI
Is there a difference in selected demographic factors, levels of expertise, the type of training and the R-MAWS and TRI?	Age, gender, educational level, years of experience, level of expertise, type of training, and geographical region	R-MAWS TRI	Multiple regression
Is there a difference in selected demographic factors based on motivation?	Age, gender, educational level, years of experience, and geographical region	R-MAWS	5 one-way MANOVAs x 5 demographics
Is there a difference in selected demographic factors based on TR?	Age, gender, educational level, years of experience, and geographical region	TRI	5 one-way MANOVAs x 5 demographics

Table 2

Variables, Measurement Level and Statistical Analysis

Variables	Measurement Level	Statistical Analysis
Age	Ratio	MANOVA; range, mean, SD
Years in nursing	Ordinal	MANOVA; range, mean, SD
Years as an educator	Ordinal	MANOVA; range, mean, SD
Highest degree	Ordinal	Frequency, %
Gender	Nominal	Frequency, %
Ethnicity	Nominal	Frequency, %
Race	Nominal	Frequency, %
Type of program	Nominal	Frequency, %
Region of US	Nominal	Frequency, %
Type of training	Nominal	Frequency, %
Level of Expertise	Ordinal	Frequency, %
R-MAWS	Ordinal	ANOVA, range, mean, SD
TRI	Ordinal	ANOVA, range, mean SD

Human Subjects

Protection of Human subjects was obtained from the University of Alabama Office of Research (See Appendix C). Subjects were informed about the details of the study and notified that participation was voluntary. Since the original link was sent to a dean or director there could have been a sense of pressure to complete the survey; however, the survey was completed by an anonymous link with no identifying information obtained. The participants were assured of confidentiality and no reports were given to their employer. Completion of the survey was interpreted as implied consent. There was no compensation to participate in the study. The only benefit would be altruistic. Participants will be adding to the current knowledge of high-fidelity simulation usage in the United States. The time to complete the survey is approximately 15 minutes and is not considered to be a subject burden.

Limitations of the Study

The study is descriptive and involves self-reported data. The initial email and survey link was sent to deans and directors of nursing programs in the U.S. and were forwarded to faculty. That could have involved the potential of self-selection regarding who received the survey. To increase response rates, multiple contacts are necessary (Dillman, 2000, p.149). In order to maintain anonymity it was not be possible to send reminder messages to complete the surveys.

An additional limitation was the perception of the participants that the dean/director of their nursing program required completion of the survey. Assurance was given regarding the voluntary and anonymous nature of the survey. A final limitation of the study was that the psychometric properties of the R-MAWS has not yet been accepted for publication and remains under review.

CHAPTER 4

RESULTS

This study reported the motivational factors, technological readiness and demographics of nurse educators who do and do not use HFS. Chapter 4 will be organized around the five research questions.

Is there a difference in nurse educators on:

1. motivation (using the Revised Motivation at Work Scale [R-MAWS]) based on levels of expertise (not using, novice, competent, or expert) and the type of HFS training (none, self-taught, on-the-job, or formal training)?
2. technology readiness (using the Technology Readiness Index [TRI]) based on levels of expertise (not using, novice, competent, or expert) and the type of HFS training (none, self-taught, on-the-job, or formal training)?
3. demographic factors (age, gender, educational level, years of experience, and geographical location, levels of expertise (not using, novice, competent, or expert) and the type of HFS training (none, self-taught, on-the-job, or formal training) and the R-MAWS and TRI?
4. demographic factors (age, gender, educational level, years of experience, and geographical location) based on motivation?
5. demographic factors (age, gender, educational level, years of experience, and geographical location) based on technological readiness?

Demographics

The actual sample size was 662 participants, however only 578 completed the entire survey. A minimum of 480 (30 participants x 16 cells = 480) responses were required to complete the 4x4 two-way factorial ANOVAs. The age of participants ranged from 23 to 100 years (*N*=662) with a mean of 50.99, SD 10.26. While it seems unlikely that a nurse educator is working at age 100, that was the recorded response. The mean age without this participant would be 50.91. There were 620 females (94.2%) and 38 males (5.8%) with four missing responses. Eighteen participants self-identified as Hispanic or Latino (2.8%) and 622 (94%) as Non-Hispanic or Latino, with 22 not responding. Caucasian represented 611 (92.1%), African-American 16 (2.3%), Asian 15 (2.3%), Native American 3 (0.5%), Pacific Islander 1 (0.1%) and other 13 (1.9%), with six participants (1%) not answering.

Participants were asked to identify their individual level of expertise. The levels consisted of 122 (17.9%) not using HFS, 247 (36.3%) novice (needs help to run a simulation), 176 (25.8%) competent (able to run simulations independently) and 108 (15.9%) expert (able to develop scenarios, run simulations independently and function as a resource person to others). There was no response from 28 participants (4.1%).

The participants were asked the type of training provided to teach HFS. Formal training could have been either from the manufacturer of the simulator or attending special classes. Levels of training were none 126 (18.5%), self-taught 76 (11.2%), on-the-job 268 (39.4%) or formal training 181 (26.7%) to use HFS. Twenty-nine did not answer this question (4.3%).

For participants who use HFS, additional information was requested regarding the amount of time spent each week in simulation and the courses that use HFS. This information provided a snapshot of the current use of HFS in the United States, as summarized in Table 3.

Table 3

Demographics

Demographic	Category	Frequency	Percent
Region	Northeast	101	15.3
	Midwest	117	17.7
	South Atlantic	89	13.4
	South Central	107	16.2
	Mountain West	119	18.0
	Pacific West	123	18.6
	Missing	6	0.9
Highest Degree	BSN	60	9.2
	MSN	428	64.7
	Doctorate	162	24.5
	Missing	12	1.8
Years in Nursing	<5 years	17	2.6
	5-10 years	50	7.6
	11-20 years	142	21.5
	21-30 years	180	27.2
	31-40 years	193	29.2
	>40 years	69	10.4
	Missing	11	1.7
Years as Educator	<5 years	167	25.2
	5-10 years	221	33.4
	11-20 years	141	21.3
	21-30 years	77	11.6
	31-40 years	40	6.0
	>40 years	3	0.5
	Missing	13	2.0
Type of Program	ADN	281	42.4
	BSN	327	49.4
	RN-BSN	131	19.8
	Graduate	152	23.0*
Level of Expertise	Not using	122	18.4
	Novice	245	37.0
	Competent	175	26.4
	Expert	108	16.3
	Missing	12	1.8
Type of Training	None	126	19.0
	Self-taught	75	11.3
	On-the-job	268	40.5
	Formal	180	27.2
	Missing	13	2.0

*Able to select more than one type of program

Of the respondents, 528 (71.2%) currently use HFS with 69 (10.4%) having a faculty position that is identified as primarily for simulation. The number of years that faculty used simulation ranged from < 3 months to over 15 years. The most common course in which simulation was used was medical-surgical nursing (*n*=287), followed by obstetrics (*n*=103), pediatrics (*n*=77), fundamental skills *(n*=60), mental health (*n*=9), leadership (*n*=9) and community health (*n*=12). Not everyone responded to this question and many respondents listed more than one course in which simulation was being used.

This was a national survey with good representation from all six regions of the United States. Based on the demographics, a snapshot of the faculty who uses HFS is female, Caucasian, 51 years old, prepared at the master's level and teaches in an ADN or BSN program. She has been a nurse for 30+ years and has been teaching for 5-10 years. The majority identify themselves as novices and learned how to use HFS on the job. The most common course to use HFS is medical-surgical nursing and only 10% hold positions identified as primarily simulation. Since the majority of respondents self-identified as novices, this increases the need to develop strong mentoring programs in our schools of nursing to increase the skills and confidence of the novices. Faculty development is also needed.

There was a text box at the end of the survey for comments allowing participants to give qualitative feedback. The comments were coded as barriers and benefits of simulation. The major barriers to simulation usage included the expense, lack of time, lack of ongoing faculty development, and the lack of sound research demonstrating the benefits of simulation as an effective teaching strategy. Some nurse educators identified the benefits of simulation as an important supplemental learning tool that results increased self-confidence and self-esteem of students, increased team-building and communication skills, a method to practice and evaluate

clinical decision-making skills and an adjunct to clinical experience in a safe environment. Clinical placements are becoming difficult to obtain in some areas, especially in obstetrics and pediatrics.

The means of the subscales of the R-MAWS are shown in Table 4. Scores could range from 1 (not at all) to 7 (completely). Nurse educators have low levels of amotivation and high levels of identification and intrinsic motivation. This indicates that nurse educators are motivated by their perceived value of the work being accomplished and the intrinsic pleasure of teaching. Material and social motivators are not strong drivers in nursing education. The Cronbach's alpha for the R-MAWS for this study was .605, which represents weak internal reliability (Houser, 2012, p. 213). The Cronbach's alpha for the subscales were: external regulation-social .519, external regulation-material .484, introjections .436, identification .576, intrinsic .614 and amotivation .650.

Table 4

Responses to R-MAWS

Motivation Level	N	Minimum	Maximum	Mean	Std. Deviation
Amotivation	602	1.00	6.00	1.20	0.56
External Regulation-Social	604	1.00	7.00	3.49	1.33
External Regulation- Material	604	1.00	6.67	2.91	1.33
Introjection	604	1.00	7.00	4.30	1.49
Identification	604	1.00	7.00	6.28	0.92
Intrinsic	602	1.00	7.00	5.83	1.07

The mean subscales and overall TRI scores are shown in Table 5. When comparing the means for this study to those found by Parasuraman in 2000, optimism is nearly identical; innovativeness is higher, insecurity and discomfort are lower, and the overall TRI mean has increased from 2.88 in 2000 to 3.25 in 2012. The Cronbach's alpha for this study was .799,

which represents moderate internal reliability (Houser, 2012, p.213). The subscales were optimism .748, innovativeness .731, discomfort .769, insecurity .777 and overall TRI .743.

Table 5

Responses to Technology Readiness Index

Index	N	Minimum	Maximum	Mean	Std. Deviation
Optimism	582	1.00	5.00	3.82	0.54
Innovativeness	582	1.00	5.00	3.40	0.74
Insecurity	582	1.22	4.56	2.85	0.57
Discomfort	582	1.40	4.70	3.02	0.53
Overall TRI	582	1.50	4.59	3.27	0.45

Research Question #1

Is there a difference in nurse educators on motivation (amotivation, external regulation-social, external regulation-material, introjections, identification and intrinsic) based on levels of expertise (not using, novice, competent, or expert) and type of HFS training (none, self-taught, on-the-job or formal training)?

None of the dependent variables except amotivation demonstrated statistical significance. Novice had significantly higher amotivation scores than expert at .012 ($p<.05$). Effect size was calculated using Eta squared (h^2) which is sum of squares divided by total sum of squares. The effect size criteria used was h^2 small (.01), medium (.06), and large (.14) (Huck, 2012, p. 223). A Tukey post hoc multiple comparison of means revealed significant mean differences between self-identified novices and experts in HFS *(M*=.2007, SD .066, p = .014*)*. There was homogeneity of the variances, which indicates there is low variability in the scores (Huck, 2012, p.31). Type of training did not demonstrate any statistical significance based on R-MAWS,

which is motivation was not influenced by whether you were not trained, self-taught, trained on-the-job, or had formal training.

Table 6

Summary of ANOVA for Amotivation (N=600)

Source	*SS*	*df*	*MS*	*F*	*p*	h^2	Observed Power
Expertise	3.544	3	1.181	3.706	.012*	.18 large	.806
Training	.058	3	.019	.061	.980		
Expertise x Training	2.982	7	.426	1.337	.230		
Within groups	186.779	586	.319				
Total	1060.361	600					

*$p < .05$

Tukey Post Hoc

(I)What is your level of expertise?	(J)What is your level of expertise?	Mean difference (I – J)	Std. Error	Sig.
Novice	Not using	.0409	.066	.925
	Competent	.0621	.058	.711
	Expert	.2007*	.066	.014

*The mean difference is significant at the .05 level.

Research Question #2

Is there a difference in nurse educators on technology readiness (optimism, innovativeness, insecurity, discomfort and overall TRI) based on levels of expertise (not using, novice, competent, or expert) and types of training (none, self-taught, on-the-job or formal training)

There was a significant difference in technological readiness on level of expertise and optimism ($p < .05$), innovativeness ($p<.01$) and overall TRI ($p <.01$). Tukey post hoc comparison of means revealed a significant mean difference between self-identified experts and

novices for optimism (*M* = -.1873, SD = .063. *p* = .019) with experts being more optimistic than novices. Tukey post hoc multiple comparison of means indicated significant mean differences between self-identified experts including a) not using HFS (*M* = -.6495, SD = .0.97, *p*=.00), b) novice (*M* = -.5764, SD = .084, *p*=.00) and c) competent (*M* = -.2693, SD = .089, *p*=.015) for innovativeness. Tukey post hoc for overall TRI found that self-identified experts had significantly higher TRI than those not using (*M* =- 1.1754, SD = .239, *p*=.00), novice (*M* = -1.1548, SD = .207, *p*=.00) and competent (*M* = - .4578, SD = .221, *p*=.164). Tukey post hoc for type of training did indicate a significant mean difference however the ANOVA was not significant. Tukey's corrects for the chance of a Type I error, so it may indicate significance when it actually does not exist. The interaction between level of expertise and type of training indicated no statistical significance for optimism or innovativeness. There was statistical significance for TRI between those with no training and formal training *(M*= -.7549, SD .214, *p*=.003*)* and on-the-job training and formal training (*M*= -.5153, SD .175, *p*=.018*)*.

Table 7

Summary of ANOVA for Optimism N=580

Source	*SS*	*df*	*MS*	*F*	*p*	h^2	Observed Power
Level of Expertise	2.555	3	.852	2.986	.031*	.019 Small	.706
Training	1.580	3	.53	1.846	.138		
Expertise x Training	4.698	7	.671	2.353	.022***		
Within groups	161.467	566	.285				
Total	8615.203	580					

**p*<.05
****NS on Tukey*

Tukey Post Hoc

(I)What is your level of expertise?	(J)What is your level of expertise	Mean difference (I – J)	Std. Error	Sig.
Novice	Not using	-.0142	.063	.996
	Competent	-.1644*	.056	.019
	Expert	-.1873*	.064	.019

*The mean difference is significant at the .05 level

What type of training have you had to use HFS?	What type of training have you had to use HFS?	Mean difference	Std. Error	Sig.
None	Self-taught	-.0271	.083	.988
	On-the-job	.0029	.062	1.000
	Formal training	-.0987	.066	.440
Self-taught	None	.0271	.083	.988
	On-the-job	.0300	.074	.978
	Formal training	-.0716	.078	.793
On-the-job	None	-.0029	.062	1.000
	Self-taught	-.0300	.074	.978
	Formal training	-.1016	.054	.235
Formal training	None	.0987	.066	.440
	Self-taught	.0716	.078	.793
	On-the-job	.1016	.054	.235

Table 8

Summary of ANOVA for Innovativeness N=580

Source	*SS*	*df*	*M*	*F*	*p*	h^2	Observed Power
Level of Expertise	13.284	3	4.428	8.905	.000**	.039 small	.996
Training	2.994	3	.998	2.007	.112		
Expertise x Training	3.792	7	.542	1.089	.368		
Within groups	281.460	566	.497				
Total	7036.373	580					

***p*<.01

Tukey Post Hoc

(I)What is your level of expertise with HFS?	(J)What is your level of expertise with HFS?	Mean difference (I – J)	Std. Error	Sig.
Not using	Novice	-.0731	.083	.817
	Competent	-.3802*	.088	.000
	Expert	-.6495*	.097	.000
Novice	Not using	.0731	.083	.817
	Competent	-.3071*	.074	.000
	Expert	-.5764*	.084	.000
Competent	Not using	.3802*	.089	.000
	Novice	.3071*	.074	.000
	Expert	-.2693*	.089	.015
Expert	Not using	.6495*	.097	.000
	Novice	.5764*	.084	.000
	Competent	.2693*	.089	.015

*The mean difference is significant at the .05 level

Table 9

Summary of ANOVA of Overall TRI N=579

Source	*SS*	*df*	*M*	*F*	*p*	h^2	Observed Power
Level of expertise	50.462	3	16.821	5.577	.001**	.0004 small	.943
Training	1914.385	3	638.128	1.980	.088		
Expertise x Training	4067.577	7	581.082	1.8031	.041*	.04 small	.706
Within groups	1707.091	566	3.016				
Total	101313.9	580					

*p<.05, **p<.01

Tukey Post Hoc

(I)What is your level of expertise with HFS?	(J)What is your level of expertise with HFS?	Mean Difference (I – J)	Std. Error	Sig.
Not using	Novice	-.0205	.205	1.000

	Competent	-.7175*	.219	.006
	Expert	-1.175*	.240	.000
Novice	Not using	.0205	.205	1.000
	Competent	-.6970*	.183	.001
	Expert	-1.155*	.208	.000
Competent	Not using	.7175*	.219	.006
	Novice	.6970*	.183	.001
	Expert	-.4578	.221	.164
Expert	Not using	1.175*	.239	.000
	Novice	1.155*	.208	.000
	Competent	.4578	.221	.164

The mean difference is significant at the .05 level

Research Question # 3

Is there a difference in nurse educators on demographic factors (age, gender, educational level, years of experience and geographical location, levels of expertise (not using, novice, competent and expert) and type of HFS training (none, self-taught, on-the-job and formal training) and the R-MAWS and TRI?

Using multiple regression of demographics, level of expertise and type of training, the following were the significant predictors of the subscales of R-MAWS and TRI:

1. Increased age and level of expertise (expert) decreased amotivation.
2. Increased age increased the mean external regulation-social.
3. Increased age and level of expertise (expert) decreased the mean external regulation-material.
4. Increased age decreased mean introjection score.
5. Level of expertise (expert) increased mean intrinsic motivation.
6. Gender (female), age and level of expertise (expert) increased mean identification.

7. Increased age decreased overall TRI; level of expertise (expert) increased overall TRI.
8. Increased age, decreased optimism with technology, level of expertise (expert) increased optimism.
9. Innovativeness increased with level of expertise (expert) and decreased with age.
10. Increased age increased insecurity with technology.
11. Increased age and decreased level of expertise increased discomfort with technology.

Age contributed 4% to the variance of External Regulation-Social. Expertise and age are predictors for amotivation. Expertise contributes 1% to the variance, age adds an additional 1% and the combination results in statistical significance (p=.019). Age accounted for nearly 4% of the variance in External Regulation-Material, adding expertise increases the variance to 5%. This results in a significant change (p=.006). Age is the only factor that contributed to variance in introjection. It contributes 1.5% to the variance which is a very small, but statistically significant change (p=.006). Expertise is the only factor that contributed to the variance of intrinsic motivation. Expertise added 1.5% which again was statistically significant (p=.004). While these variances are all very small they did contribute statistically significance to the predictors of the subscales of motivation. See Tables 10 through 19 for statistical findings.

Table 10

Model Summary Age + Level of Expertise --» Amotivation

ANOVA							
Model	*SS*	*df*	*MS*	*F*	Sig.	h^2	Observed Power
Regression	3.787	2	1.894	5.926	.003**	.02 small	.953
Residual	187.574	587	.320				
Total	191.361	589					

**$p < .01$

Model Summary				
Model	*R*	R^2	Adjusted R^2	Std. error of estimate

1	.102	.011	.009	.567
2	.141	.020	.016	.565

	Change Statistics				
Model	R^2 Change	*F* Change	*df*1	*df*2	Sig *F* change
2	.009	5.562	1	587	.019

Best Model Equation Amotivation = (-.063) (expertise) – (.005) (age) + 1.631

Table 11

Model Summary-Age --» External Regulation-Social

	ANOVA						
Model	*SS*	*df*	*MS*	*F*	Sig.	h^2	Observed Power
Regression	38.045	1	38.045	21.790	.000**	.036 small	.999
Residual	1030.135	590	1.746	1.732			
Total	1068.181	591					

**$p < .01$

	Change Statistics				
Model	R^2 Change	*F* Change	*df*1	*df*2	Sig *F* change
1	.036	21.790	1	590	.000

Best Model Equation External Regulation-Social = (-0.25) (age) + 4.781

Table 12

Model Summary Age + Level of Expertise--»External Regulation-Material

	ANOVA						
Model	*SS*	*df*	*MS*	*F*	Sig.	h^2	Observed Power
Regression	56.403	2	28.201	16.587	.000**	.05 medium	.978
Residual	1001.43	589	1.7				
Total	1057.83	591					

**$p < .01$

	Model Summary			
Model	*R*	R^2	Adjusted R^2	Std. error of estimate
1	.203	.041	.39	1.31126

2	.231	.053	.050	1.30393

	Change Statistics				
Model	R^2 Change	*F* Change	*df*1	*df*2	Sig *F* change
2	.012	7.659	1	589	.006

Best Model Equation External Regulation-Material = (-.028) (age) – (.151) (expertise) + 4.280

Table 13

Model Summary Age--»Introjection

	ANOVA						
Model	*SS*	*df*	*MS*	*F*	Sig.	h^2	Observed Power
Regression	21.505	1	21.505	9.637	.002**	.016 small	.999
Residual	1316.58	590	2.231	1.732			
Total	1338.09	591					

**$p < .01$

	Change Statistics				
Model	R^2 Change	*F* Change	*df*1	*df*2	Sig *F* change
1	.016	9.637	1	590	.002

Best Model Equation Introjection = (-.019) (age) +5.268

Table 14

Model Summary Gender + Level of Expertise + Age--»Identification

	ANOVA						
Model	*SS*	*df*	*MS*	*F*	Sig.	h^2	Observed Power
Regression	17.884	3	5.961	7.049	.000**	.03 small	.790
Residual	497.245	588	.846				
Total	515.129	591					

**$p < .01$

	Model Summary			
Model	*R*	R^2	Adjusted R^2	Std. error of estimate
1	.131	.017	.016	.926
2	.166	.028	.024	.922
3	.186	.035	.030	.919

	Change Statistics				
Model	R^2 Change	*F* Change	*df*1	*df*2	Sig *F* change
3	.007	4.385	1	589	.037

Best Model Equation Identification = (.557) (gender) + (.102) (expertise) + (.008) (age) + 4.541

Table 15

Model Summary Level of Expertise--»Intrinsic

	ANOVA						
Model	*SS*	*df*	*MS*	*F*	Sig.	h^2	Observed Power
Regression	9.392	1	9.392	8.203	.004**	.013 small	.705
Residual	673.226	588	1.145				
Total	682.618	589					

**$p < .01$

	Change Statistics				
Model	R^2 Change	*F* Change	*df*1	*df*2	Sig *F* change
1	.014	8.203	1	588	.004

Best Model Equation Intrinsic = (.129) (expertise) + 5.512

Age and level of expertise were the only significant predictors of overall TRI. Age alone accounts for 6% of the variance on overall TRI. With the level of expertise the amount of variance accounted for is increased to 10%. This represents an increase (R^2 change) of 4%, which is statistically significant ($p < .01$). Therefore the level of expertise contributes significantly more to the overall TRI than age. Age contributes 3% to the variance in optimism; however, adding level of expertise increases the variance to 4% which is statistically significant (p=.005). Level of expertise accounts for 9% of the variance in innovativeness; age increases this by 4% (p<.01). Age accounts for almost 2% of the variance in insecurity *(p*=.003). Level of expertise accounts for 3% of the variance in discomfort, age adds another 3.5% to the variance. (p=.045, p<.05). Again the variances are very small, but they did result in statistical significance for predictors of TRI.

Table 16

Model summary Age + Level of Expertise --» Overall TRI

ANOVA							
Model	*SS*	*df*	*MS*	*F*	Sig.	h^2	Observed Power
Regression	176.9	2	88.45	29.876	.000**	.09 medium	.998
Residual	1681.63	568	2.961				
Total	1858.53	570					

**$p < .01$

Model Summary				
Model	*R*	R^2	Adjusted R^2	Std. error of estimate
1	.240	.057	.056	1.75
2	.309	.095	.092	1.72

Change Statistics					
Model	R^2 Change	*F* Change	*df*1	*df*2	Sig *F* change
2	.038	23.725	1	568	.000

Best Model Equation Overall TRI = (.410) (Expertise) -(.035) (Age) + 13.894

Table 17

Model Summary Age + Level of Expertise--»Optimism

ANOVA							
Model	*SS*	*df*	*MS*	*F*	Sig.	h^2	Observed Power
Regression	6.904	2	3.452	12.105	.000**	.04 medium	.978
Residual	161.98	568	.285				
Total	168.88	570					

**$p < .01$

Model Summary				
Model	*R*	R^2	Adjusted R^2	Std. error of estimate
1	.165	.027	.026	.537
2	.202	.041	.038	.534

Change Statistics

Model	R^2 Change	*F* Change	*df*1	*df*2	Sig *F* change
2	.014	8.026	1568	.005	

Best Model Equation Optimism = (-.008) (age) + (.064) (Expertise) + 4.093

Table 18

Model Summary Level of Expertise + Age--»Innovativeness

ANOVA							
Model	*SS*	*df*	*MS*	*F*	Sig.	h^2	Observed Power
Regression	43.72	2	21.86	45.575	.000**	.14 large	.986
Residual	272.478	568	.490				
Total	316.21	570					

**$p < .01$

Model Summary				
Model	*R*	R^2	Adjusted R^2	Std. error of estimate
1	.306	.093	.092	.709
2	.372	.138	.135	.692

Change Statistics					
Model	R^2 Change	*F* Change	*df*1	*df*2	Sig *F* change
2	.045	29.56	1	568	.000

Best Model Equation Innovativeness = (.218) (expertise) – (.016) (age) + 3.680

Table 19

Model Summary Age--»Insecurity

ANOVA							
Model	*SS*	*df*	*MS*	*F*	Sig.	h^2	Observed Power
Regression	2.638	1	2.638	8.419	.004**	.014 small	.928
Residual	178.278	569	.313				
Total	180.916	570					

**$p < .01$

Change Statistics					
Model	R^2 Change	*F* Change	*df*1	*df*2	Sig *F* change

1	.015	8.419	1	569	.004

Best Model Equation Insecurity = (-.007) (age) + 3.199

Table 20

Model Summary Level of Expertise + Age--»Discomfort

ANOVA							
Model	*SS*	*df*	*MS*	*F*	Sig.	h^2	Observed Power
Regression	5.536	2	2.768	10.11	.000**	.03 medium	1.00
Residual	155.52	568	.274				
Total	161.05	570					

**$p < .01$

Model Summary				
Model	*R*	R^2	Adjusted R^2	Std. error of estimate
1	.166	.028	.026	.524
2	.185	.034	.031	.523

Change Statistics					
Model	R^2 Change	*F* Change	*df*1	*df*2	Sig *F* change
2	.007	4.039	1	568	.045

Best Model Equation Discomfort = (.086) (expertise) - (.004) (age) + 2.807

Research Question 4

Is there a difference in selected demographic factors (age, gender, educational level, years of experience and geographical region) based on motivation?

Using the one-way MANOVAs, there was statistical significance found between region and intrinsic motivation (Northeast to South Central p=.028, South Central to Pacific West p=.046). The other MANOVAs did not demonstrate significance. To probe these results, one-way ANOVAs were conducted with the following results (See Table 20). A Pearson Correlation was run and there was a weak negative correlation between age and external regulation-social, external regulation-material, introjections and amotivation.

Table 21

Independent Variable Region ANOVA

	ANOVA						
Source	*SS*	*df*	*MS*	*F*	Sig.	h^2	Observed Power
Intrinsic							
Between groups	1.8262	5	3.652	2.950	.012*	.02 small	.847
Within groups	736.651	595	1.238				
Total	754.913	600					

*p<.05

Table 22

Correlation of Age and R-MAWS

Age	External Regulation-Social	External Regulation-Material	Introjection	Identification	Intrinsic	Amotivation
Pearson Correlation	-.190**	-.203**	-.129**	.081	.057	-.09*
Sig. (2-tailed)	.000	.000	.002	.048	.163	.026
N	600	600	600	600	598	598

**Correlation is significant at the .01 level (2-tailed)
*Correlation is significant at the .05 level (two-tailed)

Research Question # 5

Is there a difference in selected demographic factors (age, gender, educational level, years of experience and geographical region based on technological readiness?

The MANOVAs for the dependent variable TRI demonstrated statistical significance for innovativeness and years of experience as a nurse educator and innovativeness and gender. A one-way ANOVA was completed to further probe these results.

Table 23

Independent Variables Years of Experience and Gender ANOVA

	ANOVA						
Source	*SS*	*df*	*MS*	*F*	Sig.	h^2	Observed Power
Innovativeness							
Years of experience							
Between groups	6.938	5	1.388	2.553	.027*	.022 small	.797
Within groups	309.202	569	.543				
Total	316.14	574					
Gender							
Between groups	2.322	1	2.322	4.230	.04*	.007 small	.530
Within groups	316.137	576	.549				
Total	318.458	578					

*p<.05

Table 24

Correlation of Age and TRI

Age	Optimism	Innovativeness	Insecurity	Discomfort	TRI
Pearson Correlation	-.169**	-.237**	-.125**	-.96*	-.216**
Sig. (2-tailed)	.000	.000	.003	.022	.000
N	578	578	578	578	578

**Correlation is significant at the .01 level (2-tailed)
* Correlation is significant at the .05 level (2-tailed)

Summary of Results

The novice users of HFS indicated higher levels of amotivation. This was statistically significant, had a large effect size and observed power of >.80, which indicates practical as well as statistical significance. Self-identified experts had higher innovativeness, optimism and overall TRI scores. However, the effect size and power analysis may indicate statistical but not practical significance. Multiple regression indicated that part of the variance in amotivation was due to age and level of expertise. Those who were older and those who identified themselves as experts in HFS had lower amotivation scores. Increased age resulted in decreased external

regulation-material and introjection scores. Increased age resulted in increased external regulation-social scores. In other words, the older nurse educators were less motivated by material gains and the sense of obligation to complete a job; however, how they are viewed by peers and supervisors was an important factor in their motivation. Gender, level of expertise and age increased the identification score, with females having higher identification scores than males. Self-identified experts in the use of HFS had higher intrinsic motivation scores. Increased age resulted in decreased overall TRI, optimism and innovativeness scores. Self-identified experts in HFS had higher overall TRI scores and innovativeness scores than those who self-identified as novices. Older nurse educators had higher insecurity and discomfort scores. Self-identified experts in HFS had lower discomfort scores. The variances were very low, indicating that these factors played a small role in overall work motivation or technology readiness. Again, there was statistical significance but questionable practical significance. Effect sizes ranged from small to medium; however, the observed power analysis was larger as shown in the tables.

Using multiple analyses of variances, educators from the Northeast and Pacific West had higher intrinsic motivation scores than nurse educators from the South Central region. These analyses also demonstrated increased age resulted in lower innovativeness scores and males and nurse educators with more years of experience had higher innovativeness scores. Pearson's correlation indicated that age was weakly negatively correlated with external regulation-social, external regulation-material, introjections and amotivation and weakly positively correlated with identification. Age was weakly negatively correlated with all subscales of the TRI.

CHAPTER 5

DISCUSSION

This chapter presents a summary of the study and conclusions drawn from the data presented in Chapter 4. There will also be a discussion of the implications of the findings and recommendations for further studies (Roberts, 2010, p. 178-179). The purpose of this study was to compare nurse educators' motivation and technological readiness of those educators who do and do not use HFS. The results of this study were compared with the findings in the literature regarding HFS, work motivation and technological readiness of nurse educators, as well as the conceptual model and theoretical framework.

HFS

The barriers to using HFS that were identified in the literature (lack of time, lack of support, lack of funding, lack of faculty development, and lack of research demonstrating the benefits of this teaching strategy) were also identified by the respondents to this survey.

The following are some representative comments from respondents: "I believe I am limited in using HFS due to insufficient research showing the benefits of simulation." "Lack of human resources limits the ability to use HFS." "The major limiting factor is lack of funding and training." "Simulation done well takes more time than taking students into clinical." "The technology is SO time consuming, I feel like a failure at my job." "We have not had the budget or the faculty to use HFS." "Providing training, experience and resources are important parts that must go along with simulation. Too often technology is obtained, but you are expected to find out how to use it, develop it, etc. on your own. Time is not allotted to training. Just one

more thing to add to an overloaded workload." "The product we use is not up-to-date. I hate having to 'jerry-rig' the system to make it work. Money needs to be adequately allocated for HFS use in a program." "A mentor or preceptor would be nice to gradually increase the comfort level with HFS." "The issue is having the infrastructure and support to allow for simulation experience."

The participants also reported benefits to the use of HFS that closely corresponded to the published literature. A sampling of respondents' comments follow. "It is exciting and very effective." "A very important adjunct to student learning. It is the only way we can assure that students have certain experiences we believe every new grad should have practice on. I believe it is important to ensure a base skill level so that patients are in the hands of a safe nurse." "I've seen incredible impact on student learning." "It challenges clinical reasoning skills, communication skills and psychomotor skills." "Provides a wonderful learning opportunity in a safe, nonthreatening environment." "HFS is helpful, especially with the lack of available clinical sites." "It allows students to make mistakes in a safe, controlled environment." "It drives home important concepts." "It helps with self-confidence and self-esteem."

Several participants commented that HFS is being used as a replacement for clinical hours. Of the participants who commented on replacing clinical hours for HFS, the reported replacement hours ranged from 10-30%. There is competition for clinical placements and it appears to be worse in rural areas. In order to decrease the expense, several respondents recommended sharing simulation equipment with other facilities. This would hopefully also increase interdisciplinary practice.

There were also cautious comments regarding the tendency to jump into technology without adequate human and physical resources to effectively utilize the equipment. There was a

caution to remember the importance of therapeutic touch and the need to be present for our clients and to advocate for them. While it is being used as a supplement to clinical experiences, there was concern expressed that simulation does not replace talking with clients and providing hands-on care.

There were 662 respondents, however only 576 completed the entire survey. There were comments that the survey was too long, especially the 36-item Technology Readiness Index. The TRI asks about all types of technology and the use of the internet for conducting business. Some of the respondents stated that they failed to see how this related to HFS usage.

This study inquired about the nurse educators perceived level of expertise with HFS and the training that was received which had not been previously reported in the literature. The self-identified levels of expertise included not using, novice (needs assistance to run simulations), competent (able to run simulations without assistance) and expert (able to develop scenarios, run simulations and function as a resource person to peers). Self-identified novices were the largest category at 245 (36.3%), followed by competent, 175 (25.8%). Those not using (122) represented 17.9% of the participants and self-identified experts (108) were 15.9%. The highest category of training was on-the-job with 268 participants (39.4%), followed by formal training at 180 (26.7%). Of the respondents, 69 (10.4%) indicated that their primary position was identified for simulation, such as a simulation coordinator.

Motivation

This was the first study that evaluated the motivation at work of nurse educators using the R-MAWS. The mean scores on the subscales of the R-MAWS indicate that nurse educators have a high level of autonomous motivation. The mean level of identification and intrinsic motivation were at the strong or very strong level on the 1-7 Likert-type scale. This seems to

indicate that nurse educators find the work interesting or enjoyable for its own sake and highly identify with the value or meaning of the work. They also had a very low mean for amotivation. External regulation both material and social were at the very little to a little level. These results indicate that overall nurse educators are most motivated by the value they see in their work, followed by the enjoyment of the job. Salary and recognition from supervisors or peers were not viewed as very important motivators. The salaries for nurse educators are typically lower than the salaries of nurses in hospitals or clinics for those with equivalent education and experience. Nurse educators appear to work for the impact the job has on students and the joy and pleasure of the work.

This corresponds closely with findings from a study of nurse educators completed in 2010. The nurse educators identified the responsibility, the work itself, the sense of personal achievement and the thought that the work was making a difference as primary motivators for doing their job (Lane, Esser, Holte & McCusjer, 2010). A qualitative study was completed to examine what motivates individuals to pursue nursing. The four themes were a desire to help, caring, a sense of accomplishment and self-validation (Newton, Kelly, Kemser, Jolly, & Billett, 2009). These themes appear to closely reflect identified or integrated extrinsic motivation and intrinsic motivation. This is in contrast to the findings in the Hegney, Plank, and Parker (2006). This study was quantitative and was completed in Australia on practicing RNs. The majority found nursing to be emotionally challenging, physically demanding and that morale was poor. Autonomy was not encouraged and the respondents reported that salaries were poor.

The self-identified novices had higher levels of amotivation than those who do not use HFS and those who are self-identified as competent or expert. This indicates that novices in the use of HFS would benefit from mentors until their level of expertise increased to competent.

This also indicates that on-going faculty development could be beneficial. As the level of expertise increases to expert, the intrinsic means also increased. This indicates that self-identified experts in HFS find simulation to be interesting and enjoyable for its own sake.

The Pacific West and Northeast participants had higher intrinsic motivation scores than those from the South Central region. A possible explanation for this is that the Pacific West is an area where a great deal of emphasis has been on high-fidelity simulation. Oregon Science and Health University in Portland, Oregon has been on the forefront of much of the research in HFS. This is also an area of the United States where much of the research on technology has occurred. The Northeast has many large universities and likely have received grant funding to support their simulation programs. The South Central region is more rural and as a result may have had less economic support for the purchase of simulators.

Technological Readiness

The technological readiness mean scores were very similar to the findings of Parasuraman in 2000. The insecurity mean (2.85 vs. 4.03) and discomfort mean (3.02 vs. 3.46) appear to indicate that they play a smaller role in technology readiness in 2012. The overall TRI mean increased to 3.27 from 2.88 in 2000 (Parasuraman, 2000). This was not surprising based on the explosion of technology in the past decade.

Technological readiness findings are reflective of the literature. A study in 2008 found that males had higher innovativeness scores than females (Caison, Bulman, Pai, & Neville, 2008). This study also found that males had higher innovativeness scores. Increasing age is negatively correlated with optimism and innovativeness, which is also reflected in the Peterson study (2008). This study also found that increased age was negatively correlated with the overall TRI and positively correlated with insecurity and discomfort means. In contrast to the Peterson

study, the results of this study indicated that years of experience as a nurse educator had increased the innovativeness mean.

Theoretical Framework/Conceptual Model

The theoretical framework for this study was the SDT. The SDT purports that motivation is dependent upon three basic psychological needs. These are autonomy, relatedness and competence. The findings of this study support the effects of autonomy, relatedness and competence in nursing education. Nurse educators are considered to be highly autonomous, especially in institutions that support academic freedom. Self-identified experts can be considered to demonstrate competence. Nurse educators are dependent upon the relationship with peers and students to effectively perform their duties. Self-identified novices in HFS had higher levels of amotivation, which was reflected by a sense of low perceived competence. If given the opportunity and support to increase the level of expertise, it is likely that the level of amotivation will decrease and identification and intrinsic motivation will increase. This is reflected in the results of self-identified experts in HFS. Self-identified experts have higher optimism, innovativeness and TRI means than novices. Older nurse educators have higher insecurity and discomfort means than younger nurse educators. These are inhibitors to technological readiness.

Motivation at work and technological readiness are two separate concepts. Findings from this study did not support the merging of the Taxonomy of Human Motivation (Ryan & Deci, 2001) and the Technology Readiness Model (Parasuraman & Colby, 2001) into the Motivation and Technological Readiness Model.

Conclusions

This was an important study that has implications for administrators, as well as nurse educators. The demographics allowed for a "snapshot" of the typical user of HFS in the United States today. The average nurse educator using HFS is a 51 year-old female, Causcasian who has a master's in nursing. She has been a nurse for 30+ years and has been teaching for 5-10 years. She is most likely to be teaching in an associate degree or baccalaureate nursing program. She is a self-identified novice who learned to operate the simulator on-the-job. This was the first study that looked at self-identified levels of expertise in HFS. The majority of educators using HFS consider themselves to be novices. This emphasizes the need for faculty development, and support in the form of mentoring to increase the perceived level of expertise. As the level of expertise increases, the contributors to technological readiness increase. Although there was a small effect size, the observed power analysis was about .80, so this could have practical as well as statistical significance. Using self-identified experts as peer mentors could have a positive impact on those who are new to the use of HFS.

Nurse educators have a high level of identified and intrinsic motivation at work. This has significance for administrators. A sense of autonomy, competency and relatedness are important attributes for intrinsic motivation and identified extrinsic motivation. Extra money or recognition does not appear to be as important to nurse educators as the rewards received from the perceived value of their work and the interest and enjoyment they get from teaching. Nurse educators overall appear to have a high level of technological readiness, and low levels of insecurity and discomfort related to the use of technology.

While age was negatively correlated with all subscales and the overall TRI, these correlations were very weak and should not play a role in work load assignment. A Pearson's

correlation of 0.8-1.0 indicates a strong relationship, 0.6-0.8 a moderately strong relationship, 0.4-0.6 a moderate relationship, 0.2-0.4 indicates a weak relationship and < 0.2 indicates no relationship (Houser, 2012). In this study, only innovativeness and optimism had a Pearson correlation of > 0.2.

Technological readiness and motivation at work do not appear to play a large role in the nurse educators' use of HFS. The high percentage of self-identified novices and the associated higher levels of amotivation have implications for work assignments. Methods to support the novice in developing competence in the use of HFS will hopefully increase the level of motivation of faculty.

Recommendations for Further Study

The findings regarding technological readiness is very similar to previous studies of nurse educators and nursing students' comfort with technology. Motivation factors do appear to play a role small role in the use of HFS, but further research needs to be done to identify other factors that influence the nurse educator's use of HFS. As those factors are identified it may be possible to develop a conceptual framework that focuses on the factors that encourage the use of HFS. There is a need for research to determine if the benefits of HFS warrant the time commitment and financial expenditures required. Are there measurable benefits to this teaching strategy compared to case studies or other teaching strategies? It is likely that clinical sites and experiences will continue to become harder to obtain at a time when the demand for nurses is exploding. Does experience with HFS compare with experience in the clinical setting? What is the ideal amount to HFS to get the best outcomes? There also needs to be research in the most efficient methods of using HFS as a teaching strategy, since time constraints continue to be an

issue. The use of simulation coordinators was recommended by the respondents. Studies need to be completed on the most effective role of the coordinator.

Further studies are needed to get more information about the current usage of HFS in nursing education. Is HFS used primarily for teaching or is it being used for high-stakes evaluation? Validated evaluation tools need to be developed and tested.

Nurse educators are highly motivated, autonomous, competent, and rely on co-workers for a sense of belonging at work. The enjoyment of the profession and the value they see in the work is more valuable than monetary or other rewards. At the same time, there is a sense of frustration due to the lack of time, funding and support to dedicate to HFS. Interdisciplinary simulation centers may be one of the answers to the time and funding issues. Sharing equipment with our partners holds the promise of making HFS more cost effective. Technological readiness does not appear to be an issue in the use of HFS. However, there is a need for more faculty development and support in using new educational technologies.

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Appendix A

Motivation and Technological Readiness to Use HFS

Q1 PLEASE COMPLETE THIS SURVEY I am a doctoral student at The University of Alabama in Instructional Leadership with a Specialization in Nursing Education. My dissertation is a descriptive comparative study of nurse educators. I will be measuring motivational and technological readiness factors of nurse educators who do and do not use high-fidelity simulation. This is a national survey and will provide a snapshot of nursing education in the United States. Participation in the survey is anonymous and no identifying information will be collected. The only benefit is altruistic. The data collected will help address gaps in the literature regarding nursing education. Completion of the survey implies consent. It will take 15 minutes or less to complete the survey. Thank you in advance! Judy Duvall

Q2 What is your age?

Q3 What is your gender?

- ❍ Male (1)
- ❍ Female (2)

Q4 What is your race?

- ❍ White/Caucasian (1)
- ❍ African American (2)
- ❍ Asian (3)
- ❍ Native American (4)
- ❍ Pacific Islander (5)
- ❍ Other (6)

Q5 What is your ethnicity?

- ❍ Hispanic or Latino (1)
- ❍ Not Hispanic or Latino (2)

Q6 In which region do you live?

- ❍ Northeast (ME, NH, VT, MA, RI, CT, NY, PA, NJ) (1)
- ❍ Midwest (WI, MI, IL, IN, OH, MO, ND, SD, NE, KS, MN, IA) (2)
- ❍ South Atlantic (DE, MD, DC, VA, WV, NC, SC, GA, FL) (3)
- ❍ South Central (KY, TN, MS, AL, OK, TX, AR, LA) (4)
- ❍ Mountain West (ID, MT, WY, NV, UT, CO, AZ, NM) (5)
- ❍ Pacific West (AK, WA, OR, CA, HI) (6)

Q7 What is your highest degree?

- ❍ BSN (1)
- ❍ MSN (2)
- ❍ Doctorate (3)

Q8 What type of program do you teach? Select all that apply.

- ❑ ADN (1)
- ❑ BSN (2)
- ❑ RN-BSN (3)
- ❑ Graduate (4)

Q9 How many years have you been a nurse?

- ❍ (1)
- ❍ 5-10 years (2)
- ❍ 11-20 years (3)
- ❍ 21-30 years (4)
- ❍ 31-40 years (5)
- ❍ > 40 years (6)

Q10 How long have you been a nurse educator?

- ❍ < 5 years (1)
- ❍ 5-10 years (2)
- ❍ 11-20 years (3)
- ❍ 21-30 years (4)
- ❍ 31-40 years (5)
- ❍ > 40 years (6)

Q11 What is your level of expertise with HFS? 1. Not using 2. Novice: Needs assistance to run simulation 3 .Competent: Able to run simulation without assistance 4. Expert: Develop scenarios, run simulations, resource for peers

- ❍ Not using (1)
- ❍ Novice (2)
- ❍ Competent (3)
- ❍ Expert (4)

Q12 What type of training have you had to use the HFS?

- ❍ none (1)
- ❍ self-taught (2)
- ❍ on-the-job (3)
- ❍ formal training (4)

Q13 How long have you used HFS?

Q14 How much time per week do you work with simulation?

Q15 Is your position identified for simulation, such as Simulation Coordinator

- ❍ Yes (1)
- ❍ No (2)

Q16 What percentage of your workload is identified for simulation?

Q17 Which simulators do you use? Please name.

Q18 In what areas of your curriculum do you use simulation? For example medical-surgical didactic; medical-surgical clinical; obstetrics, etc.

Q19 Why do you or would you put effort into your current job? The Revised Motivation at Work Scale by Gagne et al, 2012 (under review)

1. To get others' approval (e.g. supervisor, colleagues, family, clients) (1)	❍	❍	❍	❍	❍	❍	❍
2. Because others will respect me more (2)	❍	❍	❍	❍	❍	❍	❍
3. To avoid being criticized by others (3)	❍	❍	❍	❍	❍	❍	❍
4. Because others will reward me financially only if I put enough effort in my job (4)	❍	❍	❍	❍	❍	❍	❍
5. Because others offer me greater job security if I put enough effort in my job (5)	❍	❍	❍	❍	❍	❍	❍
6. Because I risk losing my job if I don't put enough effort into it	❍	❍	❍	❍	❍	❍	❍

(6)							
7. Because I have to prove to myself that I can (7)	❍	❍	❍	❍	❍	❍	❍
8. Because it makes me feel proud of myself (8)	❍	❍	❍	❍	❍	❍	❍
9. Because otherwise I will feel ashamed of myself (9)	❍	❍	❍	❍	❍	❍	❍
10. Because otherwise I will feel bad about myself (10)	❍	❍	❍	❍	❍	❍	❍
11. Because I personally consider it important to put efforts in this job (11)	❍	❍	❍	❍	❍	❍	❍
12. Because putting efforts in this job aligns with my personal values (12)	❍	❍	❍	❍	❍	❍	❍
13. Because putting efforts in this job has personal significance to me (13)	❍	❍	❍	❍	❍	❍	❍

14. Because I have fun doing my job (14)	❍	❍	❍	❍	❍	❍	❍
15. Because the work I do is exciting (15)	❍	❍	❍	❍	❍	❍	❍
16. Because the work I do is interesting (16)	❍	❍	❍	❍	❍	❍	❍
17. I don't, because I really feel I am wasting my time at work (17)	❍	❍	❍	❍	❍	❍	❍
18. I do little because I don't think this job is worth putting efforts into (18)	❍	❍	❍	❍	❍	❍	❍
19. I don't know why I am doing this job. It's pointless work (19)	❍	❍	❍	❍	❍	❍	❍

Q20 Please read each statement and indicate how strongly you agree or disagree. The Technology Readiness Index copyrighted by A. Parasuraman and Rockbridge Associates, Inc. 1999. Permission to use obtained 4/29/11

1. Technology gives people more control over their life. (1)	❍	❍	❍	❍	❍
2. The human touch is very important when doing business with a company. (2)	❍	❍	❍	❍	❍
3. Other people come to you for advice on technologies. (3)	❍	❍	❍	❍	❍
4. Technical support lines are not helpful because they don't explain things in terms you understand. (4)	❍	❍	❍	❍	❍
5. Sometimes you think that technology systems are not designed for use by ordinary people. (5)	❍	❍	❍	❍	❍
6. New	❍	❍	❍	❍	❍

technologies are much more convenient to use. (6)					
7. When you call a business, you prefer to talk to a person rather than a machine. (7)	❍	❍	❍	❍	❍
8. You prefer to use the most advanced technology available. (8)	❍	❍	❍	❍	❍
9. There is no such thing as a manual for a high-tech product that's written in plain language. (9)	❍	❍	❍	❍	❍
10.You like the idea of doing business via computers because you are not limited to regular business hours. (10)	❍	❍	❍	❍	❍
11.If you provide information to a machine or over the Internet, you can never be sure it gets to	❍	❍	❍	❍	❍

the right place. (11)					
12.When you get technical support from a provider of high tech services, you sometimes feel you are being taken advantage of by someone who knows more than you do. (12)	❍	❍	❍	❍	❍
13. You like computer programs that allow you to tailor things to your own needs, (13)	❍	❍	❍	❍	❍
14. You do not consider it safe giving out a credit card number over a computer. (14)	❍	❍	❍	❍	❍
15. It seems your peers are learning more about the newest technologies than you are. (15)	❍	❍	❍	❍	❍
16. Technology makes you more efficient in your occupation.	❍	❍	❍	❍	❍

(16)					
17. If you buy a high-tech product or service, you prefer to have the basic model over one with lots of features. (17)	❍	❍	❍	❍	❍
18. You do not consider it safe to do any kind of business online. (18)	❍	❍	❍	❍	❍
19. It is embarrassing when you have trouble with a high-tech gadget while people are watching. (19)	❍	❍	❍	❍	❍
20. In general you are among the first in your circle of friends to acquire new technology when it appears. (20)	❍	❍	❍	❍	❍
21. You find new technologies to be mentally stimulating. (21)	❍	❍	❍	❍	❍
22. There	❍	❍	❍	❍	❍

should be caution when replacing important people-tasks with technology because technology can breakdown or get disconnected. (22)					
23. You can usually figure out new high-tech products and services without help from others. (23)	❍	❍	❍	❍	❍
24. You worry information you send over the Internet will be seen by other people. (24)	❍	❍	❍	❍	❍
25. Technology gives you more freedom of mobility. (25)	❍	❍	❍	❍	❍
26. Many new technologies have health or safety risks that are not discovered until after people have	❍	❍	❍	❍	❍

used them. (26)					
27. You keep up with the latest technological developments in your areas of interest. (27)	❍	❍	❍	❍	❍
28. You do not feel confident doing business with a place that can only be reached online. (28)	❍	❍	❍	❍	❍
29. Learning about technology can be as rewarding as the technology itself. (29)	❍	❍	❍	❍	❍
30. Any business transaction you do electronically should be confirmed later with something in writing. (30)	❍	❍	❍	❍	❍
31. You enjoy the challenge of figuring out high-tech gadgets. (31)	❍	❍	❍	❍	❍
32. New	❍	❍	❍	❍	❍

technology makes it too easy for governments and companies to spy on people. (32)					
33. You feel confident that machines will follow through with what you have instructed them to do. (33)	❍	❍	❍	❍	❍
34. Whenever something gets automated, you need to check carefully that the computer or machine is not making mistakes. (34)	❍	❍	❍	❍	❍
35. You find you have fewer problems than other people making technology work for you. (35)	❍	❍	❍	❍	❍
36. Technology always seems to fail at the worst possible	❍	❍	❍	❍	❍

times. (36)					

Q21 Please include any comments. The information you are providing regarding current simulation use in nursing education will be very helpful in developing a snapshot of HFS usage.

Q22 Thank you for completing the survey. Your responses have been collected.

Appendix B

Welcome Email

To: Deans/Directors of Accredited Nursing Programs
Subject: Research Invitation
Below you will find a link to a survey and the informed consent document. Please forward the link to all of your faculty without regard to their current use of high-fidelity simulation (HFS). Please include tenured, non-tenured, full-time and part-time faculty. The survey will take approximately 15 minutes to complete and is completely anonymous. It will give us a snapshot of the current use of HFS in the United States as well as hopefully identify factors that may indicate which faculty members will be most likely to be willing to adopt this technology. The survey will remain open until Monday, April 30, 2012

Individual's Consent to be in a Research Study

Judy J. Duvall, Principal Investigator from the University of Alabama, is conducting a study called Motivation and Technological Readiness in the Use of High-fidelity Simulation: A Descriptive Comparative Study of Nurse Educators. She wishes to find out demographic information, motivational status and technological readiness of nurse educators who do and do not use high-fidelity simulation. This will provide a snapshot of the current use of high-fidelity simulation in the United States.

Taking part in this study involves completing a web survey that will take about 15 minutes. This survey contains questions about demographics, HFS usage, motivational factors, and technological readiness of nurse educators.

We will protect your confidentiality by using an anonymous survey link, which will have no identifiable information attached. Only the investigator will have access to the data. The data are password protected. Only summarized data will be presented at meetings or in publications. There will be no direct benefits to you other than altruistic. The findings will be useful to nurse educators as it will add to the minimal research that has been completed on the nurse educator and high-fidelity simulation. The chief risk is that some of the questions may make you uncomfortable. You may skip any questions you do not want to answer.

If you have questions about this study, please contact Judy J. Duvall at 931-239-9057 or by email judyjoduvall@crimson.ua.edu. If you have questions about your rights as a research participant, contact [redacted] (the University Compliance Officer) at (205) 348-8461 or toll-free at 1-877-820-3066. If you have complaints or concerns about this study, file them through the UA

IRS outreach website at http://osp.ua.edu/site/PRCO Welcome.html. Also, if you participate, you are encouraged to complete the short Survey for Research Participants online at this website. This helps UA improve its protection of human research participants.

YOUR PARTICIPATION IS COMPLETELY VOLUNTARY. You are free not to participate or stop participating any time before you submit your answers.

Your Anonymous Survey Link:

https://survey.qualtrics.com/SE/?SID=SV_9tPorZPP6hNblJy

Please copy and paste the link into your browser. That you in advance for your willingness to assist in research about HFS from the faculty member's viewpoint.

Judy J. Duvall, EdD(c), RN

Appendix C

Office for Research

Institutional Review Board for the
Protection of Human Subjects

THE UNIVERSITY OF
ALABAMA
RESEARCH

March 5, 2012

Judy Duvall
College of Education
The University of Alabama
Box 870358

Re: IRB # 12-0R-087, "Motivation and Technological Readiness in the Use of High-Fidelity Simulation: A Descriptive Comparative Study of Nurse Educators"

Dear Ms. Duvall:

The University of Alabama Institutional Review Board has granted approval for your proposed research.

Your application has been given expedited approval according to 45 CFR part 46. You have also been granted the requested waiver of written documentation of informed consent. Approval has been given under expedited review category 7 as outlined below:

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

Your application will expire on March 4, 2013. If the study continues beyond that date, you must complete the IRB Renewal Application. If you modify the application, please complete the Modification of an Approved Protocol form. Changes in this study cannot be initiated without IRB approval, except when necessary to eliminate apparent immediate hazards to participants. When the study closes, please complete the Request for Study Closure form.

Should you need to submit any further coiTespondence regarding this application, please include the assigned IRB application number.
Good luck with your research.

Sincerely,

Director & Research Compliance Officer
Office for Research Compliance
The University of Alabama

358 Rose Administration Building
Box 870127
Tuscaloosa. Alabama 35487-0127
(205) 348-8461
FAX (205) 348-7189
--TOLL FREE (877) 820-3066

Individual's Consent to be in a Research Study

Judy J. Duvall, Principal Investigator from the University of Alabama, is conducting a study called Motivation and Technological Readiness in the Use of High-fidelity Simulation: A Descriptive Comparative Study of Nurse Educators. She wishes to find out demographic information, motivational status and technological readiness of nurse educators who do and do not use high-fidelity simulation. This will provide a snapshot of the current use of high-fidelity simulation in the United States.

Taking part in this study involves completing a web survey that will take about 15 minutes. This survey contains questions about demographics, HFS usage, motivational factors, and technological readiness of nurse educators.

We will protect your confidentiality by using an anonymous survey link which will have no identifiable information attached. Only the investigator will have access to the data. The data are password protected. Only summarized data will be presented at meetings or in publications.

There will be no direct benefits to you other than altruistic. The findings will be useful to nurse educators as it will add to the minimal research that has been completed on the nurse educator and high-fidelity simulation.

The chief risk is that some of the questions may make you uncomfortable. You may skip any questions you do not want to answer.

If you have questions about this study, please contact Judy J. Duvall at 931-239-9057 or by email judyjoduvall@crimson.ua.edu. If you have questions about your rights as a research participant, contactxxxxxxxxxxxxxx (the University Compliance Officer) at (205) 348-8461 or toll-free at 1-877-820-3066. If you have complaints or concerns about this study, file them through the UA IRS outreach website at http://osp.ua.edu/site/PRCO_Welcome.html. Also, if you participate, you are encouraged to complete the short Survey for Research Participants online at this website. This helps UA improve its protection of human research participants.

YOUR PARTICIPATION IS COMPLETELY VOLUNTARY. You are free not to participate or stop participating any time before you submit your answers.

UNIVERSITY OF ALABAMA IRB
CONSENT FORM APPROVED: 3/5/12
EXPIRATION DATE: 3/4/13

Appendix D

Hi Judy,

I don't think the actual letter needs to be included. Instead, in addition to appropriately citing the TRI article, you could include a footnote (at some appropriate place while describing your use/adaptation of the TRI) indicating something like: "Written permission was obtained from A. Parasuraman and Charles Colby for the use of the TRI in this dissertation research." Charles may have additional or alternate suggestions.

Regards,
Parsu

A. "Parsu" Parasuraman
Professor of Marketing & Holder of the James W. McLamore Chair
School of Business Administration
University of Miami
Coral Gables, FL 33124-6520
Tel: 305-284-5743/Fax: 305-284-6526
parsu@miami.edu
http://www.bus.miami.edu/faculty-and-research/faculty-directory/marketing/parasuraman/index.html

-----Original Message-----
From: Judy Duvall [mailto:JJDuvall@tntech.edu]
Sent: Friday, July 06, 2012 12:49 PM
To: Charles Colby; Parasuraman, A
Subject: RE: Progress on dissertation

Do I need a letter granting me permission to include with my dissertation? I am making progress-working on Chapter 5!

Judy J. Duvall, EdD(c), RN
Assistant Professor
Whitson-Hester School of Nursing
P.O. Box 5001 Cookeville, TN 38505

931-239-9057

Hi Judy, just include the copyright notation for the printed scale questions per the instructions we sent. Good luck with the dissertation.

Charles

Do I need a letter granting me permission to include with my dissertation? I

am making progress-working on Chapter 5!

Judy J. Duvall, EdD(c), RN

-----Original Message-----
From: Charles Colby [mailto:CColby@rockresearch.com]
Sent: Tue 6/12/2012 3:52 PM
To: Judy Duvall; Parasuraman, A
Subject: RE: Progress on dissertation

Judy,

One item above, terms and conditions, needs to be completed and sent to me signed; it grants a free license. One you send back the paperwork, you may use the scale, which is documented in the second document, TR Index list.

Charles

-----Original Message-----
From: Judy Duvall [mailto:JJDuvall@tntech.edu]
Sent: Tuesday, June 12, 2012 12:10 PM
To: Charles Colby; Parasuraman, A
Subject: RE: Progress on dissertation

Thank you. As I was reviewing Dr. Parasuraman's and my email communications, I realized I did not receive the paperwork to obtain formal permission to use the TRI. If you send the paperwork I will get it back to you promptly. Thank you so much!

Judy J. Duvall, EdD(c), RN

-----Original Message-----
From: Charles Colby [mailto:CColby@rockresearch.com]
Sent: Tue 6/12/2012 10:38 AM
To: 'Parasuraman, A'; Judy Duvall
Subject: RE: Progress on dissertation

There is also a question in the Innovativeness dimension that has to be reversed within the dimension: l. It seems your friends are learning more about the newest technologies than you are.

When running reliability scores for the innovativeness dimension, make sure to use a reversed value to get an accurate measure.

You reverse items by simply subtracting them from 6.
-----Original Message-----
From: Parasuraman, A [mailto:aparasur@bus.miami.edu]
Sent: Tuesday, June 12, 2012 10:55 AM
To: Judy Duvall
Cc: Charles Colby
Subject: RE: Progress on dissertation

Hi Judy, Thanks for the update. Looks like you are making great progress with your study! Regarding computing the overall TRI, you are correct--you need to reverse score the discomfort and insecurity subscales. I am also copying my

colleague Charles Colby on this to keep him in the loop. Regards, Parsu

A. "Parsu" Parasuraman
Professor of Marketing & The James W. McLamore Chair School of Business Administration University of Miami Coral Gables, FL 33124-6520
Tel: 305-284-5743/Fax: 305-284-6526
parsu@miami.edu
http://www.bus.miami.edu/faculty-and-research/faculty-directory/marketing/parasuraman/index.html

---

From: Judy Duvall [JJDuvall@tntech.edu]
Sent: Tuesday, June 12, 2012 9:33 AM
To: parsu@miami.edu
Subject: Progress on dissertation

Good morning, Dr. Parasuaman. I have collected data for my dissertation using the TRI and the Revised Motivation at Work Scale. I am looking at motivational factors and technological readiness for the adoption of high fidelity simulation in nursing education. There are over 500 completed TRI instruments. I want to be certain I am correct regarding the scoring. Scoring looks at the mean for optimism, innovativeness, discomfort and insecurity. The overall TRI requires reverse scoring of the discomfort and insecurity subscales and then a mean of all the subscales. I am meeting with a statistician tomorrow to run my statistics and want to be certain that I have the scoring correct in my mind. I am hopeful that i can complete chapters 4 & 5 this summer and defend in late summer, early fall. Of course i will share my results with you. Thank you for all your help.

Judy J. Duvall, EdD(c), RN

Dear Judy,

Thanks for your request. As you are already aware, the TRI is a copyrighted instrument, but Charles Colby (President, Rockbridge Associates and co-developer of the TRI) and I have been granting permission for its use in academic research, and waiving the fee typically charged to commercial users. Your email suggests that your proposed project is purely academic and does not involve any commercial component. Please let us know if that is not the case. By copy of this email to Charles I am requesting him to send you the paperwork that you would need to complete to obtain formal permission to use the TRI.

I do not anticipate any problem with our granting you permission to use the TRI or to make minor wording changes to TRI items to fit your research context. You are also welcome to use our TR model with appropriate attribution.

Feel free to contact Charles or me if you have any further questions. Good luck with your dissertation.

Regards,

Parsu

PS: Thanks for letting me know about the Caison et al. (2008) article and Peterson's dissertation. I was able to retrieve the former from our library. Has Peterson's work been published? I would appreciate getting a full citation for that work if you have it. Thanks.

A. "Parsu" Parasuraman

Professor of Marketing & Holder of the James W. McLamore Chair

Director of PhD Programs
School of Business Administration

University of Miami

Coral Gables, FL 33124-6520

Tel: 305-284-5743/Fax: 305-284-6526

parsu@miami.edu

http://www.bus.miami.edu/faculty-and-research/faculty-directory/marketing/parasuraman/index.html

From: Judy Duvall [mailto:JJDuvall@tntech.edu]
Sent: Thursday, April 28, 2011 12:41 PM
To: parsu@miami.edu
Subject: Technology Readiness Index

April 28, 2011

Dear Dr. Parasuraman,

I am a doctoral student at The University of Alabama in Tuscaloosa seeking an EdD in Instructional Leadership with a Specialization in Nursing Education. I am hoping to replicate Dr. M.J. Petersen's study from 2008, this time using a national survey of nurse educators to evaluate their readiness to use the human patient simulator. I would like permission to use your Technology Readiness Index as part of my research. I enjoyed your article in the Journal of Service Research and have read Dr. Petersen's dissertation as well as a study by Caison, Bulman, Pai and Neville (2008) in the Journal of Interprofessional Care that used the TRI.

I would also like permission to make very minor wording changes to make it more relevant to nursing education-the statement "Products and services that use the newest technologies are much more convenient to use" would be changed to "New technologies are much more convenient to use." I would also like permission to use the model of technology readiness developed by Dr. Colby and yourself.

Of course I will be delighted to have the opportunity to share the results of my research with you. I am looking forward to hearing from you.

Judy J. Duvall, MSN, RN, CCRN

Appendix E

Sorry that I was not clearer but yes, of course, you can use it while citing it under review.

Keep us posted with the results as we are curious to see how the scale "behaves" in various settings.

Warm regards,

Jacques

Jacques Forest, Ph.D.
Psychologue organisationnel et CRHA
Chercheur au CIRANO
Professeur
Département d'organisation et ressources humaines
ESG-UQAM
Téléphone: 514-987-3000 #3310
Courriel: forest.jacques@uqam.ca
http://www.orh.uqam.ca/Pages/forest_j_cv.aspx

Vous voulez en savoir plus sur la MOTIVATION au travail? Lisez ceci:
http://www.ordrepsy.qc.ca/pdf/Psy_Qc_Septembre2008_Dossier_04_Forest.pdf

-----Message d'origine-----
De : Judy Duvall [mailto:JJDuvall@tntech.edu]
Envoyé : 13 mars 2012 18:13
À : Jacques Forest
Objet : RE: MAWS

So does that mean I can use it with a citation as under review?

Judy J. Duvall, MSN, RN

-----Original Message-----
From: Jacques Forest [mailto:forest.jacques@uqam.ca]
Sent: Tue 3/13/2012 11:06 AM
To: Judy Duvall
Subject: RE: MAWS

Congratulations! Keep us posted :)

Jacques

Jacques Forest, Ph.D.
Psychologue organisationnel et CRHA
Chercheur au CIRANO

Professeur
Département d'organisation et ressources humaines ESG-UQAM
Téléphone: 514-987-3000 #3310
Courriel: forest.jacques@uqam.ca
http://www.orh.uqam.ca/Pages/forest_j_cv.aspx

Vous voulez en savoir plus sur la MOTIVATION au travail? Lisez ceci:
http://www.ordrepsy.qc.ca/pdf/Psy_Qc_Septembre2008_Dossier_04_Forest.pdf

-----Message d'origine-----
De : Judy Duvall [mailto:JJDuvall@tntech.edu] Envoyé : 13 mars 2012 11:59
À : Jacques Forest Objet : RE: MAWS

Good Morning, Jacques!
I have successfully defended my proposal and have received IRB approval from The University of Alabama in Tuscaloosa. I will be ready so send out my survey the last week of March-the middle of April. Everything has been done using the R-MAWS and I am extremely hopeful that I can get your permission to use that instrument. It is perfect for my needs. I hope all is well with you!

Judy J. Duvall, EdD(c), RN

-----Original Message-----
From: Jacques Forest [mailto:forest.jacques@uqam.ca]
Sent: Mon 1/9/2012 11:42 AM
To: Judy Duvall
Subject: RE: MAWS

Dear Judy, how are you? And happy new year!

The revised MAWS has been refused for publication in JAP and is now in revision at Personnel Psychology with the same reference I gave you.

Hope it will go through this time :)

Warm regards from Montréal,

Jacques

Jacques Forest, Ph.D.
Psychologue organisationnel et CRHA
Chercheur au CIRANO
Professeur
Département d'organisation et ressources humaines ESG-UQAM
Téléphone: 514-987-3000 #3310
Courriel: forest.jacques@uqam.ca
http://www.orh.uqam.ca/Pages/forest_j_cv.aspx

Vous voulez en savoir plus sur la MOTIVATION au travail? Lisez ceci:
http://www.ordrepsy.qc.ca/pdf/Psy_Qc_Septembre2008_Dossier_04_Forest.pdf

-----Message d'origine-----
De : Judy Duvall [mailto:JJDuvall@tntech.edu] Envoyé : 21 décembre 2011 10:45 À : Jacques Forest Objet : RE: MAWS

Good Morning Jacques,
I was wondering if there has been any progress in the publication of the Revised MAWS? I did present my prospectus using this instrument and will likely defend my proposal in late January. I hope to collect data in March. This instrument will be ideal for my needs and I am very hopeful I will be able to use it. The addition of amotivation corresponds well with inhibitors to technology readiness. I hope this finds you well and that you are having a restful and joyous holiday season.

Judy J. Duvall, MSN, RN

-----Original Message-----
From: Jacques Forest [mailto:forest.jacques@uqam.ca]
Sent: Fri 10/14/2011 3:06 PM
To: Judy Duvall
Subject: RE: MAWS

The pleasure is all mine and please feel free to contact me if I can be of help on this issue as I am passionate about SDT (would that be intrinsic motivation ;)?).

Warm regards from rainy Montréal,

Jacques

Jacques Forest, Ph.D.
Psychologue organisationnel et CRHA
Chercheur au CIRANO
Professeur
Département d'organisation et ressources humaines ESG-UQAM
Téléphone: 514-987-3000 #3310
Courriel: forest.jacques@uqam.ca
http://www.orh.uqam.ca/Pages/forest_j_cv.aspx

Vous voulez en savoir plus sur la MOTIVATION au travail? Lisez ceci:
http://www.ordrepsy.qc.ca/pdf/Psy_Qc_Septembre2008_Dossier_04_Forest.pdf

-----Message d'origine-----
De : Judy Duvall [mailto:JJDuvall@tntech.edu] Envoyé : 14 octobre 2011 15:50
À : Jacques Forest Objet : RE: MAWS

Thank you so much, Jacques! I will not cite or disseminate until I get permission from you. I am hopeful that I will be able to use the R-MAWS for my study. I hope to be collecting data in March of 2012. If I do not get your permission, I will stick with the MAWS. You have no idea how much I appreciate your help!

Judy J. Duvall, MSN, RN

From: Jacques Forest [mailto:forest.jacques@uqam.ca]
Sent: Fri 10/14/2011 10:55 AM
To: Judy Duvall
Subject: RE: MAWS

Dear Judy,

Please find attached to this email the article for your personal use ONLY (do not cite or disseminate without permission).

Cheers !

Jacques

Jacques Forest, Ph.D.
Psychologue organisationnel et CRHA
Chercheur au CIRANO
Professeur
Département d'organisation et ressources humaines ESG-UQAM
Téléphone: 514-987-3000 #3310
Courriel: forest.jacques@uqam.ca
http://www.orh.uqam.ca/Pages/forest_j_cv.aspx

Vous voulez en savoir plus sur la MOTIVATION au travail? Lisez ceci:
http://www.ordrepsy.qc.ca/pdf/Psy_Qc_Septembre2008_Dossier_04_Forest.pdf

-----Message d'origine-----
De : Judy Duvall [mailto:JJDuvall@tntech.edu] Envoyé : 14 octobre 2011 11:45
À : Jacques Forest Objet : RE: MAWS

Thank you so much. I really like the 19 items-they seem more relevant to my research. Do you have any reliability and validity data on them?

Judy J. Duvall, MSN, RN

From: Jacques Forest [mailto:forest.jacques@uqam.ca]
Sent: Fri 10/14/2011 10:03 AM
To: Judy Duvall
Subject: RE: MAWS

Dear Judy,

We don't know when the article will be available yet as we haven't received the reviewers' and editors' comments yet.

Regarding the items in English, they are in the first page of the EXCEL sheet I sent you and which is also attached to this email.

Best of luck with your research.

Have a good day!

Jacques

Jacques Forest, Ph.D.
Psychologue organisationnel et CRHA
Chercheur au CIRANO
Professeur
Département d'organisation et ressources humaines ESG-UQAM

Téléphone: 514-987-3000 #3310
Courriel: forest.jacques@uqam.ca
http://www.orh.uqam.ca/Pages/forest_j_cv.aspx

Vous voulez en savoir plus sur la MOTIVATION au travail? Lisez ceci:
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-----Message d'origine-----
De : Judy Duvall [mailto:JJDuvall@tntech.edu] Envoyé : 13 octobre 2011 18:39
À : Jacques Forest Cc : Marylène Gagné Objet : RE: MAWS

Thank you for your response. Do you have any time frame for when the new article might be available? Is it possible to send the EXCEL file in English? Thank you so much!

Judy J. Duvall, MSN, RN

From: Jacques Forest [mailto:forest.jacques@uqam.ca]
Sent: Wed 10/12/2011 12:14 PM
To: Judy Duvall
Cc: 'Marylène Gagné'
Subject: RE: MAWS

Dear Judy, how are you?

Marylène forwarded me your email regarding the use of the MAWS. You have the items of the MAWS in the article attached to this email.

We also want to inform you that we have a Revised-Motivation at Work Scale for which the reference is:

Gagné, M., Forest, J., Vansteenkiste, M., Crevier-Braud, L., Van den Broeck, A., Aspeli, A. K., Battistelli, A., Bellerose, J., Benabou, C., Chemolli, E., Güntert, S. T., Halvari, H., Johnson, P., Indiyastuti, D. L., Mans, N., Martin-Albo, J., Molstad, M., Naudin, M., Ntalianis, F., Nuñez, J. L., Olafson, A. H., Panagopoulou, P., Portoghese, I., Roussel, P., Westbye, C., & Wang, Z. (2010). Validation evidence in ten languages for the Revised Motivation at Work Scale. Manuscript submitted for publication.

You can use the 19 items (which are not strike-through) in the EXCEL file attached to this email.

We wish you good luck in your research and are available if need be.

Best regards from Montréal,

Jacques

Jacques Forest, Ph.D.

Psychologue organisationnel et CRHA

Chercheur au CIRANO

Professeur

Département d'organisation et ressources humaines

ESG-UQAM

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