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Development and Preliminary Validation of a Psychometric Measure of Expertise: The Generalized Expertise Measure (GEM)

Marie-Line Germain

DEVELOPMENT AND PRELIMINARY VALIDATION OF A PSYCHOMETRIC MEASURE OF EXPERTISE: THE GENERALIZED EXPERTISE MEASURE (GEM)

DISSERTATION

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by

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Fluctuat nec mergitur

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A special mention goes to Terri Scandura for the years of “bear” academic advice. I dedicate this research work to my grandmother, Jeanne Germain, from whom I learned the most valuable lessons. Although deceased over two decades ago, she still fuels my aspiration to pursue what some perceive as a mere cognitive reverie.

ABSTRACT

DEVELOPMENT AND PRELIMINARY VALIDATION OF A PSYCHOMETRIC MEASURE OF EXPERTISE: THE GENERALIZED EXPERTISE MEASURE (GEM)

Marie-Line Germain

Barry University, 2006

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Expertise has become an engaging subject for research since the 1960s largely as a result of developments in artificial intelligence and in cognitive psychology. Today, the development of employee expertise is described as a strategic imperative for ever-changing organizations in a hyper competitive economic environment (Torraco & Swanson, 1995). However, the lack of an adequate assessment tool for expertise has hindered empirical research. To improve on previously few developed instruments, the aim of this study is to conceptually and empirically develop the Generalized Expertise Measure (GEM) and to examine its psychometric properties in two managerial samples. Schwab's (1980) three stages of measure development process were followed: generation of individual items, scale development, and psychometric examination of the new measure.

Once the items were generated and the scale developed, the factor structure of the GEM was examined employing AMOS 6.0 Confirmatory Factor Analysis (CFA) procedures (Jöreskog, 1969) for an independent employee sample (N = 165). Results of the CFA indicated that the proposed two-dimensional model of the GEM needed

improvement. An Exploratory Factor Analysis (EFA) was then performed with a second employee sample (N = 142) using SPSS 14.0 and other statistical methods were employed to assess the GEM's levels of reliability and validity, in accordance with established psychometric principles. The EFA and the Promax rotation resulted in the elimination of five items. The retained variables were then tested through a CFA, which allowed the reduction of the GEM to 16 items. The model was finally retested with the first employee sample (N = 165). The final scale includes two non-orthogonal subscales with a total of 16 items. The two factors fall under two distinct categories: Evidence-based Expertise and Self-Enhancement-based Expertise, the latter being a new proposed dimension to the current construct of expertise. Although a good model fit was obtained, (χ^2 (95) = 165.0, p = .000, CFI = .954, RMSEA = .072) future research should further investigate the psychometric properties of the GEM.

Until further refinement, the Generalized Expertise Measure appears to be useful for studies in varied industries and is a contribution to the fields of Human Resource Development and Industrial / Organizational Psychology.

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Marie-Line Germain
July 17, 2006

CHAPTER ONE

RESEARCH OVERVIEW

A- Purpose of the Study

Expertise has become an engaging subject for research since the 1960s largely as a result of developments in artificial intelligence and in cognitive psychology (Chi, Glaser, & Farr, 1988). After fifteen years of rightsizing, downsizing, reorganizing, reengineering, and other perceived methods of attaining profitability, organizations are starting to realize that the operating expense most easily reduced their workforce, is also the one resource that has the largest impact on reaching and maintaining long-term profitability and growth (Swanson & Holton, 2001). An organization's human resources are now being recognized as a significant competitive advantage and one of the hidden forces behind profits, growth, and lasting value (Pfeffer, 1994; Reichheld, 1996). As Torraco and Swanson (1995) assert, "Business success increasingly hinges on an organization's ability to use its employee's expertise as a factor in the shaping of its business strategy" (p. 11). It is the knowledge, the skills, and the experience of the organization's human resources –in short, its expertise- that have become the new secret weapon in the competitive marketplace. Furthermore, the restructuring of the American economy has not led to the deskilling of work. Actually, more and more employers capitalize on employee training: 81% of United States' employers provide or pay for employee training (as quoted by Kuchinke, 1997). Training is explicitly or implicitly directed toward developing employee expertise, whose development is at the core of the field of Human Resource Development (HRD) (Bereiter & Scardamalia, 1993).

B- On the Importance of an Expertise Measuring Tool

Cognitive literature holds abundant evidence that experts excel only at their domain of expertise (cf. Glaser & Chi, 1988), explaining why most of the very few existing expertise measures assess levels of expertise within a content domain and why no existing literature has yet identified a universal measurement tool. Although the actual measurement of expertise has never been fully defined (Kuchinke, 1997), the importance of quantifying expertise has long been recognized (Swanson & Holton, 2001). The general level of expertise possessed by an individual is readily observable through his or her actions. This ease of recognition has promoted what can be interpreted as a misdirected attempt to quantify human expertise; the classification and reclassification of individual levels of expertise. From the traditional terminology of the craft guilds of the Middle Ages to Jacobs's (1997) recently proposed taxonomy of expertise for HRD, a myriad of terms, ranging from novice to expert, have been used to describe and define human expertise (Jacobs, 1997; Hoffman, Shadbolt, Burton, and Klein, 1995; Bereiter & Scardamalia, 1993). Unfortunately, the classification of human expertise, without the ability to measure expertise quantitatively, has limited utility. The development of a measure of expertise (the Generalized Expertise Measure = GEM) is the main purpose of this study.

C- Limitations of the Study

This study will be restricted to the expertise of individuals because of the scope of the literature and will not address other levels, such as the expertise of groups, organizations, or societies; nor will this study address the expertise that can be built into

processes or systems.

D- Definitions of Terms

Expertise

For the purpose of this study, Swanson and Holton's (2001) definition of expertise will be used: they define expertise as being a combination of problem-solving skills, experience, and knowledge.

Experience: Typically ten years in the field

Expertise generally requires about ten years of dedicated preparation within an ecific domain (the 10-year rule: Chase and Simon, 1973). During this ten year-preparatory period, mere exposure or even active participation in an activity is not enough for the development of an elite skill. Instead, a specific kind of preparatory activity called deliberate practice (Rossano, 2003) is required if the highest levels of performance are to be attained.

Knowledge

Experts and novices organize their knowledge in different ways (Greeno & Riley, 1981). This definition of expertise differs from 'expert power', which Hinkin and Schriesheim (1989) define as the ability to administer to another information, knowledge, or expertise. In this research study, we are only interested in the perception a follower has of his or her leader's expertise level, and not on what the leader can transfer to his or her followers.

Problem-solving skills

A recurrent prominent area of research in cognitive psychology is problem solving. Problem-solving research was revolutionized in the 1960s when researchers turned from studying the conditions under which solutions are reached and the processes of problem-

solving. Numerous puzzle-like problems were investigated, all of which indicated that human subjects do solve problems according to means-ends analyses to some degree (Greeno, 1978). Solving real-world problems presents new obstacles that were not encountered previously in puzzle-like problems. In general, current studies of high levels of competence by cognitive psychologists appear to support the recommendation that a significant focus for understanding expertise is the investigation of the characteristics and influence of organized, hierarchical knowledge structures that are acquired over years of learning and experience. Experts would understand a problem better than novices because they "see" the underlying principle (Chi, Glaser, & Rees, 1982).

The remainder of this study is organized into five chapters, a bibliography, and appendixes in the following manner: Chapter Two presents a review of the related literature on the concept of expertise and on the evolving trends in the practices and procedures used to evaluate expertise. Chapter three delineates the research design and methodology of this study. The instruments used to gather data, the procedures followed, and the sample selection process is described. Analyses of the data and a discussion of the findings are presented in Chapter Four. Chapter Five contains the summary, conclusions, and recommendations of the study. The study concludes with references and appendixes.

CHAPTER TWO

LITERATURE REVIEW

The source of this review is primarily from the literature on cognitive psychology and the cognitive sciences, where the emphasis has been on modeling expertise and understanding its pre-conditions, processes, and outcomes (Kuchinke, 1997). It is in this field that the bulk of research has been conducted over the past several decades and where "research on expertise may be one of the most rapidly expanding areas" (Ericsson & Smith, 1991, p. 1).

A- Expertise

The concept of human expertise is at the core of human resource development, which affects several areas of the organization. The ability to apperceive expertise is an important contributor to performance at both the group level and at the organizational level (Argote & Ingram, 2000; Stasser, Vaughan & Stewart, 2000). Over the past three decades, there has been a marked increase interest in expertise (Chi, Glaser, & Farr, 1988) and exceptional performance (Ericsson & Charness, 1994; Ericsson & Lehman, 1996). During that time, researchers have addressed and offered a number of answers to key questions surrounding the acquisition and production of human performance at its highest level. There is limited work, however, on the development of expertise in usability evaluation.

Where expertise is recognized, it is frequently referred to as "craft skill". As Landauer (1995) notes, one of the difficulties many designers have in acknowledging the importance of that skill is that we are human and therefore we tend towards trusting our

intuition about usability. Views such as "I'm a typical user, and if I find it easy then so will real users" are easy to hold until there is strong evidence to the contrary. Expertise in most professions - e.g. teaching, medicine, engineering- is taken to mean that an individual has an acknowledged body of knowledge and skills that are used with apparently little effort but consistently good results. Expertise in usability evaluation is often difficult to distinguish from naive intuition or charlatanism.

a) Expertise: A historical account

Early attempts at explaining and predicting outstanding performance focused primarily on inherited general characteristics such as intelligence and personality traits and inherited special abilities such as artistic, musical, or athletic abilities. Galton (1869/2001), for instance, attempted to explain for the accomplishments of eminent individuals in a variety of fields by studying their familial and genetic origins. Such eminence, he stated, was genetically determined and limited to a small number of families with common ancestors. Modern empirical work on the development of expertise can be traced back to the pioneer studies of de Groot (1946; 1978) who found that chess experts were far superior to less accomplished players in their ability to select the best moves after a brief examination of the chessboard. In succeeding decades, a plethora of studies have examined expertise in a wide range of domains such as chess (Chase & Simon, 1973; Charness, 1989), medical diagnosis (Elstein, Shulman, & Sprafka, 1990), computer programming (Adelson & Soloway, 1985), music (Ericsson, Krampe, & Tesch-Römer, 1993; Sloboda, 1996), cricket (Lamb & Burwitz, 1988; McLeod & Jenkins, 1991), table tennis (Bootsma & Van Wieringen, 1990), snooker (Abernethy, Neal, & Koning, 1994),

volleyball (Allard & Starkes, 1980), and an array of other sports, professions, and activities (see reviews in Abernethy, 1987; Ericsson, 2002; Ericsson & Lehmann, 1996).

Societies conceptualize "expertise" and define "experts"; at times, political authorities appropriate, exploit, or abuse experts; the knowledge of expertise can promote the holder's social status and authority. Though every society had people with specialized knowledge, skills and practice, not all societies acknowledged experts as a category of recognition. The social recognition and existence of experts is also a condition that is eminently subject to manipulation by "false experts". The "confidence men" described by Olbertson (2001) were such people who, in colonial British America, claimed expertise, education, family background and even a fake name. Posing as a businessman or a doctor, the confidence man graciously shared his knowledge and enjoyed the accompanying status and privileges. The confident man inspired much anxiety and challenged the self-definition of "real" experts. This situation resulted in a need for a formal recognition of experts. Institutions such as the church, state, school and guild would emerge as the instrument to approve and validate experts and expertise. Broman (2001) examines "expertise" as a distinctively modern linkage made by certain occupational groups—for example, physicians, engineers and social workers - between theoretical knowledge, as proved by the sciences, and social practice. Broman argued that the Enlightenment ideology featured both an exaltation of empirical science as the key to discovering reliable truths about the world and the programmatic conviction that such knowledge should be "universally accessible to enlightened human reason," and put to work in combating prejudice, reforming morals and thus creating a better society. The concept that developed out of this ideology was built upon two claims that seemed mutually contradictory.

While the scientific knowledge on which expert practices are based was claimed to be universally accessible to enlightened human reason, experts reserved for them alone the rights to create, evaluate, and proclaim that knowledge. For instance, the

eighteenth-century French cooks promoted a "nouvelle cuisine", which claimed to be a form of modern chemistry that was to revolutionize complex ancient cooking. Cooking, more than just an expertise with skills, formed social identity. Cookbooks disseminated ideas and taste, and the status of cooking were to rise to that of medicine. Postnikov (2001) also described changes in Russian cartography from simple mapping of private interests (16^{th} -17^{th} century) to state-sponsored mapping by specialists (17^{th} century) with increasing technical expertise (18^{th} -19^{th} century). In the process, expertise developed in correlation with territorial conquest and administrative integration that generated widespread forms of knowledge, other social and economic elaboration and growing European contacts. Early Muslim experts, *ulama*, were the "learned men" who monopolized religious law, theology and Koranic exegesis. However, these experts differed from those in other countries and the Ottoman Empire in their theocentric orientation that combined practical action with ritual enactment. From these statements, expertise seems to be constructed by the actions of specific groups and institutional formations. The two diacritical terms, "knowledge" and "practice" functioned, for the most part, oppositionally; it is the negotiation of these terms that, in each case, provides the impulse and the means by which expertise is both constituted and, more important for Traub's (2001) purposes, analyzed. For Traub, not withstanding the analytical pressure applied to the construction of expertise, the meanings of experts and expertise remain fundamentally unchanged: the desirability of expertise is a form of cultural capital. Despite asking how claims to expertise are established, through what social processes, disciplinary formations and systems of signification, we seem to have barely broached some important analytically prior questions. What is expertise, why is it desirable, what exactly is unspecialized knowledge, and is this the same thing as illicit or illegitimate knowledge? Finally, who are not the experts? However performative in its construction, dependent upon signifiers of social status, reliant upon official sanction or communal response, and contestatory of monarchical or state power, expertise

itself seems, as a category, impervious in its boundaries and hegemonic in its status as a form of cultural capital or mode of constructing identity. It is as if the social desirability of the claim to specialized knowledge is itself self-evident. The first Industrial Revolution, which originated in England as early as 1760, marked a clear turning point in the development and direction of the concept of expertise. The Industrial Revolution could be thought of as a process. Indeed, one invention led to another, leading to new situations, which called for yet other changes. As the Industrial Revolution started to spread outside England and to the United States after the 1840s, other countries had advantages: they could avoid England's mistakes and copy the latest techniques without having to go through all of the trials and errors in development. Also, governments (including the United States) made conscious efforts to acquire this know-how – industrial espionage. The Industrial Revolution was a combination of new methods and new technology. In particular, it adopted machine power to manufacture. This led to entirely new ways of living (in large cities versus the countryside), new transports, new family arrangements (the family being a unity of consumption not production), new ways of working (in factories), and new expectations from employees and therefore, training needs. The second Industrial Revolution, which started around 1870, rather than concentrating on textiles and railways, focused essentially on a new range of industries. Financial institutions' importance increased. As the population grew exponentially, so did urbanization. Cities became places where education became possible for all. Factory owners became locked into a highly competitive system. As they became more competitive, companies had to produce goods faster. Training employees better and faster became essential. From a world of apprenticeship, formal and informal transfer of knowledge, techniques, and "know how" became essential. What we now call expertise was becoming precious to organizations' competitiveness and economic future.

This brief historical account on expertise makes us aware of how different societies conceptualized "expertise" and defined "experts"; how political authorities appropriated,

exploited, or abused experts; or how the knowledge of expertise could promote the holder's social status and authority. Though every society had people with specialized knowledge, skills and practice, not all societies acknowledged experts as a category of recognition. We can also see that history has seen a great variety of experts: nomadic hunters who fashioned hunting tools from pieces of flint, mathematicians who planned the Egyptian pyramids, Renaissance artists who represented three dimensions in their paintings, and eighteenth-century craftsmen who manufactured precision machine tools. Similar to their ancestors, managers today devise strategic plans to guide the future of their organizations. Without the expertise of skilled persons, it is unlikely that our civilization could have advanced in a way that it has over the millennia.

b) Expertise in the new economy

Most people have faced the challenge of learning new knowledge and skills as part of their job. Training programs are designed to make this learning easier and less threatening. Yet, training is not meant to solely benefit the employees. The organization expects to benefit from employees' training. In fact, training helps to ensure that employees can do what the organization asks them to do. Thus, training is ultimately about the issue of developing employee expertise.

Expertise is what experts know and can do. Experts are the individuals who are most capable in specific areas of human endeavor (Jacobs, 2003), as history shows. While expertise has been important for human progress, it is particularly important in contemporary organizations. The new economy demands increased flexibility in production and service delivery, improved use of advanced technologies, and increased

responsiveness to the requirements of customers, and these demands have made expertise more highly prized than ever before (Carnevale, 1991). Drawing on the results of a four-year study, Kotter and Heskett (1992) suggests that the competitiveness of many organizations is determined largely by the knowledge, skills, and attitudes of the people in them. According to Drucker (1993), knowledge is the primary resource for organizations in the present post-capitalist society. Organizations must transform themselves if they are to become more competitive, and the savoir faire of individual employees has become critical for ensuring the success of the transformation process. More than ever before, high-performance and successful organizations depend on employees who can perform complex job tasks, such as solving problems and making decisions. However, employees can perform complex tasks only if they possess high levels of tasks knowledge and skills - that is, expertise (Wynne, 1996). According to Wynne, experts achieve the most valuable outcomes. Chi, Glaser, and Farr (1978) say that, in contrast to novices, experts possess an organized body of conceptual and procedural knowledge that they can access readily and use when necessary.

c) Contemporary definitions of expertise

Rossano (2003) asserts that to acquire expertise, one must be able to engage in deliberate practice. Deliberate practice requires consciousness. It requires the accessible mental representations that arise when focused attention is concentrated on a stimulus or an event. Cross-species observations suggest that the ability to develop expertise using deliberate practice may be a uniquely human trait. Rossano further asserts that while animals acquire skills, they appear to do so using play rather than deliberate practice.

For experts David J. Weiss and James Shanteau (2003), applying the term “expert” to a person is a shorthand description of a set of results rather than a characterization of the person. Talent and training may combine to yield a person they label as expert, but it must be kept in mind that the label is a generalization. It is the behavior that is or is not expert. Swanson and Holton (2001) define human expertise as a “Displayed behavior within a specialized domain and / or related domain in the form of consistently demonstrated actions of an individual that are both optimally efficient in their execution and effective in their results” (p. 241).

To them, through the use of an operational definition of human expertise and the recognition of domain specific knowledge, experience, and problem solving as being the core elements of human expertise, the HRD profession gains conceptual access to one of the most powerful tools to improve performance: human expertise.

There is limited work on the development of expertise in usability evaluation; indeed, we are not aware of any such work. Where expertise is recognized, it is frequently referred to as “craft skill”. As Landauer (1995) notes, one of the difficulties many designers have in acknowledging the importance of that skill is that we are human and therefore have the tendency towards trusting our intuition about usability. Views such as “I’m a typical user, and if I find it easy then so will real users” are easy to hold until there is strong evidence to the contrary. Expertise in usability evaluation is often difficult to distinguish from naïve intuition or charlatanism. H. L. Dreyfus and S. E. Dreyfus (1986) propose five stages in the development of expertise:

Stage one: Novice: learns and applies rules for manipulating context-free elements; Stage two: Advance beginner: begins to understand the domain and see meaningful aspects.

Stage three: Competent performer: learns to set goals and interpret the current situation in terms of what is relevant to achieving those goals.

Stage four: Proficient performer: views a situation as having a certain significance tending towards a certain outcome and aspects of the situation stands out as salient in relation to that outcome.

Stage five: Expert: not only perceives the situation, but also rapidly generates an appropriate solution. This view is consistent with that discussed by Winograd and Flores (1986) who also argue that experts do not need formalized representations in order to act, and that therefore their expertise is not available to introspection or verbalization. Thus, it becomes difficult to distinguish between true expertise and charlatanism except through inspection of the results. As professions such as teaching and medicine have become established, it has become possible to assess the quality of the outputs (e.g. student learning, patient health) as a relatively immature discipline; assessments of the quality of usability evaluation are still open to serious challenge (Gray & Salzman, 1998).

Sternberg (1999) describes how intelligence can be viewed as developing expertise. Developing expertise is the ongoing process of the acquisition and consolidation of a set of skills needed for a high level of mastery in one or more domains of life performance. He believes that all tests measure various kinds of developing expertise. Interestingly, to him, developing expertise does not rule out the contribution of genetic factors as a source of individual differences in who will be able to develop a given amount of expertise. His model of developing expertise has five key elements: metacognitive skills, learning skills, thinking skills, knowledge and motivation, which are fully interactive and influence each other, both directly and indirectly. With those key

elements, Sternberg (1999) further asserts that his comprehensive model better assesses intelligence, especially in children.

i. Expertise as Knowledge

The bedrock view of expertise is that it is based on special knowledge, skills, or talent (Tiberius, Smith, & Waisman, 1998). For generations organizations have been in tune with this view-the better learners were those who memorized more material and recalled more of it; the better trainers or mentors transmitted more information to their employees.

ii. Expertise as Intuition

Current theories of expertise do not reject the central role of information in expertise, but add to it. They distinguish high performers from others by the way they think and solve problems rather than simply by their knowledge (Anderson, 1985; Dreyfus & Dreyfus, 1986). After a great deal of experience, the way people solve problems appears to change. Experienced problem-solvers deal with issues with hardly any thought or effort. They recognize recurring patterns in their work and develop learned procedures to deal with these. This kind of efficient, intuitive problem solving is an important addition to the old concept of expertise. The new view of expertise has become the most popular among cognitive theorists. Highly experienced trainers have their information organized into packages consisting of examples, explanations and questions designed to overcome employee-learner misconceptions for particular learning objectives. These packages or "scripts" (Putnam, 1987; Shulman, 1987) enhance efficiency because they give trainers the flexibility to teach interactively in response to learners' questions.

Highly experienced trainers can sense whether to use another example or to move on after asking a few questions or pausing to gather information. In contrast, novice trainers are often rigidly focused on their notes. They cover the material as if they were dictating. When asked a question that is out of sequence, they might answer, "I'll be getting to that later." There is a downside to intuitive expertise. Experienced trainers, characterized by instant recognition of problem situations and efficient actions, tend to make decisions without deliberation, without being aware of the rules, or without having rules. Such trainers often have difficulty explaining to learners their thoughts or actions that constitute expert practice. They make decisions on the basis of subtle, contextual features of the situation, features that are unavailable to the novice.

iii. Expertise as Progressive Problem Solving

Recently a third layer has been added to the growing concept of "expertise." Bereiter and Scardamalia (1993) argue that not all experience leads to expertise. The kind of efficient, intuitive approach to problems that we have been discussing happens to everyone after a sufficient amount of experience, whether they are successful at what they do or not. Despite having had lots of experience, some performers do not achieve expertise. Not all senior employees are expert employees. Bereiter and Scardamalia (p. 109) argue that, although experience can lead to intuitive expertise through routinizing, it may also lead to a deepening rut. Trainers can become resistant to new ways of doing things and may disengage from work. Such trainers fail to accommodate to the learner-employees, the subject, or the context. The extra time and energy that they gain from having their training "organized" is invested in research. In some institutions these trainers are normative and supported by the institutional values. True expertise, it is

argued, is not a static feature, to be achieved once and then abandoned, but a continual process over time, an approach toward one's career. Of course, some routines are useful. Who wants to reflect continually on taking out the garbage or brushing one's teeth? These are tasks we would rather do by routine, reserving our energy and attention for more important things. But in organizations, training can rarely be "canned." The current situation requires a high level of expertise in the sense that Bereiter and Scardamalia (1993) mean it: reinvesting time and energy and continually learning to meet new challenges. Trainers who are progressive problem-solvers become more efficient in carrying out their tasks; they tend to shift their focus to new aspects of their environment. First they focus mainly on content. With more experience they begin to focus on delivery, which is, training performance. Eventually, when both the content and the delivery become second nature, they begin to notice the social and personal aspects of their learners. This is the good news. Efficiency in one component of training provides extra time and energy that allows the trainer to move on toward mastery of another component. The true test of an expert, according to Bereiter and Scardamalia (1993), goes beyond knowledge and beyond intuitive problem solving. The feature that really distinguishes experts from others is their approach to new problems. The pattern recognition and learned procedures that lead to intuitive problem solving are only the beginning. Pattern recognition and learned procedures increase one's efficiency. The key to expert behavior is what the expert does with this bonus of time and energy. The expert invests in it what Bereiter and Scardamalia (1993) call progressive problem solving, that is, tackling problems that increase expertise rather than reducing problems to previously learned

routines. From this body of data, a number of general principles concerning the acquisition of skilled performance have been gleaned:

* Expertise generally requires about ten years of dedicated preparation within a specific domain (the 10-year rule, Chase and Simon (1973)). During this ten year-preparatory period, mere exposure or even active participation in an activity is not enough for the development of an elite skill. Instead, a specific kind of preparatory activity called deliberate practice (Rossano, 2003) is required if the highest levels of performance are to be attained. Therefore:

* The level of skill one attains in a domain has been shown to be directly related to the amount of deliberate practice one engages in (Ericsson, 2002). For instance, Krampe and Ericsson (1996) found that the very best musicians has, by age 20, logged more than 10,000 hours of deliberate practice.

* Most elite performers are introduced to their future field of expertise as children in the form of play. While still in this stage, a teacher or coach is typically assigned to harness some of the child's playfulness by setting goals and providing a more structured interaction with the activity aimed at enhancing skill development. Eventually, as the child matures and shows greater promise, a full-time commitment to the activity on the part of the parents and the child takes place and the highest levels of performance are pursued in earnest (Bloom, 1984). It is during the phase of full-time commitment that the quality and quantity of deliberate practice become critical in determining how far an individual will take his or her skill. Evidently, it is impossible to assume and generalize that all workers with more than ten years of practicing a skill in an organization are experts.

d) Deliberate practice

Deliberate practice, according to Rossano (2003), is a unique form of activity, distinguishable from both work and play, where goal-directed concentrated effort is expended in order to hone and improve specific mental and physical skills. For instance, in their analysis of chess expertise, Charness, Krampe, and Mayr (1996) found that becoming a chess grand master involved more than just frequent chess playing. In their formative years, future chess grand masters improved their skills by spending countless hours studying the games of past grand masters. While studying a game, they would predict the grand master's moves in various situations. When their predictions differed from those of the grand master, they would go back and re-analyze the chessboard in order to uncover what the master has seen that had eluded them. In this way, they trained themselves to "see" and "think" as a grand master player. Therefore, deliberate practice needs a constant evaluation of one's current skill state against that of a more skilled model. Discrepancies between the model and one's current state are often identified and used as goal conditions for assessing progress (Rossano, 2003). Constant self-evaluation and self-monitoring are necessary. Also, deliberate practice is the constant focus on the elevation, not maintenance of skill. Elevating skill often involves repetitious exercises, however, as Ericsson (2002, p. 29) stresses, deliberate practice is the opposite of mindless repetition. Once a skill has been acquired and an adequate level of competence achieved, there is a natural tendency for it to become automated (Anderson, 1982; 1987; Fitts & Posner, 1967). Repetition is usually enough to maintain one's skill. This explains why simply engaging in an activity, even regularly and vigorously, will not necessarily lead to an individual becoming an elite performer. There are many people who play football,

golf, chess, or a musical instrument on a regular basis, but only a very few elite performers. When engaging in a desired activity, the average person is usually just running off already established, highly automated responses. Deliberate practice, however, requires that the individual resists total skill automation, and constantly challenges him or herself with new goals and more effective behaviors. Expert pianists, for example, will often purposely rehearse an already learned piece at an excruciating slow tempo in order to force themselves to concentrate on the individual notes and the relationships among the notes (Rossano, 2003). This leads to a third characteristic of deliberate practice: it requires that a certain level of conscious, voluntary control be maintained in order to move beyond one's current ability level to a higher one. Experts need to retain some degree of conscious control over processes in their domain in order to deal with unexpected circumstances or (in the case of sports or work) the responses of competitors. This "retention of control" has been experimentally demonstrated by Lehmann and Ericsson (1997) who had expert pianists memorize a short musical piece. Afterwards, they were unexpectedly required to play the piece again at the same tempo; however, they were required to skip every other measure, or to play with only one hand, or even to transpose the piece into another key. Despite these unexpected changes, the accuracy of their performance remained uniformly high. Since the changes required subjects to engage in novel motor movements, Lehmann and Ericsson argued that their pianists were not simply running off an automated motor routine but were using flexibly stored knowledge in an innovative way to meet tasks demands.

More generally, the accumulated amount of deliberate practice is closely related to the attained level of performance of many types of experts, such as musicians, chess

players, and athletes (cf. Ericsson, 2000). Two important points emerge regarding deliberate practice and expertise: First, deliberate practice in some form, is necessary if skill is to be acquired. What separates elite performers or true experts from average performers or novices is the effort and duration of deliberate practice. The average person usually drops deliberate practice for a less rigorous, more repetitious form of practice once an acceptable level of competence is achieved. Experts continue deliberate practice for a much longer time, possibly indefinitely, in order to advance skill to a superlative level (Ericsson, 2002). Hence, it seems as if competence is geared towards "applying" versus expertise is geared towards "knowing". While there is currently disagreement over whether deliberate practice is sufficient for the development of expertise, its necessity is unquestioned (Ericsson & Charness, 1994; Sternberg, Grigorenko, & Ferrari, 2002). Second, the general outline of what constitutes deliberate practice remains the same regardless of the skill to be mastered; and two features inherent to deliberate practice are focused attention and conscious control. Deliberate practice is by nature a controlled process that involves highly focused, concentrated attention on inputs and behavioral flexibility of outputs.

It may seem paradoxical that the same process, deliberate practice, can be used to acquire expertise across different domains from chess to volleyball to medical diagnosis. And, in terms of specific knowledge acquired, experts in different fields certainly vary from one another. However, it appears that the generality of deliberate practice lies in the fact that the expert performance, regardless of its specific details, involves a common perceptual / motor process – that is responding effectively to identified, meaningful patterns. Deliberate practice trains an individual how to identify and effectively respond

to meaningful patterns. The chess expert, for instance, “sees” the chessboard differently, more meaningfully, than does the novice, and is therefore more proficient at selecting the right moves. Chase and Simon (1973) found that the chess experts were far more capable at recalling briefly seen chessboards compared to novices. However, the differences were all but eliminated when chair pieces were randomly arranged as opposed to reflecting arrangements from actual games. This shows that the chess experts did not have better memories per se, but instead were able to recognized larger, more meaningful patterns in the game arranged boards, while the novices were often reduced to trying to remember positions on a piece by piece basis. Similar effects have been found across a wide array of other domains (Ericsson et al., 1993), and it would be rational that they would also be found in the business world.

In the course of developing expertise, one’s domain-relevant perceptual experience is altered and enriched. Sensory inputs, which before were chaotic, irrelevant, and unusable, over time emerge as organized, meaningful patterns. This emergent organizing of incoming sensory data is typically accomplished through the construction of retrieval structures. Retrieval structures are hierarchically clustered sets of cues that organize incoming data and provide access to domain-relevant information in memory (Ericsson & Kintsch, 1995). An experiment by Chase and Ericsson (Chase & Ericsson, 1981; Ericsson, Chase, & Fallon, 1980) provides a good example of the construction and use of a retrieval structure. These experimenters studied the development of expertise in the digit span memory task by giving a subject over 200 hours of practice on the task. In the end, the subject was able to recall digit strings of up to 80 items. The subject was able to do this by organizing the digits into meaningful clusters of groups and super-groups based on

mnemonics often involving running times. For instance, the four digits 4023 might be organized into a group based on the idea that 4 minutes and 23 seconds is a good mile time. This group might then be organized into a larger group based on the descending distances (mile, 440, 100 meters). The subject would only have to hold these "larger" structures in working memory and use them as cues to accessing the actual digits. Chess experts have been found to use similar hierarchically organized structures as they assess move sequences while evaluating chess positions and planning moves (Charness, 1981). The difference between experts and less skilled subjects is not merely a matter of the amount of complexity of the accumulated knowledge. It also reflects qualitative differences in the organization of knowledge and its representation (Chi, Glaser, & Rees, 1982).

A critical expert-novice difference lies in the fact that the expert, as a result of using retrieval structures in working memory, has an organized set of cues that provides access to a vast wealth of domain-specific information stored in his or her long-term memory (Ericsson & Kintsch, 1995). The novice, per Rossano (2003), lacking the retrieval structure, is restricted to that information which can be called into and held in a very limited working memory space at any particular moment in time. Thus, through deliberate practice, the expert assembles retrieval structures, which organize sensory inputs into meaningful patterns, which in turn, provide access to the vast knowledge stored in the expert's long-term memory, which is then used to direct an effective behavioral response (Rossano, 2003).

B- Expertise in the education field and workplace learning

Since expertise has been linked to performance, its development (through learning) at the individual and organizational levels has been one of main concerns of HRD professionals. While much research has been done on the concept of learning itself, learning in the workplace is still a concept in need of further understanding and investigation. Learning and expertise have been investigated at the primary, secondary, and post-secondary levels but mainly in the scope of instructional expertise.

a) Primary and secondary education

In the education field, research on expertise has been supported by many research centers, including the Centre for the Study of Expertise in Teaching and Learning (CSETL), a nonprofit centre that seeks to identify, package, and disseminate teaching expertise. The study of expertise in teaching, as a defined endeavor, is a relatively recent line of inquiry and has been described well by Berliner (1986). The literature in science education mainly focuses on case studies of “exemplary” teachers (Tobin & Fraser, 1988), and on instructors in elementary and secondary schools (cf. Darling-Hammond & Ball, 1997; Geelan, 2003; Hatch, White, & Faigenbaum, 2005; Smith & Strahan, 2004; Varrella, 2000). Employing the general model of Dreyfus & Dreyfus (1986), Berliner (1986) views the development of expertise in pedagogy as a series of five stages or levels of skill development: novice, advanced beginner, competent, proficient, and expert. He refers to Dreyfus and Dreyfus’s thinking about the novice-to-expert continuum as “stage theory”. He hypothesizes that novices are generally student and first-year teachers and individuals. They achieve the abilities of an advanced beginner in the second or third year of teaching. With “talent and motivation”, they will reach the competent level by the third

or fourth year. Proficiency may be achieved by the fifth year, and a subset of those proficient teachers will eventually reach the level of expert. But what exactly defines "teacher expertise"? According to Darling-Hammond and Ball (1997), teacher expertise involves having a deep understanding of both content and students. This shapes how wisely teachers select from texts and other material in class, and how skillfully they assess students' progress. Kohn (1996) considers everything from furniture to the teachers' voice to the climate around the school grounds as either "good signs" or "possible reasons for concern". The most expert teachers, he asserts, tend to establish "working with" (as opposed to controlling) tone and climate in the classroom. Students are active in experiential inquiries and problem-solving events. In terms of teaching habits, expert teachers go beyond the textbook, they make a good use of time, they are patient, use varied and contextual assessments of students understanding, and are committed to their own ever-growing understanding of the subject taught (Varrella, 2000). As Hatch et al. (2005) note, expert teachers build their expertise, credibility, and influence by engaging in personal and public inquiries, deepening their understanding, and gaining the confidence that they have something worthwhile to say. Furthermore, as measured by the standards-based evaluation, teacher expertise has shown to be positively associated with student achievement. Indeed, Darling-Hammond and Ball's study (1997) shows that the percent of influence on test score change can be as high as 40% attributed to teacher qualifications (degrees, experience, and expertise). Also, the large achievement gap between black and white students is almost entirely accounted for by the qualifications of their teachers. Conventional wisdom holds that teacher's expertise –their knowledge of a subject matter, child development, curriculum, and teaching experience-

affects their practice (Jeffers & Fong, 2000). Smith and Strahan's study (2004) involve an investigation of three individual experts; analysis of the collective case yielded six central tendencies across participants and supported by previous research: a sense of confidence in themselves and in their profession; they talk about their classrooms as communities of learners; they maximize the importance of developing relationships with students; they demonstrate a student-centered approach to instruction; they make contributions to the teaching profession through leadership and service, and they show evidence that they are masters of their content areas. Additionally, as Rozycki (1992) points out, instructors shall also be ethical to be experts. It seems that the concept of expertise for teachers has a broader definition than the one for managers. Bond, Jaeger, Smith, and Hattie (2000) conducted a meta-analysis of over 200,000 research studies on teacher expertise. They identified the following 'dimensions of teacher expertise' –characteristics of accomplished, experienced teachers: use of knowledge, deep representation, problem solving, improvisation, classroom climate, multidimensional perception, sensitivity to context, monitoring learning and providing feedback, test hypotheses, passion for teaching and learning, respect for students, challenge, and deep understanding.

b) Adult education and workplace learning

Learning refers to the acquisition of knowledge by individual employees or groups of employees who are willing to apply that knowledge in their jobs in making decisions and accomplishing tasks for an organization (Miller, 1996). Adult education and adult learning is at the core of HRD and its paradigms (Swanson & Holton, 2001, p. 149), both at the individual and organizational levels. In the 1990s the concept of learning focused less on individual learning and more on organizational learning and the learning

organization (Argyris & Schön, 1996). Learning organizations see learning as a way to reach long-term performance improvement (Guns, 1996). This does not mean that individual learning simply became less important. On the contrary, organizational learning includes individual learning and is greater than the sum of the learning at the individual level (Fiol & Lyles, 1985; Kim, 1993). Knowles' (1984a; 1984b; 1990) theory of adult learning called andragogy is an attempt to develop a theory specifically for adult learning particularly in the United States. According to his humanistic theory, adults are self-directed and expect to take responsibility for decisions and adult-learning programs must accommodate this essential characteristic. Hence, adults need to know why they need to learn something. They need to learn experientially (Kolb, 1984). They approach learning as problem solving, and learn best when the topic is of immediate value. Strategies such as case studies, role-playing, simulations, and self-evaluation are most useful. Although andragogy continues to be widely believed, practiced, and taught (Peterson & Provo, 2000), Knowles' theory was further investigated, developed, and critiqued by Brookfield (1986) and by Merriam and Cafferella (1999).

In the 1960s, based on the work of Gagné and other researchers, the field of instructional psychology was developed. It has since then become an active field of theory and research on how the learning environment may be structured to maximize learning. Gagné-Briggs' theory of instruction (Gagné, 1972, 1984; Gagné & Briggs, 1979) focuses on the kinds of things individuals learn and how they learn these things. This theory argues that there is no one way to learn everything. The two main components of the theory are taxonomy of learning outcomes (what is being learned) and the techniques needed to teach them. Gagné proposed that human performance can be divided into five

distinguishable categories, each of which requires a different set of conditions for maximizing learning, retention, and transfer. The five categories are intellectual skills, verbal information, cognitive strategies, motor skills, and attitudes. Gagné and others researched which techniques are best suited to teaching outcomes. Gagné proposed instructional events that should be used in instructional design. The Gagné-Briggs theory provides a good source of ideas for HRD professionals who are looking for ways to enhance the effectiveness of their training programs.

Other learning theories relating to how people learn exist, such as reinforcement theory, social learning theory, goal setting theory, need theory, expectancy theory, and information processing theory. Each of them relates to various aspects of the learning process. However, in all of these workplace-learning theories, instructors adopt a role of facilitator or resource rather than lecturer or grader (Hopkins, 1999). This naturally leads to the topic of expertise in instruction. The body of literature on instructor expertise in adult education is scarce. Germain's (2006) research shows that most of the factors identified by adult students as proof of college instructor expertise only partially mirror some of the findings in the managerial expertise research studies conducted by Subramini, Peddibhotla, & Curley (2004) and by Germain (2005) (see Table A1). Subramini et al.'s research findings concur to some degree as some of the participants in their study viewed formal training (education) as less important than experience. Her findings also differ from the ones found in the teacher expertise literature. The factors in common between teacher expertise and college instructor expertise are: knowledge, classroom climate, and respect for the students. These dimensions are heuristically useful in drawing attention to particular facets of the complex activity of teaching. However, many of the factors found

in her study are also found in the human resource development arena, which studies the concept of managerial expertise. Indeed, the common factors between college instructor expertise and managerial expertise are education, social skills, and experience. Table 1 shows a chronological summary of the development of themes of expertise. Table A1 (in Appendixes) summarizes the similarities and differences between our findings and the ones from managerial expertise (Germain, 2005) and from the primary/secondary teacher expertise (Bond et al., 2000).

Table 1. Chronological development of the themes of expertise

AUTHORS	THEMES
Galton, 1869/2001	Outstanding performance is due to inherited special abilities. Attempts to account for the accomplishments of eminent individuals by studying their familial and genetic origins.
de Groot, 1946 (1978)	Knowledge about aspects of a task domain. Master chess players faster in reaching decisions.
Miller, 1956	Short-term memory is limited to 7 chunks of information (5 to 9). Planning is a fundamental cognitive process.
French & Raven, 1959	Expert power: based on the perception that other has some knowledge or expertise.
de Groot, 1966	Master chess players remember board positions and associate good moves. More accurate.
Collins & Raven, 1969	Expert power: stems from person's attribution of superior knowledge or ability to other.
Newell & Simon, 1972	Problem-space theory: we search for a solution among a set of possible solutions. Perceptual ability.
Chase and Simon, 1973; Johnson et al., 1981	The 10-year rule across areas for expert performance (length of experience). Chunking Theory (CT): recognition of important features and patterns. Experts are better able to identify patterns.
Merriam-Webster's Dictionary, 1976	Expert: having, involving, or displaying special skill or knowledge of a particular subject through training or experience.
Charness, 1981	Chess experts use similar hierarchically organized structures as they assess move sequences while evaluating chess positions and planning moves.
Chi, Glaser, & Rees, 1982	Difference between experts and novices reflects qualitative differences in the organization of knowledge and its representation. Automation speeds up process without loss of quality of performance and thus frees up resources that can be used to learn new information.

Chase & Ericsson, 1982	Skilled Memory Theory: people can learn to hold virtually unlimited amounts of information in working memory with sufficient practice. Expert-level performance depends upon experts' efficient use of a vast, domain-specific knowledge base. Through practice in a domain, experts acquire knowledge structures and procedures for efficiently encoding and retrieving task-relevant information in long-term memory (LTM).
Greeno & Simon, 1984	Superior pattern recognition results in the ability to do forward reasoning.
Harmon & King, 1985	Skill and knowledge possessed by some people that result in performance far above the norm.
Anderson, 1985; Dreyfus & Dreyfus, 1986	Distinguish high performers from others by the way they think and solve problems rather than simply by their knowledge. View from cognitive science: Expertise as a way of solving problems efficiently by making use of patterns and learned procedures.
Doll & Mayr, 1987	Intelligence Quotient (IQ) does not distinguish experts (expertise is not related to IQ).
Johnson, 1987	Expertise is a highly adaptive behavior. Expert behavior is fluent and efficient.
Chi, Glaser, & Farr, 1988	Experts excel mainly in their own domains; they perceive large, meaningful patterns in their domain; they are faster at performing the skills of their domain, and they quickly solve problems with little error; They have superior short-term and long-term memory; They have better recall; They see and represent a problem in their domain at a deeper (more principled) level; novices tend to represent a problem at a superficial level; experts analyze problems qualitatively; they have strong self-monitoring skills.
Gentner, 1988	One major characteristic of expert performance: individual differences (in error, patterns of error). There are many ways to be an expert.
Staszewski, 1988	Experts are made, not born. Knowledge acquired through long and steady practice is the essential ingredient of expertise. Problem solving is critical. Not connected to general aptitude. Motivation is essential. Skilled memory is a general component of expert knowledge.
Gibbins, 1988	Expert as to the task: because of what he or she does, the individual is recognized by others as being expert.
Bédard, 1989	Expertise: possession of large body of knowledge and procedural skill.
Charness, 1989	Efficient and reliable storage of information in memory are important.
Davis & Salomon, 1989	Expertise is a performance-based notion.

Hinkin & Schriesheim, 1989	Expert power: the ability to administer to another information, knowledge, or expertise.
Frensch & Sternberg, 1989	Expert: an ability acquired by practice to perform qualitatively well in a particular task domain.
Bonner & Lewis, 1990	Expertise is task-specific superior performance.
Salthouse, 1991	Degree of expertise can be displayed on a continuum from novice behaviors to expert behaviors. A possible distribution could look like a normal curve.
Patel & Groen, 1991	Expert: An individual with specialized knowledge of a domain. She sees patterns based on automatic retrieval from complex networks of stored knowledge. Ordinal scale with 6 categories: lay person, beginner, novice, intermediate, sub-expert, and expert.
Bédard & Chi, 1992	Experts know more about their domain, their knowledge is better organized, they perform better than novices; their skill is domain specific; there are many situations in which they don't excel.
Shanteau, 1992	Expert advantage depends on the task at hand. Experts need to engage in expert-like behaviors in order to maintain their self-image. Expertise is acquired through stages of development (akin to the mental development of children).
Rozycki, 1992	Expert teachers are ethical.
Spencer & Spencer, 1993	Depth of knowledge, breadth, acquisition of expertise, and distribution of expertise.
Bédard, Chi, Graham, & Shanteau, 1993	5 conditions for expertise: domain knowledge, psychological traits, cognitive skills, use of various decision strategies, and task characteristics.
Bereiter & Scardamalia, 1993	Not all experience leads to expertise; experience may also lead to a deepening rut. Expertise is acquired by reinvesting time and energy and continually learning to meet new challenges (progressive problem-solving). Approach to new problems is what differentiates experts from non-experts.
Kochevar, 1994	Power of expert performance is rooted in the superiority of his/her operative knowledge or expertise.
Ericsson & Charness, 1994	Expertise is not a function of high IQ. Expert performance is not innate but may be function of personality. Skills associated with high performance are domain specific.
Proctor & Dutta, 1995	Expert performance is an extreme case of skill acquisition. Features common to all expert performers, which suggests that they have similar cognitive, perceptual, and motor processes. Perceive complex patterns in a domain. Have short-term and long-term memory.

Ericsson & Kintsch, 1995	Long-term working memory theory (LTWMT). Construction of hierarchical retrieval structure.
Ericsson & Lehman, 1996	Experts select relevant information and encode it in special representations in working memory that allow planning, evaluation, and reasoning about alternative courses of action.
Charness, Krampe, & Mayr, 1996; Rossano, 2003	To acquire expertise, one must be able to engage in deliberate practice; Expert has retrieval structure.
Regehr & Norman, 1996	Categories, ideas, and case examples are conceptually related in complex and meaningful ways.
Martin, 1996	Can use his or her high level of knowledge and skills in practical ways.
Darling-Hammond & Ball, 1997	Teacher expertise involves having a deep understanding of both content and students.
Kuchinke, 1997	Expertise functions as a value judgment. Seen as highly skilled and knowledgeable in specific area. Up-to-date through practice and continued learning and committed to the area of expertise. Keywords: mastery, skill, competence, specialization, knowledge, savvy, and authority. Errors should be allowed to build expertise. Behaviors must be distinguished from their effects or results.
Tiberius, Smith, & Waisman, 1998	Expertise is based on special knowledge, skills, or talent.
Bond, Jaeger, Smith, & Hattie, 2000	Thirteen dimensions of teacher expertise: use of knowledge, deep representation, problem solving, improvisation, classroom climate, multidimensional perception, sensitivity to context, monitoring learning and providing feedback, test hypotheses, passion for teaching and learning, respect for students, challenge, and deep understanding.
Jeffers & Fong, 2000	Teacher's knowledge of a subject matter, child development, curriculum, and teaching experience.
Swanson & Holton, 2001	Expertise: "displayed behavior within a specialized domain and / or related domain in the form of consistently demonstrated actions of an individual that are both optimally efficient in their execution and effective in their results." (p. 241). Dimensions of expertise: Problem-solving skills, Experience, Knowledge. It is dynamic and domain-specific. Human expertise is the ability to do consistently the right thing in the right way.
Ericsson, 2002	The level of skill one attains in a domain has been shown to be directly related to the amount of deliberate practice one engages in.
Weiss & Shanteau, 2002	It is the behavior that is or is not expert.

Weiss & Shanteau, 2003	Categories of expertise: Evaluation + qualitative or quantitative expression= expert judgment; Evaluation + projection= expert prediction; Evaluation + communication= expert instruction; Evaluation + execution= expert performance.
Rossano, 2003	Expertise can be used as a basis for cross-species comparisons of consciousness; the evolution of human consciousness can be assessed using fossil evidence of skilled behavior as a measure of consciousness.
Smith & Strahan, 2004	Six central tendencies across teachers: a sense of confidence in themselves and in their profession; talk about their classrooms as communities of learners; maximize the importance of developing relationships with students; demonstrate a student-centered approach to instruction; make contributions to the teaching profession through leadership and service; show evidence that they are masters of their content areas.
Germain, 2005; Subramini et al., 2004	Managerial expertise: education, experience, performance, recommendations, written evidence, social skills.
Germain, 2006	College instructor expertise: knowledge, social skills, knowledge transfer, experience, classroom climate, education, respect for students, personality.

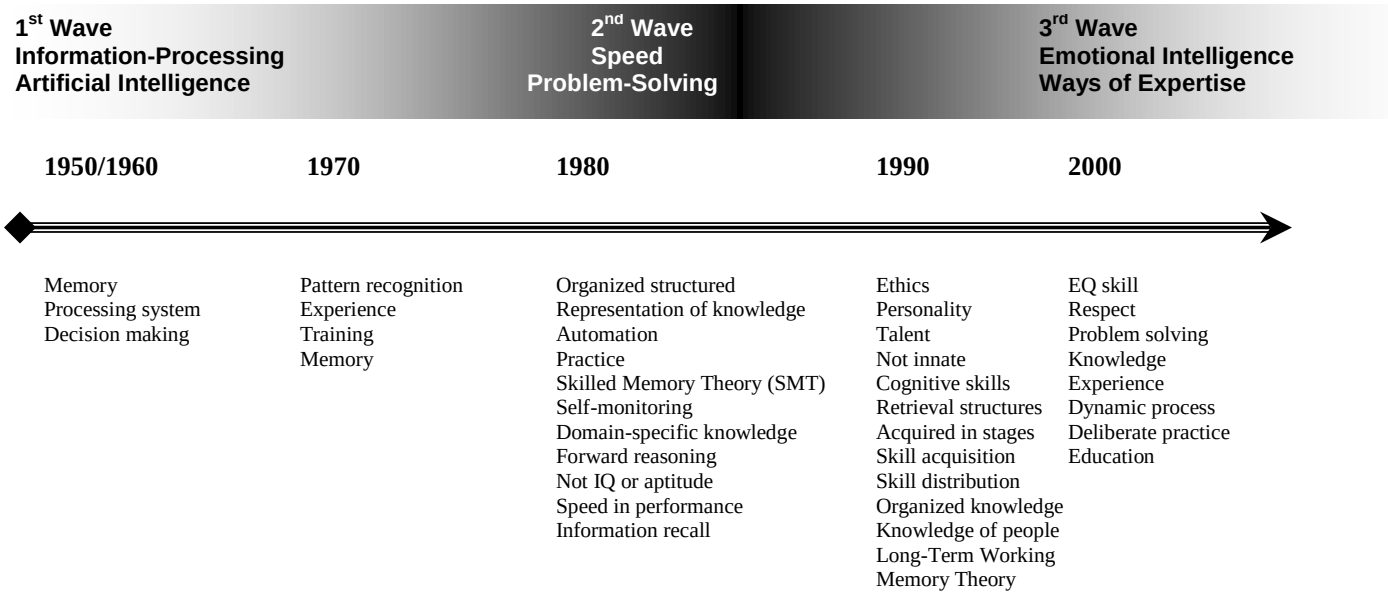
The above Table 1 was constructed based on the literature on the topic of expertise and allows for an overall view of how the concept has grown, and what it has grown into. At first sight, expertise seems to have been influenced by the evolution in other fields. Figure 1 presents a breakdown of Table 1 into three progressive eras initially identified by Kuchinke (1997) and by Holyoak (1991). Each era represents a generation or a school of thought. Here the author names those eras 'waves' (Figure 1) and further adds on to Kuckinke's and Holyoak's work.

C- Expertise Generations

The first wave (*Information-Processing / Artificial Intelligence*) started in the 1950s with the increase interest in computer science and artificial intelligence in general. Researchers were primarily concentrating on the functioning of memory (de Groot, 1966), how information was processed, and on how decisions were made. At the late stage of this wave, the concept of memory (the system by which we retain information and bring it to mind) was further investigated and broken down into three stages: sensory memory, short-term memory (STM), and long-term memory (LMT) (Atkinson & Shiffrin, 1971). Such findings influenced the work of researchers in expertise (cf. Chase & Simon, 1973; Chase & Ericsson, 1982). Research on memory was further investigated by Chase and Ericsson (1982) who spoke of Skilled-Memory Theory (SMT). This first wave of expertise theories described heuristic processes that were thought to be generally applicable to almost all domains. However, they did not prove attainable for more complex, knowledge-rich tasks and such general heuristic search methods are weak and characteristic of novices rather than experts (Kuchinke, 1997). This leads to the second

wave from which most of the well-known characteristics of expertise originate: the *Problem-Solving & Speed Wave*. This wave, which started in the late 1980s, shows a change in gear: speed and problem solving were in the agenda. Also, interest in human intelligence increased and the Stanford-Binet Intelligence Scale and the Wechsler scales of intelligence started to be commonly used. This influenced the research of Doll and Mayr (1987) who examined whether IQ was correlated with expertise. There is however a growing number of research findings that form exception to the rules of second-generation theories. For instance, experts do not always reach superior results despite their superior mental powers. Also, some knowledge can be transferred across domains. Finally, teaching novices expert rules (when identified) does not lead to better performance. With its beginning in the mid-nineties, the third wave (*Emotional Intelligence / Ways of Expertise*) in addition to being influenced by Holyoak's (1991) work on connectionism (the ability to create instantaneous cognitive networks and connect many small bits of information in a meaningful way) seems to have been greatly inspired by the business issues of the time: talent (war for talent), ethics and emotional intelligence (EI or EQ) (Goleman, 1995). Talent, as defined by Michaels, Handfield-Jones, and Axelrod (2001), is shorthand for key employees who possess a strategic mind, leadership ability, communications skills, the ability to attract and inspire people, entrepreneurial instincts, functional skills, and the ability to deliver results. Interestingly, many of these qualities are found in the latest expertise research of Smith and Strahan (2004) and Subramini et al. (2004), among others.

Figure 1. Waves and Keywords of Theories of Expertise



D- Measures of competency and expertise

a) Assessment of competency

Gilbert (1978) did extensive work on human performance, often seen as directly linked to competence. Gilbert's work consists in a series of theorems ("Leisurely Theorems" as he called them). His first one defines human competence as a function of worthy performance (W), which is a function of the ratio of valuable accomplishments (A) to costly behavior (B). It is mathematically stated as follows:

$$W = \frac{A}{B}$$

However, measuring only performance does not give a measure of competence. Gilbert therefore proposes his second theorem which is mathematically stated as follows:

$$PIP = \frac{W_{ex}}{W_t}$$

PIP stands for potential for improving performance. It tells us how much competence someone has and how much potential that person has for improving it. W_{ex} is exemplary performance, and W_t represents typical performance. To be meaningful, the ratio must be stated for an accomplishment that is identifiable. Throughout his theorems, Gilbert focuses greatly on behaviorism. However, although environmental influences on behavior are fundamental to performance improvement, HRD is not solely performance based.

The assessment of expertise is vital both in practical situations that call for expert judgment and in theoretical research on the psychology of experts. It can be difficult, however, to determine whether a judge is in fact performing expertly. There have been a few attempts at measuring expertise but only in the form of topologies or formulae, as highlighted in our next section. No true psychometric measure of expertise has seen the light, however.

Measures of expertise in the field of education are limited by exploratory, qualitative research studies conducted by Germain (2006) and Bond et al. (2000) who enumerated factors perceived to be qualifiers of expertise (see Table A1). In HRD research, the 'measure' of expertise, the most referred to, was developed by Cochran in 1943 and is based on data.

b) Assessment of Expertise

i. The CWS (Cochran, 1943; Weiss & Shanteau, 2003)

The team of researchers named the assessment tool after their respective initials, CWS. CWS is their approach to assessing expertise purely from data. The approach is based on the idea that expert judgment involves discrimination –seeing fine gradations among the stimuli and consistency evaluating similar stimuli similarly. The approach was inspired by an idea for comparing response instruments suggested by the late statistician William Cochran (1943), and adapted to the domain of expertise by David J. Weiss and James Shanteau. CWS measures expertise in a specific setting, with specific stimuli and a specific task. Someone who excels in one context may not excel in others that seem similar. The CWS index is a numerical value that captures the degree of expertise demonstrated in a set of responses. It consists of the ratio of discrimination over inconsistency as an index of expertise. Discrimination refers to the candidate's differential evaluation of the various stimuli within a set. Consistency refers to the candidate's evaluation of the same stimuli similarly over time; inconsistency is its complement. The ratio will be large when a candidate discriminates effectively, and will be reduced if the candidate is inconsistent.

$$\text{CWS} = \frac{\text{Discrimination}}{\text{Inconsistency}}$$

The rational for incorporating discrimination and consistency into an index of expertise is that a good measuring instrument, such as a ruler or a thermometer, has these properties. Discrimination and consistency are the building blocks of measurement. Similarly, expertise as its core requires the ability to evaluate the stimuli in one's domain. Accuracy, however, is not involved in CWS, as the authors do not assume any knowledge of correct responses. In general, the candidate is an individual person, a candidate expert.

He or she generates a single CWS score for particular experimental condition. That CWS score may be compared to the score produced by other candidates under identical conditions, or to the CWS score produced by the same candidate under a different experimental condition.

CWS is used for teams (all team members would generate one score) or for individuals (single-subject design). Weiss and Shanteau's goal was to develop an empirical measure of expert judgment. They argue that two necessary characteristics of expertise are discrimination of the various stimuli in the domain and consistent treatment of similar stimuli. They combine measures of these characteristics to form a ratio they call the Cochran-Weiss-Shanteau (CWS) index of expertise. Their proposed index was demonstrated using two studies that distinguished experts from non-experts based on their judgmental performance. The index provides new insights into expertise and offers a partial definition of expertise. Their research was potentially applicable to selection, training, and evaluation of experts. CWS has been useful for evaluating judgmental expertise in medical diagnosis, auditing decisions, and personnel selection. The authors state that they had had success in applying CWS to performance expertise in air traffic control (Thomas, Willems, Shanteau, Raacke, & Friel, 2001). Cochran's goal with the CWS index was to create a measure of expert judgment. It is an approach that can used to select, train, evaluate, and enhance performance. When the controller's performance depends on equipment, CWS can be considered to be evaluating the combination of human and machine. The results presented by a study done by Friel, Thomas, Raacke, and Shanteau (2001) show that the CWS index of expert performance could be applied to assessing skill development in dynamic environments. In the study, participants' CWS

scores increased with practice, suggesting that the index is sensitive to performance improvements. The finding that CWS scores were sensitive to performance improvements suggests that the index could be used to assess skill development in trainees and that it could supplement objective measures in assessing training effectiveness.

However, the CWS index has other limitations than the ones highlighted here. The index can only be interpreted relatively, not absolutely. Indeed, CWS is meaningful only in a comparative sense, that is, it can be used to determine which of two candidate experts is performing better. The distribution of expertise within the population is likely to vary across domains. If true expertise is rare for judgments requested, no expert may be included in a study. Therefore, the identified 'experts' may not really be very "experts" (Weiss & Shanteau, 2001). Additionally, there is a structural risk inherent in the CWS approach. A "correct" judgment is a weighted combination of assessed values on the observed features of the stimulus. Relevant aspects should receive high weight and irrelevant aspects should have no weight. Because we generally do not presume domain knowledge, we can be misled if a candidate attends consistently to inappropriate stimulus features. Expert judgment may yield high CWS, but high CWS does not guarantee expertise. For instance, a dance judge who evaluates the contenders primarily on the basis of appearance, taking into account hairdo and outfit very heavily, would be deemed an expert according to the CWS index if those attributes were used to discriminate consistently among the dancers. However, this is not real expertise for the task of judging dancing performance.

ii. Royer, Carlo, Dufresne and Mestre's (1996) SVT, IVT, and PIT tests

Most of the existing expertise measures assess levels of expertise within a content domain. Royer et al.'s research (1996) evaluates three procedures for producing tests that measure domain expertise. These procedures were hypothesized to have the property of being consistent with research and theory on expertise, and, per the authors, have practical properties that would enable them in actual training or instructional settings. The procedures for producing tests were chosen to reflect varying degrees of domain expertise as examinees read text from a content domain. The first test uses a technique that measures the ability to comprehend the surface meaning of a text: it is the Sentence Verification Technique (SVT). Royer et al.'s (1996) studies indicate that the technique is valid for the purpose of differentiating readers with varying levels of domain expertise. The theory and research on skill development suggests that, after learners develop the ability to comprehend the surface meaning of a text, they acquire the ability to relate text information efficiently to other information they have acquired about the domain. Chi, Glaser, and Rees' (1982) research found that novices and experts differed in the quality of the inferences they generated when solving physics problems. Specifically, they reported that the source of errors that novices made in problem solutions could often be traced to the generation of wrong inferences or the failure to generate a necessary inference. Royer et al. (1996) developed a technique for measuring inference performance that could be easily administered and scored. They called this technique the Inference Verification Technique (IVT). It measures the ability to make two kinds of inferences: the first one is 'near inferences', which involves taking two items of information presented in a text and drawing a valid inference that connects the two. The second kind of inference, which the researchers call 'far inferences', involves connecting an item of text information with

prior knowledge about the content domain and drawing a valid inference from the two pieces of information. An ITV test is administered by having examinees read a text passage and then read and judge whether each test sentence is a true or false inference from the passage. Simply put, experts develop the ability to see principles underlying the problem solution, whereas the novices could only see the problem details.

The third technique used by Royer et al. (1996) is the Principle Identification Technique (PIT), which involves presenting the participant with sets of standard problems and four example problems. The four example problems reflect the combination of surface and deep structure similarly to the standard problems that Hardiman, Dufresne, and Mestre (1989) used. The participant's task when completing a PIT test was to judge whether each example problem involved the underlying principle reflected in the standard problem. The advantage of using the PIT versus Hardiman et al.'s technique is that four judgments are collected per PIT problem, vs. one judgment per problem for Hardiman et al.'s.

One major hypothesis tested is that expert performance was superior to novice performance on all three tests. This prediction was consistent with previous findings that experts comprehend and retain more information after reading passages in their area of expertise (Royer et al., 1984). A second prediction was that the differences between experts and novices should be smallest on SVT tests and largest on PIT tests, with expert-novice differences being at the intermediate level on the IVT tests. As expertise continues to develop, the learner develops the ability to recognize large issues depicted in the text. The above hypotheses were supported. However, the researchers found that the difference between experts and novices was greater on the near transfer items than it was on the far

transfer items (IVT). The results of their study indicate that performance on their assessment techniques was consistent with theory and previous research at the general level. Evidence regarding the validity of the tests that they developed using the SVT, IVT, and PIT procedures was provided by showing that test performance generally corresponded to predictions derived from theory and research in cognitive science. These results are consistent with the interpretation that the tests had construct validity. The authors suggest that tests that measure different levels of cognitive skill attainment should be useful for two purposes: to evaluate instructional or training effectiveness, and to assist in personnel selection decisions. However, it seems as if these tests only measure competence in reading comprehension, inference ability, and problem type recognition. In other words, they simply measure skill attainment.

iii. L. M. Spencer & S. M. Spencer (1993)

L. M. Spencer and S. M. Spencer (1993) developed a technical/professional/managerial (EXP) scale based on four dimensions: depth of knowledge, breadth, acquisition of expertise, and distribution of expertise. These dimensions are in accordance with their definition of expertise: it includes both the mastery of a body of job-related knowledge (which can be technical, professional, or managerial), and also the motivation to expand, use, and distribute work-related knowledge to others.

iv. Chalykoff & Kochan (1989)

The study conducted by Chalykoff and Kochan (1989) consists in the development of a model that examines the impact of monitoring on job satisfaction and

turnover intention. In their conceptual model, the authors used Halperin, Snyder, Shenkal, and Houston (1976) and Tuckman and Oliver's (1968) two items on supervisory consideration behavior derived from the performance appraisal and feedback literature. In Chalykoff and Kochan's paper, those two items are named "supervisory experience" at times and "supervisory expertise" at other times. By their formulation, the two items suggest concentration on supervisory technical and procedural knowledge:
"My supervisor knows a great deal about the technical side of my job" and "Has a good understanding of the procedures I use in my work" (p. 830).

Although titled 'supervisory expertise', those items seem to give an incomplete description of what the concept of expertise may encompass, as suggested by our literature review. Indeed, knowledge seems to be one of the many dimensions of expertise in general (e.g., French & Raven, 1959; Harmon & King, 1985; Spencer & Spencer, 1993; Swanson & Holton, 2001). Based on this, two items seem, therefore, limitative in assessing general expertise.

v. Subramini, Peddibhotla, & Curley (2004) / Germain (2005)

Subramini, Peddibhotla, and Curley's (2004) study findings, further supported by another study by Germain (2005), indicate that the following are cues of expertise: education, experience, performance, recommendations, written evidence, and social skills.

c) Need for the development of a scale measuring expertise

While few researchers have attempted to develop a scale measuring the perception of expertise, no definite scale has ever been adopted in any field (Kuchinke, 1997), and for two possible reasons: A first reason can be the 'impossibility' of the creation of a

general expertise scale since expertise is said to be domain-specific (Swanson & Holton, 2001). A second reason may be the fact that none of the scales have shown acceptable levels of reliability and validity, when calculated. Indeed, one of the greatest difficulties in conducting survey research is assuring the accuracy of measurement of the constructs under examination (Barrett, 1972). According to Korman (1974), adequate measurement is primordial. Without it, researchers have nothing. Even with advanced techniques such as meta-analysis, conclusions often cannot be drawn from a body of research due to problems with measurement (Schmidt, Hunter, Pearlman, & Hirsch, 1985).

Considering the lack of generalizability of the aforementioned measures, topologies, and formulae, the purpose of this study is the creation of a measure of expertise named the Generalized Expertise Measure (GEM), which ought to respond to some of the current deficiencies. The American Psychological Association (2001) states that measures should demonstrate content validity, criterion-related validity, construct validity, and internal consistency. Content validity refers to the adequacy with which a measure assesses the domain of interest. Criterion-related validity pertains to the relationship between a measure and another independent measure. Construct validity is concerned with the relationship of the measure to the underlying attributes it is trying to assess. Internal consistency refers to the homogeneity of the items in the measure or the extent to which item responses correlate with the total test score. Therefore, while developing the GEM psychometric measure, focus will be put on establishing evidence of both the validity and the reliability of the scale.

CHAPTER THREE

RESEARCH METHODOLOGY

A- Kind of Research

Being the purpose of this study is the development of a context-independent scale measuring expertise, the steps taken to do so fall mainly under the characteristics of a quantitative research method approach. However, some qualitative work is necessary in the first phase of the scale development.

B- Measuring Expertise

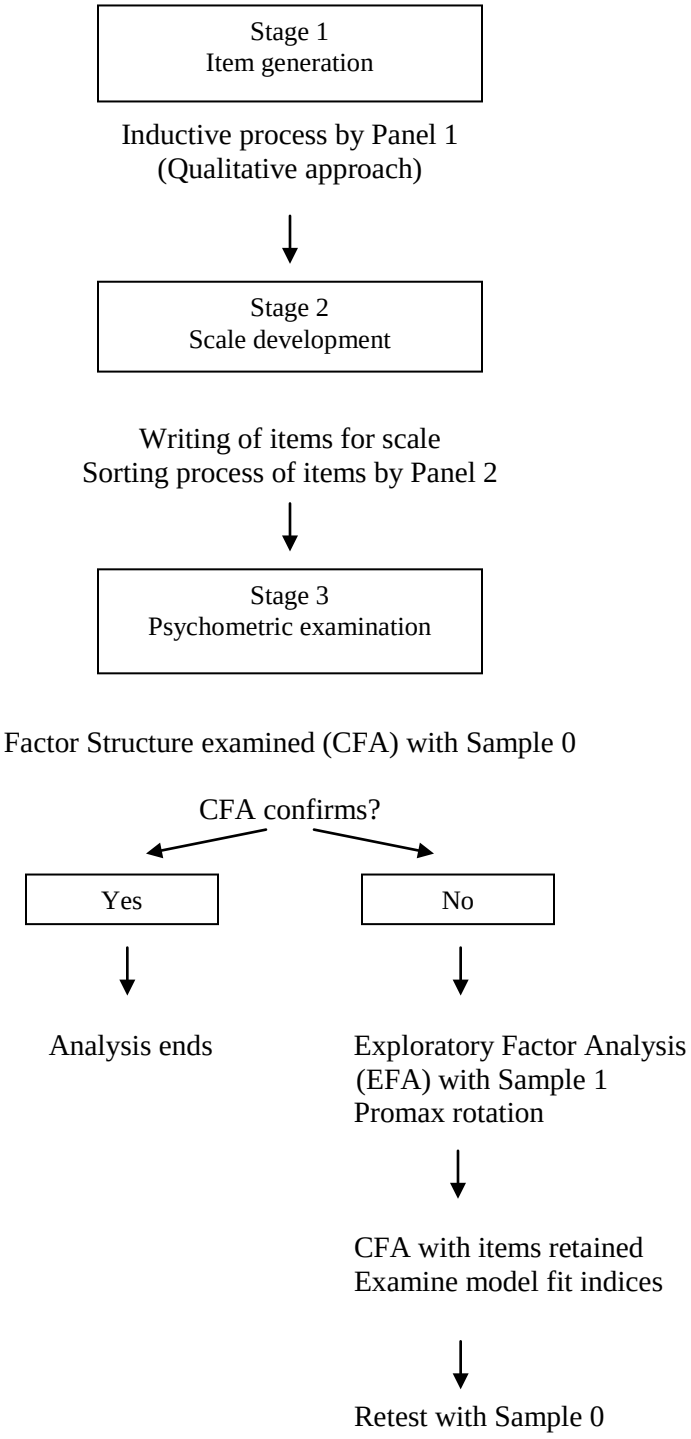
Measuring expertise has only been investigated in a few studies in the business field (cf. Chalykoff & Kochan, 1989; Kidwell & Bennett, 1994) and there is no existing standard tool to measure expertise across domains. L. M. Spencer and S. M. Spencer (1993) developed a technical/ professional/managerial (EXP) scale based on four dimensions: depth of knowledge, breadth, acquisition of expertise, and distribution of expertise. These dimensions are in accordance with their definition of expertise: it includes both the mastery of a body of job-related knowledge (which can be technical, professional, or managerial), and also the motivation to expand, use, and distribute work-related knowledge to others. This scale, however, contains questions which could be viewed as limitative to describe expertise. For instance, in their breath of managerial expertise dimension L. M. Spencer and S. M. Spencer's (1993) scale has 7 items to choose from, ranging from "none" (individual contributor with no responsibility for coordinating or supervising the work of others) to "broad" (manages large complex multi-division organization). Similarly, their knowledge dimension has 8 items to choose from, ranging from "primary" (does simple, repetitive tasks that typically can be learned in a

few hours to a few days; examples: unskilled manual laborer, cleaner) to “preeminent authority” (nationally / internationally recognized authority in unusually complex professional or scientific field). We argue that expertise does not rest on the type of position one holds in an organization. One needs not be a CEO or a COO and manage large complex multi-division organizations or be internationally known to be qualified as an expert. Our definition lies more on the following three dimensions: knowledge, experience, and problem-solving skills, which one can have at any level of an organization, white, blue, or gray-collars alike. Expertise is domain-specific. Therefore, being a manual worker does not preclude you from being an expert in your own domain, be it banking or cleaning surfaces. Another best-known and widely used method of assessing different levels of expertise consists in comparisons of think-aloud verbalizations of experts and novices (Kuchinke, 1997). Examples of this research method include comparisons of chess grand masters and novices, experienced physicians and medical students, and expert and novice troubleshooting technicians. Another commonly used research method consists of extensive case studies of single subjects, where data on a large number of different tasks are collected. However, as previously noted, all of those methods have shortcomings and have resulted in different theories of expertise (Kuchinke, 1997). Therefore, we are still in a critical need for a tool measuring expertise across fields, and the main endeavor of this study is to develop such an instrument, which would be valid, reliable, and generalizable.

C- Measure Developmental Process

The American Psychological Association (2001, as quoted in Hinkin, 1995) established that sound measures must demonstrate content-validity, criterion-related validity, construct validity, and internal consistency. These criteria determine the psychometric validation of behavioral measures. Having closely examined 277 scale development practices in 75 studies, Hinkin (1995) argued that measures generally lack content validity in the item development stage and do not have strong and clear linkages with their theoretical domains. The current study addresses these two concerns by building content validity into the measure through the processes of domain identification, item generation, and judgment-quantification or content expert validation (DeVellis, 1991). The following sections outline the steps of scale development undertaken in this study to date: (1) Domain identification and item generation, (2) Content expert validation, and (3) Pilot test. The methodologies used were sequentially elaborated. Figure 2 shows the steps followed in the development of the scale.

Figure 2. Stages of Scale Development



a) Stage 1: Domain Identification and Item Generation

The generation of items is the most important element of establishing sound measures (Hinkin, 1995). In this stage, the primary concern of the scale developer will be content validity. It is often viewed as the minimum psychometric requirement for measurement adequacy and is the first step in construct validation of a new measure (Schriesheim, Powers, Scandura, Gardiner, & Lankau, 1993). Content validity must be built into the measure through the development of items. As suggested by Schriesheim et al. (1993), content adequacy will be assessed immediately after items have been developed as this will provide the opportunity to refine and / or replace items before preparing and administering a questionnaire. An inductive approach will be used, also called “grouping” or “classification from below” (Hunt, 1991). In an inductive scale development approach, there is little theory involved at the outset as we try to identify constructs and generate a measure from individual responses.

i- Items Generation: Formation of Panels and Qualitative Work

To generate themes and obtain more substantive insights pertinent to expertise, a first panel (Panel 1) was formed, composed of six individuals who were considered experts in their field because of the positions they held and their educational background. Two non-probability sampling techniques, purposive and snowball were utilized in the selection of interview participants to ensure that they were “appropriate” opinion leaders with well-developed views on the research topic (Minichiello, Aroni, Timewell, & Alexander, 1995). Given the generative purpose of the interview, the sample size does not have to be large since “the validity, meaningfulness, and insights generated from

qualitative inquiry have more to do with the information-richness of the cases selected and the observational/analytical capabilities of the researcher than with sample size" (Patton, 2002, p.185). The six panel members were first contacted via e-mail and invited to participate in this study. The following e-mail was sent: "We are in the process of developing a psychometric instrument that requires your expertise. Would you be willing to meet for a 90-minute discussion with a panel of 5 other members?" The goal of this panel was to discuss and define expertise.

At the beginning of the meeting, the researcher briefed the Panel about the object of the study. She then asked the Panel members the following question: What do you think expertise is, and according to you, what are the components of expertise? The function of the researcher was primarily to facilitate the discussion. Each panel member was given a chalk and could write keywords or sentences on a board, and all panel members' duty was to add to this brainstorming session. A semi-structured interview was appropriate for the current study since the existing limited information on expertise only allows for the development of flexible interview guides, not rigidly structured interview schedules (Miller & Crabtree, 1999). A photograph of the board was taken is shown in Figure 3. Based on Panel 1 members' contribution, a total of 56 items were written by the researcher. Panel 1 had the following composition:

Six members comprising four males and two females (N = 6). The average age was 49 years old (M = 49, SD = 7.5).

Table 2. Panel 1 Members' age

DESCRIPTIVE STATISTICS: AGE

	N	Minimum	Maximum	Mean	Std. Deviation
AGE	6	38	59	49.00	7.537
Valid N (listwise)	6				

They all obtained a doctoral degree (Ph.D.) but were from different fields, that is, in business, engineering, psychology, and in medicine. This diversity allowed for a better picture of the concept of expertise. A total of three races were represented (Caucasian, Asian, and Hispanic). Finally, the Panel members' average number of years of experience in their field of expertise was over 15 years (M = 15.83, SD = 9.2).

Table 3. Panel 1 Years of experience in field

DESCRIPTIVE STATISTICS

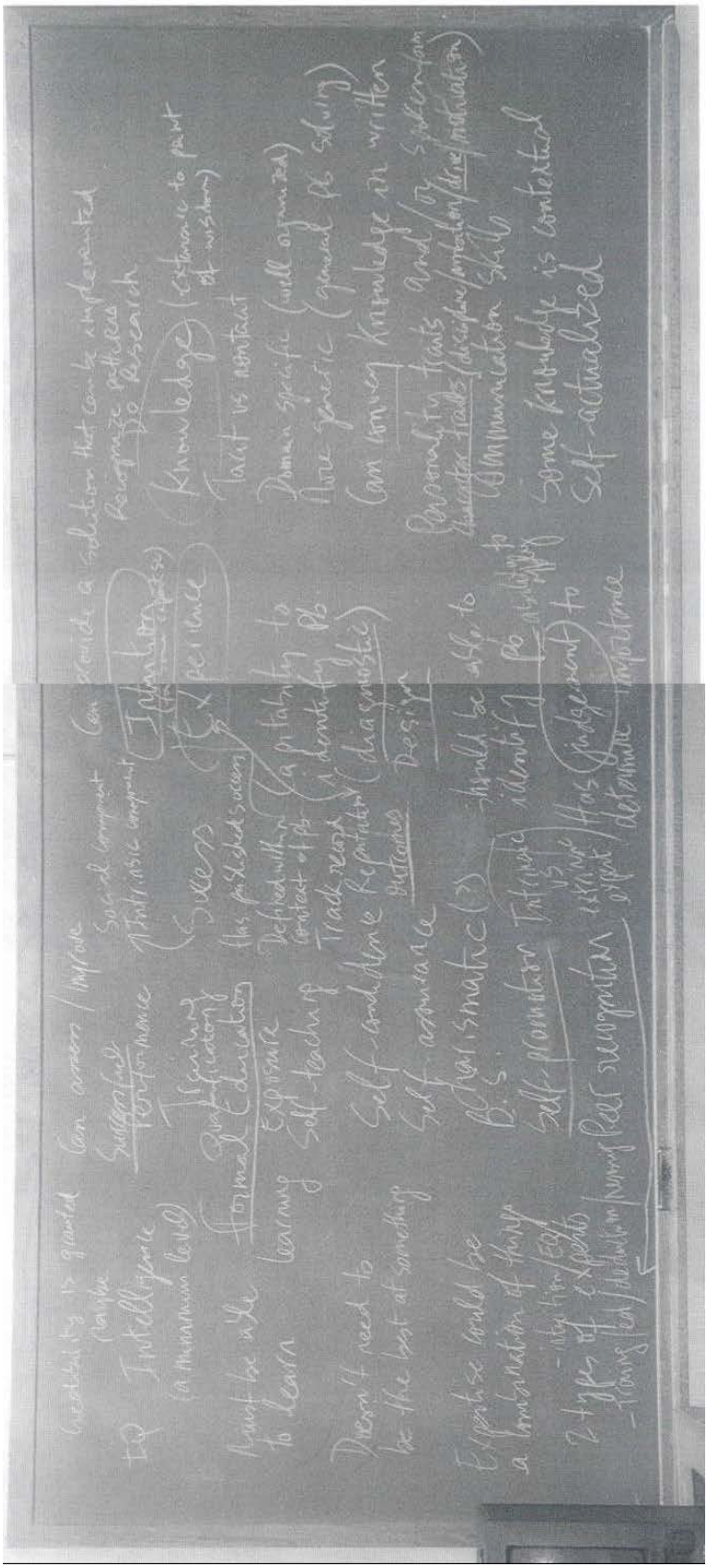
	N	Minimum	Maximum	Mean	Std. Deviation
Years of experience in field of expertise	6	5	30	15.83	9.239
Valid N (listwise)	6				

Table 4. Panel 1 Descriptive statistics summary

PANEL 1 MEMBERS SUMMARY

	Age	Gender	Race	Profession	Highest degree obtained	Field in which degree was obtained	Area of Expertise in Work	Years of experience in field of expertise
1	59	Male	Caucasian	Administrator	PhD	Business	Higher Ed Administration	50
2	46	Male	Asian	Professor	PhD	Engineering	Engineering	3
3	38	Male	Hispanic	Professor	PhD	Psychology	I/O Psych	30
4	48	Male	Caucasian	Professor	PhD	Business	Business	10
5	47	Female	Caucasian	Researcher	PhD	Medicine	Physiology	3
6	56	Female	Caucasian	Administrator	PhD	Business	Business	27

Figure 3. Photograph of Board with Panel 1 Item Generation



ii- Formulation of Questions and Content Analysis by Panel 2.

Based on Panel 1's responses, interview responses were used as a base for the researcher to write items in the form of questions that could be included as part of a survey. This procedure is known as domain sampling. Some items were written in a Likert scale format (Likert, 1932), from 1 (least likely) to 5 (most likely). Those questions were then classified into two categories by content analysis based on keywords and themes. It became clear that some of the items were related to a quality that was mainly subjective ("this person is ambitious about their work in the company") and others higher objective ("this person has written articles or books in his or her field of expertise"). After sorting them out into one of those two categories, 23 items out of the initial 56 items identified by Panel 1 remained.

The GEM was then composed of 23 items:

1- This person has knowledge that is specific to his or her field of work.
2- This person conducts research related to their field.
3- This person shows that they have the education necessary to be an expert in their field.
4- This person has knowledge about their field.
5- This person has written articles or books in his or her field of expertise.
6- This person has the qualifications required to be an expert in their field.
7- This person has been trained in his or her area of expertise.
8- This person is ambitious about their work in the company.
9- This person can assess whether a work-related situation is important or not.
10- This person can talk his or her way through any work-related situation.
11- This person is capable of improving himself or herself.
12- This person is charismatic.
13- This person can deduce things from work-related situations easily.
14- This person doesn't need to be the best at something to be perceived as an expert by employees.
15- This person does things so that the attention is drawn to them at the workplace
16- This person is intuitive in their job.
17- This person is able to judge what things are important in their job.
18- This person has the drive to become what he or she is capable of becoming in their field.
19- This person is self-assured.
20- This person has self-confidence.
21- This person says good things about themselves and about their achievements in their job.

22- This person is an expert who keeps to himself / herself.
23- This person is an expert who is outgoing.

After the researcher identified those two categories, a Panel 2 was constituted. Members of Panel 2 were directly solicited based on their expertise in their field. The Standard for Educational and Psychological Testing (American Educational Research Association, 1985) prescribed three criteria for expert panel members involved in content review process, namely relevant training, experience, and qualifications. Panel 2, also composed of six members, and did not have to be composed of "scholars". Anyone who works in a setting who has to consult with an expert to complete her or his work was eligible to be a member. Actually, since the purpose of the scale is to measure expertise in mainly employed individuals at various levels of an organization, the panel had to match the expected target population. Therefore, "experts" (individuals with higher degrees) were not included. Their task was to sort the questions identified after Panel 1's work into two categories of expertise: "subjective expertise", and "objective expertise". Written definitions of those terms were provided to Panel 2 members. Objective expertise was defined as a characteristic or a fact about a person that can be verified or assessed. Subjective expertise was defined as a characteristic or a fact about a person that is perceived by someone else as an indication of their knowledge, abilities, or skills. Panel 2 had the following composition: six members comprising two males and four females ($N = 6$). The average age was 46 years old ($M = 46.17$, $SD = 17.5$).

Table 5. Panel 2 members' age

PANEL 2 DESCRIPTIVE STATISTICS

	N	Minimum	Maximum	Mean	Std. Deviation
AGE	6	25	75	46.17	17.520
Valid N (listwise)	6				

Their educational background was varied as well as their professional field: business, construction-architecture, medicine, and education. This diversity allowed for a better representation of the general population. A total of three races were represented (Caucasian, Black, and Hispanic). Finally, the Panel members' average number of years of experience in their field of expertise was over 20 years (M = 20.50, SD = 18.58).

Table 6. Panel 2 Years of experience in field

PANEL 2 DESCRIPTIVE STATISTICS

	N	Minimum	Maximum	Mean	Std. Deviation
Years of experience in field of expertise	6	3	50	20.50	18.577
Valid N (listwise)	6				

Table 7. Panel 2 Descriptive Statistics Summary

PANEL 2 MEMBERS SUMMARY

	Age	Gender	Race	Profession	Highest degree obtained	Field in which degree was obtained	Years of experience in field of expertise
1	75	Male	Caucasian	Medical Surgeon	Doctorate	Medical Sciences	50
2	32	Female	Black	College Instructor	Master	Family Therapy	3
3	53	Male	Caucasian	Education Administration	High School	Business	30
4	44	Female	Hispanic	Construction / Architecture	Master	Architecture	10
5	25	Female	Hispanic	Education Administration	High School	Business	3
6	48	Female	Caucasian	Medical Technologist	Bachelor	Medical Sciences	27

iii- Sorting process of items and Dimensions by Panel 2

Following the suggestions of Grant and Davis (1997), the content experts (Panel 2) were asked to address three elements in examining the expertise instrument: representativeness, comprehensiveness, and clarity of the items. Representativeness in this study refers to the degree to which each item reflects and operationalizes its nominated domain. To facilitate this evaluation process, the items are already categorized under their nominated domains prior to the evaluation process, and the definition of each of the identified domains is provided. The content experts were then asked to indicate the extent to which they perceived each individual item to be representative of the domain with which it was associated (objective or subjective expertise), by selecting the most appropriate category (subjective or objective). This first element forms the quantitative part of the content validation process. Hence, Panel 2 members examined the questions and identified whether the questions captured the constructs and the closeness of the items to the constructs (Hinkin & Schriesheim, 1989). This served as a pre-test, allowing deletion of items. This panel's duty was to sort the items telling us "how much" each item measures each category. Here, it is not so much about deletion than it is about "no load". The second task was to evaluate the comprehensiveness of the entire instrument by identifying items which they perceived to be incongruent with its nominated domain and, subsequently, assigning them to an alternative domain with which the items were better matched. Instructions to the Panel 2 members were as follows: "If you believe that some items don't fit either of those categories, place an "X" in the section "Other" and you can explain what you think it should be called in the 'Comment' box. If you believe that some

statements fit both categories (Objective AND Subjective Expertise), rank them like this: assign a “1” to the category that best represents a particular category and assign a “2” to the category that would be your second choice.” An example of the possible selections was provided.

Table 8 shows how Panel 2 classified each of the 23 items as being either Objective Expertise or Subjective Expertise.

Table 8. Dimensions associated with expertise: Objective or Subjective

	Item	SUB1	OBJ1	SUB2	OBJ2	Dimension
11	This person has knowledge that is specific to his or her field of work		**6**	**2**		OBJ
18	This person conducts research related to their field		**6**	**1**		OBJ
21	This person shows that they have the education necessary to be an expert in their field	**1**	**5**		**1**	OBJ
27	This person shows that they have the formal education necessary to be an expert in their field	**1**	**5**	**1**	**1**	OBJ
33	This person has knowledge about their field		**6**	**3**		OBJ
40	This person has written articles or books in his or her field of expertise		**6**			OBJ
41	This person has the qualifications required to be an expert in their field		**6**	**1**		OBJ
53	This person has been trained in his or her area of expertise		**6**	**1**		OBJ
2	This person is ambitious about their work in the company	**6**			**1**	SUB
4	This person can assess whether a work-related situation is important or not	**5**	**1**		**3**	SUB
5	This person can talk his or her way through any work-related situation	**6**				SUB
6	This person is capable of improving himself or herself	**6**			**3**	SUB
9	This person is charismatic	**6**				SUB
15	This person can deduce things from work-related situations easily	**6**			**2**	SUB
19	This person doesn't need to be the best at something to be perceived as an expert by employees	**6**		**2**		SUB
26	This person does things so that the attention is drawn to them at the workplace	**6**			**1**	SUB
30	This person is intuitive in their job	**6**				SUB
32	This person is able to judge what things are important in their job	**5**	**1**	**1**	**2**	SUB
45	This person has the drive to become what he or she is capable of becoming in their field	**6**			**1**	SUB
46	This person is self-assured	**6**				SUB
47	This person has self-confidence	**6**				SUB
48	This person says good things about themselves and about their achievements in their job	**6**			**1**	SUB
55	This person is an expert who keeps to himself / herself	**5**	**1**		**1**	SUB
56	This person is an expert who is outgoing	**5**	**1**		**1**	SUB

Item 27 was a repeat of Item 21 and was therefore eliminated from the questionnaire.

SUB1 : This item was primarily identified as being subjective.

SUB2 : This item was secondarily identified as subjective.

OBJ1 : This item was primarily identified as objective.

OBJ2 : This item was secondarily identified as objective.

iv- Inter-rater consistency and Content Validity Ratio

Inter-rater consistency was reported. It was statistically investigated by calculating the inter-rater reliability coefficient between raters. The content validity of a construct measure can be defined as "the degree to which the measure spans the domain of the construct's theoretical definition" (Rungtusanatham, 1998). It is the extent to which the measure captures the different facets of a construct. Evaluating face validity of a measure can indirectly assess its content validity. Face validity is a matter of judgment and should be assessed before data collection (Rungtusanatham, 1998). One approach used to quantify face validity involves a panel of subject matter experts (SMEs) and the computation of Lawshe's (1975) Content Validity Ratio for each candidate item in the measure (CVR_i). Mathematically, CVR_i is computed as follows:

$$CVR_i = \frac{ne - N/2}{N/2}$$

where *ne* is the number of panelists indicating 'most likely' about a specific question and *N* is the total number of SMEs in the panel. Lawshe (1975) had further established minimum CVRs for different panel sizes based on a one-tailed test at a $\alpha = 0.05$

significance level (Rungtusanatham, 1998). Based on this, the minimum value of the content validity ratio to ensure that agreement is unlikely to be due to chance, with 6 panelists, is therefore 0.80 per identified item. Using this procedure, 21 items with CVR value higher than 0.80 should be retained in the scale, as shown in Table 9.

Table 9. CVR_i Computation Results

COMPUTATION RESULTS		
Minimum CVR_i Value	Number of Items Retained	Cumulative Number of Items
0.80	21	21
0.70	0	21
0.60	10	31
0.50	0	31
0.40	0	31
0.30	16	47
0.20	0	47
0.10	0	47
0-0.09	9	56
<0	0	56

Lawshe's (1975) Content Validity Ratio (CVR) can be used to assess the degree to which Panel 2 'agrees' or congruent items are representative of the content domain (Murphy & Davidshofer, 2001). The CVR value ranges from -1.00 and +1.00, where a CVR of 0.00 means that 50% of the experts in the panel believe that a measurement item is "most likely" and, therefore, content valid. These values are averaged to produce a

content validity index (CVR_i). Based on the work of Panel 2, categories were defined and items were written. The items are subsequently derived deductively and inductively, consistent with the definitions of each of the identified domains. This sequence is commonly utilized by researchers for theory development and item construction (e.g., MacKenzie, Podsakoff, & Fetter, 1991; Mayfield, Mayfield, & Kopf, 1995; Podsakoff, MacKenzie, Moorman, & Fetter, 1990).

b) Stage 2: Scale Development, Pretest, and Pilot Study

Pilot testing the Questionnaire: Purpose and Modality of Pilot Testing

Once the protocol of administering the questionnaires, and the sample unit were defined, the researcher examined the measurement properties of the survey questionnaires and examined the viability of the administration of these surveys. Pre-testing was done with 5 subjects, which included colleagues (to test if the questionnaire accomplished the study's objectives (Dillmann, 1978)), industry experts (to prevent the inclusion of some obvious questions that might reveal avoidable ignorance of the investigator in some specific area), and target respondents (to provide feedback on everything that can affect the answers of the targeted respondents). The pre-test was done in a face-to-face manner. Subsequently, the researcher asked whether the instructions and the questions were clear; if there were any problems in understanding what kind of answers were expected, in providing answers to the questions posed.

i. Design of the Pilot Study performed using the SPSS version of LISREL (Jöreskog & Sorbom, 2005) called AMOS 6.0.

A pilot study of the items of the measure was then conducted. The primary purpose of the pilot study is to measure the extent to which the instrument is able to "provide data of sufficient quality and quantity to satisfy the objectives of the research" (Hunt, Sparkman, & Wilcox, 1982, p. 270). The generated items were administered to a sample. This sample was targeted towards the general population, mainly to employed and professional individuals. Also, per Schwab (1980), the item-to-response ratio was close to 1:10 for each set of scales to be factor analyzed. Recent research, however, has found that in most cases, a sample size of 150 observations should be sufficient to obtain an accurate solution in an exploratory factor analysis as long as item inter-correlations are reasonably strong (Guadagnoli & Velicer, 1988; Hinkin, 1995). Ultimately, we wanted the items to condense. The initial expertise scale included a total of 23 items and the number of participants was first 319 then 307 after cleaning up the data. The respondents are asked to evaluate their direct leader or supervisor with regard to their expertise using a 5-point Likert scale (Likert, 1932) (1= strongly disagree to 5= strongly agree).
All descriptive item levels data, including standard deviations (*SD*), inter-item correlations (*r*), and the mean (*M*), are reported for the factors of expertise, as shown in Table 24 in the results section.

c) Stage 3: Psychometric examination of the GEM

i. Design of the Confirmatory Factor Analysis (CFA)

Factor analyses were conducted (Gorsuch, 1983). Factor analysis is a commonly used technique when developing a psychometric scale. It is a technique that examines the inter-relationship of a set of variables and identifies clusters of highly interrelated variables that reflect underlying themes, or factors, within the data, hence looking for a

way the data may be reduced or summarized using a smaller set of factors or components. This technique is used extensively by researchers involved in the development and evaluation of tests and scales (Kerlinger & Lee, 2000). All variables are treated equally and the object of the analysis is to create factors that help explain the multivariate associations between the original variables. Factor analysis currently has two methodologies: The traditional method, Exploratory Factor Analysis or EFA, and the newer method, Confirmatory Factor Analysis or CFA. This newer method is based on the work of Lawley (1940). It is also attributed to Jöreskog (1967; 1969; 1970) and to Jöreskog and Goldberger (1972). Exploratory Factor Analysis is usually used to learn or to discover which factors underlie the data. It takes place during the early stages of research into a phenomenon when the objective is to gain preliminary insight on a particular topic. Confirmatory Factor Analysis is used to test hypotheses about the factor structure. In CFA a model is developed, based on theory or past findings, and then tested against empirical data. The overall purpose of a Confirmatory Factor Analysis and an Exploratory Factor Analysis is to ensure the stability of the factor structure (Hinkin, 1995; Tabachnick & Fidell, 1989). Therefore, item deletions and revisions/modifications to the measurement can be expected on the basis of these analyses. Confirmatory factor analysis, unlike exploratory factor analysis, provides a complete and unified system for testing a priori models (Dillon & Goldstein, 1984). Typically, for confirmatory factor analysis, a minimum sample size of 200 has been recommended (Hoelter, 1983). The collection of experimental data allows structural modeling techniques to be used with confidence. The benefit of using structural modeling techniques is that measurement error is accounted for in the models tested, which the use of multiple regression techniques

does not allow. Indeed, multiple regression techniques imply that there is no measurement error in the variables studied (Baron & Kenny, 1986).

Using AMOS 6.0 (Arbucle, 1989, 1994; 2003), the fit of the model was assessed by examining chi-square values (χ^2), the adjusted goodness-of-fit indices (AGFI), Tucker-Lewis index (TLI), and the comparative fit indices (CFI) suggested by Medsker, Williams, and Holahan (1994). An index that meets Bentler and Bonett's (1980) criterion of .90 is considered evidence of acceptable fit.

ii. Design of the Exploratory Factor Analysis (EFA)

If the CFA did not confirm, an Exploratory Factor analysis would be used to repair the instrument and improve it. The major steps involved in Exploratory Factor Analysis are as follows:

Data → Correlation → Factor Extraction → Factor Rotation

In the EFA, a scree test (Cattell, 1966) can be calculated to indicate how many factors should be retained. In this criterion, the Cattell's scree test, eigenvalues obtained from a single analysis, are plotted and an inflection point of the resulting curve (a scree test) is determined by visual inspection. The location of the inflection points indicates the number of factors to be extracted.

Also, an oblique rotation (Promax) can be calculated to clarify the structure of expertise, by indicating if the items comprising each single factor are or are not conceptually distinct.

iii. Reliability Assessment

Reporting of internal consistency reliability is a necessary part of the scale development process (Hinkin, 1995). Reliability is a necessary pre-condition for validity

(Nunnally, 1978). To assess the reliability of an instrument based on internal consistency, the minimum conventional standard of level of Cronbach's coefficient alpha (Price & Mueller, 1986) is typically .70 for basic research measures (Nunnally, 1978).

The objective of the previous stages in the scale development process was to create a measure that demonstrates validity and reliability (Hinkin, 1995). Construct validation is now essential to ensure the quality of the new measure (Schmitt & Klimoski, 1991). According to Cronbach & Meehl (1955), the demonstration of construct validity of a measure is the ultimate objective of the scale development. Campbell (1976) asserts that due to potential difficulties caused by common method variance, it is inappropriate to use the same sample both for scale development and for assessing construct validity. Also, the use of an independent sample to provide an application of the GEM will enhance its generalizability (Stone, 1978).

D- Population and Sample

In order to validate the Generalized Expertise Measure, data on the perception of employee expertise were collected from employees of various organizations mostly located in the Southeast United States. The sample was therefore expected to be diverse (from employees to vice-presidents). Having a wide representation of workers' level of education and qualification will provide a basis for comparison and will allow us to find out if differences exist in our results of leader expertise based on individual characteristics. It was expected to survey a total of 300 participants. Subjects were a random, snowball sample.

E- Data Collection Procedures

Participants were contacted via an e-mail soliciting them to participate in an anonymous study. The researcher sent a total of ten e-mail invitations to participants who worked in a variety of fields, including: two hospitals, three universities (public and private), one large law office, a private school, and government office, and a large bank. The e-mail invited those ten participants to forward the e-mail to co-workers. The survey was posted online and hosted by the researcher. Participation was optional and anyone not wishing to take part was given the opportunity to decline. The purpose of the research was explained in a cover page before the survey is taken (see Appendix A), and respondents were to agree (by clicking on 'Start Survey' at the end of the cover page) to go forward to the next page and take the survey. Participants were encouraged to answer all questions in the survey honestly and were assured of complete anonymity. It was expected that the survey would require 15 minutes to complete.

Completion of questionnaires has traditionally been done through a pen-and-pencil method. However, recent developments in technology have allowed such surveys to be electronically posted or e-mailed. This new surveying technique is now often considered an alternative to the more traditional method. Several companies such as Proctor & Gamble have considered online surveying (Heun, 2001). Much has been written about data collection procedures and more specifically about the validity of online versus the pen-and-pencil procedure. However, the amount of research comparing web-based and pen-and-pencil methods is slowly increasing. Deutskens, de Ruyter, and Wetzels (2006), for instance, examined whether online and mail surveys produced convergent results. They found that an analysis of the accuracy and completeness of respondents' answers to both open-ended and closed-ended questions produced equivalent results. Both the

composite reliability and the average variance extracted show consistently high levels for both groups, and the means and variance – covariance matrices are equal across modes. Interestingly, they found that online respondents provide more improvement suggestions and provide overall lengthier answers when responding to questions related to their positive experience with the organization. Several other studies have demonstrated the psychometric equivalence of various survey media options (cf. Donovan, Drasgow, & Probst, 2000; King & Miles, 1995; Stanton, 1998; Church, 2001).

CHAPTER FOUR

RESULTS

A- Findings

The total data sample (*N* = 319) was examined for extensive answer omission and for excessive similar response patterns (all “1” or “2” answers, etc.). The careful screening of the data resulted in the deletion of 12 responses. The sample became *N*=307.

a) Descriptive Statistics

Participants in the study were about 35 years old on average (*M* = 35.18, *SD* = 11.5). 70.4% were females and 29.3% males. The sample was well-represented race wise. Indeed, there was an almost equal number of White / Caucasian (*M* = 37.5) and Hispanics (*M* = 36.8) participants. Black participants represented 18.9% of the sample. All of the participants had at least a high school diploma, the majority (32.9%) holding a bachelor’s degree. The sample represented a variety of fields, with four leading ones, however: education (29.6%), medical (23.8%), government (9.1%), and general business (6.8%). Slightly more than half of the respondents had the status of employee (51.1%), followed by educator (14%), then manager (11.7%). Most employees were employed full-time (a cumulative of 80.5% regrouping both exempt and non-exempt employees), most of them exempt (47.6%). The average organizational tenure was more between 5 and 6 years (*M* = 5.49, *SD* = 6.73) and the average length they had been working for their current supervisor was about 3 years (*M* = 3.08, *SD* = 4.07). Therefore, most employees had had another supervisor before working for their present supervisor. Finally, most employees supervised an average of almost 10 employees (*M* = 9.87, *SD* = 37.20).

Table 10. Age of respondents

AGE

	N	Minimum	Maximum	Mean	Std. Deviation
Age	290	18	68	**35.18**	11.512
Valid N (listwise)	290				

Table 11. Gender of respondents

GENDER

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	.3	.3	.3
	Female	216	70.4	**70.4**	70.7
	Male	90	29.3	**29.3**	100.0
	Total	307	100.0	100.0	

Table 12. Race of respondents

RACE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	.3	.3	.3
	Asian Descent	5	1.6	1.6	2.0
	Black or African Descent (non-Hispanic)	58	18.9	**18.9**	20.8
	Haitian	4	1.3	1.3	22.1
	Hispanic Descent	113	36.8	**36.8**	59.0
	Islander Descent	8	2.6	2.6	61.6
	Middle Eastern	1	.3	.3	61.9
	Other	2	.7	.7	62.5
	White or Caucasian Descent (non-Hispanic)	115	37.5	**37.5**	100.0
	Total	307	100.0	100.0	

Table 13. Educational level of respondents

EDUCATIONAL LEVEL

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High School	60	19.5	19.5	19.5
	Associate	54	17.6	17.6	37.1
	Bachelor	101	32.9	32.9	70.0
	Master	76	24.8	24.8	94.8
	Doctoral degree	16	5.2	5.2	100.0
	Total	307	100.0	100.0	

Table 14. Respondents' Industry

INDUSTRY YOU WORK IN

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Education	91	29.6	29.6	29.6
	Medical	73	23.8	23.8	53.4
	Government	28	9.1	9.1	62.5
	General Business	21	6.8	6.8	69.4
	Engineering	10	3.3	3.3	72.6
	Retail	10	3.3	3.3	75.9
	Banking	8	2.6	2.6	78.5
	Financial / Insurance	7	2.3	2.3	80.8
	Sales & Marketing	7	2.3	2.3	83.1
	Food Industry	7	2.3	2.3	85.3
	Hospitality	7	2.3	2.3	87.6
	Transportation	7	2.3	2.3	89.9
	Security	6	2.0	2.0	91.9
	Real Estate	5	1.6	1.6	93.5
	Legal	5	1.6	1.6	95.1
	Travel / Entertainment	5	1.6	1.6	96.7
	Construction	3	1.0	1.0	97.7
	Telecommunications	3	1.0	1.0	98.7
		1	.3	.3	99.0
	Automobile	1	.3	.3	99.3
	Ecclesial	1	.3	.3	99.7
	Skilled Labor	1	.3	.3	100.0
	Total	307	100.0	100.0	

Table 15. Respondents' job function

JOB FUNCTION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Employee	157	51.1	51.1	51.1
	Educator	43	14.0	14.0	65.1
	Manager	36	11.7	11.7	76.9
	Technical Staff	27	8.8	8.8	85.7
	Supervisor	26	8.5	8.5	94.1
	Director	11	3.6	3.6	97.7
	Vice President	7	2.3	2.3	100.0
	Total	307	100	100	

Table 16. Respondents' part-or full-time status

FULL TIME OR PART TIME WORK

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**Full-Time Exempt**	146	47.6	47.6	47.6
	Full-Time Non-Exempt	101	32.9	32.9	**80.5**
	Part-Time Exempt	33	10.7	10.7	91.2
	Part-Time Non-Exempt	24	7.8	7.8	99.0
		3	1.0	1.0	100.0
	Total	307	100.0	100.0	

Table 17. Respondents' years in organization and years with supervisor

YEARS IN ORGANIZATION AND YEARS WITH SUPERVISOR

	N	Minimum	Maximum	Mean	Std. Deviation
Years in Org	307	0	41	5.49	6.731
Years with Supervisor	307	0	29	3.08	4.076
Valid N (listwise)	307				

Table 18. Respondents' number of people supervised

NUMBER OF PEOPLE SUPERVISED

	N	Minimum	Maximum	Mean	Std. Deviation
Number of people supervised	307	0	350	**9.87**	37.205
Valid N (listwise)	307				

b) Measure

i. Internal Consistency of the Psychometric Measure

Scale Reliability (Internal consistency) - Cronbach Alpha Coefficient Cronbach's Alpha (α) measures how well the set of items measures a single unidimensional latent construct (Cronbach, 1951). The 23-item scale has a high internal consistency with $\alpha = .928$.

Table 19. 23-item scale case processing summary

CASE PROCESSING SUMMARY

		N	%
Cases	Valid	275	89.6
	Excluded[a]	32	10.4
	Total	307	100.0

a. Listwise deletion based on all variables in the procedure

Table 20. 23-item scale reliability statistics

RELIABILITY STATISTICS	
Cronbach's Alpha	Number of Items
.928	23

The Item-Total Statistics table (Table 21) shows items that are not a consistent part of the scale. Indeed, the part-whole correlation of those items is low and Cronbach's alpha is increased when those items are deleted.

Table 21. 23-item total statistics

ITEM-TOTAL STATISTICS

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Has knowledge specific to field of work	78.50	243.682	.688	.691	.923
Conduct research	79.44	241.334	.581	.463	.925
Has education necessary	78.82	237.811	.721	.740	.922
Has knowledge about field	78.50	244.565	.676	.690	.923
Has written articles or books	80.46	250.658	.346	.293	**.929**
Qualifications	79.04	238.955	.682	.724	.923
Trained	78.76	241.594	.699	.701	.923
Ambitious	78.89	242.423	.645	.524	.924
Doesn't need to be the best	79.29	247.727	.502	.331	.926
Has drive	78.87	237.121	.759	.678	.922
Can talk way through situations	78.87	247.121	.586	.427	.925
Capable of improving herself	78.75	246.189	.617	.451	.924
Charismatic	79.11	241.397	.640	.600	.924
Can deduce things	79.09	243.590	.665	.574	.923
Does things to get attention	79.60	262.751	.063	.339	**.934**
Is intuitive	79.11	241.057	.719	.630	.923
Can judge what is important	78.97	238.503	.767	.689	.922
Is self-assured	78.71	244.988	.644	.685	.924
Can assess if situation is important	78.99	239.963	.769	.732	.922
Has self-confidence.	78.58	244.259	.690	.740	.923
Says good things about herself	79.22	256.093	.253	.389	**.930**
Keeps to herself	80.10	258.563	.168	.250	**.932**
Outgoing	79.36	241.240	.618	.556	.924

Thus, the following items are potential strong candidates for being deleted from the scale:

Table 22. Cronbach alpha coefficient if item deleted

ITEMS	CRONBACH'S ALPHA IF ITEM IS DELETED
Has written articles or books	.929
Does things to get attention	.934
Says good things about themselves	.930
Keeps to herself	.932

ii. Factor Analyses

Split of Data and Further Statistical Analyses

In order to conduct further statistical tests, the sample (N = 307) was split in a randomly manner by SPSS 14.0, asking for an approximate 50% split. This technique will also allow for validation of the findings of one sample with the other sample. A first split sample (N = 165) was named Sample 1, and the second half (N = 142) was named Sample 0.

- Independent *t* test of Samples

In order to ensure that both samples are equivalent, an independent *t* test was calculated. Table 24 shows the Group Statistics. It displays the number of cases (307), mean value, standard deviation, and standard error for the test variables.

Table 23 shows the independent samples *t* test. This procedure compares means for the two groups of cases. Since the significance value for the Levene test is high (> .05) for all variables, we can use the results that assume equal variances for the two groups (Sample 0 and Sample 1). The significance value for the *t* test is high (*p* values above at least .256), which indicates there is no significant difference between the two groups' means. For instance, for the variable "Has knowledge specific to the field of work", there is no significant difference for Sample 0 (M = 4.13, SD = 1.033) and Sample 1 (M = 4.18, SD = 1.036); $t(305) = -.35$, $p = .72$.

The index of effect size, an Eta Squared (η^2), was calculated. It corresponds to the proportion of variance in a dependent variable explained by the group (categorical) variable and is expressed by the following formula:

$$\eta^2 = \frac{t^2}{t^2 + (N1 + N2 - 2)}$$

Using the variable “Has knowledge specific to the field of work”, the formula becomes:

$$\eta^2 = \frac{-.35^2}{-.35^2 + (142 + 165 - 2)} = \frac{0.1225}{305.1225} = .00401$$

$\eta^2 = .004$

Cohen (1988) proposes that .01 is a small effect, .06 is a moderate effect, and .14 is a large effect. Here, the effect size is of .004 is very small. Expressed as a percentage, only .4 per cent of the variance in “Has knowledge specific to the field of work” is explained by the Sample number. Finally, the confidence intervals are low and the significance values are very high, therefore, there is no significance difference between the two groups’ means.

Table 23. Independent samples test

INDEPENDENT SAMPLES TEST

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Has knowledge specific to field of work	Equal variances assumed	.007	.934	-.354	305	.723	-.042	.118	-.275	.191
	Equal variances not assumed			-.354	298.446	.723	-.042	.118	-.275	.191
Conduct research	Equal variances assumed	.046	.830	.631	305	.529	.095	.151	-.201	.391
	Equal variances not assumed			.631	299.365	.528	.095	.150	-.201	.391
Has education necessary	Equal variances assumed	.057	.795	-.203	303	.840	-.029	.142	-.309	.251
	Equal variances not assumed			-.203	300.714	.839	-.029	.142	-.308	.250
Has knowledge about field	Equal variances assumed	.218	.641	-.299	300	.765	-.034	.115	-.260	.191
	Equal variances not assumed			-.297	283.937	.767	-.034	.115	-.261	.193
Has written articles or books	Equal variances assumed	1.044	.308	-.922	298	.357	-.138	.150	-.433	.157
	Equal variances not assumed			-.925	294.347	.356	-.138	.149	-.432	.156
Qualifications	Equal variances assumed	.062	.803	.592	300	.554	.087	.147	-.203	.378
	Equal variances not assumed			.591	292.602	.555	.087	.148	-.203	.378
Trained	Equal variances assumed	6.707	.010	-.742	301	.459	-.097	.131	-.355	.160
	Equal variances not assumed			-.735	281.878	.463	-.097	.132	-.357	.163
Ambitious	Equal variances assumed	2.286	.132	-.284	302	.777	-.037	.132	-.297	.222
	Equal variances not assumed			-.282	288.485	.778	-.037	.133	-.299	.224
Doesn't need to be the best	Equal variances assumed	.415	.520	.049	302	.961	.006	.131	-.252	.265
	Equal variances not assumed			.049	293.779	.961	.006	.131	-.252	.265
Has drive	Equal variances assumed	.952	.330	1.135	303	.257	.157	.138	-.115	.429
	Equal variances not assumed			1.137	298.365	.256	.157	.138	-.115	.429
Can talk way through situations	Equal variances assumed	.164	.685	.996	305	.325	.113	.114	-.112	.337
	Equal variances not assumed			.996	298.747	.325	.113	.114	-.112	.337
Capable of improving herself	Equal variances assumed	.001	.981	.271	305	.786	.031	.116	-.197	.260
	Equal variances not assumed			.270	294.426	.787	.031	.116	-.197	.260
Charismatic	Equal variances assumed	.348	.556	-.175	305	.861	-.024	.139	-.298	.249
	Equal variances not assumed			-.174	298.217	.862	-.024	.140	-.299	.250
Can deduce things	Equal variances assumed	1.291	.257	.598	304	.550	.073	.123	-.168	.314
	Equal variances not assumed			.600	301.353	.549	.073	.122	-.167	.313
Does things to get attention	Equal variances assumed	2.679	.103	.107	303	.915	.015	.141	-.263	.293
	Equal variances not assumed			.106	285.165	.916	.015	.142	-.265	.295

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Table 24. Group Statistics

Group Statistics

	ID	N	Mean	Std. Deviation	Std. Error Mean
Years with Supervisor	0	142	3.08	4.396	.369
	1	165	3.08	3.792	.295
Has knowledge specific to field of work	0	142	4.13	1.033	.087
	1	165	4.18	1.036	.081
Conduct research	0	142	3.25	1.306	.110
	1	165	3.15	1.323	.103
Has education necessary	0	142	3.82	1.205	.101
	1	163	3.85	1.268	.099
Has knowledge about field	0	140	4.16	1.041	.088
	1	162	4.19	.949	.075
Has written articles or books	0	138	2.11	1.260	.107
	1	162	2.25	1.324	.104
Qualifications	0	140	3.64	1.287	.109
	1	162	3.56	1.271	.100
Trained	0	141	3.82	1.209	.102
	1	162	3.92	1.069	.084
Ambitious	0	142	3.75	1.200	.101
	1	162	3.78	1.102	.087
Doesn't need to be the best	0	142	3.35	1.162	.098
	1	162	3.35	1.122	.088
Has drive	0	141	3.86	1.187	.100
	1	164	3.70	1.219	.095
Can talk way through situations	0	142	3.89	.994	.083
	1	165	3.78	1.000	.078
Capable of improving herself	0	142	3.96	1.034	.087
	1	165	3.93	.995	.077
Charismatic	0	142	3.52	1.248	.105
	1	165	3.55	1.187	.092
Can deduce things	0	142	3.59	1.039	.087
	1	164	3.52	1.094	.085
Does things to get attention	0	141	3.06	1.294	.109
	1	164	3.05	1.171	.091
Is intuitive	0	142	3.57	1.113	.093
	1	162	3.59	1.084	.085
Can judge what is important	0	142	3.72	1.107	.093
	1	164	3.70	1.184	.092
Is self-assured	0	142	4.01	.993	.083
	1	163	3.93	1.016	.080
Can assess if situation is important	0	141	3.65	1.057	.089
	1	163	3.77	1.081	.085
Has self-confidence.	0	140	4.14	.991	.084
	1	164	4.05	.961	.075
Says good things about herself	0	142	3.49	1.177	.099
	1	163	3.44	1.133	.089
Keeps to herself	0	141	2.59	1.225	.103
	1	162	2.67	1.261	.099
Outgoing	0	141	3.30	1.200	.101
	1	162	3.30	1.294	.102
Age	0	132	34.57	11.230	.977
	1	158	35.68	11.754	.935
Educational Level	0	142	3.84	1.128	.095
	1	165	3.74	1.209	.094
Years in Org	0	142	5.27	6.784	.569
	1	165	5.67	6.701	.522
Number of people supervised	0	142	7.62	27.108	2.275
	1	165	11.81	44.077	3.431

- Confirmatory Factor Analysis with Sample 1

Sample 1 (*N* = 165) was tested for goodness of fit by being subjected to a Confirmatory Factor Analysis (CFA) using AMOS 6.0. The two factors that form the GEM were extracted from Panel 2's classification of the variables as either Objective or Subjective. There were a total of 16 subjective items and 7 objective items, as suggested by *Figure 4*. The results of the CFA conducted with AMOS 6.0 on the managerial Sample 1 (*N* = 165) indicated that the proposed model did not fit the data particularly well. As indicated in Tables 25, 26, 27, and 28, χ^2 (229) = 579.837, *p* = .000, the Tucker-Lewis coefficient TLI = .81, and the Comparative Fit Index CFI = .84, did not achieve the commonly accepted criterion of .90. The parsimony adjusted-measures was below the .90 typical threshold (PNFI = .64 and PCFI = .70) and the Root Mean Square Error of Approximation (RMSEA = .097) for the default model. The chi-square test tends to be the absolute test of model fit. If the probability value (*p*) is below .05, the model is typically rejected. Also, Hu and Bentler (1999) recommend RMSEA values below .06 for a well-fitted model and Tucker-Lewis Index values of ρ^2 = .95 or higher. Overall, these analyses show that the model (Model A) did not fit the data well. The model does not fit well according to the descriptive measures of fit.

Figure 4. Confirmatory Factor Analysis with Sample 1 (Model A).

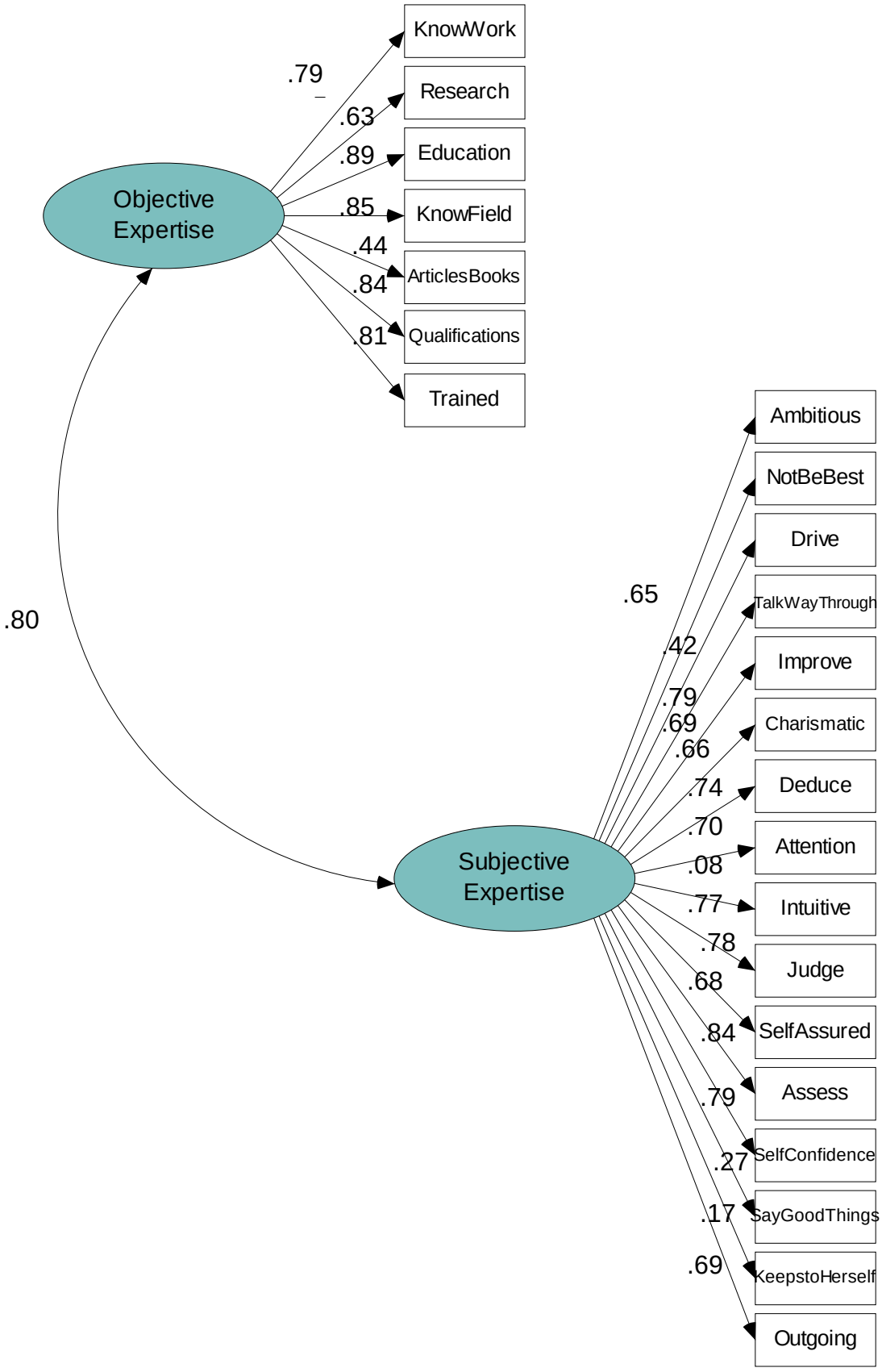

Objective Expertise
Subjective Expertise
.80
.79
.63
.89
.85
.44
.84
.81
KnowWork
Research
Education
KnowField
ArticlesBooks
Qualifications
Trained
.65
.42
.79
.69
.66
.74
.70
.08
.77
.78
.68
.84
.79
.27
.17
.69
Ambitious
NotBeBest
Drive
TalkWayThrough
Improve
Charismatic
Deduce
Attention
Intuitive
Judge
SelfAssured
Assess
SelfConfidence
SayGoodThings
KeepstoHerself
Outgoing

Table 25. Chi-square and degrees of freedom for Model A

CMIN					
Model	NPAR	**CMIN**	**DF**	P	CMIN/DF
Default model	70	**579.837**	**229**	.000	2.532
Saturated model	299	.000	0		
Independence model	23	2530.034	276	.000	9.167

Table 26. Baseline comparisons for Model A

BASELINE COMPARISONS					
Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	**CFI**
Default model	.771	.724	.848	.812	**.844**
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Table 27. Parsimony-adjusted measures for Model A

PARSIMONY-ADJUSTED MEASURES			
Model	PRATIO	PNFI	**PCFI**
Default model	.830	.640	**.701**
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

Table 28. Root mean square error of approximation for Model A

RMSEA				
Model	**RMSEA**	LO 90	HI 90	PCLOSE
Default model	**.097**	.087	.106	.000
Independence model	.223	.215	.231	.000

Subsequently, an Exploratory Factor Analysis (EFA) using SPSS 14.0 was conducted using Sample 0 (N = 142).

- Exploratory Factor Analysis with Sample 0

Since the CFA with Sample 1 did not confirm, an Exploratory Factor Analysis

using Sample 0 was performed to repair and improve the scale.

* Unrotated Factors

To assess the suitability of the data for factor analysis, the correlation matrix for coefficient of .3 and above was inspected, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and Bartlett's Test of Sphericity were calculated. This information was obtained from SPSS 14.0 (Tables 29 and 30).

Table 29. EFA Correlation Matrix

EFA CORRELATION MATRIX

Correlation Matrix

		Has knowledge specific to field of work	Conducts research	Has education necessary	Has knowledge about field	Has written articles or books	Has the qualifications required	Trained	Ambitious	Doesn't need to be the best	Has drive	Can talk way through situations	Capable of improving herself	Charismatic	Can deduce things	Does things to get attention	Is intuitive	Can judge what is important	Is self-assured	Can assess if situation is important	Has self-confidence.	Says good things about herself
Correlation	Has knowledge specific to field of work	1.000	.422	.606	.769	.128	.564	.641	.497	.457	.434	.318	.290	.353	.434	-.001	.488	.492	.352	.468	.431	.033
	Conducts research	.422	1.000	.551	.378	.503	.456	.436	.371	.429	.436	.217	.295	.278	.352	.054	.361	.466	.190	.358	.278	.059
	Has education necessary	.606	.551	1.000	.615	.328	.794	.721	.396	.435	.467	.280	.399	.297	.412	-.194	.393	.415	.244	.434	.303	-.093
	Has knowledge about field	.769	.378	.615	1.000	.195	.620	.616	.312	.428	.448	.336	.313	.341	.489	-.082	.459	.485	.338	.456	.365	-.048
	Has written articles or books	.128	.503	.328	.195	1.000	.348	.188	.154	.230	.250	.108	.156	.187	.151	.138	.122	.251	.001	.208	.095	.074
	Has the qualifications required	.564	.456	.794	.620	.348	1.000	.773	.339	.405	.378	.302	.256	.236	.390	-.175	.363	.440	.203	.411	.224	-.083
	Trained	.641	.436	.721	.616	.188	.773	1.000	.376	.435	.472	.294	.331	.274	.414	-.138	.472	.448	.351	.414	.382	-.032
	Ambitious	.497	.371	.396	.312	.154	.339	.376	1.000	.487	.707	.322	.341	.397	.400	.098	.507	.475	.442	.481	.458	.265
	Doesn't need to be the best	.457	.429	.435	.428	.230	.405	.435	.487	1.000	.620	.278	.382	.357	.431	.042	.480	.546	.330	.420	.297	.085
	Has drive	.434	.436	.467	.448	.250	.378	.472	.707	.620	1.000	.398	.456	.443	.455	.084	.570	.578	.526	.471	.446	.285
	Can talk way through situations	.318	.217	.280	.336	.108	.302	.294	.322	.278	.398	1.000	.465	.342	.342	.039	.317	.359	.417	.418	.402	.245
	Capable of improving herself	.290	.295	.399	.313	.156	.256	.331	.341	.382	.456	.465	1.000	.526	.514	-.020	.479	.456	.401	.483	.365	.073
	Charismatic	.353	.278	.297	.341	.187	.236	.274	.397	.357	.443	.342	.526	1.000	.641	.130	.525	.523	.518	.569	.487	.080
	Can deduce things	.434	.352	.412	.489	.151	.390	.414	.400	.431	.455	.342	.514	.641	1.000	.019	.601	.633	.525	.677	.485	.073
	Does things to get attention	-.001	.054	-.194	-.082	.138	-.175	-.138	.098	.042	.084	.039	-.020	.130	.019	1.000	-.066	.007	.150	-.068	.161	.440
	Is intuitive	.488	.361	.393	.459	.122	.363	.472	.507	.480	.570	.317	.479	.525	.601	-.066	1.000	.695	.548	.707	.484	.065
	Can judge what is important	.492	.466	.415	.485	.251	.440	.448	.475	.546	.578	.359	.456	.523	.633	.007	.695	1.000	.408	.751	.390	.107
	Is self-assured	.352	.190	.244	.338	.001	.203	.351	.442	.330	.526	.417	.401	.518	.525	.150	.548	.408	1.000	.477	.802	.325
	Can assess if situation is important	.468	.358	.434	.456	.208	.411	.414	.481	.420	.471	.418	.483	.569	.677	-.068	.707	.751	.477	1.000	.489	.091
	Has self-confidence.	.431	.278	.303	.365	.095	.224	.382	.458	.297	.446	.402	.365	.487	.485	.161	.484	.390	.802	.489	1.000	.412
	Says good things about herself	.033	.059	-.093	-.048	.074	-.083	-.032	.265	.085	.285	.245	.073	.080	.073	.440	.065	.107	.325	.091	.412	1.000
	Keeps to herself	.114	.218	.240	.188	.081	.230	.246	.142	.158	.127	.119	.132	-.070	.099	-.208	.261	.219	.134	.195	.038	-.129
	Outgoing	.326	.268	.317	.387	.261	.289	.293	.384	.416	.451	.352	.528	.643	.543	.253	.433	.486	.386	.434	.424	.187

The correlation matrix shows that several variables correlate with each other. Therefore, at first sight, a factor analysis method may be appropriate.

To assess the suitability of the data for factor analysis, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and Bartlett's Test of Sphericity were also calculated (Table 30).

Table 30. KMO and Bartlett's Test of Sphericity

KMO AND BARTLETT'S SPHERICITY TEST

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.870
Bartlett's Test of Sphericity	Approx. Chi-Square	1930.980
	df	253
	Sig.	.000

The KMO measure of sampling adequacy is a test of the amount of variance within the data that could be explained by factors. It should be greater than 0.5 for a satisfactory factor analysis to proceed. Here the KMO value is .870 and the Bartlett's Test of Sphericity is significant (p = .000). Bartlett's test of Sphericity is one of Bartlett's likelihood ratio tests and is used to test the null hypothesis that the variables in the population correlation matrix are uncorrelated. Here the observed significance level is .000. It is small enough to reject the hypothesis. It is concluded that the strength of the relationship among variables is strong. It is therefore a good idea to proceed to a factor analysis for the data.

Determination of how many components (factors) to extract.

Using Kaiser's criterion, the components that have an eigenvalue of 1 or more are of interest. To determine how many components meet this criterion, the Total Variance Explained Table (Table 31) was examined. This table gives eigenvalues (a measure of how much variance in the data is explained by a single factor), variance explained, and cumulative variance explained for our factor solution. The first panel gives values based on initial eigenvalues. There are as many components (factors) as there are variables. The "Total" column gives the amount of variance in the observed variables accounted for by each component or factor. The "% of Variance" column gives the percent of variance accounted for by each specific factor, relative to the total variance in all the variables. The "Cumulative %" column gives the percent of variance accounted for by all factors up to and including the current one.

Table 31. Total Variance Explained

TOTAL VARIANCE EXPLAINED

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation
Factor	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	9.134	39.714	39.714	8.668	37.687	37.687	7.760
2	2.518	10.947	50.661	2.006	8.720	46.407	6.697
3	1.514	6.582	57.243				
4	1.291	5.615	62.858				
5	1.150	4.999	67.856				
6	.923	4.014	71.870				
7	.834	3.628	75.498				
8	.686	2.984	78.482				
9	.644	2.799	81.281				
10	.522	2.270	83.551				
11	.496	2.157	85.708				
12	.476	2.067	87.775				
13	.424	1.845	89.620				
14	.380	1.651	91.271				
15	.338	1.469	92.740				
16	.334	1.454	94.194				
17	.281	1.222	95.416				
18	.252	1.097	96.514				
19	.234	1.016	97.530				
20	.183	.797	98.327				
21	.158	.688	99.015				
22	.135	.585	99.601				
23	.092	.399	100.000				

Extraction Method: Principal Axis Factoring.

a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

As shown in Table 31, only the first five components recorded eigenvalues above 1, the default value in SPSS (9.134, 2.518, 1.514, 1.291, and 1.150). These five components explain a total of 71.87 per cent of the variance. However, the first two factors account for most of the variance (50.66%)

The Extraction Sums of Squared Loadings group gives information regarding the extracted factors.

To further confirm the number of factors to extract in the subsequent studies, a Scree Plot was generated (*Figure 5*). It shows the eigenvalues for all of the 23 factors initially considered. Here it appears that the optimal number of factors to retain in the solution is two.

Figure 5. Scree Plot

SCREE PLOT

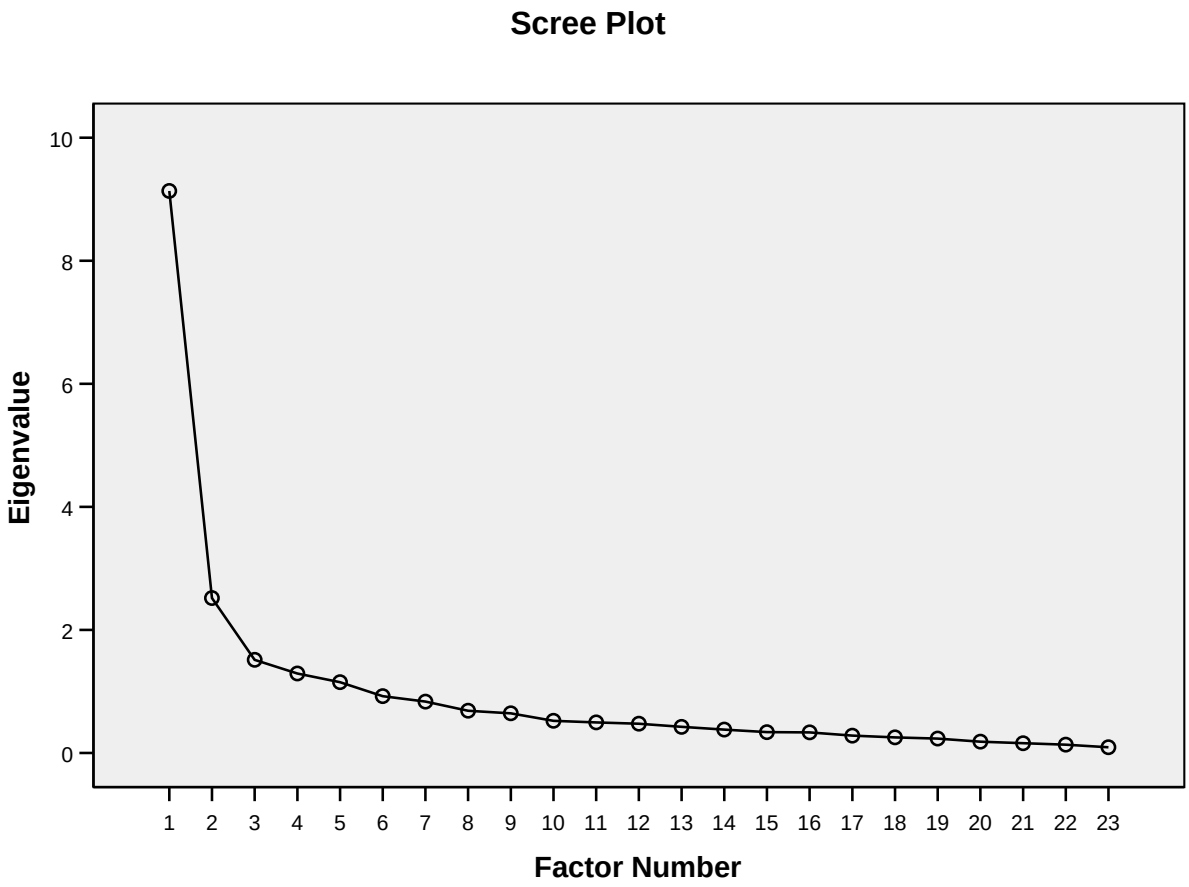


Table 32 (Factor Matrix) reports the factor loadings for each variable on the unrotated factors, each number representing the correlation between the item and the unrotated factor. These correlations were inspected for patterns. They helped in

formulating an interpretation of the factors. All of the variables have large loadings on Factor 1 (>.4) (which supports the decision to retain two factors for further investigation) with the exception of “Has written articles or books”. The only variables with a loading superior to .4 on Factor 2 (Hair, Anderson, Tatham, & Black, 1998) suggest that a factor loading is significant at .35 for a sample size of 250 include: “Does things to get attention”, “Is self-assured”, and “Says good things about herself”. The following items are cross loading on both Factors 1 and 2, which could indicate that they do not fall under one specific factor and could possibly be eliminated: “Has education necessary”, “Has knowledge about field”, “Has the qualifications required”, “Trained”, “Charismatic”, and “Has self-confidence”. However, further analyses, such as a Promax rotation need to be conducted to confirm this elimination.

Table 32. Factor Matrix

FACTOR MATRIX

	Factor	
	1	2
Has knowledge specific to field of work	.698	
Conducts research	.561	
Has education necessary	.699	-.508
Has knowledge about field	.689	-.301
Has written articles or books	.303	
Has the qualifications required	.652	-.552
Trained	.695	-.414
Ambitious	.645	
Doesn't need to be the best	.639	
Has drive	.736	
Can talk way through situations	.508	
Capable of improving herself	.601	
Charismatic	.647	.323
Can deduce things	.731	
Does things to get attention		.414
Is intuitive	.749	
Can judge what is important	.767	
Is self-assured	.629	.408
Can assess if situation is important	.753	
Has self-confidence.	.633	.374
Says good things about herself		.467
Keeps to herself		
Outgoing	.614	

Extraction Method: Principal Axis Factoring
a. 2 factors extracted. 5 iterations required.

Table 33 (Communalities) indicates the amount of variance in each variable that is accounted for. The communality is calculated from the factor loading. Extraction communalities are estimates of the variance in each variable accounted for by the factors in the factor solution. The extraction communalities are calculated using the formula Σx^2 where x is the factor loading in the factor matrix.

Small values typically indicate variables that do not fit well with the factor solution, and should possibly be dropped from the analysis. In this case, the variables "Conducts Research", "Has written articles or books", "Can talk way through situations", "Capable of improving herself", "Does things to get attention", "Says good things about herself", and "Keeps to herself" appear as if they could be candidate for elimination and may not be included in the scale.

Table 33. Communalities

COMMUNALITIES

	Initial	Extraction
Has knowledge specific to field of work	.752	.542
Conducts research	.518	.356
Has education necessary	.759	.747
Has knowledge about field	.728	.566
Has written articles or books	.394	.107
Has the qualifications required	.783	.729
Trained	.724	.655
Ambitious	.647	.436
Doesn't need to be the best	.487	.409
Has drive	.749	.559
Can talk way through situations	.383	.281
Capable of improving herself	.514	.383
Charismatic	.622	.523
Can deduce things	.633	.557
Does things to get attention	.364	.172
Is intuitive	.670	.570
Can judge what is important	.716	.590
Is self-assured	.752	.562
Can assess if situation is important	.721	.576
Has self-confidence.	.746	.540
Says good things about herself	.444	.245
Keeps to herself	.293	.110
Outgoing	.596	.457

Extraction Method: Principal Axis Factoring.

* Factor Rotation: Promax

To help interpretation and establish whether any psychological constructs might underlie the variables, the two factors were rotated. Rotation is a method used to simplify interpretation of a factor analysis by simplifying the relationships between factors and

variables since the rotated solution is typically more straightforward, allowing for easier interpretation. A Promax (oblique) rotation method was used, which allows correlations between factors.

Table 31 (above) shows that the distribution of the variance explained has been adjusted after rotation. Factor 1 now explains 37.68% of the variance and Factor 2 explains 8.72% of the variance summing a cumulative total of 46.4%.

The Pattern Matrix (Table 34) reports the parameter estimates (λ) for each variable on the factors after rotation. Each number represents the partial correlation between the item and the rotated factor. This will help formulating an interpretation of the factors. The common threads among the variables that have parameter estimates (λ >.4) for a particular factor are as follow: The variables with the highest parameter estimates on Factor 1 are "Ambitious" (λ= .574), "Has drive" (λ= .626), "Can talk way through situations" (λ= .495), "Capable of improving herself" (λ= .555), "Charismatic" (λ= .764), "Can deduce things" (λ= .642), "Is intuitive" (.596), "Can judge what is important" (λ= .560), "Is self-assured" (λ= .839), "Can assess if situation is important" (λ= .600), "Has self-confidence" (λ= .807), and "Outgoing" (λ= .700). The highest parameter estimates on Factor 2 are "Has knowledge specific to field of work" (λ= .583), "Conducts research" (λ= .485), "Has education necessary" (λ= .896), "Has knowledge about field" (λ= .656), "Has the qualifications required" (λ= .924), and "Trained" (λ= .787). At this point, the Generalized Expertise Measure is constituted of the above 18 items (12 items from Factor 1 and 6 items from Factor 2). Since the original number of items in the scale was 23, five items have been deleted as a result of the Exploratory Factor Analysis process. It is interesting to note that four of those five items ("Has written articles or books", "Does things to get

attention", "Says good things about themselves", and "Keeps to herself") were identified in the Inter-item Statistics Table (Table 21) as items that would increase the internal consistency of the scale by increasing the Cronbach's alpha coefficient if they were deleted.

The following variables had either no loading, cross-loadings, or negative loadings on either Factor 1 and Factor 2 respectively: "Has written articles or books" (0), "Doesn't need to be the best" (λ= .389 and λ= .330), "Does things to get attention" (λ= .443 and λ= -.461), "Says good things about herself" (λ= .589 and λ= -.459), and "Keeps to herself" with a weak loading on Factor 2 (λ= .386). Those items without loading, cross loading on Factors 1 and 2, and the ones that have negative loadings should be subjects for elimination.

- Social Psychology in the Interpretation of the Results of the Promax Rotation

Interestingly, these variables refer to a specific personality trait, which could be described as narcissism. The DSM-IV, published by the American Psychiatric Association (2000), defines Narcissistic Personality Disorder (NPD) as "an all pervasive pattern of grandiosity (in fantasy or behavior), need for admiration or adulation and lack of empathy". Narcissists have a conviction of personal entitlement that drives, motivates, pervades, and dominates the entire spectrum of their behavior and actions even at the workplace. They tend to exaggerate their accomplishments, talents, skills, and contacts to the point of lying. In 2002, Paulhus and Williams' research in non-clinical samples shows that high narcissists show a high degree of self-enhancement (Paulhus & Williams, 2002) and have a strong self-deceptive component to their personality (Paulhus, 1998). They are typically low on agreeableness and they seem not to be realistic about their own character

(they could be considered Machiavellians if they were (Paulhus & Williams, 2002)). Although a non-pathological personality in the literature, it can be perceived as offensive and as a nuisance. Besides, because the average length of time our respondents had been working for their supervisor was three years (M = 3.08, SD = 3.07), we can safely assume that after a certain amount of time, employees uncover their supervisor's excessive self-promotion, which can then be perceived as a negative trait. Although supervisors may not purposely excessively self-promote; the idea that perception is reality is the basis for this social psychology theory, which is framed around the presumption that the other's perceptions of someone or their organization become the reality from which they form ideas and the basis for intended behaviors. It seems as if the respondents (and therefore employees) in our research did take into account personality traits that make a supervisor a fairly successful and somewhat assertive individual (with the variables self-confident and self-assured, for instance). However, they also seemed to have created a personality threshold between how much supervisory self-promoting is acceptable or not.

Looking at those two items through another lens, they could be classified as Impression Management items. In social psychology, Impression Management (IM) is the process through which people try to control the impressions other people form of them (Ferris & Kacmar, 1992). Strategic interpersonal behavior to shape or influence impressions formed by an audience is not a new field; it has a rich history. Plato spoke of the "great stage of human life" and in the seventeenth century William Shakespeare crafted the famous sentence "all the world is a stage, and all the men and women merely players". The desire to make a favorable impression on others is a strong one and for good reason. IM theory states that any individual or organization must establish and maintain

impressions that are congruent with the perceptions they want to convey to their publics (Goffman, 1959). From both a communication and public relations viewpoint, the theory of impression management encompasses the vital ways in which one establishes and communicates this congruence between personal or organizational goals and their intended actions that create public perception. The goal is for one to present oneself the way in which he or she would like to be thought of by the individual or group he or she is interacting with. There are six main impression management techniques (Gardner & Martinko, 1988): conformity, excuses, apologies, flattery, favors, association, and self-promotion. The latter can involve efforts at self-enhancement such as improving one's appearance, name-dropping, or making positive statements about one's own experience or competence (Baron, 1996). Self-promotion also consists in highlighting one's best qualities, downplaying one's deficits, and calling attention to one's achievements. In several studies, self-promotion has been positively correlated with organizational success, especially during the interviewing process (Gilmore & Ferris, 1989). Applicants who used those controlling techniques (self-enhancement and self-promotion) were rated higher by interviewers on factors such as motivation, enthusiasm, and even technical skills and they received more job offers most likely because those techniques reflect self-confidence and initiative.

Table 34. Pattern Matrix after Promax rotation

PATTERN MATRIX AFTER PROMAX ROTATION

	Factor	
	1	2
Has knowledge specific to field of work		**.583**
Conducts research		**.485**
Has education necessary		**.896**
Has knowledge about field		**.656**
Has written articles or books		
Has the qualifications required		**.924**
Trained		**.787**
Ambitious	**.574**	
Doesn't need to be the best	.389	.330
Has drive	**.626**	
Can talk way through situations	**.495**	
Capable of improving herself	**.555**	
Charismatic	**.764**	
Can deduce things	**.642**	
Does things to get attention	.443	-.461
Is intuitive	**.596**	
Can judge what is important	**.560**	
Is self-assured	**.839**	
Can assess if situation is important	**.600**	
Has self-confidence.	**.807**	
Says good things about herself	.589	-.459
Keeps to herself		.386
Outgoing	**.700**	

Extraction Method: Principal Axis Factoring.
Rotation Method: Promax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

Table 35 shows the structure matrix for the oblique rotation. It shows the simple correlations between variables and factors. These simple correlations are affected by correlations between factors as well as variable-factor relationships.

Table 35. Structure Matrix for oblique rotation

STRUCTURE MATRIX FOR OBLIQUE ROTATION

	Factor	
	1	2
Has knowledge specific to field of work	.563	.713
Conducts research	.447	.581
Has education necessary	.462	.863
Has knowledge about field	.529	.742
Has written articles or books		.322
Has the qualifications required	.402	.847
Trained	.494	.809
Ambitious	.651	.466
Doesn't need to be the best	.580	.556
Has drive	.733	.547
Can talk way through situations	.528	.344
Capable of improving herself	.614	.423
Charismatic	.720	.367
Can deduce things	.735	.532
Does things to get attention		
Is intuitive	.731	.578
Can judge what is important	.730	.618
Is self-assured	.735	.306
Can assess if situation is important	.735	.580
Has self-confidence.	.726	.327
Says good things about herself	.324	
Keeps to herself		.317
Outgoing	.675	.362

Extraction Method: Principal Axis Factoring.
Rotation Method: Promax with Kaiser Normalization.

Table 36 shows the correlations among the factors for the oblique rotation (the strength of the relationship between the two factors). The strength of the relationship between Factor 1 and Factor 2 is average (.579).

Table 36. Factor Correlation Matrix

FACTOR CORRELATION MATRIX

Factor	1	2
1	1.000	.579
2	.579	1.000

Extraction Method: Principal Axis Factoring.
Rotation Method: Promax with Kaiser Normalization.

Based on the EFA and on the results of the Promax rotation, the above five items were deleted from the scale, resulting in an 18-item scale. The 18-item GEM is now as follows:

1. This person has knowledge that is specific to his or her field of work.
2. This person conducts research related to their field.
3. This person shows that they have the education necessary to be an expert in their field.
4. This person has knowledge about their field.
5. This person has the qualifications required to be an expert in their field.
6. This person has been trained in his or her area of expertise.
7. This person is ambitious about their work in the company.
8. This person can assess whether a work-related situation is important or not.
9. This person can talk his or her way through any work-related situation.
10. This person is capable of improving himself or herself.
11. This person is charismatic.
12. This person can deduce things from work-related situations easily.
13. This person is intuitive in their job.
14. This person is able to judge what things are important in their job.
15. This person has the drive to become what he or she is capable of becoming in their field.
16. This person is self-assured.
17. This person has self-confidence.
18. This person is an expert who is outgoing.

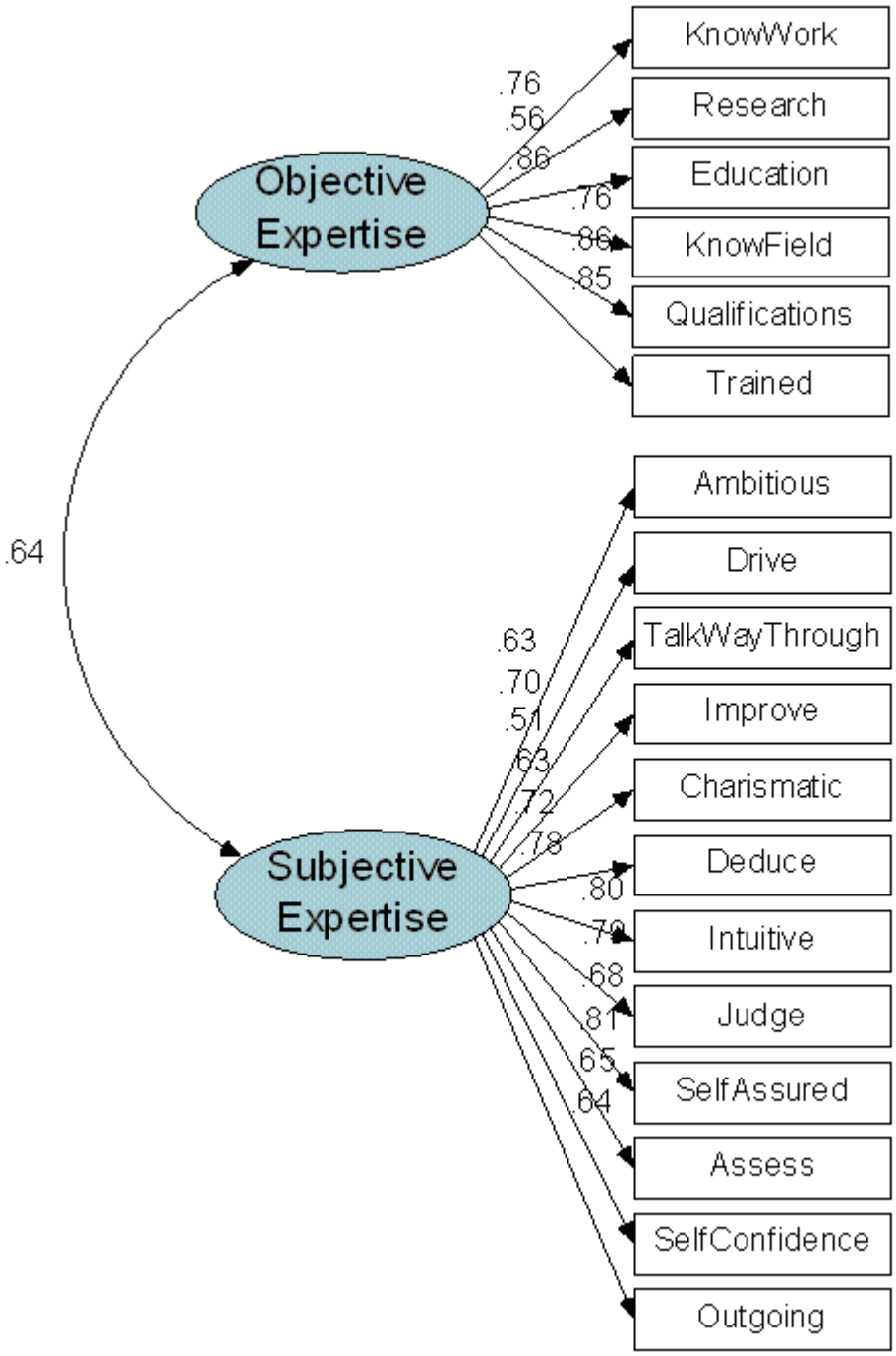
Items 1 through 6 represent Objective Expertise and items 7 through 18 represent

Subjective Expertise.

- From EFA to CFA: Confirmatory Factor Analysis with Sample 0

In order to further refine the 18-item scale, a Confirmatory Factor Analysis was conducted using AMOS 6.0 with Sample 0. *Figure 6* shows the item and factor correlations from the AMOS output (Model B).

Figure 6. 18-item and factor correlations AMOS output (Model B)



As shown in Tables 37, 38, 39, and 40, the above model reported an average fit (χ^2 (134) = 426.0, p = .000, CFI = .820, RMSEA = .124).

Model Fit Summary

Table 37. Chi-square and degrees of freedom for Model B

CHI-SQUARE AND DEGREES OF FREEDOM

Model	NPAR	**CMIN**	**DF**	P	CMIN/DF
Default model	55	**426.004**	**134**	.000	3.179
Saturated model	189	.000	0		
Independence model	18	1797.176	171	.000	10.510

Table 38. Baseline comparisons for Model B

BASELINE COMPARISONS

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	**CFI**
Default model	.763	.698	.824	.771	**.820**
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Table 39. Parsimony-adjusted measures for Model B

PARSIMONY-ADJUSTED MEASURES

Model	PRATIO	PNFI	PCFI
Default model	.784	.598	.643
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

Table 40. Root mean square error of approximation for Model B

RMSEA

Model	**RMSEA**	LO 90	HI 90	PCLOSE
Default model	**.124**	.111	.138	.000
Independence model	.260	.249	.271	.000

Although those results are an improvement of fit compared to Model A, (with a chi-square difference of $\Delta\chi^2$ (95) = 153.83, p = n. s.) with further modifications it is believed that Model B can be improved to better fit the data.

Table 41 shows the standardized regression weights estimates for each item,

which will be used to further refine the GEM scale.

Table 41. Standardized Regression Weights

STANDARDIZED REGRESSION WEIGHT

			Estimate
KnowWork	<---	Objective Expertise	.756
Research	**<---**	**Objective Expertise**	**.561**
Education	<---	Objective Expertise	.863
KnowField	<---	Objective Expertise	.762
Qualifications	<---	Objective Expertise	.863
Trained	<---	Objective Expertise	.848
Ambitious	<---	Subjective Expertise	.633
TalkWayThrough	**<---**	**Subjective Expertise**	**.511**
Improve	<---	Subjective Expertise	.632
Charismatic	<---	Subjective Expertise	.717
Deduce	<---	Subjective Expertise	.780
Intuitive	<---	Subjective Expertise	.797
Judge	<---	Subjective Expertise	.793
SelfAssured	<---	Subjective Expertise	.676
Assess	<---	Subjective Expertise	.810
SelfConfidence	<---	Subjective Expertise	.649
Outgoing	<---	Subjective Expertise	.638
Drive	<---	Subjective Expertise	.701

* Model modifications

Based on the above results with the 18 items, manual modifications were made in order to achieve a better fit. The variables with the lowest loading on the two factors were

eliminated ("Research" with a loading of .561 and "Talk Way Through" with a loading of .511). Also, correlations between some of the items were assumed based on logic. "Ambitious" and "Drive" were moderately correlated (r = .52), which could be explained by the fact that individuals who are ambitious also tend to be driven. By definition, ambition is having a strong desire for success and achievement and in psychology, drive is usually defined as a strong motivating tendency or instinct related to self-preservation, reproduction, or aggression that prompts activity toward a particular end. From the respondent's perspective the distinction between the two may be blur and weak.
Also, because of the similarity in the way the questions were formulated in the questionnaire, "Self-Confidence" and "Self-Assured" were assumed to be correlated (r = .68). Besides, the terms are synonymous. Confidence is a feeling of assurance or trust and assurance is a freedom from doubt, a belief in oneself and one's abilities.

"Judge" and "Assess" were assumed to be correlated also because of the similarity in the way the questions were formulated: "My supervisor is able to judge what things are important in their job" and "My supervisor can assess whether a work-related situation is important or not" (r = .30). "Charismatic" and "Outgoing" were believed to be correlated (r = .38) mainly because of the literature on leadership, which shows that those traits are found in charismatic leaders (Bass, 1985; 1988; 1990) and in impression management (House, 1977).

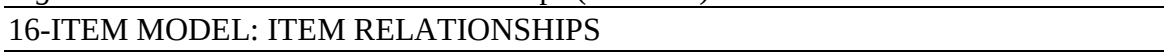
Finally, because they were thought to be both items related to a thinking process, the items "Deduce" and "Intuitive" were thought to be correlated. Interestingly, they were slightly negatively correlated (r = -.23). This could be explained by the fact that once the subjective aspect is taken out from both items, they do not relate to the same idea. Indeed,

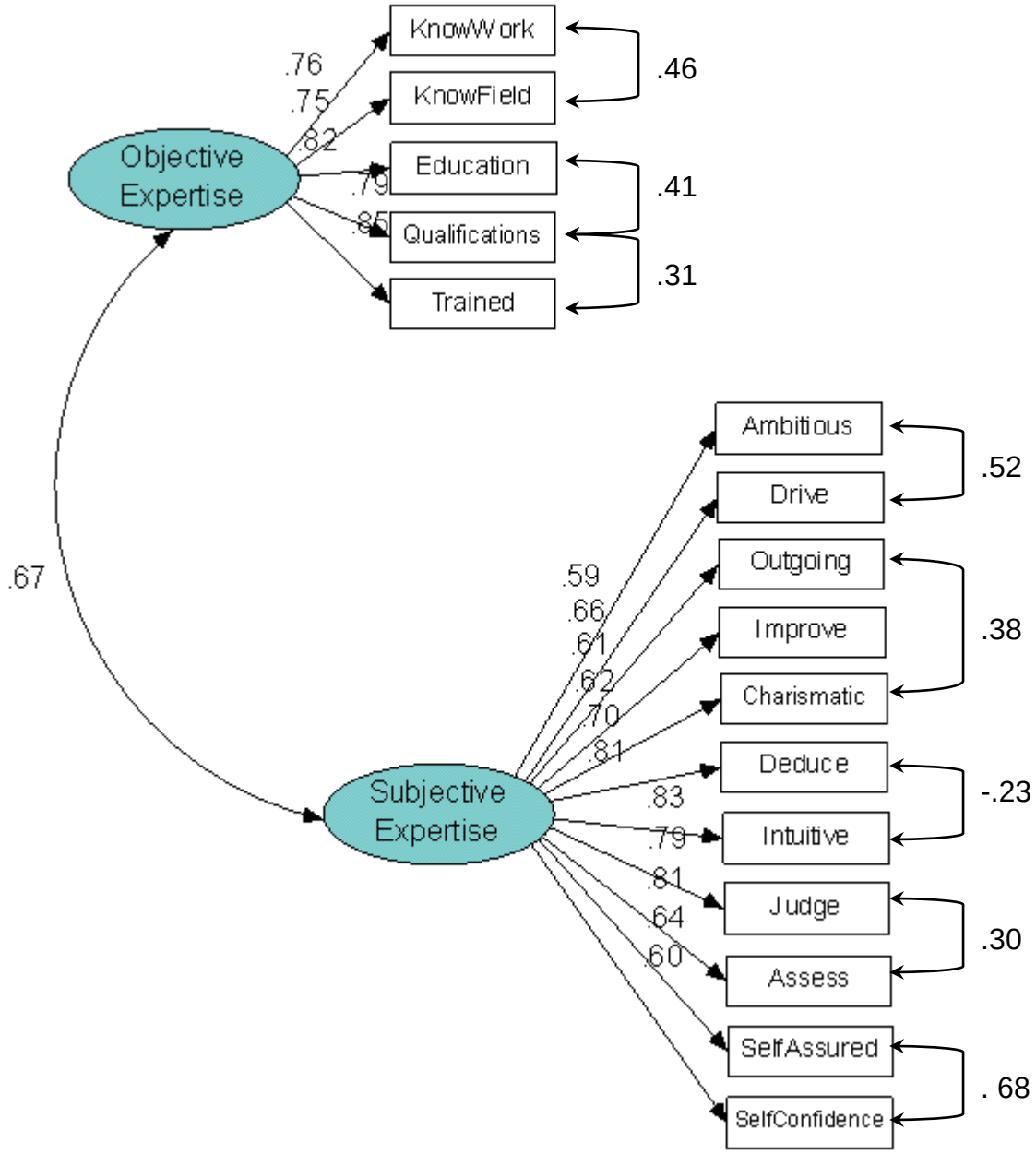
one may be able to deduce things but this does not make him or her intuitive person. If anything, one is an inductive process (intuitive), and the other is a deductive process (deduce).

Within Objective Expertise, the following items were thought to be correlated: "Know Field" and "Know Work" mainly because of the question formulation similarity (r = .46).

Although "Education" and "Qualifications" do have the same meaning, respondents may not have clearly understood the distinction between the two (r = .41). Finally, correlating "Qualifications" and "Trained" improved the model. The two items show a slight correlation with one another (r = .31). This could be explained by the fact that a trained individual has obtained some qualifications and someone with qualifications could be believed to have received a certain level of training in a particular area. *Figure 7* shows the above relationships, which helped improve the model fit.

Figure 7. 16-item model: item relationships (Model C)





$\chi^2(95) = 165.0$, $p = .000$

Model Fit Summary

Table 42. Chi-square and degrees of freedom for Model C

CHI-SQUARE AND DEGREES OF FREEDOM					
Model	NPAR	**CMIN**	**DF**	P	CMIN/DF
Default model	57	**165.032**	**95**	.000	1.737
Saturated model	152	.000	0		
Independence model	16	1658.366	136	.000	12.194

Table 43. Baseline Comparisons for Model C

BASELINE COMPARISONS					
Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	**CFI**
Default model	.900	.858	.955	.934	**.954**
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Table 44. Parsimony-Adjusted Measures for Model C

PARSIMONY-ADJUSTED MEASURES			
Model	PRATIO	PNFI	PCFI
Default model	.699	.629	.666
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

Table 45. Root mean square error of approximation for Model C

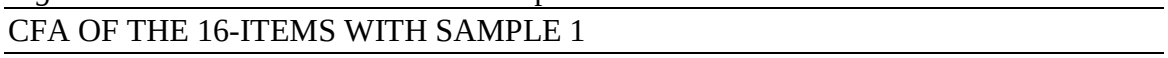
RMSEA				
Model	**RMSEA**	LO 90	HI 90	PCLOSE
Default model	**.072**	.053	.090	.028
Independence model	.282	.270	.294	.000

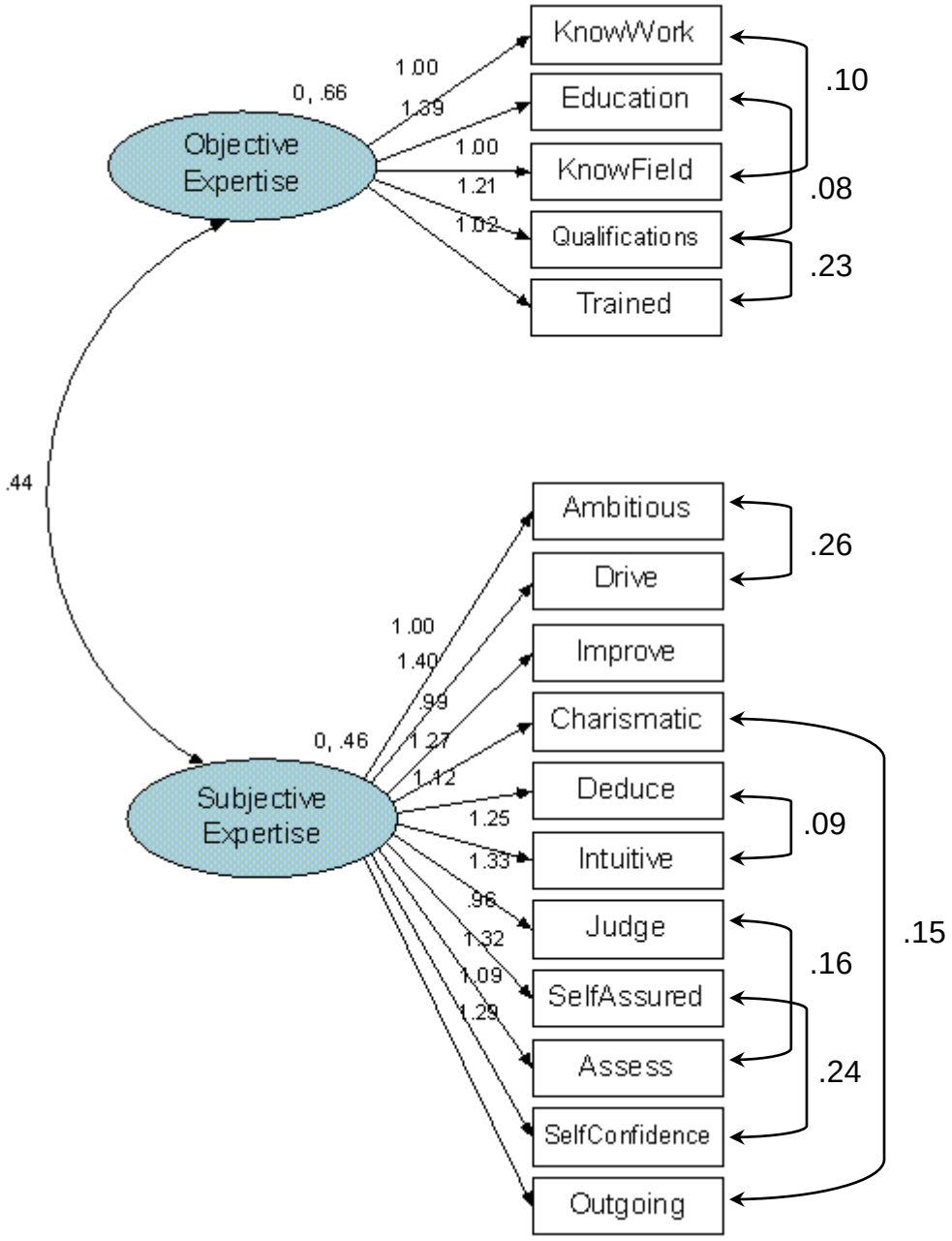
After manual modifications, χ^2 (95) = 165.0, p = .000, the RMSEA is .072 and the CFI .954, which are almost acceptable values. It is an improvement compared to Model B ($\Delta\chi^2$ (39) = 361, p = n. s.). For degree of freedom of 95, a chi-square table indicates that a chi-square of 118 is recommended (with p = 0.05) and 143 if p = .001.

- Validation of Confirmatory Factor Analysis on Sample 1

With the results from the Confirmatory Factor Analysis of Sample 0, another CFA was conducted with Sample 1 to further validate the scale. *Figure 8* shows the graph of the 16-item GEM scale from AMOS with the possible correlations within items that offer the best fit.

Figure 8. CFA of the 16 items with Sample 1





The CFA 16 variables for Sample 1 (N = 165) best model fit has a chi-square of 192 with a degree of freedom of 95 (χ^2 (95) = 191.8, p = .000). The model has a reasonable Comparative Fit Index (CFI = .949) and a RMSEA value slightly above the acceptable .06 per Hu and Bentler's (1999) recommendation (RMSEA = .079).

Model Fit Summary

Table 46. Chi-square and degrees of freedom for Model C with Sample 1

CHI-SQUARE AND DEGREES OF FREEDOM					
Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	57	**191.881**	**95**	**.000**	2.020
Saturated model	152	.000	0		
Independence model	16	2026.074	136	.000	14.898

Table 47. Baseline Comparisons for Model C with Sample 1

BASELINE COMPARISON					
Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	**CFI**
Default model	.905	.864	.950	.927	**.949**
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Table 48. Parsimony-Adjusted Measures for Model C with Sample 1

PARSIMONY-ADJUSTED MEASURES			
Model	PRATIO	PNFI	PCFI
Default model	.699	.632	.663
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

Table 49. Root Mean Square Error of Approximation for Model C with Sample 1

RMSEA				
Model	**RMSEA**	LO 90	HI 90	PCLOSE
Default model	**.079**	.063	.095	.002
Independence model	.291	.280	.302	.000

The Scale Reliability (Internal consistency, Cronbach Alpha coefficient) of the 16-item scale is high ($\alpha = .91$ for the five Evidence-Based items and $\alpha = .92$ for the eleven Self-Enhancement items).

B- Summary and Final GEM Model

The purpose of this research was to examine the psychometric properties and underlying factor structure of the Generalized Expertise Measure using CFA and EFA procedures on an employee sample. The initial results of CFAs did not support the two-factor model proposed for a first sample of employees. Next, EFA was conducted on a second sample of employees. Based on the results of this analysis, another CFA was conducted, which suggested support for the two-factor solution and the model was confirmed with the first employee sample. Based on those results, a sixteen-item scale with two non-orthogonal subscales of Generalized Expertise is offered. This measure showed high reliability in both employee samples and a fit above .90, which is considered acceptable. Comparative statements are not available, however.

Table 50 shows a summary of the models tested in this section, showing the final 16 items (Model C) used after the best fit for Samples 0 and 1.

Table 50. AMOS results of all Confirmatory Factor Analyses for the GEM

SUMMARY OF ALL CONFIRMATORY FACTOR ANALYSES

Models	χ^2	*df*	$\Delta\chi^2$	CFI	RMSEA
Model A	579.83	229	-	.84	.097
Model B	426.0	134	153.83	.82	.124
Model C	165.0	95	361	.954	.072
Model C (with Sample 1)	191.8	95	-	.949	.079

Based on the above statistical analyses, the final GEM scale includes the

following 16 items:

1. This person has knowledge that is specific to his or her field of work.
2. This person shows that they have the education necessary to be an expert in their field.
3. This person has knowledge about their field.
4. This person has the qualifications required to be an expert in their field.
5. This person has been trained in his or her area of expertise.
6. This person is ambitious about their work in the company.
7. This person can assess whether a work-related situation is important or not.
8. This person is capable of improving himself or herself.
9. This person is charismatic.
10. This person can deduce things from work-related situations easily.
11. This person is intuitive in their job.
12. This person is able to judge what things are important in their job.
13. This person has the drive to become what he or she is capable of becoming in their field.
14. This person is self-assured.
15. This person has self-confidence.
16. This person is an expert who is outgoing.

CHAPTER FIVE

DISCUSSION

All the world is a stage,
And all the men and women merely players:
They have their exits and their entrances;
And one man in his time plays many parts (…).

William Shakespeare (*As You Like It*, II. vii, pp.138-139)

A- Discussion

a) Objective Expertise

i- Examination or the Five Items

"Knows work, Knows field, Education, Qualifications, and Trained" are identified as Objective Expertise items of the GEM. It appears that those items can be measured in a formal manner with an assessment, or informally by requesting that the individual presents proof of educational achievements. Similarly, one can provide proof that he or she has had training in a particular area. As for someone's knowledge of work or field, one can easily be assessed with casual questioning or via formal examinations. Those examinations could include specific questions related to a person's job or field.

Back in 1959, French and Raven, then Collins and Raven in 1969, found a nexus between knowledge and power via the term 'expert' by asserting that advanced knowledge occasionally leads to 'expert power', a power influenced wielded as a result of expertise, special skills, or knowledge. In addition to expert knowledge, 'experts' sometimes make use of cognitive or emotional appeals and some employees might feel they have to follow their supervisor's directions if they perceive them as experts in their jobs or in their field.

ii- The Evidence Theme

All of the five objective items seem to have something in common: some sort of evidence can be obtained or presented to confirm their veracity. Indeed, proof of knowledge, education, qualifications, and training could be presented in the way of transcripts, diplomas, or certificates of achievement. It would therefore be rational for the Objective Expertise items category to be renamed and carry the global name of "Evidence-Based Expertise" (EBE).

Table 51 shows the objective expertise items, some theories they most relate to, and the name of the component it would most likely espouse. The components derive from Swanson and Holton's (2001) definition of expertise or from previous research on the topic of expertise.

Table 51. Objective Expertise Items: Theories and Components

OBJECTIVE EXPERTISE ITEMS: THEORIES AND COMPONENTS

Objective Expertise Items	Theories	Component
Knows work	Definition of expertise Swanson & Holton (2001)	Knowledge
Knows field	Definition of expertise Swanson & Holton (2001)	Knowledge
Education		Knowledge
Qualifications		
Trained		

b) Subjective Expertise

i- Examination of the Eleven Items

"Ambitious, Drive, Improve, Charismatic, Deduce, Intuitive, Judge, Self-assured, Assess, Self-confidence, and Outgoing" have been identified as Subjective Expertise items of the GEM. Those items seem to divert in meaning and to be multi-faceted. The following sections will shed light on several theories and categorize the items according to those theories whenever feasible.

c) A New Component Identified: Behavioral Patterns

Outgoing, Self-confidence, Drive, Self-assured, Charismatic, Ambitious, Can improve.

While some of an expert's behaviors might not be included in the individual's job description, they are crucial to the effective function of a department or an organization in general.

Personality is a general term that may subsume many other individual difference variables (Murphy, 1996). Current definitions tend to describe personality as the set of characteristics of a person that account for consistent patterns of response to situations (Pervin, 1980). Affective reactions are an important component of personality. These reactions are all linked to the ubiquitous general evaluative dimension that pervades social perception (Osgood, 1962). In general, personality traits are stable qualities that an individual shows in most situations and they are typically inferred from behavior. The concept of personality being intricate, we will use the term "behavioral patterns" to alleviate the misuse of the theories of personality when describing personality traits of experts. Although different personality theorists have used different terms to describe the important (non-cognitive) dimensions of personality, within the last 20 years, consensus has emerged that a five-factor model of personality, often termed the Big Five (Goldberg,

1990) can be used to describe the most salient aspects of personality. The Big 5 is a descriptive model of personality and represents personality domains associated with aspects of power, love, work, affect, and intellect; those are frequently labeled Extraversion, Agreeableness, Conscientiousness, Emotional Stability, and Openness. Extroversion is the energy, surgency, and the tendency to seek stimulation and the company of others. Agreeableness is a tendency to be compassionate and cooperative rather than suspicious and antagonistic towards others. Conscientiousness is a tendency to show self-discipline, act dutifully, and aim for achievement. The "Can improve" item is closely related to the aim for achievement although one can argue that we may want to do better but may not have the capability to improve. Openness to experience is an appreciation for art, emotion, adventure, unusual ideas; imagination and curiosity. Another useful instrument that can help classify some of the personality items of the GEM is the Myers-Briggs Type Indicator (MBTI) (Myers-Briggs, 1970). The MBTI is a personality test designed to assist a person in identifying some significant personality preferences. The MBTI includes the dichotomy extravert-introvert. "Outgoing" would be categorized as the extravert personality type and so would "Drive" according to Goldberg's extraversion dimension of the Big Five.

"Self-assurance", "self-confidence" and "ambition" all correspond to the enterprising dimension of Holland's typology of personality called the Self-Directed Search (SDS) (Holland, 1959). It is a career inventory developed by John L. Holland based on the theory that people are happier and more successful in jobs that match their interest, values, and skills. According to the theory, people can be loosely classified into six personality types: Realistic, Investigative, Artistic, Social, Enterprising, and

Conventional (RIASEC). Enterprising people like to work with people influencing, leading, or managing them. They like to assume responsibility and enjoy public speaking. They tend to be ambitious, extroverted, self-confident, and adventurous.

Self-confidence was identified by Smith and Strahan (2004) as a tendency in effective teaching and in expert teachers in general. Finally, personality and social skills were identified as characteristics of expert college instructors (Germain, 2006).
This parallel between the subjective items and behavioral patterns of experts confirms Bédard, Chi, Graham, and Shanteau' s (1993) findings who had made personality traits one of their five conditions of expertise along with knowledge, cognitive skills, task characteristics, and decision strategies. Additionally, Tiberius, Smith, and Waisman (1998) believed that expertise was based on knowledge, skills, and talent. Weiss and Shanteau (2003) further asserted that it is the behavior that is or is not expert.

Deduce – Assess – Judge - Intuitive

Current theories of expertise add to the central role of information in expertise. They distinguish high performers from others by the way they think and solve problems rather than simply by their knowledge (Anderson, 1985; Dreyfus & Dreyfus, 1986). After a great deal of experience, the way people solve problems appears to change. Experienced problem-solvers deal with issues with hardly any thought or effort. They recognize recurring patterns in their work and develop learned procedures to deal with these. This problem solving approach has a great deal of intuition, which has been an important addition to the old concept of expertise. The downside of intuitive expertise has also been explored. Indeed, instant recognition of problem situations and efficient actions tend to make decisions without deliberation, without being aware of the rules, or without having

rules. Such individuals often have difficulty explaining to learners their thoughts or actions that constitute expert practice. They make decisions on the basis of subtle, contextual features of the situation; features that are unavailable to the novice.

Benjamin Bloom (1956) developed a classification of levels of intellectual behavior in learning. This taxonomy contained three overlapping domains: the cognitive (mental skills - knowledge), affective (growth in feelings or emotional areas - attitude), and psychomotor (manual or physical skills - skills). Within the cognitive domain, which is most applicable to this study on the concept of expertise, he identified six levels: knowledge, comprehension, application, analysis, synthesis, and evaluation. The higher level of the cognitive domain is therefore “evaluation”, which is a stage at which an individual can make judgments about the value of ideas or materials. It involves knowledge and the development of intellectual skills. This includes the recall or recognition of specific facts, procedural patterns, and concepts that serve in the development of intellectual abilities and skills. The typical keywords associated with that level (evaluation) are as follows (Bloom, 1984):

assess	compare	decide	discriminate	measure	rank	test
convince	**conclude**	explain	grade	**judge**	summarize	support
appraise	criticize	defend	persuade	justify	reframe	

The words “assess” and “judge” is two of the GEM subjective expertise items. Also, “conclude” could be synonymous of “deduce”, another item of the GEM. Table 52 summarizes the possible categories of intellectual or behavior in which the Subjective Expertise items may fall in.

Table 52. Subjective Expertise items: theories and components

SUBJECTIVE EXPERTISE ITEMS: THEORIES AND COMPONENTS

Subjective Expertise Items	Theories	Component
Drive	- Leadership - Extraversion (The Big 5, Goldberg, 1990)	Behavioral
Self-Confidence	- Leadership - Enterprising (Holland's (1959) Typology of Personality)	Behavioral
Charismatic	- Leadership (Bass, 1985; 1988; 1990) - Impression Management (House, 1977)	Behavioral
Can improve	- Conscientiousness (The Big Five, Goldberg, 1990)	Behavioral
Intuitive	- Expertise as intuition (Anderson, 1985; Dreyfus & Dreyfus, 1986)	Problem solving skills
Outgoing	- Extraversion (The Big Five, Goldberg, 1990) - Social (Holland's (1959) Typology of Personality) - Impression Management (Bass, 1985; Conger, 1989; Conger & Kanungo, 1988; Harvey, 2001; House, 1977). - Extraversion (MBTI)	Behavioral
Ambitious	- Enterprising (Holland's (1959) Typology of Personality)	Behavioral
Self-assured	- Leadership - Enterprising (Holland's (1959) Typology of Personality)	Behavioral
Deduce	- Expertise (Swanson & Holton, 2001) - Critical thinking skills / evaluation stage of cognitive domain in Bloom's taxonomy (1956)	Problem solving skills
Can judge importance	- Expertise (Swanson & Holton, 2001) - Critical thinking skills / evaluation stage of cognitive domain in Bloom's taxonomy (1956)	Problem solving skills
Can assess importance	- Expertise (Swanson & Holton, 2001) - Critical thinking skills / evaluation stage of cognitive domain in Bloom's taxonomy (1956)	Problem solving skills

The majority of subjective expertise items are basic behavioral patterns with some critical thinking skills. It could be argued that critical thinking skills are a part of problem-solving skills since being able to solve problems implies being able to assess or judge a situation while using deductive reasoning. All of those items seem to be behaviors or personal enhancers, that is, they create the illusion of expertise without any basis or evidence, are based on perception, and allow a person to appear expert-like. Additionally, whether consciously or unconsciously, some individuals may make use of such subjective traits to their advantage to create and maintain the illusion of their expertise. Therefore, the "subjective expertise" category could be relabeled "Self-Enhancement Based Expertise" (SEBE).

d) Expertise and Leadership

Table 56 shows that individuals perceived as experts have characteristics found in leaders. Those characteristics include "drive", "self-confidence", "self-assurance", and "charisma".

i. Leadership Trait: Charisma

Charisma is, literally, a gift of grace or of God (Wright, 1996, p. 194). Max Weber, brought this idea into the realm of leadership. He used 'charisma' to talk about self-appointed leaders who are followed by those in distress. Such leaders gain influence because they are seen as having special talents or gifts that can help people escape the pain they are in (Gerth & Mills, 1991, pp 51-55).

Charisma has been studied as a trait (Weber, 1947) and as a set of behaviors (House, 1977; House & Baetz, 1979; House & Howell, 1992). The trait approach to

charisma looks at qualities such as being visionary, energetic, unconventional, and exemplary (Bass, 1985; Conger, 1989; Conger & Kanungo, 1988; Harvey, 2001; House, 1977). Charisma is a term typically used in leadership. According to Conger and Kanungo (1988), followers make attributions of heroic or extraordinary leadership abilities when they observe certain behaviors. In 1999, Conger and Kanungo isolated five characteristics of a charismatic leader: they have a vision, they are willing to take risk to achieve that vision, they are sensitive to both environmental constraints and follower needs, and they exhibit behaviors that are out of the ordinary (perceived as novel). Charismatic leaders are also thought to possess outstanding rhetorical ability (Harvey, 2001, p. 253). Weber (1947) had a more trait approach to leadership. According to Weber charisma is:

> "a certain quality of an individual personality, by virtue of which s/he is set apart from ordinary people and treated as endowed with supernatural, superhuman, or at least specifically exceptional powers or qualities. These are such as are not accessible to the ordinary person, but are regarded as of divine origin or as exemplary, and on the basis of them the individual concerned is treated as a leader" (pp. 358-359).

Finally, charisma was revisited to look at its impression management behaviors or what House (1977) had called "image building." Studies by Bass (1985; 1988; 1990) suggest that charismatic leaders engage in impression management to construct an image of competence, increased subordinate competence and subordinate-faith in them as leaders. The trait approach to charisma looks at qualities such as being energetic (Conger & Kanungo, 1988). Along with charismatic, "outgoing" individuals are perceived as

being self-confident, more successful in job interviews (Gilmore & Ferris, 1989); it would therefore make sense that they would be perceived as more expert-like by their subordinates.

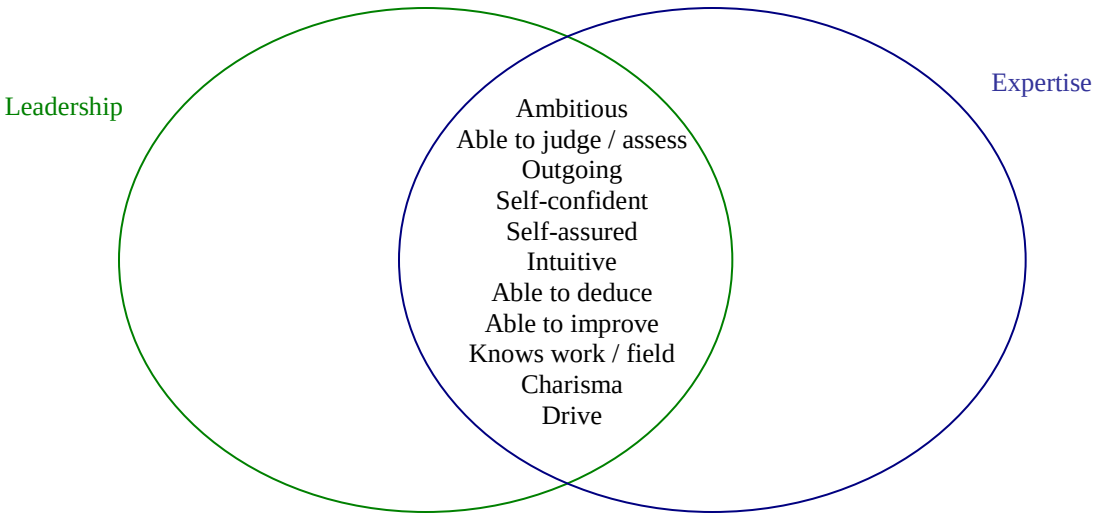
Besides charisma, other traits and skills that have been identified by Stogdill (1974) may be common of leaders and experts. As Table 53 shows, the following traits and skills might be shared by both leaders and experts:

Table 53. Stogdill's Leadership Traits (1974) and Skills and Equivalence in Expertise

Leadership Traits		Equivalence in Expertise
Adaptable to situations		
Alert to social environment		
Ambitious and achievement-oriented	→	Ambitious
Assertive		
Cooperative		
Decisive	→	Able to judge / assess
Dependable		
Dominant (desire to influence others)		
Energetic (high activity level)	→	Outgoing
Persistent		
Self-confident	→	Self-confident / self-assured
Tolerant of Stress		
Willing to assume responsibility		
<u>Leadership Skills</u>		
Clever (intelligent)		
Conceptually skilled	→	Intuitive / Able to deduce / Able to improve
Creative		
Diplomatic and tactful		
Fluent in speaking		
Knowledgeable about group task	→	Knows work and field
Organized (administrative ability)		
Persuasive		
Socially skilled	→	Outgoing

Figure 9 summarizes common leadership and expertise traits based on the GEM items and leadership theories.

Figure 9. Common Leadership and Expertise Traits and Skills



ii. Theories of Leadership and Expertise

For nearly half a century, the popularity of leadership and expertise has been rising around the world in organizations as well as in research. Both topics have been the object of a multitude of research articles and books chapters (Germain, Vecchio, Schriesheim, Martinko, & Van Fleet, 2004; Bass, 1990). National and international academic journals have extensively explored those topics. Research centers have been built and training programs have been created to better employees' leadership skills and their expertise. The discussion of whether leadership is a behavior, a trait, or a skill has been ongoing. Such discussion could now apply to the concept of expertise: is expertise a behavior, a trait, or a skill?

Leadership skills were once thought to be a matter of birth. Leaders were born, not made (Kirkpatrick & Locke, 1996; Cawthon, 1996). Power was only for those whose inheritance and fate made them leaders. One had to be of the right breed to lead; all others had to be led. No matter the amount of yearning or learning, one's destiny could not change. Considering that characteristics of experts include personality traits, it is natural to question whether experts could simply be born. Similarly, it was thought that leadership was a matter of traits such as specific physical characteristics (height, appearance), personality characteristics (extrovert), skills and abilities (intelligence), and social factors (interpersonal skills). The theory such as the so-called "great man" (Kirkpatrick & Locke, 1996) was an inadequate definition of leadership and so could be for expertise. However, there has been a revival of this theory in the leadership literature and in expertise many of the self-enhancement-based items identified in the GEM are based on traits. When this view of leadership was refuted, it was replaced by the notion that it was great events that made leaders. It was about being at the right place at the right time. Situational theories of leadership have also been challenged (Doh, 2003). For experts, however, one could wonder whether experts become experts simply because they are at the right place at the right time. They may find themselves in an organization that promotes or fosters employees' manifestation of their personality traits such as extroversion or drive. Employees that are credulous and easily impressed may also surround the so-called experts, hence nurturing their expert-like behavior. Or it is possible that they emerge at a time when an organization offer a positive climate for individuals who show expert-like characteristics, be it evidence- or self-enhancement-based.

Table 54. Theories of Leadership and Similar Theories of Expertise

Theories	**Characteristics**	**Similar theories of Expertise**
Great Man Theory 1900s	Leaders are born not made	Experts are born (Galton, 1869)
Trait Theory 1940s – 1950s	Inherited traits that are suitable (physical, personality, abilities, social skills)	Inherent traits of expertise (GEM's Self-enhancement)
Behavioral theory 1950s – 1960s	Leaders can be made rather than are born Role theory: People subtly encourage others to act within the role expectations they have for them	Experts can be made (Staszewski, 1988) People subtly encourage others to act within 'expert' role
Contingency Theory 1960s – 1970s	Environment determines which style of Leadership is best suited for situation. No leadership style is best suited in all situations	N/A
Participative theory	3 types of decision-makers in leaders: Autocratic, democratic, laissez-faire	N/A
Situational Theory (Fiedler, 1964) (Hersey & Blanchard, 1969)	The best action of the leader depends on a range of situational factors (motivation, capabilities of followers, leader/follower relationship: Contingency theory, i.e. task oriented or relationship oriented)	The best action of the expert depends on a range of situational factors (motivation, expert/employee relationship: Contingency theory of expertise)
Transactional Theory (Burns, 1978)	People are motivated by reward and Punishment. Clear structure	N/A
Transformational Theory (Bass, 1985)	People will follow a person who inspires them. Vision and passion	People are more likely to perceive someone that inspires them as an expert (charismatic)

It is as if what French painter Georges Braque once said about art is also true of expertise: “Il n’est en art qu’une chose qui vaille: celle qu’on ne peut expliquer” (in art, there is only one thing that counts: the thing you can’t explain) (Braque, 1952/1988).

e) The GEM Items versus the Definition of Expertise

How do the 16 GEM items compare to Swanson & Holton’s (2001) definition of expertise used as a foundation for this research? As highlighted in the literature review, the authors define expertise as a combination of knowledge, experience, and problem-solving skills.

i. Knowledge

Knowledge is found in almost all theories or models of expertise, even though it may be descriptively different (tacit knowledge, cooperative knowledge, or domain knowledge). Knowledge is an interactive part of expertise but not expertise itself (Bereiter & Scardamalia, 1993). Findings issued from the development of the GEM show that part of the knowledge can be acquired through formal education and training, which would in turn contribute to someone’s qualifications. The GEM evidence-based items confirm that knowledge is a fundamental part of the concept of expertise.

ii. Problem solving skills

This term problem solving is often used in cognitive psychology and constitutes some amount of searching and / or deliberation to find a way to achieve a goal. Wertheimer, an early Gestalt psychologist, believed that true problem solving involves a real understanding of both the problem and the environment in which the problem was framed. Bereiter and Scardamalia (1993) took this a step further and suggested that

experts are progressive problem solvers while “the problem solving efforts of the non-expert is taken over by well-learned routines (…) aimed at eliminating still more problems thus reducing the activity even further” (p. 81). Some of the GEM personality-based items confirm that problem-solving skills are a part of the concept of expertise.

iii. Experience

Just as it is recognized that experts have knowledge, it is also understood that they are experienced. It has been hypothesized from the research, but not yet verified, that to become an expert one must have the equivalent of ten years of combined studies and related work-experience. This element of time seems to be relative to the question of how to speed up the process of acquiring expertise. However, one can argue that quality and quantity of the events experienced by the individual sure play a role. As Bereiter and Scardamalia, (1993) concluded from their study of schoolteachers, experience “distinguishes old-timers from beginners, but does not distinguish experts from experienced non-experts” (p. 81). At first, the GEM items do not seem to include any items directly related to the notion of experience. However, after close evaluation, experience is embedded in many of the evidence- and personality-based items. Table 59 shows the GEM items within which experience is tacit. For instance, being a good judge or being able to assess a situation supposes that a person has done that task repeatedly, and has hence gained experience judging and assessing. Similarly, the knowledge of one’s field is typically acquired over a certain number of years. Efficiency in problem solving (judge, assess, deduce) comes with experience, as Anderson (1985) and Dreyfus and Dreyfus (1986) asserted. After a great deal of experience, the way people solve problems appears to change. Experienced problem-solvers deal with issues with hardly any thought

or effort. They recognize recurring patterns in their work and develop learned procedures to deal with these. This kind of efficient, intuitive problem solving is an important addition to the old concept of expertise.

Table 55. GEM items and embedded experience

GEM ITEMS AND EMBEDDED EXPERIENCE

Objective Expertise Items	Theories	Component
Knows work	**Experience embedded**	Knowledge
Knows field	**Experience embedded**	Knowledge
Education Qualifications		Knowledge
Trained	**Experience embedded**	
Subjective Expertise Items	**Theories**	**Component**
Drive		Behavioral
Self-confidence		Behavioral
Charismatic		Behavioral
Can improve		Behavioral
Intuitive	**Experience embedded**	Problem solving skills
Outgoing		Behavioral
Ambitious		Behavioral
Self-assured		Behavioral
Deduce	**Experience embedded**	Problem solving skills
Can judge importance	**Experience embedded**	Problem solving skills
Can assess importance	**Experience embedded**	Problem solving skills

f) A Revised Definition of Expertise

The evidence-based items of the GEM are in alliance with the definition of expertise as presented by Swanson and Holton (2001). However, the self-enhancement based items add a new dimension to the construct. A new working definition of expertise can then be proposed. Expertise could be defined as a combination of evidence and self-enhancement based characteristics possessed by an individual. The idea that expertise is indeed partially based on behavior challenges Staszewski's (1988) presumption that experts are made, not born. However, it supports later studies conducted by Bédard, Chi, Graham, and Shanteau (1993) who asserted that there were five conditions of expertise: domain knowledge, cognitive skills, use of various strategies, task characteristics, and psychological traits. It is also supported by Ericsson and Charness's (1994) research, which presents that expertise, is not a function of intelligence quotient and that expert performance is not innate but may be a function of behavior. Weiss and Shanteau (2003) later added that it is the behavior itself that is or is not expert. In 2004, Smith and Strahan, while focusing on teacher expertise, found that expert teachers were the ones who could maximize the importance of developing relationships with students. This implies the need for social skills. Finally, this self-enhancement-based dimension of expertise provides support for other studies showing that social skills are perceived by others as expert-like characteristics (Germain, 2005; 2006; Subramini et al., 2004). The creation of a third wave of expertise presented in Chapter Two has now added support. Started in the mid-nineties, the third wave (emotional intelligence / ways of expertise) emphasizes war for talent, ethics, and emotional intelligence (EI or EQ) (Goleman, 1995), which includes a dimension named social skills / ability to handle relationships.

Moreover, this research confirmed the hypothesis that expertise could be divided into 2 categories: objective expertise and subjective expertise, which were defined as follows: a characteristic or a fact about a person that can be verified or assessed (objective expertise) and a characteristic or a fact about a person that is perceived by someone else as an indication of their knowledge, abilities, or skills (subjective expertise).

i. Revised model of the Basic Components of Expertise

Swanson and Holton (2001) offer a clear diagram of the components of expertise (knowledge, experience, and problem solving skills) and their intertwining. Based on the findings of this study, we propose to add a fourth component, "self-enhancement" to complement their existing model and to reflect the proposed revised definition of expertise. Also, as previously mentioned, it seems that the component of experience is embedded in all of the components with the exception of behavior although one could argue that self-assurance and self-confidence can be increased with experience. *Figure 10* shows Swanson and Holton's current model of expertise and *Figure 11* proposes a revised model integrating the self-enhancement component and a variance of how the experience component affects the other components.

Figure 10. Swanson & Holton's Components of Expertise (2001)

SWANSON AND HOLTON'S COMPONENTS OF EXPERTISE

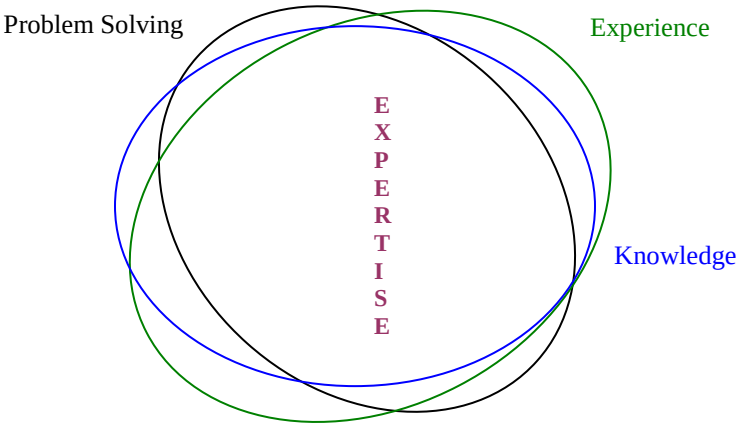
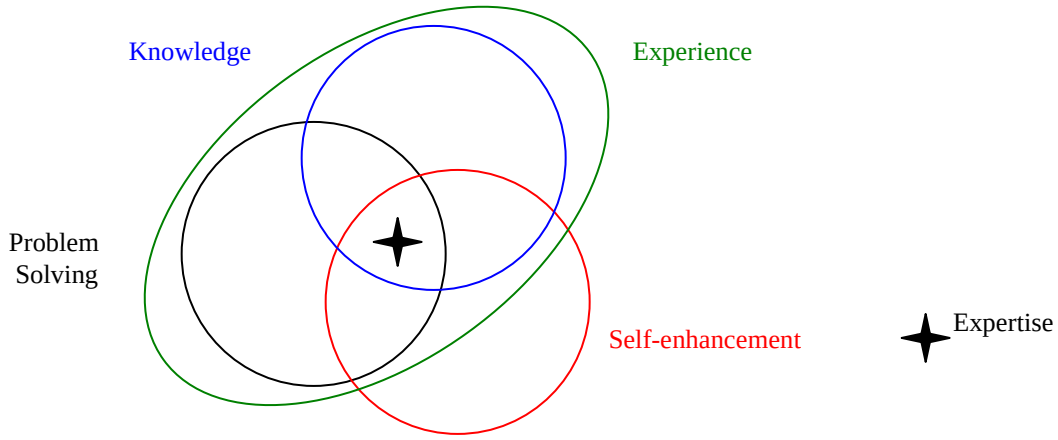


Figure 11. Components of Expertise Revised

COMPONENTS OF EXPERTISE REVISED



The distinction between Evidence Based Expertise and Self-Enhancement Based Expertise somewhat parallels the traditional distinction between "Industrial" and "Organizational" psychology. That is, personnel psychologists have traditionally been concerned with performance and effectiveness and have usually focused on ability as the individual difference most relevant to that set of concerns (evidence-based expertise). Organizational psychologists, on the other hand, have generally have been more concerned with the individual's experience of working in an organization and have been somewhat more open to thinking about behavior or other non-cognitive variables but have been less inclined to think about ability (self-enhancement based expertise). Research in management in the last two decades have shown that high intelligence, in and of itself, is no guarantee of success, organizational success included. This is true in leadership (Baron, 1996) and this is the basis of Goleman's (1995) argument for emotional intelligence. Other factors seem to determine when, and to what extend experts' intellectual abilities contribute to effectiveness in this role.

B- Implications

Personality and self-enhancement characteristics offer general guidelines that can lead to effective job performance. As such, it can improve hiring, transfer, and promotion decisions. Can we predict which people will be experts on the basis of their personality characteristics alone? We do not know. However, it is recommended that behavioral assessments should be used in conjunction with other information such as skills, abilities, and experience (Hogan, Hogan, & Roberts, 1996) and should therefore include evidence based expertise items.

Although organizations are unlikely to expect performance at the highest human levels from all employees, effective organizational performance does demand very high levels of performance in key positions by key workers. The study of what constitutes expertise offers many insights into how such performance is acquired, what affects it, and how it can be maintained.

a) Implications for Training and Development at the Workplace

Employee training and development (T&D) constitutes the largest realm of HRD activity and is traditionally defined as a process of developing work related knowledge and expertise in employees for the purpose of improving performance (Swanson & Holton, 2001). Ericsson and Lehman (1996) defined expert performance as “consistently superior performance on a specified set of representative tasks for a domain” (p. 277). Over the past 15 years, researchers have addressed and offered a number of answers to key questions surrounding the acquisition and production of human performance at its highest level. Perhaps the most significant finding is that “counter to the common belief

that expert performance reflects innate abilities and capacities, recent research in different domains of expertise has shown that expert performance is predominantly mediated by acquired complex skills and physiological adaptations" (Ericsson & Charness, 1994). The question here is how can organizations train employees on the 16 items of the GEM? Training employees in the Evidence-based items (knowledge of work, education, knowledge of field, qualifications, and training) can be done in a fairly straightforward manner through structured training and development. Indeed, structured training and development is the systematic development of workplace knowledge and expertise through carefully selected knowledge, practice, and/or experiences that result in criterion behavior (Swanson & Holton, 2001).

The Self-Enhancement based items of expertise (ambition, assessment, improvement, charisma, deduction, intuition, judgment, drive, self-assurance, self-confidence, and extroversion) are more likely to be learned through unstructured training and development (with on-the-job Training & Development, for instance), which is the unplanned and undocumented process of developing expertise. Self-development techniques, mentoring and coaching, small group activities may be helpful in developing skills such as deduction, judgment, and even self-assurance and self-confidence. However, some of the self-enhancement-based items being so innate (for instance intuition or ambitious) it may be difficult for HRD professionals to easily unleash such characteristics within employees.

Just as the question of whether leadership can be learned is a matter of semantics, so can it be for expertise. The question "can leadership be *learned* or can it be *taught*?" can apply to expertise. The answers are still unknown but under ongoing investigation.

Some scholars concur that leadership can be taught, even though some are more specific in their beliefs and assert that only some aspects of leadership are “teachable”. Some believe that even though some individuals may be better equipped to assume leadership roles; leadership training can enhance their abilities (Germain et al., 2004). They take an attributional perspective on the topic, making reference to findings in positive psychology as well as in authentic leadership. Similarly, it is expected that some characteristics of expertise are teachable and /or can be enhanced through formal education and that some individuals might be better equipped to assume expert roles. Many scholars believe for the concept of leadership, only some aspects of leadership (and expertise) may be taught.

On teaching Expertise

The best pedagogies to teach expertise skills may vary and range from lecture/discussion formats to videotaping to experiential exercises to “learning by doing” as it is doing in leadership (Van Fleet & Peterson, 1991). This view converges with Kouzes and Posner’s (1987): “formal training and education can help. Many leadership skills are successfully learned in the classroom. But training alone is insufficient. We also learn from other people and from experiences." (p. 277). What is taught in HRD courses helps students to acquire knowledge about HRD processes “at the time we teach them”. To have a life-long development process, expertise may need to involve contemporary materials such as films, magazines, and newspapers. Those allow for contemporary applications of expertise-like behaviors. Beyond videos, structured simulation is a powerful tool for providing opportunities for active rehearsal and confidence building (self-confidence being a trait of expertise). Mott (2002) considers continuing professional education as a means of developing professional expertise. That being said, effective

experts seem to be individuals who are ambitious, driven, and outgoing, between others. Such qualities or values seem to be intrinsic and may simply be “unteachable”.

One thing is for sure: the effectiveness of leadership training and education remains questioned and so could be the training of expertise. Just like organizational trainers may not have the ability to create leaders, they may not have the ability to create experts. Expertise training may simply be viewed as the teaching of skill sets that can be further developed with experience. Expertise requires dedication, and possibly self-determination on the part of the apprentice. Human resource developers can stimulate, encourage, nurture, and expand such commitments, but the question remains: Can we create experts from whole cloth?

C- Limitations of the Study and Recommendations for Further Research

Since the questionnaire’s primary purpose was to find out how employees perceive their supervisor’s expertise, most of the questions were formulated accordingly. That is, they all started with the words “My supervisor”. This could be seen as a limitation due to the fact that employees were mainly thinking about their supervisor while responding to the survey instead of freely describing what qualities “any” expert has or has not. However, this provides more strength for the parallel between some leadership and expertise traits and skills explored earlier. Further research should investigate whether similar results would be obtained if employees were to respond to the questions describing a generic “expert”.

Although this study suggests that the GEM may be appropriate for the workplace, future research should further investigate the factor structure of the GEM in additional samples drawn from workplace populations. Similarly, research studies should

investigate whether the same results would be obtained from a single data source. Although the GEM model has achieved a reasonably good fit, future work with different samples from specific fields and industries may yield different results. Indeed, it could be expected that professionals from the medical field, for instance, may perceive an expert as someone who is stronger in the ability of assessing the importance of facts and intuition rather than on their personality (extraversion for example). In addition, the GEM should be statistically compared to the Chalykoff and Kochan (1989)'s two-item on "supervisory expertise". Those studies would help establish validity (face, content) and reliability (inter-observer, test-retest) for the GEM.

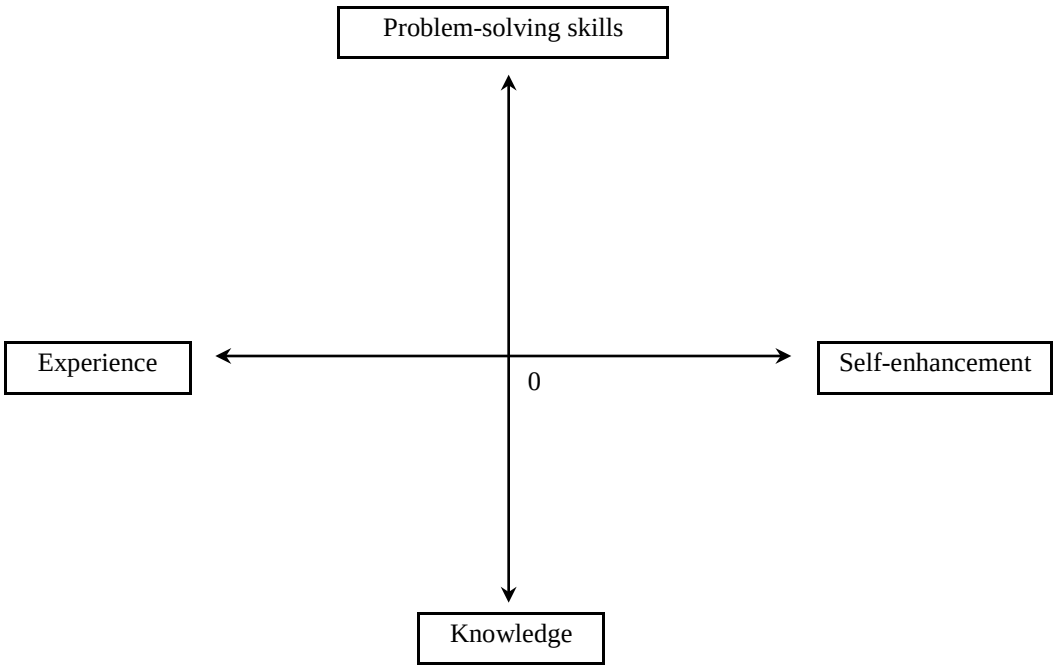
Further research is also needed to confirm the existence of the behavioral component in the expertise construct. In 1988, Staszewski suggested that experts were made, not born, a statement further supported by Ross (2006). However, his research focused on knowledge acquired, problem-solving skills, and motivation. As previously highlighted, the question of whether leaders are born or made is a perennial one. If expertise and leadership are connected - as there seems to be similarities in traits found in leaders and experts (see *Figure 8*), the logical question to ask would then be: are experts born or made? It is expected that the perception of a supervisor's level of expertise will be correlated with other variables such as the quality of the leader-member relationship, the employee job satisfaction, and possibly the gender of each member of the dyad. Research in leadership shows a leader-member relationship is usually positively correlated with job satisfaction and is affected by the gender of the dyad. Future studies should investigate these potential correlations between expert managers and employees.

Finally, future research should examine the relative weight of each item in the assessment of expertise in individuals. It is expected that some individuals may be stronger in some of the components than others, making the adherence to the four components unequally distributed.

a) The Four Quadrants of Expertise

The four components could be represented by an x and y axes with the components at each extremity (*Figure 12*).

Figure 12. The Four Components of Expertise

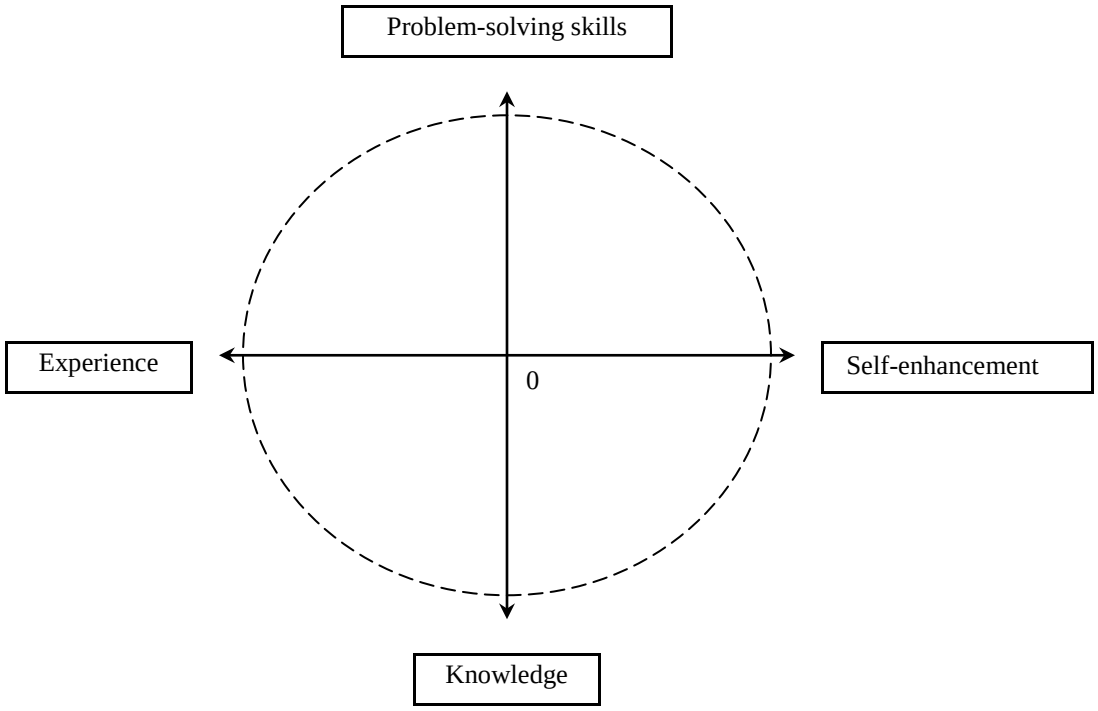


Each component's measurement could be defined according to previous research. For instance, to define "experience", the left part of the x axis would range from 0 to indefinite and corresponding to the number of years of experience. The representation of

a perfectly ‘balanced’ expert –that is an expert that shows strength in all four components of expertise, would form a circle, as shown in the following four quadrants (*Figure 13*).

Figure 13. Example of an expert balanced on the four components of expertise

EXPERT BALANCE ON FOUR COMPONENTS OF EXPERTISE



Until further development and validation, the Generalized Expertise Measure appears to be useful for studies in a variety of industries and is a contribution to the fields of Human Resource Development and Industrial / Organizational Psychology.

LIST OF REFERENCES

Abernethy, B. (1987). Selective attention in fast ball sports II: Expert novice differences. *Australian Journal of Science and Medicine in Sport, 19*, 7-16.

Abernethy, B., Neal, R. J., & Koning, P. (1994). Visual-perceptual and cognitive differences between expert, intermediate, and novice snooker players. *Applied Cognitive Psychology, 8*, 185-211.

Adelson, B., & Soloway, E. (1985). The Role of Domain Experience in Software Design. *IEEE Transactions on Software Engineering, 11*(11), 1351-1360.

Allard, F., & Starkes, J. L. (1980). Perception in sport: Volleyball. *Journal of Sport Psychology, 2*, 22-33.

American Education Research Association (1985). *The Standard for Educational and Psychological Testing*. Washington DC: Author.

American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*. (2000). 4th ed. Text Revision (DSM-IV-TR). Washington: DC.

American Psychological Association. (2001). *Publication manual of the American Psychological Association* (5th Ed.). Washington: DC: APA.

Anderson, J. R. (1982). Acquisition of cognitive skill. *Psychological Review, 89*, 369-406.

Anderson, J. R. (1985). *Cognitive Psychology and its Implications.* Boston: Harvard University Press.

Anderson, J. R. (1987). Skill acquisition: Compilation of weak-method problem solutions. *Psychological Review, 94*, 192-210.

Arbuckle, J. L. (1989). AMOS: Analysis of Moment Structures. *The American*

Statistician, *43*, 66-67.

Arbuckle, J. L. (1994). AMOS: Analysis of moment structures. *Psychometrika*, *59*, 135-137.

Arbuckle, J. L. (2003). *Amos for Windows. Analysis of moment structures (Version 5).* Chicago, IL: SmallWaters.

Argote, L., & Ingram, P. (2000). Knowledge transfer: A basis for competitive advantage in firms. *Organizational Behavior and Human Decision Processes*, *82*, 150-169.

Argyris, C., & Schön, D. (1996) *Organizational learning II: Theory, method and practice.* Reading, MA: Addison Wesley.

Atkinson, R. C., & Shiffrin, R. M. (1971). The control of short-term memory. *Scientific American*, *225*, 82-90.

Baron, R. A. (1996). Interpersonal relations in organizations. In K. R. Murphy (Ed), *Individual differences and behavior in organizations*. San Francisco, CA: Jossey-Bass.

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*, 1173-1182.

Barrett, G. V. (1972). New research models of the future for industrial and organizational psychology. *Personnel Psychology*, *25*, 1-17.

Bass, B. M. (1985). *Leadership and performance beyond expectations*. New York: Free Press.

Bass, B. M. (1988). Evolving perspectives on charismatic leadership. In J. A. Conger and R. N. Kanungo (Eds.), *Charismatic leadership: The elusive factor in organizational effectiveness* (pp. 40-77). San Francisco: Jossey-Bass.

Bass, B. M. (1990). *Bass & Stogdill's handbook of leadership: Theory, research, & managerial applications* (3rd Ed.). New York: Free Press.

Bédard, J. (1989). Expertise in Auditing: Myth or reality? *Accounting, Organizations and Society, 14*(1/2), 113-131.

Bédard, J., & Chi, M. T. H. (1992). Expertise. *Current Directions in Psychological Science, 1*(4) 135-139.

Bédard, J., Chi, M. T. H., Graham, L. E., & Shanteau, J. (1993). Expertise in Auditing; Discussion. *Auditing, 12*, 21-56.

Bentler, P. M., & Bonett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin, 88,* 588-606.

Bereiter, C., & Scardamalia, M. (1993). *Surpassing ourselves: An inquiry into the nature and implications of expertise.* Chicago: Open Court.

Berliner, D. C. (1986). In pursuit of the expert pedagogue. *Educational Researcher, 15(7),* 5-13.

Bloom, B. S. (1956). *Taxonomy of Educational Objectives: Handbook 1, Cognitive Domain*. Longman, New York.

Bloom, B. S. (1984). *Taxonomy of Educational Objectives*. Boston, MA: Allyn and Bacon, Pearson Education.

Bonner, S. E., & Lewis, B. (1990). Determinants of auditor expertise. *Journal of Accounting Research, 28,* (Supplement), 1-20.

Bond, L. Jaeger, R. M., Smith, T. & Hattie, J. A. (2000, September). *The certification System of the National Board for Professional Teaching Standards: A construct and*

consequential validity study. Greensboro, NC: National Board for Professional Teaching Standards, Technical Analysis Group, Center for Educational Research and Evaluation, University of North Carolina-Greenboro.

Bootsma, R. J., & Van Wieringen, P. C. (1990). Timing an attacking forehand drive in table tennis. *Journal of Experimental Psychology, Human Perception and Performance, 16*(1), 21-29.

Braque, G. (1952/1988). *Le Jour et la Nuit*. Paris: Editions Gallimard.

Broman, T. (2001). Experts and expertise in pre- and early-modern societies: A workshop presented by the International Institute. *The Journal of International Institute*. Retrieved September 01, 2005, from http://www.umich.edu/~iinet/journal/vol9no2/tonomura_experts.html

Brookfield, S. D. (1986). *Understanding and Facilitating Adult Learning*. San Francisco: Jossey-Bass.

Burns, J. M. (1978). *Leadership*. NY: Harper & Row Publishers.

Campbell, A. (1976). Subjective measure of well being. *American Psychologist, 31*, 117-124.

Carnevale, A. P. (1991). *America and the New Economy*. Alexandria, VA: American Society for Training and Development, (ED 333 246).

Cattell, R. B. (1966). The scree test for the number of factors. *Multivariate Behavioral Research, 1*, 245-276.

Cawthon, D. L. (1996). Leadership: The great man theory revisited. *Business Horizons*, May-June, 1-4.

Chalykoff, J., & Kochan, T. A. (1989). Computer-aided monitoring: Its influence on employee job satisfaction and turnover. *Personnel Psychology*, *42*, 807-834.

Charness, N. (198l). Search in chess: Age and skill differences. *Journal of Experimental Psychology: Human Learning and Memory*, *7*, 467-476.

Charness, N. (1989). Expertise in chess and bridge. In D. Klahr and K. Kotovsky (Eds.), *Complex information processing: The impact of Herbert A. Simon* (pp. 183-208). Lawrence Erlbaum Associates.

Charness, N., Krampe, R. T., & Mayr, U. (1996). The role of practice and coaching in entrepreneurial skill domains: An international comparison of life-span chess skill acquisition. In K. A. Ericsson (Ed.), *The Road to Excellence: The Acquisition of Expert Performance in the Arts and Sciences, Sports, and Games* (pp. 51-80). Mahwah, NJ: Lawrence Erlbaum Associates.

Chase, W. G., & Ericsson, K. A. (1981). Skilled Memory. In J. R. Anderson (Ed.), *Cognitive skills and their acquisition* (pp. 141-189). Hillsdale, NJ: Lawrence Erlbaum Associates.

Chase, W. G., & Ericsson, K. A. (1982). Skill and working memory. In G. Bower (Ed.), *The psychology of learning and motivation* (Vol. 16). New York: Academic.

Chase, W. G., & Simon, H. A. (1973). The mind's eye in chess. In W. G. Chase (Ed.), *Visual information processing* (pp. 215-281). New York: Academic Press.

Chi, M. T. H., Glaser, R., & Farr, M. J. (1988). *The Nature of expertise.* Hillsdale, NJ: Lawrence Erlbaum Associates.

Chi, M. T. H., Glaser, R., & Rees, E. (1982). *Expertise in problem solving*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Church, A. H. (2001). Is there a method to our madness? The Impact of data collection methodology on organizational survey results. *Personnel Psychology, 54*, 937-969.

Cochran, W. G. (1943). The comparison of different scales of measurement for experimental results. *Annals of Mathematical Statistics, 14*, 205-216.

Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement, 20*, 37-46.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Hillsdale, NJ: Erlbaum.

Collins, B.E., & Raven, B.H. (1969). Group Structure: Attraction, Coalitions, Communication, and Power. In G. Lindzey and E. Aronson (Eds.), *The Handbook of Social Psychology* (2nd Ed, Vol. 4). Reading, Mass.: Addison-Wesley.

Conger, J. A. (1989). *The charismatic leader: Behind the mystique of exceptional leadership*. San Francisco: Jossey-Bass.

Conger, J. A., & Kanungo, R. N. (Eds.). (1988). *Charismatic leadership: The elusive factor in organizational effectiveness*. San Francisco: Jossey-Bass.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, *16*, 297-333.

Cronbach, L. J., & Meehl, P. C. (1955). Construct validity in psychological tests. *Psychological Bulletin*, *52*, 81-302.

Darling-Hammond, L., & Ball, D. L. (1997). *Teaching for High Standards: What Policymakers Need to Know and Be Able to Do*. Paper prepared for the National Education Goals Panel. Washington, DC: United States Department of Education.

Davis, J. S., & Solomon, I. (1989). Experience, expertise, and expert-performance

research in public accounting. *Journal of Accounting Literature, 8*, 150-164.

de Groot, A. D. (1946). *Het denken van den schaker*. Amsterdam, Noord Hollandsche.

de Groot, A. D. (1966). Perception and memory versus thought: some old ideas and recent findings. In B. Kleinmuntz (Ed.), *Problem Solving: Research, Method, and Theory* (pp. 19-50). New York: John Wiley.

de Groot, A. D. (1978). *Thought and choice in chess* (2nd ed.). The Hague: Mouton Publishers. (Revised translation of De Groot, 1946).

Deutskens, E. C., de Ruyter, J.C., & Wetzels, M. (2006). An Assessment of Equivalence between Online and Mail Surveys in Service Research. *Journal of Service Research, 8*(4), 346-355.

DeVellis, R. F. (1991). *Scale development: Theory and applications*. Newbury Park, CA: Sage Publications.

Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV). (2000). American Psychiatric Association.

Dillmann, D. A. (1978). *Mail and telephone survey: The design method*. NY: John Wiley & Sons.

Dillon, W. R., & Goldstein, M. (1984). *Multivariate analysis: Methods and applications*. NY: John Wiley & Sons.

Doh, J. P. (2003). Can leadership be taught? Perspectives from management educators. *Academy of Management Learning and Education*, *2*(1), 54-67.

Doll, J., & Mayr, U. (1987). Intelligenz und Schachleistung - eine Untersuchung an Schachexperten. [Intelligence and achievement in chess - a study of chess masters]. *Psychologische Beiträge, 29*, 270-289.

Donovan, M. A., Drasgow, F., & Probst, T. M. (2000). Does computerizing paper-and-pencil job attitude scales make a difference? New IRT analyses offer insight. *Journal of Applied Psychology, 85*(2), 305-313.

Dreyfus, H. L., & Dreyfus, S. E. (1986). *Mind over machine: The power of human intuition and expertise in the era of the computer*. New York: The Free Press.

Drucker, P. F. (1993). *Post-capitalist society*. Harper Business.

Elstein, A. S., Shulman, L. S., & Sprafka, S. A. (1990). Medical problem solving: a ten-year retrospective. *Evaluation and the Health Professions*, *13*(1), 5-36.

Ericsson, K. A. (2000). *Expert performance and deliberate practice: An updated excerpt from Ericsson*. Retrieved May 05, 2005, from http://www.psy.fsu.edu/faculty/ericsson/ericsson.exp.perf.html

Ericsson, K. A. (2002). Attaining excellence through deliberate practice: Insights from the study of expert performance. In M. Ferrari (Ed.), *The pursuit of excellence in education* (pp. 21-55). Hillsdale, NJ: Erlbaum Associates.

Ericsson, K. A., & Charness, N. (1994) Expert performance: Its structure and acquisition. *American Psychologist, 49*, 725-747.

Ericsson, K. A., & Kintsch, W. (1995). Long-term working memory. *Psychological Review, 102*, 211-245.

Ericsson, K. A., & Lehmann, A. C. (1996). Expert and exceptional performance: Evidence of maximal adaptations to task constraints. *Annual Review of Psychology, 47*, 273-305.

Ericsson, K. A., & Smith, J. (1991). *Toward a General Theory of Expertise: Prospects and Limits*. Cambridge, England: Cambridge University Press.

Ericsson, K. A., Chase, W. G., & Fallon, S. (1980). Acquisition of memory skill. *Science, 208*, 1181-1182.

Ericsson, K. A., Krampe, R. T., & Tesch-Römer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review*, *100*, 363-406.

Ferris, G. R., & Kacmar, K. M. (1992). Perceptions of organizational politics. *Journal of Management*, *18*(1), 93-116.

Fiedler, F. E. (1964). *A Contingency Model of Leadership Effectiveness. Advances in Experimental Social Psychology* (Vol.1, 149-190). New York: Academic Press.

Fiol, C. M., & Lyles, M. A. (1985). Organizational learning. *Academy of Management Review*, *10*(4), 803-813

Fitts, P. M., & Posner, M. I. (1967). *Human Performance*. Belmont, CA: Brooks/Cole Publishing Co.

French, J. R. P., & Raven, B. H. (1959). The bases of social power. In D. Cartwright (Ed), *Studies in social power* (pp. 150-167). Ann Arbor: University of Michigan.

Frensch, P. A., & Sternberg, R. J. (1989). Expertise and intelligent issues: When is it worse to know better? In R. J. Sternberg (Ed.), *Advances in the psychology of human intelligence* (Vol. 5, pp. 157-188). Hillsdale, NJ: Lawrence Erlbaum Associates.

Friel, B. M., Thomas, R. P., Raacke, J., & Shanteau, J. (October, 2001). *Longitudinal development of expertise*. Paper to be presented at the Human Factors Conference, Minneapolis, MN.

Gagné, R. M. (1972). Domains of learning. *Interchange, 3*, 1-8.

Gagné, R. M. (1984). Learning outcomes and their effects: Useful categories of human

performance. *American Psychologist*, *39*, 377-385.

Gagné, R. M., & Briggs, L. J. (1979). *Principles of instructional design* (2nd ed.). New York: Holt, Rinehart and Winston.

Galton, F. (1869/2001). *Hereditary Genius: An inquiry into its laws and consequences*. London & NY: MacMillan and Co. Reprinted in 2001 by University Press of the Pacific.

Gardner, W. L., & Martinko, M. J. (1988). Impression management in organizations. *Journal of Management*, *14*(2), 321-338.

Geelan, D. (2003, October). *The Death of Theory in Educational Research*. Proceedings of the 2003 Complexity Science and Educational Research Conference. October 16-18. Edmonton, Canada, pp. 137-153.

Gentner, D. (1988). Metaphor as structure mapping: The relational shift. *Child Development*, *59*, 47-59.

Germain, M. L. (2005, February). *Apperception and self-identification of managerial and subordinate expertise*. Paper presented at the Academy of Human Resource Development conference. Estes Park, CO. February 24-27, 2005.

Germain, M. L. (2006, April). *Perception of Instructors' Expertise by College Students: An Exploratory Qualitative Research Study*. Paper presented at the American Educational Research Association annual conference, San Francisco, CA. April 7-11, 2006.

Germain, M. L., Vecchio, R. P., Schriesheim, C. A., Martinko, M. J., & Van Fleet, D. D. (2004, November). *Can Leadership be Taught?* Symposium conducted at the meeting of the Southern Management Association. November 3-6, 2004, San Antonio, TX.

Gerth, H. H., & Mills, C. W. (1991). *From Max Weber: Essays in Sociology*. London: Routledge.

Gibbins, M. (1988). Discussion on an Experimental Study of the Effects of Elicitation Methods on Review of Preliminary Audit Strategy by External Auditors. *Contemporary Accounting Research*, *Spring*, 412-415.

Gilbert, T. F. (1978). *Human Competence: Engineering Worthy Performance*. New York: McGraw-Hill.

Gilmore, D. C., & Ferris, G. R. (1989). The effects of applicant impression management tactics on interviewer judgments. *Journal of Management*, *15*(4), 557-564.

Glaser, R., & Chi, M. T. H. (1988). Overview. In M. T. H. Chi, R. Glaser, and M. J. Farr (Eds.), *The Nature of Expertise* (pp. xv-xxi). Hillsdale, NJ: Lawrence Erlbaum Associates.

Goffman, E. (1959). *The Presentation of Self in Everyday Life.* New York: Anchor Books.

Goldberg, L. R. (1990). An alternative "description of personality": The Big-Five factor structure. *Journal of Personality and Social Psychology*, *59*, 1216-1229.

Goleman, D. (1995). *Emotional Intelligence*. NY: Bantam Books.

Gorsuch, R. L. (1983). *Factor Analysis*. Hillsdale, NJ: Lawrence Erlbaum. Orig. ed. 1974.

Grant, J. S., & Davis, L. L. (1997). Selection and use of content experts for instrument development. *Research in Nursing and Health*, *20*, 269-274.

Gray, W. D., & Salzman, M. C. (1998). Damaged merchandize? A review of experiments that compare usability evaluation methods. *Human-Computer Interaction*, *13*(3), 203-261.

Greeno, J. G. (1978). Natures of problem solving abilities. In W. K. Estes (Ed.),

Handbook of learning and cognitive processes (Vol. 5). Hillsdale, NJ: Lawrence Erlbaum Associates.

Greeno, J. G., & Simon, H. A. (1984). Problem solving and reasoning. In R. C. Atkinson, R. Hernstein, G. Lindzey, & R. D. Luce (Eds.), *Steven's handbook of experimental psychology*. New York: John Wiley & Sons.

Greeno, J. G., & Riley, M. S. (1981). Processes and development of understanding. In F. E. Weinert, & R. Kluwe (Eds.), *Learning by thinking*. Stuttgart, Germany: Kohlhammer.

Guadagnoli, E., & Velicer, W. F. (1988). Relation of sample size to the stability of component patterns. *Psychological Bulletin*, *103*, 265-275.

Guns, B. (1996). *The Learning Organization: Gain and Sustain the Competitive Edge.* San Diego, CA: Pfeiffer.

Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). *Multivariate Data Analysis* (5th Ed). Upper Saddle River, NJ: Prentice Hall.

Halperin, K. S., Snyder, C. R., Shenkal, R. J., & Houston, B. K. (1976). Effects of source status and message favorability on acceptance of personality feedback. *Journal of Applied Psychology*, *1*, 85-88.

Hardiman, P. H., Dufresne, R. J., & Mestre, J. P. (1989). The relation between problem categorization and problem solving among experts and novices. *Memory and Cognition, 17*(5), 627-638.

Harmon, P., & King, D. (1985). *Expert systems: Artificial intelligence in business*. NY: Wiley.

Harvey, A. (2001). A dramaturgical analysis of charismatic leader discourse. *Journal of*

Organizational Change Management, 14(3), 253-266.

Hatch, T., White, M. E., & Faigenbaum, D. (2005). Expertise, Credibility, and Influence: How teachers can influence policy, advance research, and improve performance. *Teachers College Record, 107*(5), 1004-1035.

Heun, C. T. (2001). Proctor & Gamble readies online market-research push. *Information Week, October 15*, 26.

Hershey, P., & Blanchard, K. H. (1969). *Management of Organizational Behavior: Utilizing Human Resources*. Englewood Cliffs, NJ: Prentice-Hall.

Hinkin, T. R. (1995). A review of scale development practices in the study of organizations. *Journal of Management, 21*(5), 967-988.

Hinkin, T. R., & Schriesheim, C. A. (1989). Development and application of new scales measure the French and Raven (1959) bases of social power. *Journal of Applied Psychology, 74*(4), 561-567.

Hoelter, J. W. (1983). The analysis of covariance structures: Goodness-of-fit indices. *Sociological Methods and Research, 11*, 325-344.

Hoffman, R. R., Shadbolt, N., Burton, A. M., & Klein, G. A. (1995). Eliciting knowledge from experts: A methodological analysis. *Organizational Behavior and Human Decision Processes*, *62*, 129-158.

Hogan, R., Hogan, J., & Roberts, B. W. (1996). Personality measurement and employment decisions. *American Psychologist*, *51*(5), 469-477.

Holland, J. L. (1959). A theory of vocational choice. *Journal of Counseling Psychology, 6*, 35-45.

Holyoak, K. J. (1991). Symbolic connectionism: Toward third-generation theories of

expertise. In K. A. Ericsson and J. Smith (Eds.), *Towards a general theory of expertise: Prospects and limits* (pp. 301-335). NY: Cambridge Press.

Hopkins, G. (1999). How to Design an Instructor Evaluation. *Training and Development, 53*(3), 51-52.

House, R. J. (1977). A 1976 theory of charismatic leadership. In J. G. Hunt. and L. L. Larson (Eds.), *Leadership: The cutting edge* (pp. 189-207). Carbondale, IL: Southern Illinois University Press.

House, R. J., & Baetz, M. (1979). Leadership: Some empirical generalizations and new research directions. In B. M. Staw (Ed.), *Research in organizational behavior, 1*, 341-423. Greenwich, CT: JAI Press.

House, R. J., & Howell, J. M. (1992). Personality and charismatic leadership. *Leadership Quarterly, 3*, 81-108.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, *6*(1), 1-55.

Hunt, S. D. (1991). *Modern marketing theory*. Cincinnati, OH: South-Western Publishing.

Hunt, S. D., Sparkman, R. D., & Wilcox, J. B. (1982). The pretest in survey research: Issues and preliminary findings. *Journal of Marketing Research, 14*, 269-273.

Jacobs, R. L. (2003). *Structured on-the-job training: Unlashing employee expertise in the workplace* (2nd ed.). San Francisco, CA: Berrett-Koehler Publishers.

Jacobs, R. L. (1997). The taxonomy of employee development: Toward an organizational culture of expertise. In R. J. Torraco (Ed.), *1997 AHRD Conference Proceedings* (pp. 278-283). Baton Rouge, LA: Academy of Human Resource Development.

Jeffers, C. S., & Fong, N. I. (2000). Funding Issues & Teacher Expertise in Elementary Art Teaching: A Dynamic Relationship. *Art Education, 53*(5), 33-39.

Johnson, S. D. (1987). *Knowledge and skill differences between expert and novice service technicians and technical troubleshooting tasks*. Unpublished doctoral dissertation. Minneapolis, MN: University of Minnesota.

Johnson, P. E., Duran, A. S., Hassebrock, F., Moller, J., Prietula, M., Feltovich, P. J., & Swanson, D. (1981). Expertise and error in diagnostic reasoning. *Cognitive Science, 5*, 235-283.

Jöreskog, K. G. (1967). Some contributions to maximum likelihood factor analysis. *Pychometrika*, *32*, 443-482.

Jöreskog, K. G. (1969). A general approach in confirmatory maximum likelihood factor analysis. *Psychometrika*, *34*, 183-202.

Jöreskog, K. G. (1970). A general method for analysis of covariance structures. *Biometrika*, *57*, 239-251.

Jöreskog, K. G., & Goldberger, A. S. (1972). Factor analysis by generalized least squares. *Psychometrika*, *37*, 243-260.

Jöreskog, K. G., & Sörbom, D. (1993). *LISREL 8: Structural equation modeling with the SIMPLIS command language*. Mooresville, IN: Scientific Software International.

Jöreskog, K. G., & Sörbom, D. (2005). *LISREL 8.7 [Computer Software]*. Lincolnwood, IL: Scientific Software International, Inc.

Kerlinger, F. N., & Lee, H. B. (2000). *Foundations of Behavioral Research*. (4th ed.). Forth Worth, TX: Harcourt College Publisher.

Kidwell, R. E., & Bennett, N. (1994). Employee reactions to electronic control

systems: The role of procedural fairness. *Group and Organization Management, 19*, 203-218.

Kim, D. (1993). The link between individual and organizational learning, *Sloan Management Review, Fall 1993*, 37-50.

King, W. C., & Miles, E. W. (1995). A quasi-experimental assessment of the effect of computerizing noncognitive paper-and-pencil measurements: A test of measurement equivalence. *Journal of Applied Psychology, 80*, 643-651.

Kirkpatrick, S. A., & Locke, E. A. (1996). Direct and indirect effects of three-charismatic leadership components on performance and attitudes. *Journal of Applied Psychology, 81*, 36-51.

Knowles, M. (1984a). *The Adult Learner: A Neglected Species* (3rd Ed.). Houston, TX: Gulf Publishing.

Knowles, M. (1984b). *Andragogy in Action*. San Francisco: Jossey-Bass.

Knowles, M. S. (1990). *The Adult Learner: a neglected species* (4th Ed.). Houston: Gulf Publishing.

Kochevar, L. K. (1994). *Generativity of expertise*. Unpublished doctoral dissertation. Minneapolis, MN: University of Minnesota.

Kohn, A. (1996). *Beyond discipline: From compliance to community*. Alexandria, VA: ASCD.

Kolb, D. A. (1984). *Experiential Learning: Experience as the source of learning and development*. New Jersey: Prentice-Hall

Korman, A. K. (1974). Contingency approaches to leadership. In J. G. Hunt and L. L. Larson (Eds.), *Contingency approaches to leadership* (p. 189-195). Carbondale: Southern Illinois University Press.

Kotter, J. P. & Heskett, J. L. (1992). *Corporate Culture and Performance*. New York: The Free Press.

Kouzes, J. M., & Posner, B. Z. (1987). *The Leadership Challenge: How to get Extraordinary Things Done in Organizations*. San Francisco, CA: Jossey-Bass.

Krampe, R. T., & Ericsson, K. A. (1996). Maintaining excellence: Deliberate practice and elite performance in younger and older pianists. *Journal of Experimental Psychology: General*, *125*, 331-359.

Kuchinke, K. P. (1997). Employee expertise: The status of the theory and the literature. *Performance Improvement Quarterly*, *10*(4), 72-77.

Lamb, K. L., & Burwitz, L. (1988). Visual restriction in ball-catching: re-examination of early findings. *Journal of Human Movement Studies*, *14*, 93-99.

Landauer, T. (1995). *The Trouble with Computers*. Cambridge, MA: MIT Press.

Lawley, D. N. (1940). The estimation of factor loadings by the method of maximum likelihood. *Proceedings of the Royal Society of Edinburgh*, *60*, 64-82.

Lawshe, C. H. (1975). A quantitative approach to content validity. *Personnel Psychology*, *28*, 563-575.

Lehmann, A. C., & Ericsson, K. A. (1997). *Expert pianists' mental representations: evidence from successful adaptation to unexpected performance demands* (pp. 165–169). Proceedings of the Third Triennial ESCOM Conference, Uppsala: SLU Service / Reproenhenten.

Likert, R. (1932). A Technique for the Measurement of Attitudes. *Archives of*

Psychology, *140*, 44-53.

MacKenzie, S. B., Podsakoff, P. M., & Fetter, R. (1991). Organizational citizenship behavior and objective productivity as determinants of managerial evaluations of salespersons' performance. *Organizational Behavior and Human Decision Processes, 50*, 123-150.

Mayfield, J., Mayfield, M., & Kopf, J. (1995). Motivating language: Exploring theory with scale development. *Journal of Business Communication*, *32*(4), 329-345.

McLeod, P., & Jenkins, S. (1991). Timing accuracy and decision time in high-speed ball games. *International Journal of Sport Psychology*, *22*, 279-295.

Martin, B. (1996). *Confronting the Expert* (Ed.). Albany: State University of New York Press.

Martin, D. F., Taylor, R. R., O' Reilly, D., & McLaurin, R. J. (1999, November). *The effect of trust on leader-member exchange relationships* in *two national contexts.* Paper presented at the Southern Academy of Management Conference. Atlanta, GA.

Medsker, G. J., Williams, L. J., & Holahan, P. J. (1994). A review of current practices for evaluating causal models in organizational behavior and human resources management research. *Journal of Management*, *20*, 439-464.

Merriam, S. B., & Cafferella, R. S. (1999). *Learning in Adulthood: A Comprehensive Guide*. San Francisco: Jossey-Bass.

Merriam-Webster's collegiate dictionary. (1976). Springfield, MA: Merriam-Webster.

Michaels, E., Handfield Jones, H., & Axelrod, B. (2001). *The War for Talents*. Harvard, MA: Harvard Business School Press.

Miller, G. A. (1956). The magical number seven, plus or minus two: Some limits on our capacity for processing information. *Psychological Review, 63,* 81-97.

Miller, D. (1996). A Preliminary Typology of Organizational Learning: Synthesizing the Literature. *Strategic Management Journal, 22,* 484-505.

Miller, W. L., & Crabtree, B. F. (1999). Depth interviewing. In B. F. Crabtree and W. L. Miller (Ed.), *Doing Qualitative Research* (2nd Ed., pp. 89-107). Thousand Oaks, CA: Sage.

Minichiello, V., Aroni, R., Timewell, E., & Alexander, L. (1995). In-depth interviewing (2nd Ed.). Melbourne: Longman Cheshire.

Mott, V. W. (2002). The Development of Professional Expertise in the Workplace. In V. W. Mott and B. J. Daley (Eds.) *New Directions for Adult and Continuing Education* (Vol. 2000, Issue 86, pp. 23-31). New York: John Wiley & Sons.

Murphy, K. R. (1996). *Individual differences and behavior in organizations*. San Francisco, CA: Jossey-Bass.

Murphy, K. R., & Davidshofer, C. O. (2001). *Psychological testing: Principles and Applications* (5th Ed.). Upper Saddle River, NJ: Prentice-Hall.

Myers-Briggs, I. (1970). *Personal letter to Mary McCaulley*. The MBTI Qualifying Program: The Center for Applications of Psychological Type, 2004, p. 20.

Newell, A., & Simon, H. A. (1972). *Human problem solving*. Englewood Cliffs, NJ: Prentice Hall.

Nunnally, J. C. (1978). *Psychometric theory* (2nd Ed.). New York: McGraw-Hill.

Olbertson, K. A. (2001). Experts and expertise in pre- and early-modern societies: A workshop presented by the International Institute. *The Journal of International Institute*. Retrieved September 01, 2005, from

http://www.umich.edu/~iinet/journal/vol9no2/tonomura_experts.html

Osgood, C. E. (1962). Studies on the generality of affective meaning systems. *American Psychologist*, *17*, 10-28.

Patel, V. L., & Groen, G. J. (1991). The general and specific nature of medical expertise: A critical look. In K. A. Ericsson and J. Smith (Eds.), *Toward a general theory of expertise: Prospects and limits* (pp. 93-125). New York: Cambridge University Press.

Patton, M. Q. (2002). *Qualitative research and evaluation methods* (3rd Ed.). Thousand Oaks, CA: Sage Publications.

Paulhus, D.L. (1998). Interpersonal and intrapsychic adaptiveness of trait self-enhancement: A mixed blessing? *Journal of Personality and Social Psychology*, *74*, 1197-1208.

Paulhus, D. L., & Williams, K. (2002). The dark Triad of Personality: Narcissism, Machiavellianism, and Psychopathy. *Journal of Research in Personality*, *36*, 556-563.

Peterson, S., & Provo, J. (2000). A case study of academic program integration in the USA: Andragogical, philosophical, theoretical, and practical perspective. *International Journal of Lifelong Education*, *19*(2), 103-114.

Pervin, L. A. (1980). *Personality theory and assessment*. New York: Wiley.

Pfeffer, J. (1994). *Competitive advantage through people: Unleashing the power of the workforce*. Boston: Harvard Business School Press.

Podsakoff, P. M., MacKenzie, S. B., Moorman, R. H., & Fetter, R. (1990). Transformational leader behaviors and their effects on followers' trust in leader,

satisfaction, and organizational citizenship behaviors. *Leadership Quarterly, 1*(2), 107-142.

Postnikov, A. V. (2001). Experts and expertise in pre- and early-modern societies: A workshop presented by the International Institute. *The Journal of International Institute*. Retrieved September 01, 2005, from http://www.umich.edu/~iinet/journal/vol9no2/tonomura_experts.html

Price, J. L., & Mueller, C. W. (1986). *Handbook of organizational measurement*. Marshfield, MA: Pitman Publishing.

Proctor, R. W., & Dutta, A. (1995). *Skill Acquisition and Human Performance*. Thousand Oaks, CA: Sage

Putnam, R. T. (1987). Structuring and adjusting content for students: A study of live and simulated tutoring of addition. *American Educational Research Journal, 24*, 13-48.

Reichheld, F. F. (1996). *The loyalty effect: The hidden force behind growth, profits, and lasting value*. Boston: Harvard Business School Press.

Ross, P. E. (2006). *The Expert Mind*. Retrieved August 8, 2006, from http://scientificamerican.com/print_version.cfm?articleID=00010347-101C-14C1-8F9E83414B7F4945

Rossano, M. J. (2003). Expertise and the evolution of consciousness. *Cognition, 89*, 207-236.

Royer, J. M., Carlo, M. S., Dufresne, R., & Mestre, J. (1996). The assessment of levels of domain expertise while reading. *Cognition and Instruction, 14*(3), 373-408.

Royer, J. M., Lynch, D. J., Hambleton, R. K., & Bulgarelli, C. (1984). Using the sentence verification technique to assess the comprehension of technical text as a function

of subject matter expertise. *American Educational Research Journal, 21,* 839-869.

Rozycki, E. G. (1992). The classroom teacher: who wants experts? *Educational Horizons, 70*(3).

Rungtusanatham, M. (1998). Let's not overlook content validity. *Decision Line, 129*(4), 10-13.

Salthouse, T. A. (1991). Expertise as the circumvention of human processing limitations. In K. A. Ericsson and J. Smith (Eds.), *Towards a general theory of expertise: Prospects and limits* (pp. 286-300). Cambridge Press: New York.

Schmidt, F. L., Hunter, J. E., Pearlman, K., & Hirsch, H. R. (1985). Forty questions about validity generalization and meta-analysis. *Personnel Psychology, 38,* 697-798.

Schmitt, N. W., & Klimoski, R. J. (1991). *Research methods in human resources management*. Cincinnati, OH: South-Western Publishing.

Schriesheim, C. A., Powers, K. J., Scandura, T. A., Gardiner, C. C., & Lankau, M. J. (1993). Improving construct measurement in management research: Comments and a quantitative approach for assessing the theoretical content adequacy of paper-and-pencil survey-type instruments. *Journal of Management, 19*, 385-417.

Schwab, D. P. (1980). Construct validity in organization behavior. In B. M. Staw and L. L. Cummings (Eds.), *Research in organization behavior* (Vol. 2, pp. 3-43). Greenwich, CT: JAI Press.

Shakespeare, W. (1623/1998). *As You Like It.* Signet Classics (April 1998).

Shanteau, J. (1992). The psychology of experts: An alternative view. In G. Wright and F. Bolger (Eds.), *Expertise and Decision Support* (pp. 11-23). New York: Plenum

Press.

Shulman, L. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review, 57*, 1-22.

Sloboda, J. A. (1996). The acquisition of musical performance expertise: Deconstructing the "talent" account of individual differences in musical expressivity. In K. A. Ericsson (Ed.), *The road to excellence: The acquisition of expert performance in the arts and sciences, sports and games* (pp. 107-126). Mahwah, NJ: Lawrence Erlbaum Associates.

Smith, T. W. & Strahan, D. (2004). Toward a prototype of expertise in teaching: A descriptive case study. *Journal of Teacher Education*, *55*(4), 357-371.

Spencer, L. M., & Spencer, S. M. (1993). *Competence at Work: Models for Superior Performance* (1st Ed.). NY: Wiley Publisher.

Stanton, J. M. (1998). An empirical assessment of data collection using the Internet. *Personnel Psychology, 51*, 709-725.

Stasser, G., Vaughan, S. I., & Stewart, D. D. (2000). Pooling unshared information: The benefits of knowing how access to information is distributed among group members. *Organizational Behavior Human Decision Processes, 82*, 102-116.

Staszewski, J. J. (1988). Skilled Memory and Expert Mental Calculation Programs. In M. T. H. Chi, R. Glaser, and M. J. Farr, (Eds.), *The Nature of Expertise* (pp. 71-128). Hillsdale, NJ: Lawrence Erlbaum Associates.

Sternberg, R. J. (1999). Intelligence as developing expertise. *Contemporary Educational Psychology, 24*, 359-375.

Sternberg, R. J., Grigorenko, E. L., & Ferrari, M. (2002). Fostering intellectual excellence

through developing expertise. In M. Ferrari (Ed.), *The pursuit of excellence in education* (pp. 57-83). Mahwah, NJ: Lawrence Erlbaum Associates.

Stogdill, R. M. (1974). *Handbook of leadership: A survey of the literature*. New York: Free Press.

Stone, E. (1978). *Research methods in organizacional behavior*. Glenview, IL: Scott, Foresman.

Subramini, M. R., Peddibhotla, N. B., & Curley, S. P. (2004). *How do I know that you know? Cues used to infer and to signal expertise*. Paper presented at the annual meeting of the Academy of Management. New Orleans. August 3-6, 2004.

Swanson, R. A., & Holton III, E. F. (2001). *Foundations of Human Resource Development*. San Francisco: Berrett-Koehler Publishers, Inc.

Tabachnick, B. G., & Fidell, L. S. (1989). *Using multivariate statistics*. New York: Harper and Row.

Thomas, R P., Willems, B., Shanteau, J., Raacke, J., & Friel, B. (2001). CWS applied to controllers in a high-fidelity simulation of air traffic control. In *Proceedings of the 2001 International Symposium on Aviation Psychology* [CD-ROM] Columbus: Ohio State University.

Thomson, L. F., Surface, E. A., Martin, D. L., & Sanders, M. G. (2003). From paper to pixels: Moving personnel surveys to the web. *Personnel Psychology, 56*, 197-227.

Tiberius, R.G., Smith, R.A., & Waisman, Z. (1998). Implications of the nature of "expertise" for teaching and faculty development. In M. Kaplan (Ed.), *To Improve the Academy, 17*, (pp. 123-138). Stillwater, OK: New Forums Press and the Professional and Organizational Development Network in Higher Education.

Tobin, K., & Fraser, B. J. (1988). Investigations of exemplary practice in science and mathematics teaching in Western Australia. *Journal of Curriculum Studies, 20*(4), 369-371.

Torraco, R. J., & Swanson, R. A. (1995). The strategic roles of human resource development. *Human Resource Planning*, *18*(4), 10-21.

Traub, V. (2001). Experts and expertise in pre- and early-modern societies: A workshop presented by the International Institute. *The Journal of International Institute*. Retrieved September 01, 2005, from http://www.umich.edu/~iinet/journal/vol9no2/tonomura_experts.html

Tuckman, B. W., & Oliver, W. F. (1968). Effectiveness of feedback to teachers as a function of source. *Journal of Educational Psychology, 59,* 297-301.

Van Fleet, D. D., & Peterson, T. O. (1991, January). *Videotapes in Leadership Education*. Paper presented to the Organizational Behavior Teaching Conference, Bellingham, WA, January 1991.

Varrella, G. F. (2000). Science teachers at the top of their game: What is teacher expertise? *The Clearing House, 74*(1), 43-46.

Weber, M. (1947). *Max Weber: The Theory of Social and Economic Organization*. Translated by A. M. Henderson & T. Parsons. NY: The Free Press.

Weiss, D. J., & Shanteau, J. (2001, March). *Do judgments alone provide sufficient information to determine the expertise of the judge who made them?* Paper presented at the 11th International Symposium on Aviation Psychology, Columbus, OH.

Weiss, D. J., & Shanteau, J. (2003). Empirical Assessment of Expertise. *Human Factors, 45*(1), 104-116.

Weiss, D. J., Dawis, R.V., England, G. W., & Lofquist, L. H. (1967). *Manual for the*

Minnesota Satisfaction Questionnaire. University of Minnesota.

Winograd, T., & Flores, F. (1986). *Understanding Computers and Cognition: A new Foundation for Design*. Westport, CT: Greenwood Publishing Group, Inc.

Wright, P. (1996). *Managerial Leadership*. London: Routledge.

Wynne, B**.** (1996). May the sheep safely graze? A reflexive view of the expert-lay knowledge divide. In S. Lash, B. Szerszynski, and B. Wynne (Eds), *Risk, Environment & Modernity: Towards a new ecology* (pp. 44-83).London: SAGE Publications Ltd.

Yukl, G. A. (2002). *Leadership in Organizations* (5th ed.). Upper Saddle River, NJ: Prentice-Hall.

APPENDIXES

A- Questionnaire and Cover Page

Questionnaire's Cover Page

Employee Climate Survey

Dear Research Participant:

Your participation in a research project is requested. The title of the study is "Development and preliminary validation of a psychometric measure of expertise: the generalized expertise measure". The research is being conducted by Marie-Line Germain, a Ph.D. student in the School of Education at Barry University, and is seeking information that will be useful in the field of Human Resource Development. The aim of the research is to find out how you perceive your direct supervisor's level of expertise in their job and to better understand your work environment. In accordance with these aims, the following procedures will be used: online survey forwarded to employed individuals in various organizations. We anticipate the number of participants to be 300.
If you decide to participate in this research, you will be asked to complete the survey starting on the following page. It should take you about 15 minutes to complete it.
Your consent to be a research participant is strictly voluntary and should you decline to participate or should you choose to drop out at any time during the study, there will be no adverse effects on your employment or grades.
There are no known risks to you for completing the survey. Although there are no direct benefits to you, your participation in this study may help our understanding of how individuals perceive their supervisor's expertise. As a research participant, information you provide will be kept anonymous, that is, no names or other identifiers will be collected on any of the instruments used. Data will be kept in a locked file in the researcher's office. By completing this online survey you have shown your agreement to participate in the study.

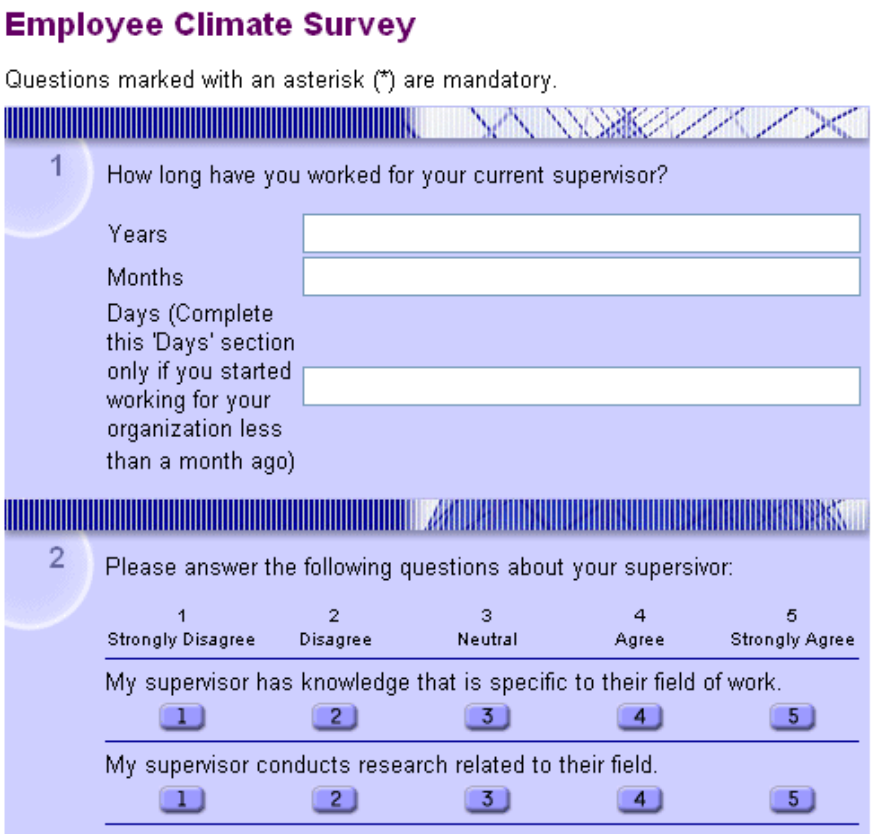
If you have any questions or concerns regarding the study or your participation in the study, you may contact me, Marie-Line Germain, at (305) 962-8668, my supervisor, Dr. Hubschman, at (305) 899 3724, or the Institutional Review Board point of contact, Ms. Nildy Polanco, at (305) 899-3020.

Thank you for your participation. After completing the survey, click on 'Submit'. If you know employed individuals who could participate in this survey (inside or outside your organization), feel free to the send them this web link.

Sincerely,

Marie-Line Germain, Ph.D. (ABD)

Dissertation survey



Employee Climate Survey

Questions marked with an asterisk (*) are mandatory.

1 How long have you worked for your current supervisor?

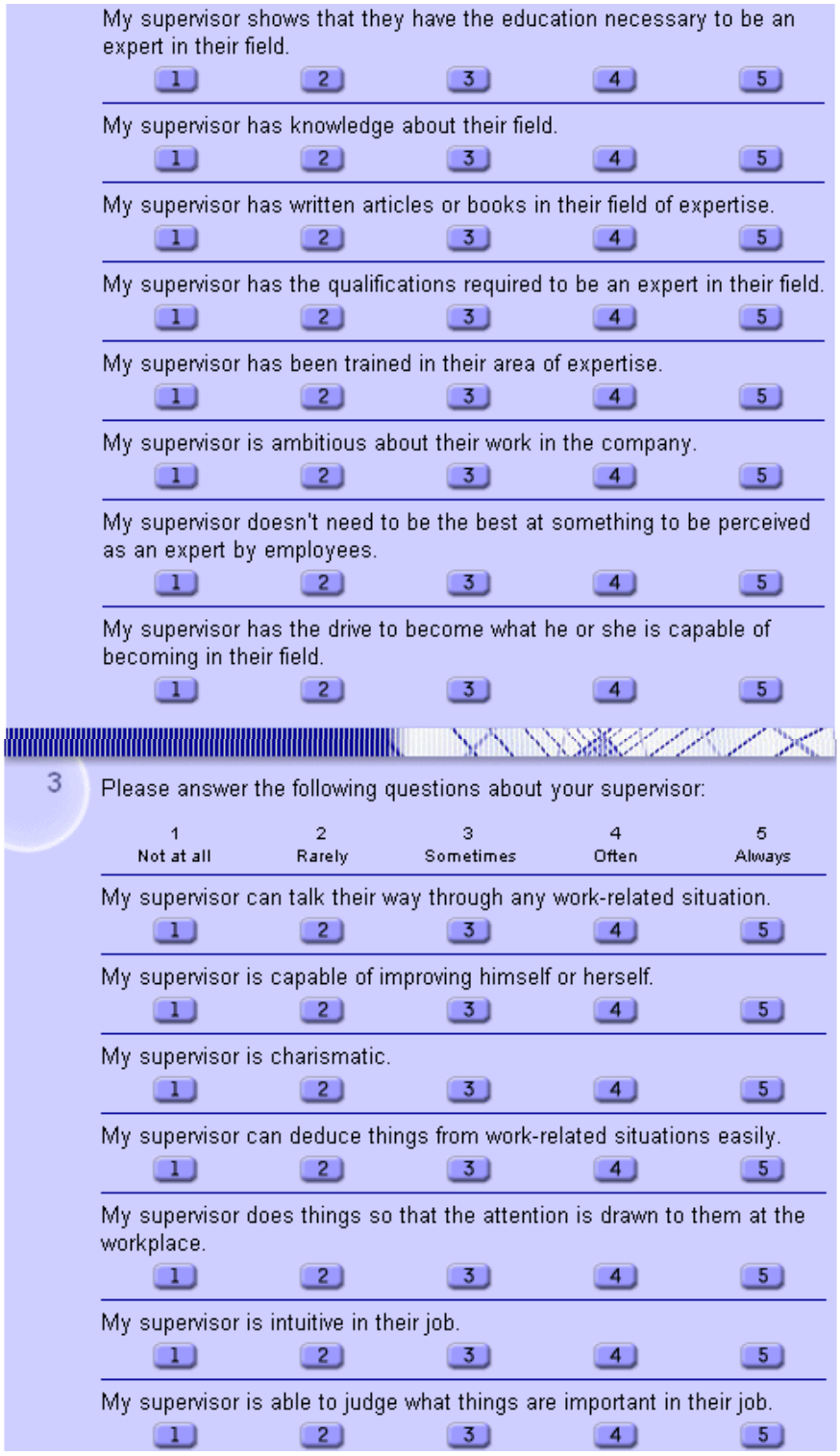
Years

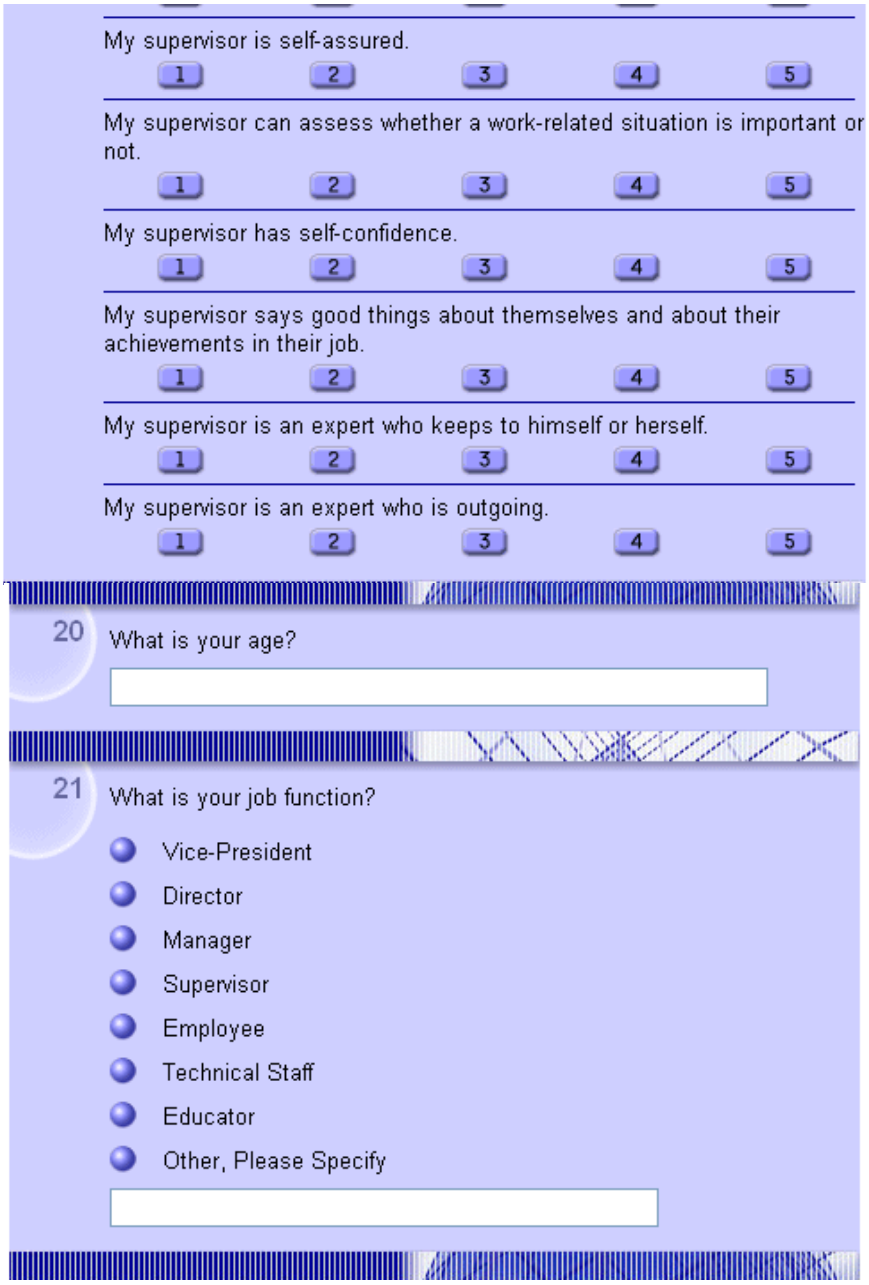
Months

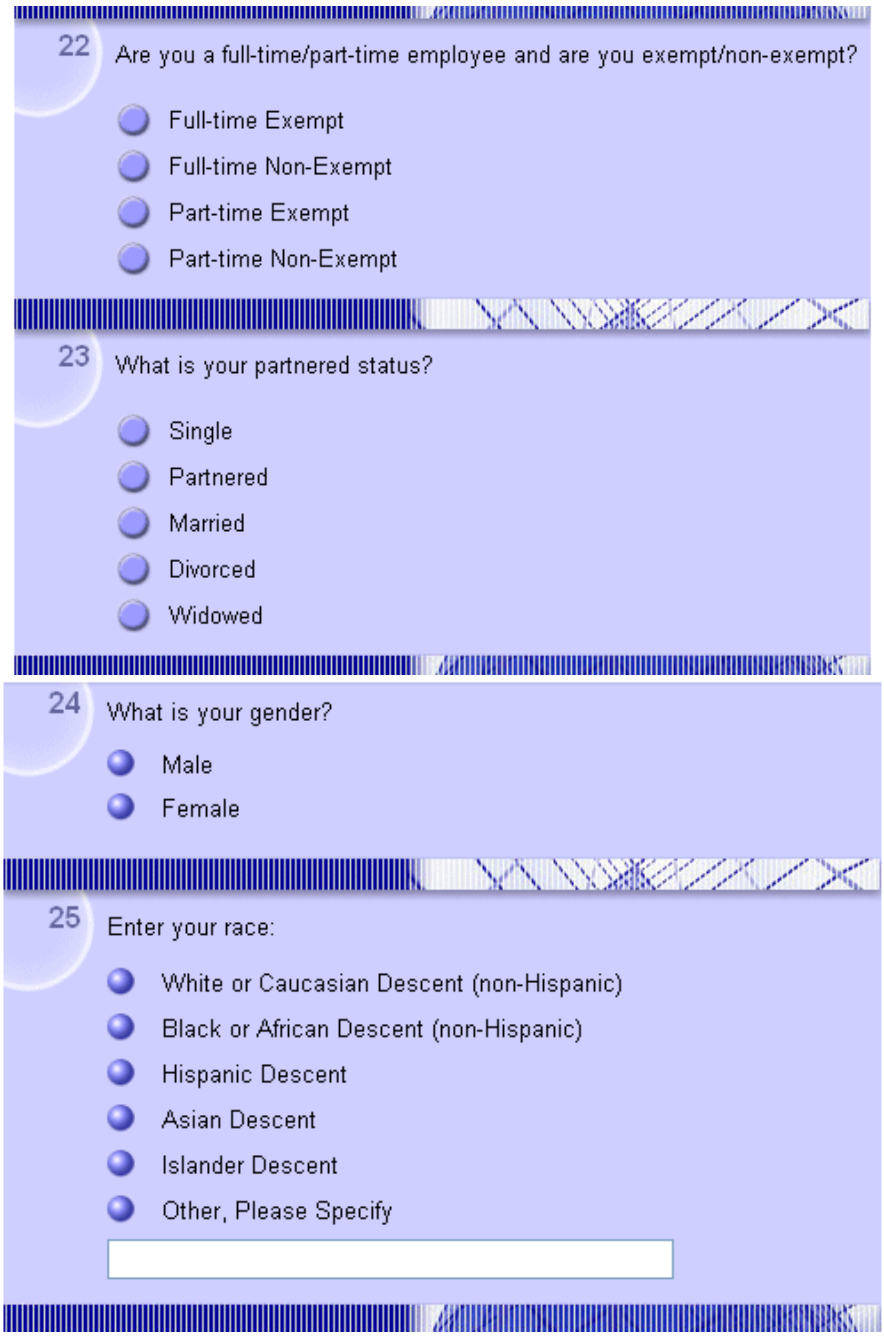
Days (Complete this 'Days' section only if you started working for your organization less than a month ago)

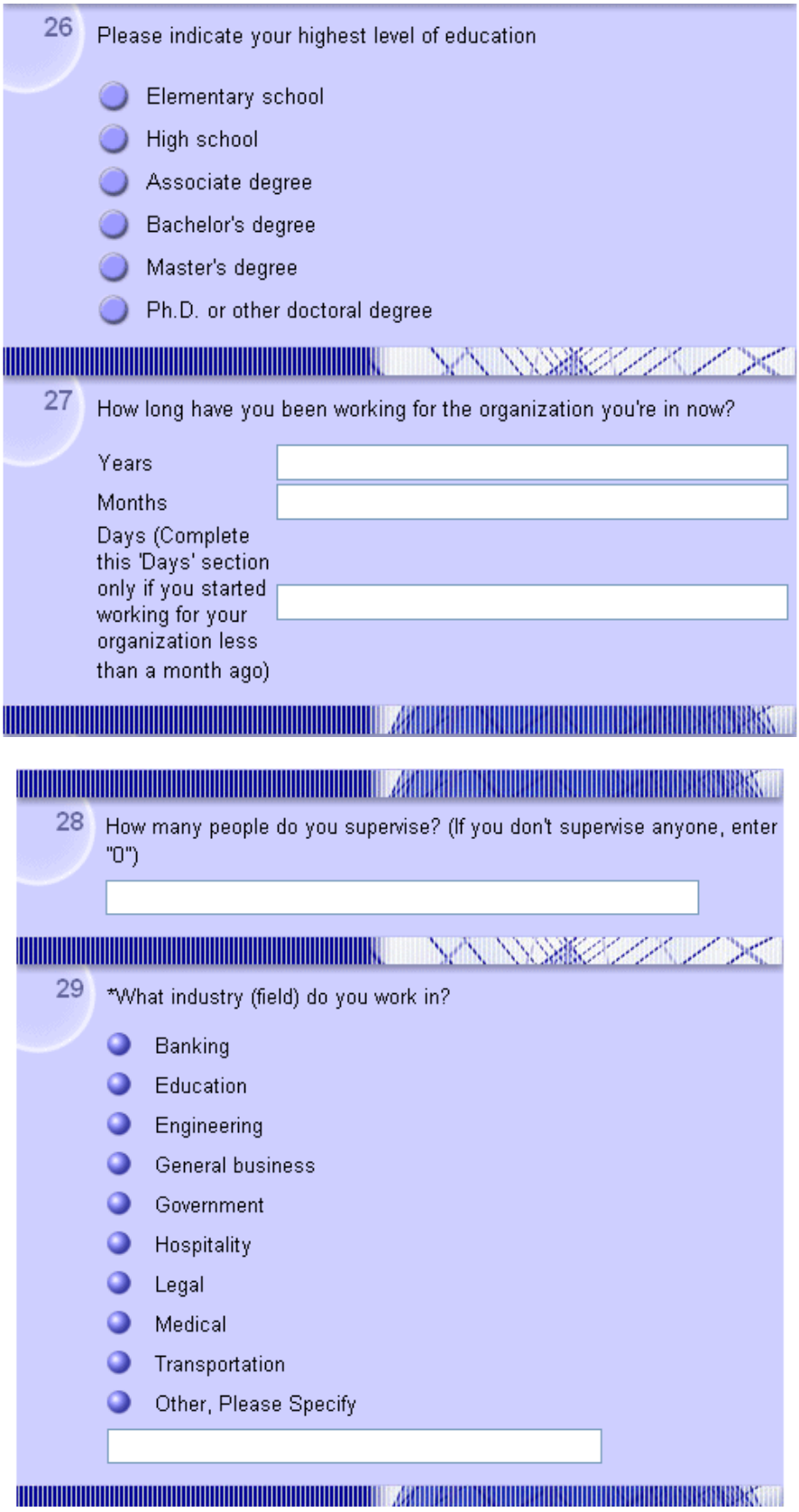
2 Please answer the following questions about your supersivor:

	1 Strongly Disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly Agree
My supervisor has knowledge that is specific to their field of work.	1	2	3	4	5
My supervisor conducts research related to their field.	1	2	3	4	5


My supervisor shows that they have the education necessary to be an expert in their field.
1 2 3 4 5
My supervisor has knowledge about their field.
1 2 3 4 5
My supervisor has written articles or books in their field of expertise.
1 2 3 4 5
My supervisor has the qualifications required to be an expert in their field.
1 2 3 4 5
My supervisor has been trained in their area of expertise.
1 2 3 4 5
My supervisor is ambitious about their work in the company.
1 2 3 4 5
My supervisor doesn't need to be the best at something to be perceived as an expert by employees.
1 2 3 4 5
My supervisor has the drive to become what he or she is capable of becoming in their field.
1 2 3 4 5
3
Please answer the following questions about your supervisor:
1 Not at all
2 Rarely
3 Sometimes
4 Often
5 Always
My supervisor can talk their way through any work-related situation.
1 2 3 4 5
My supervisor is capable of improving himself or herself.
1 2 3 4 5
My supervisor is charismatic.
1 2 3 4 5
My supervisor can deduce things from work-related situations easily.
1 2 3 4 5
My supervisor does things so that the attention is drawn to them at the workplace.
1 2 3 4 5
My supervisor is intuitive in their job.
1 2 3 4 5
My supervisor is able to judge what things are important in their job.
1 2 3 4 5


My supervisor is self-assured.
1 2 3 4 5
My supervisor can assess whether a work-related situation is important or not.
1 2 3 4 5
My supervisor has self-confidence.
1 2 3 4 5
My supervisor says good things about themselves and about their achievements in their job.
1 2 3 4 5
My supervisor is an expert who keeps to himself or herself.
1 2 3 4 5
My supervisor is an expert who is outgoing.
1 2 3 4 5
20
What is your age?
21
What is your job function?
Vice-President
Director
Manager
Supervisor
Employee
Technical Staff
Educator
Other, Please Specify


22
Are you a full-time/part-time employee and are you exempt/non-exempt?
Full-time Exempt
Full-time Non-Exempt
Part-time Exempt
Part-time Non-Exempt
23
What is your partnered status?
Single
Partnered
Married
Divorced
Widowed
24
What is your gender?
Male
Female
25
Enter your race:
White or Caucasian Descent (non-Hispanic)
Black or African Descent (non-Hispanic)
Hispanic Descent
Asian Descent
Islander Descent
Other, Please Specify



26 Please indicate your highest level of education

- Elementary school
- High school
- Associate degree
- Bachelor's degree
- Master's degree
- Ph.D. or other doctoral degree

27 How long have you been working for the organization you're in now?

Years

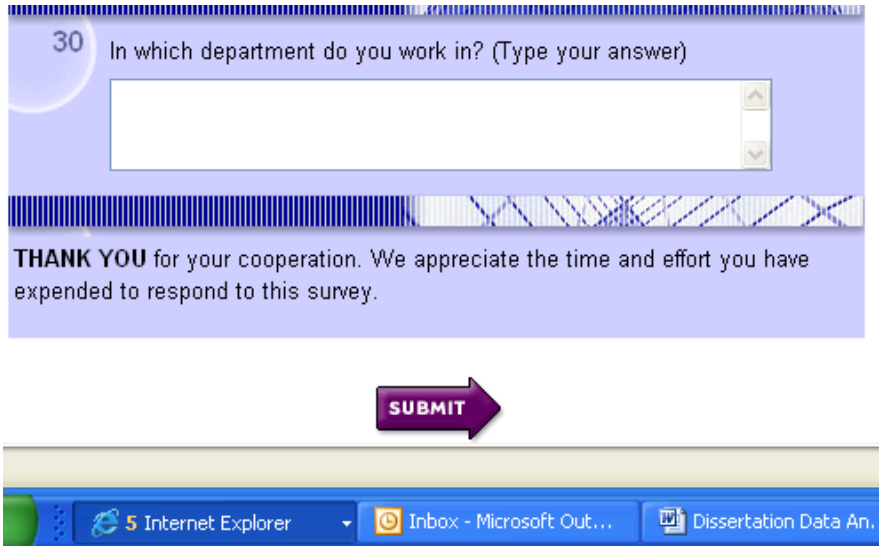
Months

Days (Complete this 'Days' section only if you started working for your organization less than a month ago)

28 How many people do you supervise? (If you don't supervise anyone, enter "0")

29 *What industry (field) do you work in?

- Banking
- Education
- Engineering
- General business
- Government
- Hospitality
- Legal
- Medical
- Transportation
- Other, Please Specify


30
In which department do you work in? (Type your answer)
THANK YOU for your cooperation. We appreciate the time and effort you have expended to respond to this survey.
SUBMIT
5 Internet Explorer
Inbox - Microsoft Out...
Dissertation Data An.

B- *Table A1*. Comparison of Identifiers of College Instructor, Teacher, and Manager Expertise

Qualifiers of College Instructor Expertise (Germain, 2006)	**Dimensions of Teacher Expertise** Bond, Jaeger, Smith, & Hattie (2000)	**Identifiers of Managerial Expertise** (Germain, 2005)
Knowledge 1- Knowledge of subject taught 2- Can answer questions **Social Skills** 1- Can communicate well 2- Can reach students 3- Is accessible / Approachable **Knowledge Transfer** 1- Can transfer knowledge 2- Can explain clearly **Experience** 1- Experience teaching the topic 2- Experience in the field / real life experience 3- Uses examples to illustrate the course **Classroom climate** 1- Can engage student participation 2- Can motivate students **Education** 1- Degree obtained 2- If degree concords with the subject taught **Respect** 1- Instructor's respect of varied opinions 2- Respect towards students **Personality** 1- Is enthusiastic / outgoing / entertaining 2- Is interested in topic 3- Patient 4- Flexible	**Use of knowledge** **Deep representation** **Problem solving** **Improvisation** **Classroom climate** **Multidimensional perception** **Sensitivity to context** **Monitoring learning / providing feedback** **Test hypotheses** **Passion for teaching & learning** **Respect for students** **Challenge** **Deep understanding**	**Education** 1. Academic training 2. Needed skills 3. Training related to the project / Certifications 4. Résumé **Experience** 1. Experience in the field 2. Demonstration of expertise and success in a similar project 3. Past behavior and knowledge 4. Amount of time spent at the job **Performance** 1. Former performance evaluations 2. Quality of past and current work **Recommendations** 1. Peer recommendations 2. Recommendations from former and current managers 3. Contact previous employers **Written Evidence** 1. Public publications 2. Has peer-reviewed publications in the area of expertise **Social Skills** 1. People skills 2. Teamwork ability 3. Communication skills

C- Curriculum Vitae

MARIE-LINE GERMAIN

EMPLOYMENT

EDUCATION

2001 - Present **City College**, Miami, FL
Department Chair and Faculty
Duties include directing the General Education Department: recruiting and managing faculty members; Ensuring ongoing development of innovative departmental programs and obtaining sponsorships; Initiating College-wide programs such as students' benefits and revision / creation of educational programs, themed weeks, and motivational initiatives. Instruct general education and business courses (see list below). Also Chair of SACS Accreditation Committee on Institutional Effectiveness. Creator and director of the *Center for Innovative Instruction and Faculty Expertise,* which fosters faculty development through teaching and research.

2000 - Present **University of Miami**, Coral Gables, FL
Lecturer. Foreign Languages and Literatures Department.
Duties include lecturing undergraduate students in French linguistics, culture, and language.
University of Miami Online High School: Online instruction of French levels I and II to about 20 students.

2006- Present **University of Phoenix**, Plantation, FL
Lecturer. Department of Graduate Education.
Duties include lecturing students in a variety of graduate Research Methods courses.

2004 - 2005 **University of St. Francis**, Miami campus, FL (Baptist Hospital Health Systems)
Lecturer. Taught Research Methods and Ethics courses to graduate and executive students.

1996 - 2001 **Inlingua Language Schools International,** Miami, FL
Language Instructor. Duties included development of training materials and teaching English and French linguistics, phonetics, conversation and culture to foreign individuals and executive groups. Performance evaluation. Students included executives from *Sudameris Bank* and *Alcatel*. Also provided consulting to increase student enrollment and retention.

1994 - 1995 **Greta, Department of Education,** Enghien-Les-Bains, France
English Instructor. Taught English to French adults in continuous education. Group of 25 students preparing professional degrees. Beginner to intermediate level. Duties included preparing teaching materials, instructing English linguistics, grammar, conversation, phonetics and evaluating students' level.

1990 - 1995 **Collège Saint-Joseph**, Asnières, France
Instructor and Career Advisor. Duties included preparing classroom instruction programs and substitute teaching in mathematics, French, and English to middle school French students. Also responsible for mentoring students with academic challenges.

EDUCATION

2006 (July) Ph.D. in Leadership and Education — Barry University, Miami, Florida
Specialization in Human Resource Development
Dissertation title:
Development and Preliminary Validation of a Psychometric Measure of Expertise: the Generalized Expertise Measure (GEM).

1995 1st year Ph.D. (DEA) in Anglo-American Studies — University of Paris-X, France
1994 M.A. in English Language and British Civilization — University of Paris-X, France
1993 B.A. in English Language and British Civilization — University of Stirling, Scotland

PUBLICATIONS AND CONFERENCE PAPERS

REFEREED ARTICLES and BOOK CHAPTERS

- **Germain**, M. L., & Scandura, T. A. (2005). Grade Inflation and Students Individual Differences as Systematic Bias in Faculty Evaluations. *Journal of Instructional Psychology*, *32*, 58-67.

- **Germain**, M. L., & Scandura, T. A. (2005). Mentoring and Identity Development: The Role of Self-Determination. Book chapter In *Supporting Women's Career Advancement: Challenges and Opportunities*. R. Burke and M. C. Mattis, (Eds.). MA: Elgar Publishing, pp.106-123.

- **Germain**, M. L. (2004). Issues of Competencies and Ethics in Research. In *Crossing Frontiers in Research Methods*. Published by ISEOR. H. Savall and M. Bonnet (Eds.). Vol. 2, pp. 897-910.

PROCEEDINGS PAPERS

- **Germain**, M. L. (2006, April). *Perception of Instructors' Expertise by College Students: An Exploratory Qualitative Research Study*. American Educational Research Association annual conference, San Francisco, CA. April 7-11.

- **Germain**, M. L. & Hubschman, B. (2006, April). *A Study of Factors Contributing to College Students' Stress: An Exploratory Analysis.* American Educational Research Association annual conference, San Francisco, CA. April 7-11.

- **Germain**, M. L. (2006, February). *What experts are not: Factors identified by managers as disqualifiers for selecting subordinates for expert team membership*. Academy of Human Resource Development Conference. Columbus, OH. February 22-26.

- Pierre, F., & **Germain**, M. L. (2005, March). *Integrated Learning Systems (ILS): A comparison of two ILS measures of achievement in reading and Florida's Comprehensive Assessment Test (FCAT)*. In Proceedings of Society for Information Technology & Teacher Education (SITE) International Conference 2005 (pp. 170-174). Norfolk, VA: AACE.

- **Germain**, M. L. (2005, February). *Apperception and self-identification of managerial and subordinate expertise*. Academy of Human Resource Development. Estes Park, CO. February 24-27.

- **Germain**, M. L., & Hubschman, B. (2005, February). *Achieving workplace literacy: Using social learning theory for a training program aimed at aboriginal employees*. Academy of Human Resource Development. Estes Park, CO. February 24-27.

- **Germain**, M. L. (2004, November). *Mentor learning: An investigation and impact on organizations*. Southern Management Association Conference, San Antonio, TX. November 3-6.

RESEARCH PAPERS UNDER JOURNAL OR CONFERENCE REVIEW

- Scandura, T. A., & **Germain**, M. L. (2005). *Formal mentoring relationships and attachment theory: Implications for Human Resource Development*. *Human Resources Development Review.* Status: Revise and resubmit.

- **Germain**, M. L. (2005). Perception of College Instructors' Expertise by Students: An Exploratory Qualitative Research Study. Submitted to the *College Teacher Review*. Under review.

CONFERENCES PAPERS

- **Germain**, M. L. (2006, October). *Collecting employee survey data through Cyberia: A promising virtual land for university researchers*. Southern Management Association conference, Clearwater, FL. October 25-28.

- **Germain**, M. L., Lowe, K., Cogliser, C., Gardner, W. L., & Lankau, M. (2006, October). *Several Degrees of connections between research and teaching in universities: Can they be linked, should they be linked, and if so, how?* Southern Management Association conference, Clearwater, FL. October 25-28.

- **Germain**, M. L. (2006, April). *Perception of Instructors' Expertise by College Students: An Exploratory Qualitative Research Study*. American Educational Research Association annual conference, San Francisco, CA. April 7-11.

- **Germain**, M. L. & Hubschman, B. (2006, April). *A Study of Factors Contributing to College Students' Stress: An Exploratory Analysis*. American Educational Research Association annual conference, San Francisco, CA. April 7-11.

- **Germain**, M. L. (2006, February). *What experts are not: Factors identified by managers as disqualifiers for selecting subordinates for expert team membership*. Academy of Human Resource Development Conference. Columbus, OH. February 22-26.

- **Germain**, M. L. (2006, February). *Stages of Scale Development and Validation: The Example of the Generalized Expertise Measure (GEM)*. Academy of Human Resource Development Conference. Columbus, OH. February 22-26.

- **Germain,** M. L. (2006, February). *A Chronological Synopsis of Dimensions of Expertise: Towards the Expert of the Future*. Paper submitted to the Academy of Human Resource Development Conference. Columbus, OH. February 22-26.

- **Germain**, M. L. (2005, April). *Learning from a successful research / teaching nexus in undergraduate education: A global perspective*. American Educational Research Association annual conference, Montreal, Canada. April 11-15.

- Pierre, F., & **Germain**, M. L. (2005, March). *Integrated Learning Systems (ILS): a comparison of two ILS measures of achievement in reading and Florida's Comprehensive Assessment Test (FCAT)*. Society for Information Technology & Teacher Education (SITE) 16th International Conference. Phoenix, AZ. March 1-5.

- **Germain**, M. L. (2005, February). *Apperception and self-identification of managerial and subordinate expertise*. Academy of Human Resource Development. Estes Park, CO. February 24-27.

- **Germain**, M. L., & Hubschman, B. (2005, February). *Achieving workplace literacy: Using social learning theory for a training program aimed at aboriginal employees*. Academy of Human Resource Development. Estes Park, CO. February 24-27.

- **Germain**, M. L., Vecchio, R. P., Schriesheim, C. A., Martinko, M. J., & Van Fleet, D. D. (2004, November). *Can leadership be taught?* Session Chair. Symposium, Southern Management Association Conference, November 3-6, San Antonio, TX.

- **Germain**, M. L. (2004, November). *Mentor learning: An investigation and impact on organizations*. Southern Management Association Conference. San Antonio, TX. November 3-6. Paper also in conference proceedings.

- **Germain**, M. L. (2004, March). *Issues of competencies and ethics in research*. International Conference on Research Methods. ISEOR (Institut de Socio-economie des Entreprises et des ORganisations), sponsored by the Academy of Management. Lyon, France.

- **Germain**, M. L. (2004, April). *Motivation and education in a sociology course: An innovative approach*. 15th International Conference on College Teaching and Learning. Jacksonville, FL.

- **Germain**, M. L. (2003, November). *Can ethics be taught?* Presentation at the Southern Management Association annual conference. Teaching Methodologies Workshop. Clearwater, FL.

- **Germain**, M. L. (2003, April). *The use of teams in university classrooms: Training matters*. Poster presentation at the 14th International Conference on College Teaching and Learning. Jacksonville, FL.

- **Germain**, M. L., & Scandura, T. A. (2003, April). *Students' individual differences as systematic bias in faculty evaluations*. Poster presentation at the Society for Industrial and Organizational Psychology (S.I.O.P.). Orlando, FL.

CONFERENCE DISCUSSION and SESSION CHAIR

- Clark, K. D., & Chin, L. (2005, November). *The Dark Side of Internet Usage in the Classroom: Problems, Challenges, and Potential Lessons*. Southern Management Association conference, Charleston, SC. November 9-12. Discussant.

- *HRM: Developing the Essentials of Leadership*. (2005, November). Southern Management Association conference, Charleston, SC. November 9-12. Session Chair.

- Gumport, P. J., Potter, C. J., Light, G., Luna, M., Drane, D., Calkins, S., Hart, J., Lattuca, L. R., Strauss, L. C., and Backer, V. L. (2005, April). *Curricular Changes and Challenges*. American Educational Research Association annual conference, Montreal, Canada. April 11-15. Session Chair.

- Witt, L. A. & Wilson, J. (2004, November). *Interactive Effects of Extroversion and Agreeableness on Social Skill*. Paper presented at the Southern Management Association Conference, November 6-9, San Antonio, TX. Discussant.

NEWSPAPERS, MAGAZINES ARTICLES and NON-REFERRED PUBLICATIONS

- **Germain**, M. L. (2004). *Only Lyon*. Academy of Management, Research Methods Division newsletter. (p. 9)

WORKING PAPERS

- **Germain**, M. L., & Ford, L. *Mentor Learning: An Investigation and Impact on Organizations*. To be submitted to Group and Organization Management journal.

- **Germain**, M. L., & Maldonado, N. *Leadership and Organizational Learning: A Lesson from El Lector*. Working paper.

- **Germain**, M. L. *The Faustian Pact of Mentoring*. Working paper.

GRANTS

- 2006: Obtained national, competitive grant from the *Professional and Organizational Development Network in Higher Education*. Grant money was used for the creation of a teaching and research center at City College, Miami (Center for Innovative Instruction and Faculty Expertise).

- 2006: Applied for French-American Cultural Exchange grant for "*The Tournées Festival*", which supports contemporary creative work in the context of French-American cultural and educational exchange. Awaiting response. Typical amount granted: $2,000.

- 2006: Application in progress for a grant from the Academy of Human Resource Development (AHRD). The project to be submitted by September 1st, 2006 consists in an international study on the perception of managerial expertise. One researcher from China and one from The Netherlands are involved in this project and data will be collected from employees in France, The Netherlands, the United States, and China. Grant amount: $2,500.

CONSULTING

- 2006: *Shell Lumber, Inc.* Miami, Florida: Assessment of all employees for organizational climate. In planning stage.

- 2001: *Inlingua*, Miami, Florida. Marketing strategies for new product development

EXECUTIVE TRAINING

- 2004 and 2005: *Baptist Health Systems*, Miami, Florida. Taught graduate courses on Research Methods and Ethics to nurses and hospital administrators

- 2000: *Sudameris Bank*, Miami, Florida. Taught French to company executives

- 2000: *Alcatel*, Miami, Florida: Taught French to company executives

UNIVERSITY-LEVEL COURSES TAUGHT

Course name	Course Number	Educational Institution	Grade Level
BUSINESS COURSES			
Consumer Behavior	MAR4503	City College	Bachelor's course
Human Resources Management	MNA1100	City College	
Principles of Management	MAN2021	City College	
Principles of Marketing	MAR1000	City College	
RESEARCH COURSES			
Research Methods	HSAD 681	University of St. Francis	Graduate course
Research Methods	IDS 4914	City College	Bachelor's course
Action Research I	EDD 569	University of Phoenix	Graduate course
Action Research II *	EDD 577	University of Phoenix	Graduate course
Action Research III **	EDD 580	University of Phoenix	Graduate course
Measurements, Evaluation, and Ethics in Research	QNT 575	University of Phoenix	Graduate course
GENERAL EDUCATION COURSES			
Business English	EN141	City College	
Business English	Taught in French	Greta, Higher Education, France	
College English	EN120	City College	
Composition I	ENC1101	City College	
Composition I	ENC1101-D (Online)	City College	
Critical Thinking	PHI2100	City College	
Essential English	EN110	City College	
Essential Reading	RD110	City College	
Ethics and Health Care	HSAD 650	University of St. Francis	MA course
Ethics and Morality	PHIL 327	University of St. Francis	BA course
French Level I	FRE101 (Taught in French)	University of Miami	
French Level II	FRE102 (Taught in French)	University of Miami	
French Level III	FRE105 (Taught in French)	University of Miami	
Intermediate French	FRE211 (Taught in French)	University of Miami	
French I	Taught in French (Online)	University of Miami Online High School	
French II	Taught in French (Online)	University of Miami Online High School	
Introduction to Literature	LIT2000	City College	
Introduction to Literature	LIT2000-D (Online)	City College	
Oral Communication	GA141	City College	
Personal Development	SLS1201	City College	
Philosophy	PHI2010	City College	
Principles of Marketing	MAR1011	City College	
Principles of Psychology	PSY1011	City College	
Principles of Psychology	PSY1012-D (Online)	City College	
Sociology	SYG2000	City College	
Sociology	SYG2000-D (Online)	City College	
Writing for Management	EN432	City College	BA course

*and **: courses will be taught in November 2006 and May 2007, respectively.

SERVICE

Editorial Board Reviewer, *Journal of International Business Studies*

Ad-hoc Reviewer and Member of the Reader Advisory Board, *The Miami Herald*

Copy Editor, *Management and Organization Review* (journal)

Reviewer, *Academy of Management*. 2006. Divisions: Human Resources and Management Education

Reviewer, *American Educational Research Association*. 2006 and 2005
Division: Postsecondary Education. Section: Faculty, Curriculum, and Research

Reviewer, *Southern Management Association*. 2006, 2005 and 2004
Tracks: Management History / Management Education / International Management, Human Resources / Careers, and Research Methods

Best Paper Award committee member, *Southern Management Association*. 2004
Track: Management Education-History

Chair of SACS Accreditation Committee on Institutional Effectiveness, *City College* (2003-present)

Academic Council Committee member, City College (2001-present)

Library Committee member, *City College* (2001-2005)

Chair of Commencement Committee, *City College* (2001-2006)

Guest speaker for *Miami Dade College*. Undergraduate class of Instructor Patricia Sabates. Topic: *Team Leadership*. (November 2005). Miami, FL.

Guest speaker for the *University of Miami Business School*, Department of Management. Bachelor's Class of Ekin Pellegrini. Topic: *Résumé Writing*. (April 2004). Coral Gables, Florida.

Guest speaker for the *University of Miami Business School*, Department of Management. Graduate class of Dr. Terri A. Scandura. Topic: *Towards a Constructive Résumé*. (March 2004). Coral Gables, Florida.

Guest speaker for the *University of Miami Business School*, Department of Management. M.B.A. class for Dr. Terri A. Scandura. Topic: *Résumé writing*. (February 2004). Coral Gables, Florida.

Southern Management Association: Teaching Methodologies Workshop Coordinator (November 2003). Clearwater, Florida.

Guest speaker for *Boeing* executives. Topic: *Managing Organizational Change*. (June 20, 2003). Cape Canaveral, Florida. Class of Terri A. Scandura.

Guest speaker for the *University of Miami Business School*, Department of Management. M.B.A. class of Dr. Terri A. Scandura. Topic: *Résumé Writing*. (April 2001). Coral Gables, Florida.

AWARDS and RECOGNITIONS

- In *Who's Who in America*. 60th and 61st Editions. 2006 and 2007
- Best Reviewer, *Southern Management Association*. 2005 - Track: Human Resources / Careers
- In *Who's Who in Humanities Higher Education*. 2005
- Best Reviewer, *Southern Management Association*. 2004 - Track: Management Education-History
- In Manchester *Who's Who among Executive and Professional Women* – 2004/2005 Honors Edition
- University of Miami *Purple Iris Award* for Outstanding Teaching from Delta Phi Epsilon Sorority (Fall 2004)
- University of Miami *Purple Iris Award* for Outstanding Teaching from Delta Phi Epsilon Sorority (Spring 2004)

- Faculty of the Quarter – *City College Miami* (2001)

OTHER PROFESSIONAL EXPERIENCES

MARKETING

1996-2001 **Interval International**, Miami, FL.
Marketing Manager. New product development and marketing for 1.3 million-member base. Responsible for directing all domestic travel marketing, advertising, direct mail and collateral productions; coordinated and administered *electronic* advertising programs, assisted in the research and production of new promotional efforts, conducted market studies, suggested marketing strategies while maintaining existing marketing and advertising platforms. Augmented web site to include new programs, solicited new vendors, and developed new partnerships while negotiating marketing contracts, co-op budgets, commissions, and joint promotional projects with all travel suppliers (major cruise line and travel companies). Conducted qualitative and quantitative research to evaluate membership benefits and to increase member retention rate. Hired and managed departmental support staff.

TOURISM

1991-1994 **Pro Lingua**, Paris, France

Translator and coordinator in English-speaking countries. Translator and guide for French speaking groups (15 to 25 students) in the United Kingdom and the United States. Duties included coordination between France and designated foreign countries, and responsibility for foreign language training programs.

COMPUTER SKILLS

- Proficiency in online courses platforms: Blackboard, WebCT, CyberClass, and V-Campus
- Able to work with Microsoft 2003 software (Excel, Front Page, PowerPoint, Publisher, Word), Adobe, PageMaker, File Maker Pro, PhotoShop
- Internet proficient and knowledge of HTML language
- S.P.S.S. proficient (Statistical Package for the Social Sciences)
- Basics of AMOS 6.0 (Statistical software for structural equation modeling)
- AS/400 proficient (Application System used for general business and departmental use)

LANGUAGES

Bilingual French/English
Written German
Conversational Spanish

PROFESSIONAL AFFILIATIONS & INTERESTS

- Member of S.I.O.P. (Society for Industrial and Organizational Psychology)
- Member of A.E.R.A. (American Educational Research Association)
- Member of A.H.R.D. (Academy of Human Resource Development)
- Member of S.M.A. (Southern Management Association)
- Ex-member of M.L.A. (Modern Language Association) and of L.S.A. (Linguistics Society of America)
- Ex-member of *Toastmasters International*, a public speaking organization
- Ex-member of A.R.D.A. (American Resort Development Association)
- Other: Travel Agent license (*Amadeus* and *System One* literate)
- Interests: Architecture, modern art, and aviation (pursuing private pilot license)

"All scientific work has this in common, that we try to comprehend nature in the most parsimonious manner. An explanation of a set of phenomena or of a set of experimental observations gains acceptance only insofar as it gives us intellectual control or comprehension of a relatively wide variety of phenomena in terms of a limited number of concepts. The principle of parsimony is intuitive for anyone who has even slight aptitude for science. The fundamental motivation of science is the craving for the simplest possible comprehension of nature, and it finds satisfaction in the discovery of the simplifying uniformities that we call scientific laws." (Kerlinger & Lee, 2000, p. 857).