~ Knowledge Genesis ~

Bridging Gaps Between

Learning and Understanding

By

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Declaration

This thesis contains no material which has been accepted for the award of any other degree or diploma in any tertiary institution, and to my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made in the text of the thesis.

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Douglas Colbeck

28th January 2009

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Douglas Colbeck

28th January 2009

Abstract

"We can understand almost anything, but we can't understand how we understand!"

Albert Einstein (1879-1955)

As part of trying to understand the world around us, we all engage in the classification and assimilation of new information and knowledge, sometimes with the intention of enhancing our understanding, other times as an attempt to try and rationalise how and where we fit in this often complex world around us. This process of how we discover, qualify and justify differing forms of information and then integrate new information into our pre-existing personal beliefs, redefines our unique personal knowledge database, enabling us to learn new things.

This research is an investigative study into previously unseen personal epistemological belief structures as maintained by clusters of tertiary level undergraduate learners. This study also stands as an exemplar for the methodologies that were developed and utilised in the data harvesting, computational analysis and graphical illustrations of these revealing structures.

The data for this study was harvested using a purposively designed survey instrument. Much deliberation and calculation went into its construction, deployment and subsequent analysis of the response data.

The harvested data was then subjected several differing trial analysis processes before a final three phase analytical methodological approach was determined. The first phase comprised a quantitative multivariate factor analysis utilising Principal Factor Analysis which was also augmented by obliquely rotating the dataset within Euclidean space to calculate meaningful and appropriate factor loadings.

Secondly, a multiple regression analysis was applied to the data, revealing correlational relationships between the observed factor loadings.

Finally, a qualitative overlay codified data analysis founded on grounded analysis techniques was applied to the factor statement groupings in order to enhance as well as offer rich detail to the data being observed.

This mixed-method stance of quantitative and qualitative analysis is gaining greater global acceptance within the field of social research by not only offering greater insight into the data being observed, but also by providing more meaningful interpretation and conclusions from the entire analysis process.

Some of the conclusions reached within this research include the provision of evidence toward: -

- That there are indeed contextually unique, quantifiably founded, hierarchical structures of epistemological beliefs being maintained by clusters of learners.
- That these beliefs are not more or less independent as previously hypothesised, but do in fact appear reciprocally connected within the context of each of the epistemological belief structures observed.
- That these belief structures were also observed to differ when segregated into meta-domain representations of Gender, Domain and Nationality based criterion. The observed structures did however remain somewhat domain dependent, with learners within similar courses of study demonstrating comparable belief constructs.

By understanding epistemic belief structures and using them to develop new strategies aimed at positively influencing learners' personal epistemological beliefs, learners will become more active, higher level, independent thinkers by improving their own personal literacy development, thus allowing them to span the gap between their own learning and understanding.

The transitional journey undertaken to establish the meticulous methodologies used within this study proved truly exhaustive, and it is hoped that the findings herein revealed will enhance the understanding of fundamental belief principles and inform instructional design practices as well as the wider academic community as a whole.

Acknowledgments

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I am also very grateful to my family for all of the help and support they have given me over the course of this project. It would have been impossible without all of their help. Special recognition, and heartfelt appreciation, go to my loving but long-suffering partner, Susan. Without her understanding and compassion as well as her countless dogged hours of proofreading, I feel sure this study would not be in the form it is now.

Finally I need to dedicate this work to the memory of my late father, who I felt was always somewhere close by, watching, encouraging, wondering "what the hell I was doing, and why I wasn't out doing some real work" - but still lending a hand in his own enigmatic way. I wish he was here to share this accomplishment with me.

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Chapter 1: Research Project Introduction

"The learning and knowledge that we have, is, at the most, but little compared with that of which we are ignorant." - Plato

1.1 Chapter Introduction

It is human nature to try and explain what we observe occurring around us, a process that people engaged in long before physical, biological or social sciences were established as disciplines (Black, 1999). As part of this understanding of the world around us, we engage in varying forms of classification and assimilation of new information and knowledge, sometimes with the intent of enhancing our understanding, other times as an attempt to try and rationalise how and where we fit in this often complex world around us (Marton, 1981).

Why do we unflinchingly support a favourite football team? What makes a particular sporting team our favourite in the first place? Why do we prefer one brand of car over another when each will transport us to our required destination?

How we discover, qualify and accept differing forms of information, integrating this information into already existing personal belief structures, redefines our existing knowledge, enabling us to learn new things and allowing us to make informed decisions. This then allows us as individuals to select and then defend the myriad of choices and decisions we make in real life.

Understanding these underlying relationships will significantly assist educators in developing new strategies in order to assist their students to really understand what they are learning and why. This research will also assist other more domain specific research professionals such as those within the field of Artificial Intelligence to understand how we, as mere mortals think, in order to better understand contextually based rule development in order to depict rule-based structures and processes more accurately, algorithmically.

1.2 Reasons behind the Research

Most educators today, coming as they do from all differing forms of current educational disciplines, realise that learners come as a unique package complete with their own unique variety of learning styles and experiences. Prior knowledge, understanding and personal epistemological beliefs play critical roles in how students understand and philosophise concepts within their personal educational environment.

The reason behind this study was to investigate currently held personal epistemological beliefs as maintained by a cluster of learners. This would be instigated by extending existing studies from the literature in order to establish and develop quantitative and qualitative methodologies to expose how and why beliefs are held and maintained by the participants and then to look at what form or structure these factors may possibly adopt.

The end results would enable this researcher to dynamically reproduce the epistemological beliefs structures held by the participants in order to offer clarification and support of key educational philosophies that would better support the development of life long learning skills in students regardless of gender, domain of study or even nationality.

1.3 Research Questions

The questions that guided this study were the following;

1. Can epistemological beliefs be exposed and then reliably reproduced to quantitatively demonstrate varying datasets?
2. Are epistemological beliefs distinguishable across gender, domain or national boundaries?
3. What form or structure can epistemological beliefs adopt in comparison with current ideology within the literature?
4. Can these epistemological belief structures provide insightful dialogue on how learners construct and rationalise their unique forms of knowledge genesis?

1.4 Research Justification

Evidential support is growing in the field of student learning that the theories surrounding epistemological beliefs are occupying an increasingly significant position. Personal epistemology is now influential in many aspects of today's learning environment, areas such as comprehension, literacy, perseverance, and commitment. Personal epistemological development is seen to be developing within multidimensional phases that adjoin what is perceived to be a sequence of progressively complicated beliefs.

Accordingly, the significance of epistemological beliefs is now being recognised more and more as a critical accomplishment within educating today's aspiring learners, and the development of student learning in general. This is in direct contradiction to the level of research currently being conducted on how today's learning environments influence such learners development (Avramides, 2005, Prosser and Trigwell, 2004).

Findings within the current literature suggest that the learner's learning environment does have a major influence on the maintenance of their epistemological beliefs. Tolhurst (2004), released a set of findings based on an investigation into how "changing the structure of an undergraduate course made students more active learners and also influenced their epistemological development".

Tolhurst (2004) goes on to say that "by understanding these beliefs, and the creation of strategies positively influencing the construction and adaptation of their beliefs, it should be possible to encourage learners to become more active, independent and lifelong learners/thinkers, but much more research is clearly needed" (Tolhurst, 2004).

1.5 Project Rationale

The topic of epistemological beliefs is important and recognised globally as a critical factor in future educational planning (Avramides, 2005, Jehng et al., 1993, Qian and Alvermann, 1995, Schommer, 1994a). This factor cannot be ignored, if instructional design methodologies are intended to try and keep pace with our advancing society.

Developing an understanding of what these beliefs are, how they are formed, and how they are influenced will be of significant value toward this end, as during this study it became apparent that these initial epistemological belief structures could be identified, isolated and developed by educators. This would then, enable definable improvements to be made in future educational outcomes, allowing the learner to bridge the gap between what they see as learning compared to what they feel they are really understanding.

1.6 Chapter Summary

This chapter establishes, however briefly, an introduction to this research, the justification and the reasons behind the need for research projects such as this, and finally, the research questions that will be fundamentally explored and answered.

As a result, this project was commenced with a view to hopefully achieve the projected outcomes set by this researcher.

Studies of epistemological beliefs and beliefs structures are still very much at the embryonic stage, but by developing research doctrine within studies such as this, researchers could expose much easier methods of obtaining more fluid understandings of human knowledge genesis processes.

1.7 Thesis Outline

The physical layout of this dissertation is described in detail below.

Chapter one outlines the purpose, drive and aims of the study by providing justification and insight into this research project.

Chapter two reviews the existing literature, especially surrounding the topic of "Constructivism Theory" as well as background information pertaining to currently postulated epistemological models and related theories.

Chapter three details the adopted research methodology as well as the approaches developed and used by this researcher. This research was based on an initial cluster of four hundred and thirty five (435) Australian learners and their responses to the EBS instrument. This dataset was then later expanded to include an American participatory cluster of fifty one (51) learner responses as well as a Chinese participatory cluster of one hundred and four (104) learner responses. This made for a grand total of 590 responses.

The participants were purposively selected from a diverse range of educational environments and domains. This strategy added to the project an internal stability and robustness by ensuring a multifarious and non-insular collection of participatory clusters would be included within the final analysis.

Chapter 4 validates the concepts, reasoning, and confirmatory strategies behind the decisions taken when constructing the Epistemological Beliefs Sampler (EBS) instrument, and discusses how this versioned tool assisted in observing and understanding the beliefs as maintained by the participatory clusters.

Chapter 5 presents the detailed analyses conducted on the datasets harvested by the EBS instrument. General background information is also provided in order to assist in understanding the adopted analysis strategies used by this researcher in an attempt to prove or disprove existing hypotheses concerning epistemological beliefs. There is also discussion surrounding the core categories and sub-themes that surfaced from the data analysis process.

The resultant observed relationships between the emergent categories and prevalent sub-themes will also be described as well as graphically presented. This has been done to add clarification to the results and findings of the overall analysis strategy that was conducted on the dataset(s).

Chapter 6 highlights the extended analysis conducted on all the datasets harvested by the EBS instrument. The entire dataset was portioned off into fields as diverse as Gender, Domain and Nationality based data subsets. The findings from these separate analyses are presented, giving an intensity of insight into how dynamic and diverse each cluster's structure is.

Chapter 7 discusses the main conclusions derived from the data analysis process. Discussed also are the findings relating to the observed epistemological belief structures, with the aim of comparing and contrasting these findings against the current literature. In doing so, the findings within this study may assist in extending the current body of knowledge regarding research into personal epistemological beliefs.

This chapter also provides some reflective considerations on the roles of stakeholders within educational environs and presents further areas for reflective consideration with the thought to expanding and develop this research project further.

Finally this study’s main limitations are also discussed.

The Reference section presents the alphabetically listed source of all works of significance used and cited within this dissertation.

Finally, the Appendices at the end of this document contain:-

- A complete listing of the statements used within the EBS instrument
- A copy of the original request for research participants
- A copy of the original research participants consent form
- A comprehensive listing of the multivariate factor analysis tabulated data, calculated matrices, correlational data and any other calculated data used to support the hypotheses proposed by this researcher

Chapter 2: Literature Review

> *"In recent years, metacognitive research and, more specifically, the interest in so-called `epistemological beliefs' have grown. Research interest in these beliefs is based on the theoretical assumption that;*
>
> *(a) Learners do have identifiable conceptions and beliefs about the nature (and development) of knowledge, and*
>
> *(b) These conceptions and beliefs actually affect the interpretation of learning tasks, the engagement in particular learning activities, and even more strongly, epistemological beliefs affect comprehension in important ways"*
>
> *(Schommer, 1990b)*

2.1 Chapter Introduction

This chapter illustrates and examines in detail the underlying forces and philosophy that have promoted both investigation and discussion of personal epistemological belief construction.

Presented as fundamental to this discussion is the theory of Constructivism and the effect on pedagogical strategies that utilise this methodology. To further assist understanding, a comparison between the accepted Educational Paradigm and the Constructivist Epistemological Paradigm is presented for reflection.

Epistemology, being the cornerstone of this entire project is presented on all its views. The three dominant forces in the field of epistemological research are discussed, as well as a discussion on the justification for the stance taken by this researcher.

Finally, because the seminal research presented by Marlene Schommer-Aikins is a principal focus for this research, her Epistemological Beliefs Model is discussed in some detail, primarily so that there can be clear demarcation between her studies and the advancement into new areas that this research presents. This is supplemented with discussion on other postulated research theories currently developing within the field of personal epistemology.

2.2 Knowledge Genesis ~ One Theory

The traditionally reliant epistemologically related empiricist view of educational services includes such lavish theories as; the educator dispenses wisdom, and the learner soaks it up, filling them with not only boundless truthful knowledge, but also associated skills such as social manners, etiquette, etc (Fitzgerald and Cunningham, 2002).

> *"The students are empty receptacles, or, if not, what we tell them is so shiny and new that it will undoubtedly replace all of those childish notions that they brought with them"* (Powers and Powers, 2000).

Unfortunately this praxis still holds for many current educators and institutions as well as the parents of those unfortunate students. One theory that contradicts this notion is the Theory of Constructivism.

2.3 Knowledge Genesis ~ Constructivism Theory

For the past two decades, or even longer, educators and psychologists alike have used constructivism theory in their efforts to explain learning and the gaining of truth (Glynn et al., 1991, Woo, 2001). Powers and Powers (2000) ask "Can we as researchers ever know the real truth?" Apparently not, as according to the theory of constructivism, none of us really can. Constructivism according to Powers and Powers (2000), maintains that "while there is a physical reality, we can never say that what we know is the truth because all of our knowledge has been constructed from our own personal experiences and social interactions in a particular cultural setting rather than merely passively receiving and storing knowledge as proffered by educators or even as read from textbooks, lecture notes or other similar written sources" (Powers and Powers, 2000).

Since this style of social construction builds recursively on information (facts, ideas and beliefs) that the learner already has acquired, from this information, every learner maintains their own personalised version of what they perceive knowledge to be. Therefore, since no individual can claim that their experience is absolute, no individual can claim their knowledge to be absolute (Atherton, 2005, Ben Ari, 2001, Powers and Powers, 2000).

2.3.1 Knowledge Construction

The theory of constructivism has promoted more successful teaching strategies than those originating within traditional techniques, because the inevitable processes within knowledge construction are explicitly addressed (Ben Ari, 2001, Biggs, 1995, Biggs, 2003, Marton et al., 2004).

According to constructivism theory, an educator cannot overlook the existing knowledge base maintained by their learners, instead, the educator must enter into meaningful discussions with the learner in an attempt to appreciate how the learner understands, or views the understanding process, and only then endeavour to facilitate the learners progress into what is seen as an acceptable and/or correct framework or theory, as understood by the educator (Marton et al., 1984, Powers and Powers, 2000). A term that is commonly used for such views is “alternative frameworks”, denoting that the students maintain consistent personal models, but that they just happen to be a variation of the currently accepted concepts (Mackay, 1997, Steffe and Gale, 1995, von Glaserseld, 1995).

Similarly, von Glaserseld (1995) would never state that the learner’s view of knowledge is wrong, but would argue that “the concepts as understood by the learner are viable provided that they prove adequate in the contexts in which they were created”. Many researchers are of similar opinions that this “alternative framework” or “misconception”, forms the fundamentally essential, prior knowledge critical to the construction of new knowledge (von Glaserseld, 1995). These misconceptions are not considered mistakes, but as a logical construction based on consistent, though non-standard concepts or perceptions as maintained by the learner (Powers and Powers, 2000, Smith et al., 1993).

Learners believe that their version of knowledge must be correct, because their personal perceptions explain exactly what it is that they have experienced. All Constructivists then agree that even if the learner’s ideas appear ridiculous, that they are simply inexperienced within a particular space and lack the social interactions that would dispute and question their ideas within that space (Marton et al., 2004). These erroneous ideas may persist even after the learner is confronted with an alternative concept (Driver and Tiberghien, 1985). Would it be that it would be enough to proffer the correct idea, but the educator is also obliged to explicitly confront these erroneous assumptions, preferably before the learner dismisses them (Ben Ari, 2001, Driver and Tiberghien, 1985, Powers and Powers, 2000, Steffe and Gale, 1995).

Finally, Powers and Powers (2000) declare, that "knowledge is perceived to be constructed in a social setting influenced by the educator. Within this setting learners must be provided with an opportunity to form new knowledge in cooperation and interaction with their peers".

2.3.2 Implications for Educational Methodologies

Within the theory of constructivism there are contained many critical connotations for current teaching methods. As has already been highlighted within the literature, the knowledge base that learners maintain is founded on unique life experiences that the learner has been exposed to. When confronted with teaching techniques that have little or no basis in reality, the learner will tend to ignore or reject any new information and therefore will tend to not alter their existing personal data base. Understandably, educators need to ensure that their methodologies are based on experiential processes if they are to have any measure of success (Powers and Powers, 2000, Steffe and Gale, 1995, von Glaserseld, 1995)

The importance of teaching strategies that use experiential, hands-on learning methodologies is well documented, and these strategies are usually well accepted when carefully integrated within the curricula. Powers and Powers (2000) enlighten us further by clarifying; "the principle of experiential learning also provides theoretical support for a number of formal teaching methods. For example, "discovery learning" is a broadly applied term that has been used to describe any activity in which the learners are free to make there own discoveries about a certain phenomenon" (Biggs, 1995, Powers and Powers, 2000).

The latest teaching method gaining increased popularity is "problem-based learning" (Biggs, 2002). This method is pervasive and increasingly ubiquitous within educational environments by presenting learners with ill-structured problems, putting them in the role of problem-solvers while the educator serves as facilitator or mentor (Atherton, 2005, Ben Ari, 2001, Biggs, 2002, Powers and Powers, 2000). The single most advantageous implication within this methodology is the ability of the educator to supply an almost unceasing array of problems for the learners to ponder and then attempt to solve.

Of the other implications for teaching, the importance of social interaction is also well recognized (Atherton, 2005). In particular, team based work projects or assignments are an important part of the modern educational experience, gaining increased support and use within nearly all levels within the Australian Schooling System. Previously, one of the main criticisms of the Australian educational system was the inability of our learners to work effectively as competent team members (Biggs, 2002, Tarricone and Luca, 2002).

However, as Powers and Powers (2000) inform us, “This recognition is based on the importance of the activity as an end, not as a means to an end. According to the constructivist approach, learners must assimilate new scientific knowledge into their existing frameworks in order to effectively form and express their own opinions, and engage their peers in discussion. The social interaction is the catalyst for acquiring new knowledge; it is not the knowledge itself” (Atherton, 2005, Powers and Powers, 2000).

2.3.3 The Educational Paradigm

“Globalisation and competition, together with a new type of student who place higher value on learning and gaining knowledge rather than credentials, is causing a paradigm shift in higher education” (Aldred, 2003, Hawkins, 2008)

Steffe and Gale (1995) describe an educational paradigm, which can best be described as a construct comprising four components;

1. An ontology which is a theory of existence.
2. An epistemology which is a theory of knowledge, both of knowledge specific to an individual, and of shared human knowledge.
3. A methodology for acquiring and validating knowledge.
4. A pedagogy which is a theory of teaching.

From the Steffe and Gale (1995) developmental framework, Ben Ari (2001) puts forward what he sees a classical educational paradigm:

There is an ontological reality.

   a. The Newtonian model of absolute space and time is the model of reality we use in practice, and we are Platonists who hold that mathematics has an independent existence.

2. Epistemology is foundational.
   a. The truth is out there. Through empirical experiences we can discover absolutely true foundations, and use valid forms of logical deduction to expand true knowledge.
3. The mind is a clean slate that can be filled with transmitted knowledge.
4. Listening to lectures and reading books are the primary means of knowledge transmission. Repetition will ensure that the knowledge is retained (Ben Ari, 2001).

2.3.4 Constructivist Epistemological Paradigm

Ben Ari (2001) then proposes that the constructivist epistemologically based paradigm is dramatically different; he suggests the following educational model.

1. “Ontological reality is at best irrelevant. Since we can never truly ‘know’ anything, ontology cannot influence our educational paradigm.”
2. “The epistemology of constructivism is non-foundationalist and fallible. Absolute truth is unattainable, so there is no foundation of truth on which to build. Knowledge is constructed by each individual and thus necessarily fallible.”
3. “Knowledge is acquired recursively: sensory data is combined with existing knowledge to create new cognitive structures which are in turn the basis for further construction. Knowledge is also created cognitively by reflecting on existing knowledge.”
4. “Passive learning will likely fail, because each student brings a different knowledge framework to the classroom, and will construct new knowledge in a different manner. Learning must be active: the student ‘must construct knowledge assisted by guidance from the teacher and feedback from other students.”

The task of the educator is significantly more difficult in this model than in the conventional educational paradigm described above, because the guidance must be based on, the understanding of each learner's currently existing personal cognitive structure(s). If the learner does not yet have the personal experiences critical to formulating these necessary structures, then the capacity of the learner to bring preconceived models to their educational environment is minimal. The educator must then ensure that an initial feasible ranking structure is constructed and subsequently developed as learning is undertaken (Ben Ari, 2001).

2.3.5 Implications for this Research

Constructivism as a theory, significantly informs us about the task of the educator, the role of peers, of formative assessment within educational domains. This theory also adds a layer of rich information regarding the well documented social difficulties faced by learners in the classroom (Ben Ari, 2001, Biggs, 2002, Biggs, 2003, Marton et al., 2004).

The literature also reveals that performance is no indication of understanding. Madison (1995) elicits; "the internal structures of the learner, is far more helpful than research that measures performance alone and then draws conclusions on the success of a technique". A learner's failure to construct a feasible model about a concept, is not a failure of the learner per se, but of the educational process, even if the perceived failure is not immediately self-evident (Ben Ari, 2001, Madison, 1995).

Learner's come with preconceived models of things such as what a computer is, whether or not they (the learner) are visual learners, or even ideas about what side of their brain (or coloured hat) they use when learning. Exposure to internet founded information and the ability to converse via ever improving modern communication technologies, bombard the learner's cognitive skills with limited accessibility to other sources of information or methodologies that could assist in the creation of contextually based and not misconceived models of prior knowledge (Ben Ari, 2001, Hawkins, 2008, Powers and Powers, 2000).

2.4 Epistemology – an Overview

The Macquarie Concise Dictionary defines Epistemology as: -

/əpɪstə'mɒlədʒi/ *noun* the branch of philosophy that deals with the origin, nature, methods, and limits of human knowledge. [Greek: knowledge]

--**epistemological** /əpɪstəmə'lɒdʒɪkəl/, *adjective*

--**epistemologically** /əpɪstəmə'lɒdʒɪkli/, *adverb*
--**epistemologist**, *noun*

Figure 1: Definition of Epistemology

According to Hofer and Pintrich (1997), “Epistemology is an area of philosophy concerned with the nature and justification of human knowledge. A growing area of interest for psychologists and educators is that of personal epistemological development and epistemological beliefs: how individuals come to know, the theories and beliefs they hold about knowing, and the manner in which such epistemological premises are a part of, and an influence on, the cognitive processes of thinking and reasoning”.

Over the course of the past two decades, there have been a number of research programs that have investigated students’ thinking as well as their beliefs about the nature of knowledge and knowing. Some of the areas under investigation include definitions of knowledge, how knowledge is constructed, and even how knowledge is evaluated. However, each of these research programs has used differing conceptual frameworks as well as relatively diverse methodologies to examine students’ epistemological beliefs and thinking.

Hofer and Pintrich (1997) go on to state that; “Epistemology is the study of theories of knowledge or ways of knowing, particularly in the context of the limits or validity and how we come to understand the various ways of knowing and learning”.

The definition of the term “learning” as used in this discussion by Hofer and Pintrich (1997) relate to the perspectives of human and social constructivist paradigms as presented by Mintzes et al. (2000) and Mintzes (2006).

Bransford et al. (1999) supports this position by adding “from these perspectives it is considered that learners build knowledge and understanding for themselves through their personal, social and culturally mediated experiences”. Bransford et al. (1999)

also defines learning as "being viewed as both a process and a product that encompasses several dimensions including, socio-cultural, cognitive, aesthetic, motivational, and collaborative" (Bransford et al., 1999, Mintzes, 2006, Mintzes et al., 2000).

Learning is perceived as being ongoing, developed by stages, and contextually bound where alteration, justification and assimilation of new knowledge is produced through personal experience or successive experiences, which, as Woo (2001) states, "are interpreted in the light of prior understanding". It should therefore be considered that every learner's personal knowledge base and unique understanding is continually transforming, almost in a perpetual state of creation and maintenance, as new experiences are encountered, interpreted and finally assimilated by the learner (Anderson and Piscitelli, 2002, Woo, 2001).

2.5 Epistemological Positions

As Anderson and Piscitelli (2002) explain;

> *"To these ends we see learning as any change that occurs in the person's knowledge, understanding, and/or disposition."*

The three main epistemological positions in currently defined within the literature are shown in Figure 2: Epistemological Relationships, and are discussed in further detail below.

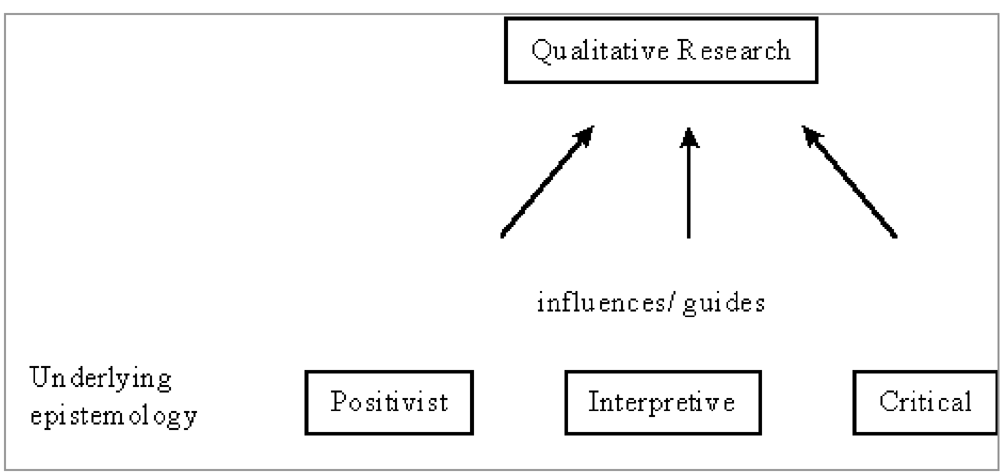


Figure 2: Epistemological Relationships

2.5.1 Positivism

Positivism holds the position that the ambition of attaining knowledge is to basically describe all phenomena that we experience. The function of science is to simply maintain a position relating directly to what can be observed and measured. Trochim (2002), reinforces this position by stating that “Knowledge of anything beyond that, a positivist would hold, is impossible!” (Trochim, 2002).

Positivists also generally assume that “reality is objectively given and can be described by measurable properties, which are independent of the observer (researcher) and their instruments”. Trochim (2002) also states that “positivist studies generally attempt to test theory, in an attempt to increase the predictive understanding of phenomena”.

In the positivist view of the world, as seen by Trochim (2002), science is maintained as the principle mechanism that allows us access to all forms of truth. Science is also seen as a means to understand the world around us in an effort to actually try and control it by predicting what it (the world) is capable of and deploying already conceived contingency plans. Trochim (2002) states that “the world and the universe are considered deterministic; they both operate by laws of cause and effect that could be discerned if the unique approach of the scientific method is applied” (Trochim, 2002).

Deductive reasoning can be used therefore to postulate and test theories. Armed with the results of these tests we may well conceive that a proposed theory just doesn’t fit with what we know to be the facts, and may need to be recalculated in order to better envisage reality with the facts that we have. Positivists also believe in empiricism, this maintains the position that observation and measurement of a phenomena is the critical heart of acceptable scientific enterprise. The accepted core approach of the scientific method consists of the experiment, which is an endeavour to discern natural laws through direct manipulation and observation in our attempts to predict and control the future (Hammersley, 1999, Trochim, 2002).

2.5.2 Interpretivism

Researchers aspiring to an interpretivist philosophy start with an intrinsic assumption that only through social constructs such as, language, consciousness and shared meaning can they access reality. The philosophical base of interpretive research is hermeneutics and phenomenology (Bleicher, 1980, Boland and Day, 1991, Neuman, 2003).

Interpretive studies try to understand phenomena through the meanings that people assign to them. This view is directly opposite to the Positivist stance in which science must be objective, by claiming that all observations are affected by a large array of higher involving issues such as personal viewpoints and past experiences of the researcher (Darke and Shanks, 1997, Wood-Harper, 1992).

Interpretive researchers also recognise and support that language and semantics may contain different meanings for each unique individual and only by a deep understanding of the phenomena holistically, can insightful knowledge be gained (Myers, 1997b, Myers and Walsham, 1998).

Consequently, unlike Positivist research activities, the results of interpretive research are not generally repeatable, nor are they generally applicable to a wide range of situations and scenarios. Nevertheless the results are extremely significant for the related scenario and participants as well as the researcher, and can be influential in similar situations that closely resemble the original research (Bernstein, 1983, Butler, 1998, Myers, 1997b).

2.5.3 Critical Social Science

Critical social science is defined by Fay (1987) as "a practical social science that can inspire people to become socially active in order to correct their socio-economic and political circumstances so that they might satisfy their basic life needs". Fay (1987) then goes on to discuss three core ideas of critical social science: being enlightenment, empowerment and emancipation (Fay, 1987).

2.5.3.1 Enlightenment

Enlightenment attempts to inform people about their unique and difficult situation and expose their latent capability to modify their current situation in an attempt to meet or exceed their perceived needs. Enlightenment is seen as being accomplished through matters of reflection, discussion (social and personal communication) and resolution of so-called "quasi-causes" of their unique and difficult socially related circumstance (Fay, 1984, Fay, 1987, Klein and Myers, 1999).

Unfettered forms of all communication streams must be seen to be encouraged by the intrinsically interconnected social and political institutions within our modern forms of society, thereby ensuring proper discussion. Participants within these discussions must also try and agree to mutually acceptable definitions regarding the meanings directly relating to words, gestures and symbols used within all communication processes. True communication is universally accepted as being founded on collective acceptance of the language form used to convey any forms communication between correlated parties within any discourse (Klein and Myers, 1999).

2.5.3.2 Empowerment

Empowerment is, according to Fay (1987); "considered a practical force which stimulates a people to take action, which is meant to improve their social condition". Susman (1983) adds to this by stating "the recipients of an expected positive result take the social actions. It is not the 'expert' who decides the action to be taken to improve others' quality of life. It is the recipient of the service that makes the determination" (Fay, 1987, Susman, 1983).

2.5.3.3 Emancipation

Emancipation can therefore be seen as a form of liberation directly resulting from the nature of social action. Consequently, people may become self-emancipated as a result of their own form of reflection and as a result of their own social action(s), from what can be seen and understood to be an oppressive, problematic, social situation (Bernstein, 1983, Habermas, 1984).

According to Fay (1987), "Critical researchers assume that social reality is historically constituted and that it is produced and reproduced by people. Although people can consciously act to change their social and economic circumstances, critical researchers recognize that their ability to do so is constrained by various forms of social, cultural and political domination" (Fay, 1987).

The focal position maintained by critical research is perceived as being one of "social critique", within this position the constrained and discriminating environment of "the status quo" are illuminated. It can be said then that critical research focuses on antagonisms, arguments and disagreements often found within contemporary society, whilst also agreeing with the Interpretivist stance that the examination of Social Science phenomena should not be objective (Hirschheim and Klein, 1994, Klein and Myers, 1999, Neuman, 2003, Ngwenyama, 1991).

2.5.4 Research Epistemological Stance

This research focuses upon uncovering existing epistemological beliefs and belief structures maintained by the participants. This research is also exploring how the participants perceive, justify and assimilate new information in their attempt to not only learn new knowledge, but to understand and gain new wisdom.

Critical Social Science epistemology is viewed as inappropriate as the researcher was not inserted into the educational environment to alter, inspire, or make any differences, but to merely observe and understand the data as it emerges from an intensive analysis process.

Within the selected participatory clusters there are bound to be differing cultural and ethnographic backgrounds combined with differing levels of experience and chronological maturity of the learners. This conundrum alone will give credence, depth and validity to the research by adding a rich, layer of personal experiences as proffered by the participants.

As the aims of this research could also be considered mainly objective, so a positivist epistemology was regarded as being the most appropriate approach for this researcher.

2.6 Epistemological Research Reviewed

What follows is a somewhat chronologically based discussion on the advancements within epistemological research.

The development and findings of most current epistemological research projects have been well documented to date, each offering a juxtaposed position with the most recent previously published work. Similarly, this research also offers some historical linkage but adopts a somewhat diverse position to most other projects.

During the 1950's psychological research and educational theories were dominated by Behaviourism which deliberately segregated the concepts of knowing and learning (Kohlberg, 1971). Piaget (1950) first penned the term "genetic epistemology" to describe his theory of intellectual development, initiating the interest of developmental psychologists in this intersection of philosophy and psychology (Piaget, 1950). Bringing knowing back into the picture was central to emerging theories of moral judgment and development (Gilligan, 1982, Keegan, 1982, Kohlberg, 1969, Kohlberg, 1971).

William G. Perry (Jnr) is generally credited with being the founding figure of most epistemological research development, where in Perry (1970), he attempts to understand how students' interpreted pluralistic educational experiences had led to a theory of epistemological development in college students (Perry, 1970).

2.6.1 Main Issues Addressed Within the Literature

In Hofer and Pintrich (2002), current developmental research on epistemological beliefs and reasoning is acknowledged as having addressed six general issues:

1) Refining and extending Perry's developmental sequence (King and Kitchener, 1994, King et al., 1983, Kitchener, 1986).
2) Developing more simplified measurement tools for assessing such development (Baxter Magolda and Porterfield, 1985, Knefelkamp, 1974, Moore, 1989, Widick, 1975).
3) Exploring gender-related patterns in knowing (Baxter Magolda, 1992, Belenky et al., 1986).
4) Examining how epistemological awareness is a part of thinking and reasoning processes (King and Kitchener, 1994, Kuhn, 1991).
5) Identifying dimensions of epistemological beliefs (Schommer, 1990a, Schommer, 1994b); and, most recently,
6) Assessing how these beliefs link to other cognitive and motivational processes (Butler and Winne, 1995, Hofer, 1994, Ryan, 1984a, Ryan, 1984b, Schommer, 1990a, Schommer, 1993a, Schommer et al., 1992, Schutz et al., 1993).

However, in all this research there is very little agreement on the actual construct under study, the dimensions it encompasses, whether epistemological beliefs are domain specific or how such beliefs might connect to disciplinary beliefs, and what the linkages might be to other constructs in cognition and motivation. In addition, there have been no attempts to conceptually integrate the early Piagetian-framed developmental work on epistemological beliefs to newer cognitive approaches such as theory of mind or conceptual change (Hofer and Pintrich, 1997).

2.7 Epistemological Methodologies and Instruments

As mentioned earlier, psychological research on epistemological development began during the mid 1950s, and since that inception there has been three distinct, yet interwoven paths of research, all of which discuss and define the six main issues identified and presented above.

Inspired by the original work of Perry (1970), Baxter Magolda (1987, 1992); Belenky et al., (1986); and Perry (1970, 1981) have all posited models that are to some degree structural, developmental sequences. This group has been largely interested in how individual learners interpret their educational experiences.

Perry instigated research into this domain by using participatory sampling that was almost entirely male. Belenky et al. (1986) investigated the feminine side of this domain utilising an exclusively female participatory sample. Baxter Magolda (1987, 1992) however, investigated the concepts of gender implications by accepting both male and female participatory samples into her research.

King & Kitchener (1994), Kitchener & King (1981), Kitchener, et al., (1989), and Kitchener, et al., (1993) comprise a second group of researchers that have been investigating “how epistemological assumptions influence thinking and reasoning processes, focusing on reflective judgment and skills of argumentation” (Kuhn, 1991, Kuhn, 1993). Slight differences can be observed within the theories and models that are offered from this group, but this is also influenced by the level of investigation of the inquiry as well as the participatory cluster population being studied, facts not lost on this researcher. There has been some concurrence in terms as to “what individuals believe knowledge is and how it is they know” (Hofer and Pintrich, 2002, Hofer and Pintrich, 1997).

A third and more recent line of research undertaken by Ryan (1984a, 1984b) and Schommer (1990, 1994), has taken a tangent approach that epistemological ideas are a system of more or less independent beliefs rather than reflecting any coherent developmental structure. It is hypothesised that these beliefs may also influence comprehension and cognition applicable to academic tasks.

These accepted mainstream epistemological development research theories and epistemological belief models are discussed in detail below.

2.7.1 Perry's Scheme of Intellectual and Ethical Development

Nearly all existing research on epistemological beliefs can trace its lineage back to two longitudinal studies undertaken by William Perry that began in the early 1950s at Harvard’s Bureau of Study Counsel (Hofer and Pintrich, 1997). His work culminated in a developmental scheme of abstract structural aspects of knowing and valuing as held by his college students (Perry, 1970).

Perry was interested in the responses of students when faced with the intellectual and social environment of the university. He developed an instrument that he called the Check-list of Educational Values (CLEV). Perry based the CLEV on the authoritarian personality research undertaken by Adorno, Frenkel-Brunswik, Levinson, & Sanford, (1950) and Stern's (1953) “Instrument of Beliefs”. Perry was operating on a prevailing mental model of the time that differences in student responses to the relativistic world they encountered in college were largely attributable to each individual’s personality (Adorno et al., 1950, Stern, 1953) in (Hofer and Pintrich, 1997).

2.7.1.1 The Check-list of Educational Values (CLEV)

Perry administered the CLEV to a random sample of 313 first year college students in 1954 – 1955, and then invited thirty one students (twenty seven men and four women) for annual follow-up interviews. After reviewing the transcripts of these interviews, Perry and his staff concluded that there was not so much a matter of personality evident in the manner in which the students made meaning of their environment, rather there was more compelling evidence toward a logically coherent, cognitive developmental process.

Based on these interviews, Perry and his colleagues outlined a proposal of intellectual and ethical development that included a sequence of nine positions, along with the transitional steps that appeared to provide transformation from one level to another, and then launched a second longitudinal study to validate the scheme, with a randomly selected group of 109 first-year students (eighty five male and twenty four female) from the entering classes of 1958 – 1960, who were then followed for their four years of college. However, only two females out of the original twenty four were included in the final published results of this study. Why the remaining females were omitted is still unclear (Hofer and Pintrich, 1997).

2.7.1.2 Perry's Model

Perry's scheme of intellectual and ethical development suggests that the learner constantly adjusts and evaluates their thought processes when attaching meaning and/or relevance to their experiences. Within Perry's scheme the defined levels are described as positions of development rather than formal developmental stages, all of which share constructs similar to other Piagetian-type developmental schemes.

These positions as proposed by Perry appear to represent an invariant sequence of hierarchically integrated structures. Changes in acceptance or the making of meaning is brought about through cognitive disequilibrium. By interacting within their educational environment and responding to new situations or challenges the individual learner is faced with either assimilating the new experience within their own existing knowledge constructs, or accepting the new experience as a totally new construct.

The nine positions of the Perry's scheme have typically been clustered into four sequential categories (Knefelkamp and Slepitza, 1978, Kurfiss, 1988, Moore, 1994). See Table 1: Perry's Model of Epistemological Development, from (Hofer and Pintrich, 1997).

Intellectual and Ethical Development (Perry)	
Categories	*Positions of Development*
Dualism	(1) absolute right (2) absolute wrong
Multiplicity	(3) truth within authority (4) truth without authority
Relativism	(5) creator of meaning (6) decisions on meaning
Commitment within Relativism	(7) responsibility (8) engagement (9) forging commitment

Table 1: Perry's Model of Epistemological Development

Dualism

Positions 1 and 2 are characterized by a dualistic, absolutist right and-wrong view of the world. Within this world, Authorities are expected to know what the truth is and are able to convey it to the learner.

Multiplicity

Position 3 represents a somewhat minor modification of dualism, with the beginning of the recognition of diversity and uncertainty. Authorities who disagree haven't yet found the right answer, but truth is still knowable. By Position 4, dualism is modified again; areas in which there are no absolute answers are outside the realm of authority. An individual at this position is inclined to believe that all views are equally valid and that each person has an intrinsic right to his or her own opinion.

Relativism

Position 5 is the watershed of the scheme, as individuals make the shift from a dualistic view of the world to a view of contextual relativism that will continue, with modifications, through the upper stages. A major shift is in the perception of self as an active maker of meaning. At Position 6 individuals perceive knowledge as relative, contingent, and contextual and begin to realize the need to choose and affirm one's own commitments.

Commitment within Relativism

The final positions, 7 through 9, reflect a focus on responsibility, engagement, and the forging of commitment within relativism. Individuals make and affirm commitments to values, careers, relationships, and personal identity. Developments in the upper positions are described by Perry as more qualitative than structural, and are not marked by formative change. Although proposed as part of the scheme, these positions were not commonly found among college students.

Perry did not conduct further research to explore linkages between his conception of epistemological development and student learning, but he did speculate in later work on possible connections among cognitive styles, learning strategies and development. Perry hypothesized that "changes in students' views of the nature of knowledge and the role of authority will lead to observable changes in manner of studying, as expressions of changes in altered modes of learning and cognition" (Hofer and Pintrich, 1997).

2.7.1.3 Perry's Model (Conclusion)

Perry was the first to postulate that students made sense of their educational experience, not by way of a reflection of personality but, by an evolving developmental process.

A core principal of his scheme has been the manifestation of the dualistic, multiplistic, and relativistic points of view that characterized the epistemological outlook of many college students.

Perry also accepted that his research had several notable limitations which included;

- Participants were student volunteers from a single college.
- Investigators who abstracted the scheme also served as the interviewers.
- Validation was conducted in relation to the data from which the scheme itself was derived.
- The sample was largely composed of White, elite, male college students educated at Harvard during the 1950s (Perry, 1970).

Notwithstanding these self expressed limitations of his original study, Perry's work laid the foundations for many research projects that followed this seminal work, and much of the research today can trace its lineage back to his original thoughts and hypotheses.

2.7.2 Women's Ways of Knowing

During the 1970's, the limitations residing within Perry's work came under scrutiny, particularly where Perry had tried to generalise his findings to a larger general population base from an elite male sample cluster (Gilligan, 1982). By providing a purely male sample, Perry's theory was challenged by Gilligan (1982), on the basis that a purely male sample could only provide a normative view of psychological theories derived only from male experience.

Theories based on gender exclusive data often provide a model for human development against which the excluded gender (in this case, female) is judged deficient. It was therefore postulated that this theory only contained traditionally masculine attributes and values.

In this context, Belenky et al. (1986) developed an interest in issues pertaining to the female gender. Using the foundation work constructed by Perry, Belenky et al. (1986)

then developed a model that drew on five different perspectives “from which women view reality and draw conclusions about truth, knowledge, and authority” (Belenky et al., 1986).

2.7.2.1 Epistemological Perspectives

Belenky et al. (1986) used an interview-case study approach where they interviewed one hundred and thirty five women, of whom ninety were enrolled, or recently enrolled, in one of six diverse academic institutions and forty five were involved in human service agencies.

Because of the resolve of the researchers to use a similar approach to Perry’s earlier methodology, they were committed to a similar phenomenological approach when conducting their interviews with the participants. Each interview lasted from two to five hours in total.

Independent scoring during the analyses of the interview transcriptions was applied to any material pertaining to the work of Gilligan, Kohlberg, or Perry. The preliminary attempts by the researchers to classify the data using Perry's scheme met with mixed results due to the lack of fit with Perry’s model. This led to the development of a new classification scheme of five epistemological perspectives (Belenky et al., 1986, Hofer and Pintrich, 1997).

2.7.2.2 The Epistemological Perspectives Model

Belenky et al. (1986) proposed model that provided for “five differing epistemological perspectives from which women know and view the world”. Like Perry’s research, these are also not described as stages, but there is some discussion and speculation on possible developmental constructs within the model (Hofer and Pintrich, 1997). In Table 2: Belenky's Epistemological Perspectives, the epistemological perspectives model is compared with the relevant positions within Perry's model.

The positions of silence and received knowledge generally correspond to Perry’s position of Dualism, where “in Silence - women experience a passive, voiceless existence, listening solely to external authority and in received knowledge, they maintain a perspective of either/or thinking in which there is only a singular correct answer and all ideas are viewed in a monochromatic way as being either good or bad, true or false”. All the women in this position see knowing as originating outside of themselves.

Subjective knowledge still maintains a multiplicity within its dualistic nature, but the source of truth and information is realised as being within oneself. Belenky et al. (1986) describe the male as having the right to assert their own opinion, where the female sees truth as something more intuitive and personally experienced.

The position of procedural knowledge is described by Belenky et al. (1986) as having two forms or epistemological orientations. Separate knowing is impersonal and detached but evident within critical thinking. Connected knowing is still considered procedural where truth develops more contextually and within a capacity for empathically founded experience. The mode of knowing is personal and emphasizes understanding over judgment. These epistemological orientations are not described as gender specific but as possibly gender related (Belenky et al., 1986). See Table 2: Belenky's Epistemological Perspectives.

Intellectual and Ethical Development (Perry)	Women’s Way of Knowing (Belenky et al.)
Position	*Epistemological Perspectives*
Dualism	Silence Received knowledge
Multiplicity	Subjective knowledge
Relativism	Procedural knowledge (a) Connected knowing (b) Separate knowing
Commitment within Relativism	Constructed knowledge

Table 2: Belenky's Epistemological Perspectives

The perspective of constructed knowledge represents an integration of subjective and objective strategies for knowing. Within this perspective, knowledge and truth are seen as being contextual and the individual learner sees themself as a contributor in the construction of both personal and shared knowledge (Hofer and Pintrich, 1997).

2.7.2.3 Epistemological Perspectives Model (Conclusion)

Belenky et al. (1986) expanded and enhanced Perry's original research by extending the framework to include female perspectives. By doing this they also offered themselves up for similar gender exclusivity criticisms as also experienced by Perry in his earlier study. Criticisms were also raised as to the ordering of the interview stages, as questions and concepts used earlier within the interview process may have had some effect on later responses.

Other criticisms arose that centred on the use of participants that were past members of the institutions approached, and in fact were not even currently enrolled at the institution at the time. Similarly less educated women received shorter questions in sharp contrast to longer questions offered to the more educated female participants, on the role of expertise in their own learning. This caused a variance in the interview protocols creating some difficulties in drawing meaningful conclusions from the two populations which resulted in a difference of epistemological perspectives.

One of the major conceptual differences with Perry's work is that Perry's positions are descriptive of the nature of knowledge and truth, while Belenky et al. (1986) focused more on the source of knowledge and truth.

Considerable use has been made of the "women's ways of knowing" model by educators, particularly at the tertiary level. The most useful heuristic seems to have been the distinction between separate knowing and connected knowing, which has served as a means for understanding gender-related approaches to learning, in (Hofer and Pintrich, 1997)

2.7.3 Epistemological Reflection Model

In 1986, Marcia Baxter Magolda began a five year study of one hundred and one randomly selected students (fifty one female, fifty male) from Miami University in Ohio. Baxter Magolda's study initially intended to quantify the learner's way of thinking as presented by Perry (1970) by developing and validating her Measure of Epistemological Reflection (MER) instrument (Baxter Magolda, 1987, Baxter Magolda and Porterfield, 1985).

2.7.3.1 The Measure of Epistemological Reflections (MER)

The Measure of Epistemological Reflections (MER) was developed in conjunction with other studies undertaken by Baxter Magolda that involved both undergraduate and graduate students. Baxter Magolda was confronted with patterns of responses that did not neatly fit the then current epistemological scheme and was intrigued by the discrepancies in findings between the men in Perry's study and the women in the study of Belenky et al. (1986).

Baxter Magolda then also became interested in possible gender-related implications. Accordingly, she then designed a longitudinal study of epistemological development and how epistemological assumptions affect interpretation of educational experiences (Baxter Magolda, 1992, Baxter Magolda and Porterfield, 1985, Hofer, 1994, Hofer and Pintrich, 1997).

In 1986 Baxter Magolda began her research. She conducted annual open-ended interviews and gave participants the Measure of Epistemological Reflections (MER), to be completed and returned later. Seventy complete longitudinal sets were interpreted in the development of the epistemological reflection model (Baxter Magolda, 1992).

The first-year interviews were designed to address six areas of epistemological development:

1. The role of the learner,
2. The role of the instructor,
3. The role of the peers,
4. The role of evaluation in learning,
5. The nature of knowledge, and
6. Decision making.

In the following years the interview structure was modified to include questions about “the Nature of Knowledge”, “out-of-class learning”, and “learner changes in response to learning experiences”. Baxter Magolda (1992) reports developing a coding analysis structure based on Perry's first five positions, as well as the five perspectives of Belenky et al. (1986), where she initially analysed the interview data by categorisation of themes based on the learners’ responses. Later reflection on this process and a transformation in her thinking brought about a more naturalistic, qualitative reinterpretation of the data and the development of her model, see; Table 3: Epistemological Reflection Model.

Intellectual and Ethical Development (Perry)	Women's Way of Knowing (Belenky et al.)	Epistemological Reflection (Baxter Magolda)
Position	*Epistemological Perspectives*	*Ways of Knowing*
Dualism	Silence Received knowledge	Absolute knowing
Multiplicity	Subjective knowledge	Transitional knowing
Relativism	Procedural knowledge (a) Connected knowing (b) Separate knowing	Independent knowing
Commitment within Relativism	Constructed knowledge	Contextual knowing

Table 3: Epistemological Reflection Model

Baxter Magolda (1992) reports that each of her four qualitatively different "ways of knowing," leads to "particular expectations of the learner, peers, and educator in an educational environment. The definition of epistemology that emerges from these categories is focused more on the nature of learning as situated in the college classroom context and less on assumptions about knowledge itself (Baxter Magolda, 1992, Hofer and Pintrich, 1997).

Within the Baxter Magolda model, the following stances are described,

- *'Absolute knowers'* view knowledge as certain and believe that authorities have all the answers.
- *'Transitional knowers'* discover that authorities are not necessarily all-knowing and so begin to accept the notion recounting an uncertainty of knowledge.
- Those who are *'independent knowers'* begin to question any authoritative source as the only basis of gaining knowledge and begin to embrace the thought that their own opinions and judgements are equally valid.
- *'Contextual knowers'* are proficient in constructing and developing somewhat individual perspective, through their ability to judge temporal evidence within context.

Expertise itself is subjected to evaluation. Knowledge evolves, and appears to be continually reconstructed on the basis of new evidence and new contexts (Baxter Magolda, 1992).

By co-joining previous primarily single gender research with an overlay of a more naturalistic and qualitative methodology, Baxter Magolda was able to build on the previous studies which enabled her to report findings that were associated with gender-related reasoning patterns that demonstrated some familiar ground across the first three ways of knowing.

These are described as representing a continuum of differences in how students justify epistemic assumptions within each of the ways of knowing.

- Within absolute knowing, the two patterns are;
  - Receiving, used more often by females than by males in the study, and
  - Mastery, a pattern more common to the males.
- The patterns for transitional knowers are;
  - Interpersonal (more likely among females), and
  - Impersonal (more likely among male).
- Patterns for independent knowers are;
  - Inter-individual (more likely among females), and
  - Individual (more likely among male).

Baxter Magolda further hypothesizes that the patterns may converge within contextual knowing (Baxter Magolda, 1992, Hofer and Pintrich, 2002, Hofer and Pintrich, 1997).

2.7.3.2 Epistemological Reflection Model (Conclusion)

Baxter Magolda (1992) appears to have identified a gap in the then current epistemological research, regarding gender-related patterns of epistemological development of both male and female learners. Her overall findings appear consistent with those of Belenky et al. (1986), in suggesting that there may be gender-related patterns in knowing, but that both epistemological theory patterns appear among both genders.

On the negative side, Baxter Magolda's (1992) sample consisted of college students at only one institution, in this case a mid-size Midwestern university where students were of traditional age, mostly white (97%), and largely from middle-class, two-parent families. The initial scope of the study was to examine how epistemological assumptions affected interpretations of educational experiences, but this was limited by the fact that epistemology, as it appears to have been defined in this study, largely consisted of student perceptions of learning experiences (Hofer and Pintrich, 1997).

2.7.4 Reflective Judgment

Using the work of Perry (1970) as a foundation for their study, along with the research conducted by Dewey (1933) & Dewey (1938), on reflective thinking, King and Kitchener studied the epistemic assumptions that underlie reasoning (King and Kitchener, 1994, King et al., 1983, King et al., 1989, Kitchener, 1983, Kitchener, 1986, Kitchener and King, 1981, Kitchener and King, 1989, Kitchener et al., 1993).

Some fifteen years of transcribing and analysing interview studies went into their work using participants from various educational institutions in their region, the ages of their participants ranging from high school through to mature-age learners.

2.7.4.1 The Reflective Judgment Model

The Reflective Judgment Model is a seven-stage developmental model that maintains a focus on epistemic cognition, or the means that humans use to comprehend the process of knowing and the related ways in which they can then justify their beliefs concerning ill-structured problems (King and Kitchener, 1994). King and Kitchener (1994) support this argument by adding "reflective judgment is the ultimate outcome, and developmental endpoint, of reasoning and the ability to evaluate knowledge".

The methodology behind the model uses a qualitative interview process constructed around four ill-structured problems. King and Kitchener (1994) asked their participants to "state and justify their point of view and respond to six follow-up questions designed to tap assumptions about knowledge and how it is gained".

The problems posed to the participants typically related to topics such as;

- How the pyramids were built,
- The safety of chemical additives in food,
- The objectivity of news reporting, and
- The issue of creation and evolution.

Transcripts of the interviews were scored by trained, certified coders in a three phase codification process. Within each stage, the scoring rules were divided into two sections: “the Nature of Knowledge” and “the Nature of Justification”, each of these had three subsections.

The Nature of Knowledge consists of;

- One's view of knowledge,
- Right versus wrong knowledge, and
- Legitimacy of differences in viewpoints.

The Nature of Justification consists of;

- The concept of justification,
- Use of evidence, and
- The role of authority in making judgments.

The reflective judgment model consists of seven qualitatively different stages that describe how individuals perceive and reason about ill-structured problems. Throughout each of the reflective judgment stages, the focus is on both the individual's conception of the nature of knowledge and the nature or process of justification for knowledge.

Within the seven-stage model there are three levels (see Table 4: Reflective Judgment Model).

Intellectual and Ethical Development (Perry)	Women's Way of Knowing (Belenky et al.)	Epistemological Reflection (Baxter Magolda)	Reflective Judgment (King & Kitchener)
Position	*Epistemological Perspectives*	*Ways of Knowing*	*Reflective Judgment Stages*
Dualism	Silence Received knowledge	Absolute knowing	Pre-reflective thinking
Multiplicity	Subjective knowledge	Transitional knowing	Quasi-reflective Thinking
Relativism	Procedural knowledge (a) Connected knowing (b) Separate knowing	Independent knowing	
Commitment within Relativism	Constructed knowledge	Contextual knowing	Reflective thinking

Table 4: Reflective Judgment Model

In the Pre-reflective thinking (Stages 1, 2, and 3) stages, individuals are unlikely to perceive that problems exist for which there may be no correct answer.

Stage 1: In this stage, hypothesized as typical in young children but not identified in pure form in any of the subjects in King and Kitchener's studies, knowledge is simple, concrete, and absolute and needs no justification. There is a one-to-one correspondence between what one observes and the perception of truth.

Stage 2: This stage is similar to Perry's dualism, and posits a true reality known by authorities, but not by everyone.

Stage 3: By this stage there is recognition of temporary uncertainty, that authorities may not currently have the truth. This temporary uncertainty allows for judgments based on personal opinion, these pre-reflective stages are similar to the initial positions in the other models displayed in Table 4: Reflective Judgment Model.

Quasi-reflective thinking (Stages 4 and 5) characterizes the reasoning of Stages 4 and 5, which are marked by a growing realization that one cannot know with certainty.

Stage 4: Realisations emerging at this stage are that knowledge and the justification of knowledge are perceived as abstractions, but are poorly differentiated. Paralleling Perry's multiplicity period (see Table 1: Perry’s Model of Epistemological Development). This stage is marked by the view that each person is entitled to their own opinion.

Stage 5: This stage is similar to Perry's period of relativism, is characterized by the belief that knowledge is contextual and relative. King and Kitchener (1994) associate this as “What is known is always limited by the perspective of the knower”. At this stage individuals are capable of relating two abstractions and can thus relate evidence and arguments to knowing, although the ability to coordinate these into a well reasoned argument is not yet present. As shown in Table 4: Reflective Judgment Model, quasi-reflective thinking cuts across several different positions or perspectives relative to the other illustrated models.

Reflective thinking (Stages 6 and 7) emerges in Stages 6 and 7. Knowledge is actively constructed and must be understood contextually; judgments are open to re-evaluation.

Stage 6: At this stage, the action of knowing shifts, moving the knower from spectator to a position as an active constructor of meaning. Knowledge is uncertain and contextual, but it is now possible to coordinate knowing and justification to draw conclusions across perspectives. Expert authority is again cited, but now it is critically evaluated. Conclusions remain limited and situational at this stage.

Stage 7: Thinking is now marked by the use of critical inquiry and probabilistic justification to guide knowledge construction. Through this process individuals are able to determine that some judgments are more reasonable or valid than others, but with an awareness that all conclusions may be re-evaluated (Hofer and Pintrich, 1997).

King and Kitchener (1994) claim that their model is one of developmental stages, as the stages seem to form an underlying organisational structure although each stage qualitatively differentiates from its neighbour. The stages also appear to form an invariant sequence of developmental change (Hofer and Pintrich, 2002, Hofer and Pintrich, 1997, King and Kitchener, 1994).

This is in contrast to Flavell’s (1971) posited theory that developmental change is abrupt and segmented (Flavell, 1971). King and Kitchener (1994) also state that individuals have both an optimal and a functional level, and the difference between them is an individual’s developmental range, a concept that is similar to Vygotsky's (1962) zone of proximal development. In this stage, change may be marked by rapid spurts of growth, followed by a plateau that permits generalization across domains (King and Kitchener, 1994, Vygotsky, 1962).

Mechanisms of developmental change are attributed to Piagetian theories; assumptions about knowledge develop through assimilation and accommodation of existing cognitive structures as individuals interact with the environment (Hofer and Pintrich, 2002, Hofer and Pintrich, 1997).

2.7.4.2 Reflective Judgment Model (Conclusion)

King and Kitchener (1994) reported results based on both cross-sectional and longitudinal studies of over 1,700 individuals from teenagers through adulthood.

Given the earlier interest in gender differences in ways of knowing, Kitchener and King (1994) examined results of their 10-year study and found no significant gender differentiation within their testing stages. They did ascertain however that in the older male age groups, higher scores were found than those for females, this was speculatively attributed to the fact that at that time, more males were pursuing higher educational qualifications than were females (King and Kitchener, 1994).

King and Kitchener (1994) have provided the most extensive developmental scheme with epistemological elements. Although based primarily on studies of college students, this research program has been more explicitly derived from developmental psychological models than research on college student development and higher education. The model is particularly noteworthy for its elaboration of the upper levels of Perry's scheme and for the specification of dimensions of epistemic cognition (Hofer and Pintrich, 2002, Hofer and Pintrich, 1997).

One area of concern however is the fact that only a small percentage of participants actually scored in the higher levels of stages 6 and 7 of their model. This phenomenon consistently reoccurs in other similar studies where it appears that only the advanced graduate and post-graduate learners appear capable of higher level understanding.

As discussed by Hofer and Pintrich (1997), the focus of the reflective judgment model is on the perception and resolution of ill-structured problems, and it is from individual responses to these problems that epistemic assumptions are extrapolated. This approach to epistemological development enabled King and Kitchener (1994) to define an area of intellectual development that they claim had not been tapped by studies on critical thinking. In terms of epistemological beliefs, however, it is not likely that they are tapped only by reasoning about ill-structured problems. Learners are likely to have ideas about knowledge and knowing that are activated in everyday educational settings and which affect their learning on a routine basis.

In addition, only trained coders have been able to utilize the Reflective Judgment Interview process due to the complex rating process, which has limited its use somewhat (Hofer and Pintrich, 2002, Hofer and Pintrich, 1997).

2.7.5 Argumentative Reasoning

Deanna Kuhn (1991) developed an interest in the thinking that occurs in everyday lives and developed the concept of thinking as argumentative reasoning. Kuhn’s work on informal reasoning attempted to study how individuals responded to everyday, ill-structured problems that lacked definitive solutions. Although the primary purpose of the study was to investigate argumentative thinking, the attempt to understand how and why individuals reasoned also elicited beliefs about knowledge, and a portion of the study focused specifically on epistemological perspectives (Hofer and Pintrich, 1997, Kuhn, 1991).

2.7.5.1 The Argumentative Reasoning Model

A critical element of Kuhn's (1991) design was the inclusion of broader samples of the population. The participants were derived from four age groups: teenagers 13 – 19 years old, 20 – 39 years old, 40 – 59 years old, and 60 years and older. Kuhn selected 40 participants for each age group, with gender and educational level being equally represented. Participants were individually interviewed twice from 45 to 90 minutes duration for each session, in familiar surroundings for the participants, such as their home or work environments. In the interest of extracting reasoning about complex, real-world phenomena, Kuhn (1991) selected three current urban social problems as the basis for the interviews. Subjects were asked to generate causal explanations for each of these topics:

(a) What causes prisoners to return to crime after they are released?

(b) What causes children to fail in school?

(c) What causes unemployment?

Individuals were expected to explain how they came to hold a view and to justify the position with supporting evidence (Hofer and Pintrich, 1997, Kuhn, 1991).

Participants were also asked to generate an opposing view, provide a rebuttal to that position, and then offer a remedy for the problem. The final segment of the interview explicitly asked for epistemological reflection on the reasons that the participants had presented. Kuhn (1991) noted that there were several sections of the interview which provided indicators of the epistemological standards that underlay argumentative reasoning (Hofer and Pintrich, 1997, Kuhn, 1991).

Kuhn (1991) reported that the epistemological thoughts evidenced within the interviews broadly resembled the forms reported in earlier studies including Perry (1970), Kitchener, King, and others (King et al., 1983, Kitchener and Fischer, 1990, Kramer and Woodruff, 1986).

Kuhn (1991) goes on to define three categories of epistemological views: absolutist, multiplist, and evaluative (which are aligned with Perry's, Belenky et al.'s, and Baxter Magolda's positions, as illustrated in Table 5: Argumentative Reasoning Model).

Kuhn (1991) expounds on his three defined categories by proffering;

1. "Absolutists view knowledge as certain and absolute, stress facts and expertise as the basis for knowing, and express high certainty about their own beliefs."

2. "Multiplists deny the possibility of expert certainty and are sceptical about expertise generally. They see that experts not only disagree but are inconsistent over time. The multiplist position is marked by "radical subjectivity". In the devaluing of experts, multiplists are likely to give weight to emotions and ideas over facts. More importantly - within this framework, beliefs take on the status of personal possessions, to which each individual is

entitled. The result is that all views may have equal legitimacy, and one's own view may be as valid as that of an expert."

3. "Accordingly the evaluative epistemologist also denies the possibility of certain knowledge; they recognize expertise and view themselves as less certain than experts. Most importantly, they understand that viewpoints can be compared and evaluated to assess relative merits. The possibility of genuine interchange with those with conflicting opinions is acknowledged, as is the possibility that theories may be modified as a result. Kuhn (1991) goes on to claim that argument is at the heart of this process, as it offers a means of influencing others' ways of thinking."

Intellectual and Ethical Development (Perry)	Women's Way of Knowing (Belenky et al.)	Epistemological Reflection (Baxter Magolda)	Reflective Judgment (King & Kitchener)	Argumentative Reasoning (Kuhn)
Position	*Epistemological Perspectives*	*Ways of Knowing*	*Reflective Judgment Stages*	*Epistemological Views*
Dualism	Silence Received knowledge	Absolute knowing	Pre-reflective thinking	Absolutists
Multiplicity	Subjective knowledge	Transitional knowing	Quasi-reflective Thinking	Multiplists
Relativism	Procedural knowledge (a) Connected knowing (b) Separate knowing	Independent knowing		Evaluatists
Commitment within Relativism	Constructed knowledge	Contextual knowing	Reflective thinking	

Table 5: Argumentative Reasoning Model

2.7.5.2 Argumentative Reasoning Model (Conclusion)

Hofer and Pintrich (1997) give an analysis of the responses of the 169 subjects in Kuhn's study, indicating that only 2 subjects were consistently classified across the three topics, as in the evaluative category, which was surprising given the ranges of ages and backgrounds in the study. Eleven others were classified at the evaluative level for two of the three topics, for a total of 13, still a relatively small percentage.

Kuhn (1991) also found no significant gender or age differences in her results. She does however report on a relationship between educational background and epistemological level; those in the higher education group were more likely to be in the evaluative category and less like to be absolutist (Kuhn, 1991).

Hofer and Pintrich (1997) describe Kuhn's contribution to the literature on epistemological understanding as not being in the development of a model, as she appears to use a simplified three-stage representation of Perry’s (1970) scheme and offers little new information as to the empirical validation of this scheme, but in the connection of epistemological theories to reasoning. The skills of argument appear predicated on a level of epistemological understanding that requires contemplation, evaluation, and judgment of alternative theories and evidence. These cognitive processes, according to Kuhn, require the metacognitive ability to be reflective about one's own thinking (Hofer, 1994, Hofer and Pintrich, 2002, Hofer and Pintrich, 1997, Kuhn, 1991).

The study is notable for its focus on ill-structured problems from everyday life and in the use of a broad sample of participants. This sampling of a broader population on non-academic issues removes epistemological beliefs from the realm of the classroom and separates issues of knowing from those of teaching and learning processes. This focus seems to exemplify the emphasis of Western schooling methodologies, and it is not surprising that the graduate-trained philosophers in her study provided the best results (Hofer and Pintrich, 1997).

2.7.6 Epistemological Beliefs

Marlene Schommer (now Schommer-Aikins), engaged by the possibilities that epistemological beliefs may influence comprehension and academic performance, developed a research program that was more quantitative in its approach than that of her predecessors, as well as taking a more analytic view of the components of personal beliefs (Schommer, 1990a, Schommer, 1990b, Schommer, 1992, Schommer, 1993b).

As Ryan (1984b) states, “her examination of earlier contradictory research that attempted to tie Perry's (1970) scheme to meta-comprehension led her to challenge the notion that epistemological beliefs were uni-dimensional and developed in fixed stages" (Ryan, 1984b). According to Schommer (1990) more than one dimension has to be considered with respect to epistemological beliefs as "epistemological beliefs are far too complex to be captured in a single dimension" (Schommer et al., 1992). She proposed a belief system made up of five more or less independent dimensions, which she hypothesized as;

1) Structure of knowledge,
2) Certainty of knowledge,
3) Source of knowledge,
4) Control of knowledge acquisition, and
5) Speed of knowledge acquisition.

The conceptual origins for the first three were in Perry's (1970) work, and the latter two in Dweck and Leggett's (1988) research on beliefs about the nature of intelligence and Schoenfeld's (1983, 1985, 1988) work on beliefs about mathematics (Dweck and Legget, 1988, Hofer and Pintrich, 1997, Schoenfeld, 1983, Schoenfeld, 1985, Schoenfeld, 1988).

Marlene Schommer developed an instrument consisting of 63 sentential statements that appeared to characterize epistemological beliefs (Schommer, 1990b). The statements are written so as to present the reader with either a negative or positive overtone in regards to the actual statement, and participants rate each statement according to their personal belief and comprehension of it by using a Likert scale grading system. The scale ranges from 1 (strongly disagree) to 5 (strongly agree).

Two or more subsets of items were written for each of the five proposed dimensions; some of these came directly from Perry's Checklist of Educational Values (CLEV), and others were adapted from Schoenfeld (1983, 1985), Dweck and Leggett (1988), and others. These were reviewed and categorized into 12 subsets by three educational psychologists prior to the piloting of the questionnaire with undergraduates (Schommer, 1990a, Schommer, 1990b).

Factor analysis was performed on this and subsequent studies of hers, and have typically yielded four factors, which, stated from a naive perspective, are

1) Fixed Ability,
2) Quick Learning,
3) Simple Knowledge, and
4) Certain Knowledge.

A criticism of the methodology used by Schommer within her study is that the factor analysis conducted on, and reported from, her research was constrained to the use of twelve pre-defined subsets or groupings of her original 63 statements as variables. The analysis was not conducted on the original 63 statements items themselves, a criticism also shared by other researchers (Baxter Magolda and Porterfield, 1985, Clarebout et al., 2001, Hofer and Pintrich, 2002, Hofer and Pintrich, 1997, Schraw et al., 2002).

2.7.6.1 Epistemological Beliefs Model

As Hofer and Pintrich (1997) state, each of the four factors is viewed as a continuum, although they are stated from the naive perspective.

1. Fixed Ability is a concept borrowed from Dweck and Leggett (1988), who found that some individuals believe intelligence is a fixed entity and others view it as incremental, believing that it can be improved. Three subsets of items appear to load on this factor across several studies:
    1.1. Can't Learn How to Learn,
    1.2. Success Is Unrelated to Hard Work, and
    1.3. Learn the First Time

One subset, Ability to Learn Is Innate, was hypothesized as a part of the Fixed Ability factor, but has not consistently loaded there. In two of three recent studies this subset has loaded on the Quick Learning factor.

2. Quick Learning characterizes the view that learning occurs quickly or not at all; at the other extreme of the continuum is the belief that learning is gradual. Only one subset of items has consistently loaded on this factor, a subset entitled
    2.1. Learning Is Quick

3. The factor Simple Knowledge suggests a range of beliefs from that of knowledge as isolated, unambiguous bits to a view of knowledge as highly interrelated concepts. This factor contains the subsets;

   3.1. Avoid Ambiguity,

   3.2. Seek Single Answers, and

   3.3. Avoid Integration.

4. Although two or more subsets were written for each factor, only one has consistently loaded on Certain Knowledge, the subset;

   4.1. Knowledge Is Certain. This factor was conceptualized as a continuum from the belief that knowledge is absolute to the belief that knowledge is tentative and evolving.

The fifth hypothesized dimension, '*source of knowledge*',(Schommer, 1990a, Schommer, 1990b, Schommer, 1994b) does not appear to emerge as a factor from the current questionnaire subsets. Schommer (1990b) suggests that the continuum would range from authority to reason, but those subsets related to issues of authority have typically loaded on two or more of the other four epistemological dimensions (Hofer and Pintrich, 2002, Hofer and Pintrich, 1997)

In Schommer's (1990b) study some subsets loaded on more than one factor and some subsets failed to reach the accepted minimum value of >.30. In Table 6: Factor loadings for the Schommer instrument, the sequence and final loadings of the factor analysis solution can clearly be seen for each of Schommer's results sets (Clarebout et al., 2001).

Schommer has furthered this investigation of how epistemological beliefs affect academic work. In a series of studies using her questionnaire on epistemological beliefs, she has documented the relation between beliefs about knowledge, strategy use, and performance. In a study of college undergraduates, students completed the questionnaire and then several weeks later were asked to read a passage of text as if preparing for a test, supply a concluding paragraph, rate their degree of confidence in comprehending the material, and complete a mastery test (Schommer, 1990b).

Belief in quick learning predicted oversimplified conclusions, low test scores, and overconfidence. Those who believed in certain knowledge were likely to generate inappropriately absolute conclusions (Schommer, 1990b).

Subsets	(1990) F1:Innate Ability F2: Simple knowledge F3: Quick learning F4: Certain knowledge	(1992) F1:Innate Ability F2: Simple knowledge F3: Certain knowledge	(1992) F1:Externally controlled learning F2: Simple knowledge F3: Quick learning F4: Certain knowledge	(1993a) F1:Fixed Ability F2: Simple knowledge F3: Quick learning F4: Certain knowledge
Learning is quick	F3	F1	F3	F3
Can't learn how to learn	F1	F1	F1	F1
Learn the first time	F1	F1	F1	F1
Concentrated effort is a waste of time	-	F1	F1	-
Success is unrelated to hard work	F1	F1	F1	F1
Avoid ambiguity	F2	F2	F2	F2
Seek single answers	F2	F2	F2	-
Avoid integration	F2	F2	F2	F2
Depend on authority	-	F2	F2	-
Ability to learn is innate	-	-	-	F3
Don't criticise authority	-	F3	-	-
Knowledge is certain	F4	-	-	F4

Table 6: Factor loadings for the Schommer instrument

In a second study of college undergraduates Schommer, (1992), students completed the epistemological questionnaire and then read a statistical passage. They rated their comprehension confidence, and then completed a mastery test and a study strategy inventory. Higher confidence and better performance were negatively correlated with belief in simple knowledge. Path analysis also suggested that epistemological beliefs may have an indirect effect on academic performance, as belief about knowledge may affect study strategies (Schommer, 1992).

According to Hofer and Pintrich (1997), Schommer has conducted several other related studies on epistemological beliefs. Results of a study of junior college and university students indicated differences on all four dimensions, with university students more likely to believe in "*fixed ability*" and junior college students more likely to believe in "*simple knowledge*", "*certain know*ledge", and "*quick learning*" (Schommer, 1993a). A study of epistemological beliefs of high school students indicated that there were no differences between gifted students and others in ninth grade, but that by the end of high school, gifted students were indeed less likely than others to believe in factors such as "*simple knowledge*" and "*quick lear*ning" (Schommer and Dunnell, 1994).

Differences in beliefs during high school years were the focus of a cross-sectional study that indicated a linear trend in all epistemological beliefs except "*fixed ability*" from freshman to senior year. In the same study, epistemological beliefs also predicted GPA, and gender differences were found in two dimensions, with females less likely to believe in "*fixed ability*" or "*quick learning*" (Schommer, 1993b). In a study of adults, their level of personal education predicted "*simple* and *certain knowledge*"; the more exposure to education, the less likely individuals were to subscribe to these beliefs (Schommer, 1992).

A specific issue addressed in Schommer's studies relates to the generality of epistemological beliefs. She wonders whether epistemological beliefs are identical across domains or rather domain-specific. Using the initial questionnaire, Schommer (1995) found some evidence that suggests similarity in epistemological beliefs across domains. Recent work on the domain independence of beliefs indicated that epistemological beliefs are moderately similar across social science and mathematics domains(Paulsen and Wells, 1998, Schommer and Walker, 1995).

2.7.6.2 Epistemological Beliefs Model (Conclusion)

Hofer and Pintrich (1997), after reviewing research on epistemological beliefs, report little agreement or compassion with the Epistemological Beliefs model and questionnaire instrument as constructed by Schommer’s (1990) research. In particular the dimensions it encompasses, the domain specificity of epistemological beliefs, and the possible relationships with other constructs(Clarebout et al., 2001).

According to Clarebout et al (2001), considering the literature regarding Schommer's instrument, a distinction can be made between those authors who report the use of the epistemological beliefs questionnaire without any changes e.g., Bendixen et al. (1994), Paulsen & Wells (1998), and those who adapted the instrument, Buehl & Alexander (1999), Cole et al. (2000), Jehng et al. (1993), and Lodewijks et al. (1999). The first group of authors accepted or replicated her research whereas the second started from her research while pointing out some weaknesses and constructed new or partly new instruments(Bendixen et al., 1994, Buehl and Alexander, 1999, Clarebout et al., 2001, Cole et al., 2000, Jehng et al., 1993, Lodewijks et al., 1999, Paulsen and Wells, 1998).

However this researcher believes that Schommer’s (1990) study was a launching point that encouraged a spurious period of research into this research area during the 1990’s that is re-emerging under renewed observation within just the last few years.

Schommer's fundamental contributions have been recognized as being in four main areas:

(a) She was the first to develop a paper and pencil test for assessing beliefs, thus enabling a more quantitative research approach.

(b) She also suggested that epistemological beliefs may be a system more or less independent beliefs or dimensions,

(c) She was an instigator in the quantitative investigation of several of these proposed dimensions, and

(d) She initiated one of the most significant and perceptive lines of research, successfully linking theories regarding epistemological beliefs to essential issues concerning educational environments, classroom learning and peer affected performance.

At the same time, there are some conceptual and measurement issues that remain unresolved in this model(Hofer and Pintrich, 2002, Hofer and Pintrich, 1997, Schommer-Aikins, 2002).

Most researchers agree that the concept of four dimensions is difficult to prove, let alone endorse. That two of the factors, "*Simple Knowledge*" and "*Certain Knowledge*", appear consistent within the ideas found within the literature, with many other researchers agreeing in principle to this separation of ideas(Dixon, 2000, Duell and Schommer-Aikins, 2001, Hofer and Pintrich, 2002, Hofer and Pintrich, 1997, Ohtsuka et al., 1996, Tolhurst and Debus, 2002).

The dimension of "*Fixed Ability*", however, seems well outside the construct of epistemological beliefs, and it is not surprising that while it continues to appear as a factor it does not follow the patterns of other dimensions or appear to be a useful predictor in Schommer's research(Hofer and Pintrich, 1997).

Schommer (1990) appears to interpret this non-contrivance as proof that the dimensions do operate independently, whereas other researchers have concluded that this provides proof that there is in fact a lack of independence between dimensions. As conceived by Dweck and Leggett (1988), the idea that an individual holds either an entity view or an incremental view of ability is part of one's implicit theory of intelligence(Dweck and Legget, 1988, Hofer and Pintrich, 1997).

As Hofer and Pintrich (1997) discuss, views of intelligence have not typically been thought of as part of the construct of epistemological beliefs, though they may be indirectly related to learning in that they motivate goal choice and thus affect the academic behaviour that ensues.

Hofer and Pintrich (1997) go on to state that the dimension, "*Quick Learning*" is also problematic from the nature of knowledge perspective. It seems that quick learning is a perception of the difficulty of the task of learning and a general expectation or goal regarding learning. Although beliefs about learning are probably related to beliefs about knowledge, they can be distinguished conceptually. A belief about what knowledge is and how it can be described is not the same as a belief about how quickly one might go about learning. Although they may be correlated, it seems useful to separate quick learning beliefs from beliefs about the certainty or absolute nature of knowledge (Baxter Magolda, 1992, Hofer and Pintrich, 2002, Hofer and Pintrich, 1997, Kohlberg, 1971, Kurfiss, 1988).

Schommer's fifth hypothesized dimension, the "*Source of Knowledge*", has yet to be empirically validated as a factor in her studies. Stated in the naive perspective as "*Omniscient Authority*", this dimension is conceptualized as a continuum that ranges from the belief that knowledge is handed down from authority to the belief that it is derived from reason. Two subsets were written for this dimension: "*Don't Criticize Authority*" and "*Depend on Authority*". "*Source of Knowledge*" may be more complex and multidimensional than this would indicate, including not only views of authority but the role of the self as knower, as suggested by Belenky et al. (1986) in (Hofer and Pintrich, 1997).

As mentioned previously, the absence of confirmatory factor analysis on the full range of 63 items, not just the subset of items, raises doubts about the evidence presented for the substantive validity of the questionnaire. It is not clear from the factor analyses whether the full set of 63 items would actually load onto the four or five proposed factors because no item analysis has been reported, only factor analyses of the a priori subsets of items. Furthermore, given that the items in the subsets have not been empirically verified by Schommer and that the credibility of the factors thus rests on the degree to which the subsets load as variables, it is of serious concern that for two of the factors, "*Quick Learning*" and "*Certain Knowledge*", only one subset has consistently loaded across multiple studies (Hofer and Pintrich, 1997).

Hofer and Pintrich (1997) also report that in a study by Qian and Alvermann (1995), an attempt to factor analyse the items led to a three-factor model, with simple and certain knowledge combined and the reduction of the questionnaire to 32 items (those with a factor loading > .30) (Qian and Alvermann, 1995).

Measuring epistemological beliefs in paper-and-pencil questionnaire format is an attractive and expedient alternative to interviews and has made it possible for Schommer and others to pursue multiple studies that identify the relation between beliefs about knowledge and other cognitive processes and actual learning (Bendixen et al., 1994, Hofer and Pintrich, 2002, Hofer and Pintrich, 1997, Knefelkamp and Slepitza, 1978).

This is a very important contribution to the field by Schommer and an important area for future research. In proposing that epistemological beliefs are a system of more or less independent dimensions, Schommer claims that learners could be sophisticated in some beliefs but not in others (Schommer-Aikins, 2004, Schommer-Aikins, 2002, Schommer, 1990a, Schommer, 1990b).

Hofer and Pintrich (1997) also report that considerable questions still remain about this approach, as well as about this particular use of survey methodology. Although each of the dimensions is conceptualized as a continuum, it may be difficult to assume that a continuum of epistemological beliefs can be represented or measured by simply stating extreme positions and registering degrees of agreement. More recently, Schommer has begun to outline the possibility that beliefs may be better represented as a frequency distribution, but there is no empirical substantiation of this as yet (Hofer and Pintrich, 2002, Hofer and Pintrich, 1997, Schommer, 1994a, Schommer, 1994b).

2.8 Chapter Summary

Identified as being a critical component, Schommer's (1990) study was used as a preparatory point for this research, from which to launch further study and exploration of the hypotheses presented within her original research in order to examine the extent to which these dimensions might be in some way independent, or whether or not there may be some causality or correlation among these dimensions.

Given the existing status of concurrence presented within the currently available literature, it is obvious that more evidence (qualitative or quantitative) is needed to either support or dismiss the claims presented in Schommer's (1990) and subsequent studies.

Of all the models reviewed, the Epistemological Beliefs Model appeared to offer the most reasonable prospect of developing and understanding methodological constructs that would enable further understanding of how humans understand facts, create information and develop knowledge.

By presenting fresh research data from both quantitative and qualitative perspectives, it is hoped that this research will encourage discourse that will assist the development and understanding of epistemological theories and how crucial these theories are to developing new directions within educational outcomes.

Chapter 3: Methodology

> *"One might get the impression that I recommend a new methodology which replaces induction by counter induction and uses a multiplicity of theories, metaphysical views, fairy tales, instead of the customary pair theory/observation. This impression would certainly be mistaken. My intention is not to replace one set of general rules by another such set: my intention is rather to convince the reader that all methodologies, even the most obvious ones, have their limits."*
>
> *(Feyerabend, 1975) - (1924 – 1994)*
> *Austrian-born philosopher of science*

3.1 Chapter introduction

The purpose of this study was to investigate and explore existing epistemological beliefs of first year undergraduate students enrolled and studying at the University of Tasmania. This chapter outlines the thought processes and decisions surrounding the quantitative and qualitative methodologies used to create the Epistemological Beliefs Sampler (EBS). This pen and paper instrument would be developed as an effort to obtain and analyse holistic observations associated with each participatory group.

In addition, dialogue between the traditionally viewed disparities of quantitative and qualitative methodologies is reviewed. Particularly the blending of the two methodologies and the appropriateness of the need to create a polymorphic technique for this research project whilst attempting to uncover hitherto unrealised facets of how humans create, cultivate and enhance their own unique epistemological beliefs and belief structures.

Finally, during the course of this discussion the methodology used by this research (qualitative case-study enhanced using a grounded analysis approach, constructed on a foundation of empirical quantitative data analysis) will be justified. This chapter then concludes with a brief discussion on the limitations faced during the course of the research as well as the boundaries within this research that may possibly be applied to similar real world applications.

3.2 Research Methodology Synopsis

This project is a mixed-method series of case studies utilising quantitative and qualitative research methods to gain an understanding of the epistemological beliefs and related experiences of groups of undergraduate university students.

Sentient beings all indulge in varying types and forms of experience; including awareness, thoughts, reflection, sentiment, aspiration, and achievement (Boland, 1985, Boland and Day, 1982, Husserl, 1982, Rathswohl, 1991, Woodruff-Smith, 2003). This axiom that people experience the world in different ways is ideally suited to the cognitive analytically based approach of this study.

3.3 Quantitative versus Qualitative

The ongoing argument over relative merits of what are generally referred to, as quantitative and qualitative research methods are somewhat driven by the researcher's ontological and epistemic approach to their research topic, as well as the results they wish to show from their research.

Most researchers develop an expertise in one style, but the methods or styles have different complimentary strengths. Since there is only partial overlap, a study using both is fuller or more comprehensive (Dick, 1998, Kaplan and Duchon, 1988, Neuman, 2003). Most quantitative researchers try and look for some form of fundamental purpose, a method of prediction, and finally, a simplification of their findings. Where qualitative researchers try and look for enlightenment, comprehension, and reuse of discovered knowledge within other similar situations.

Qualitative analysis provides a different form of knowledge than its counterpart in quantitative inquiry. Ragin (1987, 1992) points out that "all knowledge, including that gained through quantitative research, is referenced in qualities, and that there are many ways to represent our understanding of the world" (Ragin, 1987, Ragin and Becker, 1992).

Styles of differing researchers basing their work on either quantitative or qualitative methodology will contain traits common to both. Design issues between the two approaches, however, usually differ (Neuman, 2003). See Table 7: Methodology design comparison.

Quantitative Research	Qualitative Research
Test Hypothesis that the researcher begins with	Capture and discover meaning once the researcher becomes immersed in the data
Concepts are in the form of distinct variables	Concepts are in the form of themes, motifs, generalizations, and taxonomies
Measures are systematically created before data collection, and are standardised	Measures are created in an ad hoc manner and are often more specific to the individual setting or researcher
Data are in the form of numbers from precise measurement	Data are in the form of words and images from documents, observations, and transcripts
Theory is largely causal and is deductive	Theory can be causal or non-causal and is often inductive
Procedures are standard, and replication is assumed	Research procedures are particular, and replication is rare
Analysis proceeds by using statistics, tables, or charts and discussing how what they show relates to hypotheses	Analysis proceeds by extracting themes or generalizations from evidence and organising data to present a coherent, consistent picture

Table 7: Methodology design comparison

Because of this inclusion of both Quantitative and Qualitative methodologies and the tendency of overlapping areas within both methodologies, some discussion on this is necessary to understand the reasons and decisions behind selecting this combined approach and how the research, whilst sharing common traits with both methodologies is primarily a Qualitative approach based firmly on Quantitative statistical analysis foundations.

3.4 Quantitative Research Method

Briefly - Quantitative research is primarily ontologically objectively based with an epistemologically positivist stance toward how the research is to be conducted (Dick, 1998, Neuman, 2003, Ragin, 1987).

Quantitative research is also based around the appropriation and empirical study of 'hard data' - that is – data that is strictly numerical in nature, or data which can be reduced to a numerical form so that it is value free. The data collected is typically derived from experimental studies or calibrated surveys which disallow the researcher to enter the lives of the participants. The nature of the data also negates any attempts of personal interpretation by the researcher.

3.4.1 Ontological Stance

Within the computer science community, research on ontology is increasingly becoming ubiquitous. While the philosophical world has previously laid claim to this term, areas of research such as Computational Linguistics, Database Theory and Artificial Intelligence are now frequently incorporating its use within their research.

The importance of ontological discussions are being realised in areas as diverse as information integration, information retrieval and extraction, knowledge engineering, knowledge representation, qualitative modelling, language engineering, database design, information modelling, object-oriented analysis, knowledge management and organization, and finally, agent-based systems design (Guarino, 1998).

Gruber (1993) states that, "in the philosophical sense, we may refer to Ontology as a particular system of categories accounting for a certain vision of the world. An Ontology is a specification of a conceptualisation pertaining to the art and science of what is" (Gruber, 1992, Gruber, 1993). The purpose of Ontology is to examine the fundamental nature of the "being" of anything. There are two fundamentally opposite positions on the beliefs of objects in the real world, these being Objective and Subjective (Neuman, 2003).

3.4.1.1 Objective Stance

The Objective ontological stance comprises three main beliefs.

1. That observation of tangible phenomena should be external in nature, factual, precise and conducted logically. The researcher must be logical in their approach to investigating the phenomena, and enter the research as a whole without any preconceived personal decisions as to the direction of the research (Neuman, 2003).

2. The personal prejudices and cultural values of the researcher must remain segregated from the phenomena to allow value free, amoral and neutral observations of the phenomena to be conducted (Neuman, 2003).

3. The data collated from the phenomena must be free of non-random errors and unbiased in nature to ensure the validity both internally and externally of the research. This procedure requires that the researcher be devoid of their own personal opinion, only accept supported views about the phenomena, and reporting techniques and technical correctness must be assured (Neuman, 2003).

3.4.1.2 Subjective Stance

The Subjective ontological stance holds the view that the researcher is intimately involved with the phenomena and cannot conduct observations of the participants if detached from the phenomena under investigation. Subjectivity can guide the researcher in everything they do, from the choice of the topic being studied, through formulating hypothesis, through to the choice of methodologies, and finally – how we interpret data (Ratner, 2002). Past experiences, current viewpoints and cultural convictions can all influence the perception of the phenomenon by the researcher (Neuman, 2003, Ratner, 2002).

3.4.2 Research Ontology

Objectivism combines subjectivity and objectivity as it is argued that objective knowledge necessitates active and usually sophisticated subjective processes. These processes may include but are not exclusive to perception, analytical reasoning, synthetic reasoning, logical deduction and the distinction of essences from appearances. On the other hand, subjective processes may also augment our sometimes objective comprehension of the environment around us (Guarino, 1998, Ratner, 2002).

This research aims to ascertain and expose the epistemological constructs as created and maintained by the participants, whilst endeavouring to comprehend the methods and reasons that learners use to justify and assimilate new knowledge into their own unique knowledge base. As Silverman (1998) states, “recognition of the fact that most learning environments are of a social construct nature”, this researcher also needed to become partially subjective to facilitate any successful approach to observing this phenomenon (Silverman, 1998).

Therefore, a primarily objective approach was decided on when analysing the EBS data, with an enhancing proportion of subjectivity on the written data analysed during the subsequent analytical phases of the project.

3.5 Qualitative Research Method

By defining qualitative research, we are indicating any form of research that produces its results by means other than numerical calculation, statistical process, or any other form of quantification (Strauss and Corbin, 1990).

The fundamental principle of a Qualitative approach is that the observed experience can be explained only by the perceptions, perspectives and highly subjective nature of the participant's experience, not by any objective axiom. The methods of Qualitative research address the important issue of access to personal perceptions, position and previous information (Hammersley, 1999, Myers, 1994, Taylor and Bogdan, 1984).

As Cooper and Branthwaite (1977) state, "for most of us, personal perceptions, position and previous information are restricted to psychosocial and cultural filters, which determine what information can be exposed to public scrutiny, what information is communicable, and indeed our very awareness of such information". The model proposed by Cooper and Branthwaite (1977) is very useful for understanding these filters.

Table 8: The Cooper and Branthwaite Model, clearly illustrates the restrictions of a formally structured questionnaire, which is very open to statistical analysis and other forms of calculated scrutiny. However, as Mani (1999) suggests; "although Qualitative Research is impressionistic, as opposed to conclusive it can provide unique insights from its preoccupation with probing and understanding rather than counting and collating" (Cooper and Branthwaite, 1977, Mani, 1999)

<table>
<tr><th colspan="3">Accessibility</th><th>Layers of Response</th><th>Responses by structured interviewing</th></tr>
<tr><td>Public</td><td rowspan="2">Communicable</td><td rowspan="3">Aware</td><td>Spontaneous,
Reasoned,
Conventional</td><td rowspan="4">Relative Ease
↕
Relative Difficulty</td></tr>
<tr><td rowspan="3">Private</td><td>Concealed,
Personal</td></tr>
<tr><td rowspan="2">Non Communicable</td><td>Intuitive,
Imaginative</td></tr>
<tr><td>Unaware</td><td>Unconscious,
Repressed</td></tr>
<tr><td colspan="5">Source: Cooper and Branthwaite, (1977) Qualitative Technology: New Perspectives on measurement and meaning through Qualitative Research</td></tr>
</table>

Table 8: The Cooper and Branthwaite Model

3.5.1 Qualitative Research Approaches Used

As previously stated, this project is an investigative case study using qualitative research methods grounded on empirical quantitative foundations. The study utilises a carefully designed and constructed survey instrument (EBS). The participants' responses are analysed based on a grounded analysis approach to harvest rich, quality data. The number of the participants and the percentage returns of each group's responses also increase the potential for validity and reliability.

Table 9: Qualitative Analysis Methodologies illustrates the methodologies inspired and developed within the Social Sciences, enabling interested researchers to study social and cultural phenomena. Some of these methodologies include Ethnography, Case Study Research, Action Research, and Grounded Theory.

Qualitative Methodologies			
Approach	**Brief Description**	**Timescales needed**	**Previous use in IS research**
Action Research	Problem solving approach. Suitable for projects that requires specific knowledge. Produces definitive results.	Long	No
Ethnography	Researcher immerses him/herself in field of study. Researcher observes study from "inside out".	Long	Yes
Grounded Theory	Theory is developed during research through continuous interplay between analysis and data collection. Requires high theoretical sensitivity for success.	Short-Long	Some
Case Study	Used to investigate interaction between factors and events. An empirical approach to research.	Short	Yes

Table 9: Qualitative Analysis Methodologies

Some of the more important techniques include within the term Qualitative are:

- Observations and Participant Observation
- Depth Interviews, Surveys, and Questionnaires
- Focus Group Discussions
- Case Studies, Documents and Text

Common to all these techniques is the importance of questioning what is observed in order to attempt to understand causal interactions. Individual participants are normally the focus of Depth Interviews, while case Studies and Focus Groups look at group-sized perceptions and may also be guided by group dynamics (Myers, 1997b).

3.5.1.1 Action Research

Action research is associated with a practical, problem-solving orientation to research which usually entails extended periods of time. However, action research can be considered functional if intended for a project that necessitates a specific form of knowledge for a specific form of problem within a specific context, usually as an integral part of a larger problem solving strategy intrinsic to the particular research (Bell, 1992). Action research has usually been associated with organisational development and/or educational research and is not often found within science oriented fields such as the computing or information systems domain (Silverman, 1993, Silverman, 1998). As there was neither a concise problem nor an unambiguous postulated hypothesis to be tested, selecting this methodology was deemed inappropriate for the research involved.

3.5.1.2 Ethnography

Social and cultural anthropologists wanting to observe aspects of our society or culture in depth originally developed the ethnographic approach to research. In this approach the researcher would attempt assimilation into the phenomena by self-immersion into the area under scrutiny, in an attempt to research the phenomenon within its own context (Silverman, 1998). Anthropological studies no longer constrain this approach, and it is starting to be freely used within a great variety of other fields, not least of all the computing and information systems domains (Myers, 1997a). The ethnographic approach was rejected based on two reasons.

- Firstly, the ethnographic approach is not particularly suitable for the area under study due to the reflective nature of the data (Harvey, 1997a).
- Secondly, the data critical for this research could be harvested and collated without the for need explicit interaction with the participants.

3.5.1.3 Grounded Theory

In 1967, two academic sociologists, Barney Glaser & Anselm Strauss put forward their seminal work entitled “The Development of Grounded Theory”. This theory was described as “a systematic approach to generating new conceptualisations of what is going on in newly emerging areas of study”. This work enabled researchers of the day to explore practices past the universally accepted hypothesis-testing uses of raw data and into the hypothesis-generating potential of their observations of the same data. The uptake of this approach by academia has been phenomenal, particularly in the fields of sociology and social anthropology and more recently within more applied disciplines - like educational research (Goede and De Villiers, 2003).

The Grounded theory approach has become progressively more universal within Social Research, mainly because of the way the method can be used in "developing context-based, process-orientated descriptions and offering explanations of an observed phenomenon" (Myers, 2003, Myers and Avison, 2002).

Grounded analysis is a technique for investigating and assessing how participants perceive complex stimuli, which has been refined over many years. Grounded analysis has also proven to be an extremely powerful means of developing and encouraging new-concepts such as profiling market segments and generating creative guidelines (Rust, 2003). The use of a facilitator enhanced Group Support System (GSS) has also enhanced the theory by demonstrating it to be a very effective cognitive tool when looking at knowledge restructuring (Kwok et al., 2000, Yoong, 1996).

This approach was considered appropriate for this study as it would enhance and enrich the data by using an iterative approach toward the captured information accumulating a greater clarity and depth to the research.

3.5.1.4 Case Study Methodology

A principal analytical methodology investigated and finally selected for this use within parts of this research was the case study method. This methodology is the more commonly used qualitative method for research that is founded within both computing and information systems research (Benbasat et al., 1987, Myers and Avison, 2002). Benbasat et al. (1987), state that "case study research is appropriate for research projects that are in early or formative stages or where the experiences of the subjects are important and the context within which they operate is critical". They also suggest three reasons why the case study approach would be useful for Social Science based research, all three of which were deemed applicable to this study:

1. "The researcher can study the information system in a natural setting"
2. "The researcher can answer 'how?' and 'why?' questions"
3. "It is suitable for studies in which little formal research has been previously conducted"

Benbasat et al. (1987) also suggest a series of eleven critical characteristics that can be found within most case studies, these are detailed in Table 10: Key characteristics of the case study methodology.

	Key Characteristics of Case Studies	Application to this Research Study
1	Phenomenon is examined in a natural setting	The EBS instrument was deployed both physically (handed out in the lecture theatre) and via an online internet based website. On each occasion the learner was considered to be in their a primary learning environment
2	Data are collected by multiple means	Data collected by the EBS survey instrument (phase I) and a series of 5 carefully propagated questions (phase II)
3	One or few entities (person, group or organization) are examined	Research concerned itself with the perceptions held by the particular groupings of the participants
4	The complexity of the unit is studied intensively	The focus was on the relationship between learners' epistemological beliefs and how they perceive knowledge
5	Case studies more suitable for exploration, classification and hypothesis development stages of the knowledge building process	No definitive hypothesis was tested as such, the approach was more exploratory Outcomes can be used as a building process for further research to be conducted
6	No experimental controls or manipulation are involved	No experimental controls or manipulations were involved
7	The investigator may not specify the set of independent and dependent variables in advance	Independent or dependent variables were not identified in advance, which is different to other existing studies
8	The results derived depend heavily on the integrative powers of the investigator	The results from the study were drawn from the EBS data (phase I) and the participants' responses to a series of five carefully constructed questions (phase II). Great care was observed in the construction and planning of the EBS instrument and the phase II questions with regard to reliability and validity
9	Changes in site selection and data collection methods could take place as the investigator develops new hypotheses	Site selection and appropriateness of the learning environment changed during the planning stages as the aim of study was clarified and expanded
10	Case research is useful in the study of "why?" and "how?" questions because these deal with operational links	The type of data collected was personal responses to a series of statements, further clarified by detailed responses to open ended questions
11	The focus is on contemporary events	Research area is contemporary and current, and expected to grow rapidly
Source: (Benbasat et al., 1987)		

Table 10: Key characteristics of the case study methodology

Table 10: Key characteristics of the case study methodology, lists the key characteristics, with the associated corresponding aspects, relating to this study that are indicative of the aptness of the case study approach as a tool within this project.

3.5.2 Justification for using Case Study Methodology

This research was conducted in an attempt to gain insight into the epistemological constructs of clusters of participants within a contextual setting (their educational environment), and while there has been some seminal work in the field of epistemological beliefs there has been little or no formal research in to understanding how the learner actually perceives or structures information and knowledge, or how they even justify or assimilate new knowledge gained within their educational environment into their own existing personal knowledge base.

The case study approach also appears to exhibit some usefulness in identifying and exposing areas for further investigation as well as aiding hypothesis generation. This seems to correspond well to the particular field under examination.

3.5.3 Reliability and Validity

Any interpreted qualification of data will be based on quantitatively collected data from participants involved with the study and as such should be recognisable as being both conceivable and verifiable by readers of this research.

A facet of validity relates to the generalisation of the findings within a research project. As the results of this research will be produced from a relatively small section of a larger sample population, it is suggested that the findings presented are repeatable and valid within the context discussed.

3.6 Quantitative Sampling Techniques

Generally, after conducting quantitative research investigation, you have a collection of statistically based numbers. This dataset of numbers is then analysed in some way, and then some form of interpretation is applied to the results in order to relate the findings back to the research question(s).

In order to establish a proprietary dataset that can be used in quantitative research, some form of empirical measurement needs to take place. Theoretically speaking you need to reduce some observable human phenomenon into accurate numerical data.

As a result of this reduction phase, conforming to a measurement standard becomes a complicated and intricate affair. Noise in one form or another is often present in the data, largely due to inaccuracies or inconsistencies in the process of measurement. Therefore the deployment of valid and reliable methods in which to measure the data becomes critical (Antonius, 2003, Hamel, 2000).

There are two types of sampling design: those that are based on probability and those that are not based on probability. In a probability sample, each unit has a known probability or likelihood of being selected, and the selection is based on a simple random choice of the units. Non-probability samples are often not conducted using random selection, with the consequence that those results based purely on non-random often tend to display some form of bias (Neill, 2003).

According to Antonius (2003), sampling designs of probabilistic or non-probabilistic nature can be further segregated into the following sample types

3.6.1 Probabilistic Samples

1) Simple random Samples

A truly random assortment sample is a selection chosen from within a larger sample population by some form of random procedure. This is done in such a way as to ensure that each element within that population will experience exactly the same chance of being chosen. (I.e. random names from list of all potential participants)

2) Systematic samples

The selection of names from a list using regular intervals to aid the selection of the required number of units for the sample (Starting at no.1 on the list and then, for example, selecting every third name on the list).

3) Cluster samples

The selection of groups within a population to be used as a representative samples of the overall population. Cluster sampling is a much cheaper and easier design than other forms of probabilistic sample design (i.e. selecting one class from an entire course of different classes).

4) Stratified random samples

    a. Proportional

    b. Non-proportional

The selection of specific groups within a population that is required for the study and in an attempt to ensure that each group is accurately and proportionally (scaled down representation of the population) or non-proportionally portrayed (particular segment of the population).

3.6.2 Non-Probabilistic Samples

1) Quota samples

Quota samples share some similarities with stratified random samples, but they differ in that they are non-probabilistic. They include various groups within the population, but the proportions are carefully constrained which can sometimes lead to an unbalanced data collection.

2) Convenience samples

As the name suggests, the data is collected from whoever was available and in arms reach on the day that the data collection took place.

3) Judgment samples

The intentional use of specific participants, which meet the often stereotypical beliefs of the researcher, and who also may or may not be ideally representative of the overall population.

4) Samples of volunteers

Volunteers are composed of participants that respond to a general request for assistance and are accepted without any form of selection process. This may or may not be a suitable representative of the population required for the study (Antonius, 2003).

3.6.3 Quantitative Data Sampling Technique Adopted

The quantitative sample design used to amass the data that was ultimately analysed by the SPSS application was the probabilistic cluster sample technique.

This design most suited the single domain analysis approach as well as multiple domain comparisons. By selecting representative groups (first year Nursing, Health Science, Computing, and Information Systems students in the initial study) of the overall student population, a more balanced and unbiased data collection process could be undertaken.

3.7 Qualitative Sampling Techniques

Miles and Huberman (1984 and 1997) state, that good sampling techniques are crucial for later analysis. The quantitative researcher usually uses a pre-planned approach often based on mathematical theory, whereas qualitative researchers select cases gradually, with the specific content of a case determining whether or not it will be selected. A qualitative researcher rarely has the luxury of, or the time to draw on, a large sample base for intense analysis (Miles and Huberman, 1984, Miles and Huberman, 1997).

This researcher has used both methodologies before but never in conjunction with each other, so the bilateral combination of both these methodologies required a careful and systematic approach when deciding how to best to acquire and maintain clean data.

3.7.1 Purposive Judgemental Sampling

Qualitative samples by their nature tend to be purposive, rather than random. Sampling in qualitative research usually requires the setting of limitations, defining particular aspects of the case, as well as linking the study directly to the research question. Sampling within Qualitative research is often theory-driven, initially by the demands of the research, or progressively as in a grounded analysis approach (Miles and Huberman, 1997).

There are seven differing principle non-probability sampling types available to the qualitative researcher (Neuman, 2003). Table 11: Types of Non-probability Sample Methods, describes purposive sampling as being acceptable when particular types of cases are required for an in-depth investigation. In this case, the selection of clusters of participants within differing educational style domains would prove especially informative due to the additional nature of each participant’s unique personal experiences and thoughts.

No.	Type of Sample	Principle
1	Haphazard	Get any cases in any manner that is convenient
2	Quota	Get a preset number of cases in each of several predetermined categories that will reflect the diversity of the population, using haphazard methods
3	Purposive	Get all possible cases that fit particular criteria, using various methods
4	Snowball	Get cases using referrals from one or a few cases, and then referrals from those cases, and so forth
5	Deviant Case	Get cases that substantially differ from the dominant pattern (a special type of purposive sample)
6	Sequential	Get cases until there is no additional information or new characteristics (often used with other sampling methods)
7	Theoretical	Get cases that will help reveal features that are theoretically important about a particular setting/topic
Source: (Neuman, 2003)		

Table 11: Types of Non-probability Sample Methods

Miles and Huberman (1997) further deconstruct sampling types into sixteen more focussed qualitative sampling strategies. Table 12: Types of Qualitative Sampling Strategies, illustrates their categorisation models.

Type of Sampling	Purpose
Maximum Variation	Documents diverse variations and identifies important common patterns
Homogenous	Focuses, reduces, simplifies, facilitates group interviewing
Critical case	Permits logical generalisation and maximum application of information to other cases
Theory based	Finding examples of a theoretical construct and thereby elaborate and examine it
Confirming and disconfirming cases	Elaborating initial analysis, seeking exceptions, looking for variations
Snowball or chain	Identifies cases of interest from people who know people who know what cases are information rich
Extreme or deviant case	Learning from highly unusual manifestations of the phenomena of interest
Typical case	Highlights what is normal or average
Intensity	Information-rich cases that manifest the phenomenon intensely, but not extremely
Politically important cases	Attracts desired attention or avoids attracting undesired attention
Random purposeful	Adds credibility to a sample when potential purposeful strategy is too large
Stratified purposeful	Illustrates subgroups; facilitates comparisons
Criterion	All cases that meet some criterion; useful for quality assurance
Opportunistic	Following new leads; taking advantage of the unexpected
Combination or mixed	Triangulation, flexibility, meets multiple interests and needs
Convenience	Saves time, money and effort, but at the expense of information and credibility
Source: (Miles and Huberman, 1997)	

Table 12: Types of Qualitative Sampling Strategies

A stratified purposive approach was used in this study, purely based on the geographical closeness and availability of the initial clusters of participants. This differs from the simple random sampling approach, in which the total numbers of samples are randomly distributed over the entire sample population, in that more samples will tend to be focused in areas of higher availability and access. By allocating samples to strata according to the local variability, the overall effectiveness of the sampling strategy is increased.

Using this strategy; the participatory population (learners) was divided into several sub-areas, called strata (domain types within differing schools that operate within auspices of the University of Tasmania). The division of these strata were not further divided into sub-strata as this would be detrimental to the identifying those clusters that would be representative of the total population in favour of selecting explicit groups that would overly enhance this research's results by adding unnecessary bias toward gaining positive outcomes (Neuman, 2003). The required clusters were selected from each stratum using these purposive judgemental stratified sampling techniques.

3.8 Participatory Involvement Process

An introductory letter was sent to several Heads of Schools within the University of Tasmania explaining the object of the research study. All contacts were met favourably and cordial invitations from those senior academics approached, paved the way by allowing introductions to the educators that were ultimately collaborated with when harvesting the required data.

3.8.1 Selection of Participatory Clusters

A conscientious effort was made to include as diverse a variety of participatory clusters within the parent domains as was possible. Clusters initially selected from Schools at the University of Tasmania included students from: -

- School of Nursing
- School of Health Science
- School of Computing
- School of Information Systems

Participatory clusters selected for this research were ideally required to be representative of their parental domains. Among the criteria applied to the selection of these participatory clusters was the requirement that the learners were in their first year of study at the institution, and that the staff members agreed to apply the research data harvesting process within the first face to face encounter instance between both the educators and the learners. This follows on from the demographic requirements of the Schommer Epistemological Questionnaire (Ohtsuka et al., 1996, Schommer-Aikins, 2004, Schommer-Aikins, 2005, Schommer, 1990b).

It was therefore considered that a multiple case study approach should be used as this would allow patterns of similarities within overall dataset to be compared with any observable disparities from the nationality based datasets, allowing easy identification and analysis.

3.8.2 Selection of Participatory Sites

Yin (1994) presents criteria were found to be useful in aiding the selection of potential participatory research sites (Yin, 1981a, Yin, 1981b, Yin, 1994).

Yin defines sites as;

- Literal replications
    - Sites where similar results are predicted to occur
- Theoretical replications
    - Sites where contradictory results are predicted to occur.

Benbasat et al. (1987) note, that by using careful site selection, the researcher can extend the initial objectives of the study if required.

The initial participants and sites (domains) selected were all from the University of Tasmania's Newnham campus area in Launceston, from several of the geographically adjacent Schools within the campus. This institution is actively involved in educating tertiary level students from varied backgrounds and age groups.

From this point of view, there was a potential to enable the selection of both literal and theoretical replication sites. This diversity allowed for a framework of analytical comparison to be constructed from the harvested data. For this research both domain and site selection were also chosen using purposive judgemental sampling techniques (Neuman, 2003).

By selecting closely linked domains, Health Science and Nursing, Computing (Science) and Information Systems, it was hoped that in the event of poor data returns, a combination of data would provides enough material to still allow the research to proceed.

3.9 Data Collection

Within this study, this researcher's main interest lay in attempting to discover and explore the epistemological belief structures relating to the unique perceptions and experiences of the learners. Subsequently, no demographic data was required from the participants with relation to ethnicity, social standings or religious beliefs. Age, domain and gender were the primary essential pieces of information that would facilitate better stages of analysis within the overall project strategy.

3.9.1 EBS Participant Acceptance

To warrant an easier acceptance of the EBS by both staff and students, and in an attempt to ensure a high percentage of responses, the survey was distributed during the participants' first orientation lecture at the University of Tasmania.

This proved to be acceptable on two points;

(1) Less time to overtly think about the statements by the participants would produce more significant levels of first response answers, and

(2) It would also allow the instrument to be distributed, answered, and collected easily within the first fifteen minutes of the participant's first lecture of semester one while the lecturer was concurrently completing other initial administration tasks.

This strategy enabled the survey instrument to be distributed to 515 first year undergraduate students, with a return of 435 completed surveys (84.4%). An additional six surveys were returned that were not fully completed, and as a consequence, that data was precluded from the dataset.

3.10 Ethics Procedures

The data collection process requires that each participant understands their rights within the process. At the commencement of each survey dissemination session each participant was provided with form explaining in detail as to what they were consenting to be involved in, and a review of this information form was also conducted, ensuring minimal miscomprehension. This written document was developed according to the requirements of the Northern Tasmania Social Sciences Human Research Ethics Committee.

The information form included details as to

- The eventual use of the data,
- The participant's right to withdraw,
- The participant's right to review any written documentation,
- Confidentiality aspects, and
- The legal status of the data (Appendix B: Participant Forms).

Answers would be provided when and where participants posed any questions, but no suggestions would be made as to how the participants should complete the questionnaire.

The participants would then be asked to retain the information document and only to continue filling out the survey instrument if they actually understood and consented to the conditions contained in the information document. Volunteering participants would then be asked to sign an attached consent form (Appendix B: Participant Forms). The consent forms, along with the completed paper questionnaires would then both be returned to the researcher for storage in the case of the consent forms, and further analysis in the case of the questionnaire forms.

3.11 Quantitative Data Analysis

The major aim of factor analysis is the orderly simplification of a large number of inter-correlated measures to a few representative constructs of factors (Ho, 2000). This study initially attempted to replicate the analysis methodology and techniques used by Marlene Schommer within her study involving the 1990 Epistemological Questionnaire. This seminal work within the field of epistemological belief analysis provided the groundwork for this research, and through personal correspondence from Marlene, encouraged a different perspective to be applied to her original research findings.

This has resulted in a reflective stance to take toward the participant's responses and different approaches to the methods used to analyse those responses, ultimately adding to the existing body of research in this field, as well enabling the achievement of what this researcher feels are more satisfactory conclusions. What follows is an overview of the Multivariate Factor Analysis Process used by this researcher and the justification for each method of analytical computation.

3.11.1 Multivariate Factor Analysis

Multivariate Factor Analysis is conducted in order to expose the hidden structure within a dataset of variables. The analysis reduces attribute space from an initial larger number of variables down to a smaller number of factors. This analytical process is termed a "non-dependent" procedure, that is, it does not assume or use a dependent variable is specified and reuses each variable within the dataset when conducting the analysis. As previously discussed there are two principle methods when conducting factor analysis.

3.11.1.1 Confirmatory Factor Analysis

According to Ho (2000) "confirmatory factor analysis (CFA) seeks to determine if the number of factors and the loadings of measured (indicator) variables on them conform to what is expected on the basis of a pre-established theory(s). Indicator variables are selected on the basis of prior theory and factor analysis is used to see if they load as predicted on the expected number of factors. The researcher's a priori assumption is that each factor (the number and labels of which may be specified a priori) is associated with a specified subset of indicator variables (Ho, 2000, Leech et al., 2005).

A minimum requirement of confirmatory factor analysis is that one hypothesizes beforehand the number of factors in the model, but usually also the researcher will posit expectations about which variables will load on which factors (Kim and

Mueller, 1978). This is useful; for example, if the researcher seeks to determine, for instance, if measures created to represent a latent variable really belong together (Antonius, 2003, Garson, 2007).

This is the method believed used in the original Schommer (1990) study as well as the confirmatory analysis used when testing the EBS instrument.

3.11.1.2 Exploratory Factor Analysis

In another description, Ho (2000) explains, "exploratory factor analysis (EFA) seeks to uncover the underlying structure of a relatively large set of variables. The researcher's a priori assumption is that any indicator may be associated with any factor. This is the most common form of factor analysis. There is no prior theory and one uses factor loadings to intuit the factor structure of the data" (Antonius, 2003, Ho, 2000).

3.11.1.3 Computation of the Correlation Matrix

Factor analysis is based on the correlations between measured variables so a correlation matrix containing the inter-correlation coefficients for all the variables must be computed. This matrix, along with all the data tables presented on analysed data, was computed using the Statistical Package for the Social Sciences (SPSS) v.12.0.1.

3.11.2 Methods of Extraction of Initial Factors

In this phase the number of primary factors needed to describe the aggregations within the data is determined. To do this the researcher must decide on the method of extraction and the number of factors to be selected to represent the underlying constructs of the data. The two basic and most accepted methods for factor analysis are the Principal Component Analysis and the common Factor Analysis.

SPSS package offers seven methods of extraction;

1. Principal Component Analysis
2. Common Factor Analysis
    a. Unweighted Least Squares
    b. Generalised Least Squares
    c. Maximum Likelihood

d. Principal Axis Factoring
e. Alpha Factoring
f. Image Factoring

The selection of the most appropriate method of analysis lies in the objective of the researcher.

3.11.2.1 Principal Component Analysis

If the purpose is to reduce the data in order to obtain the minimum number of factors needed to represent the original set of data then Principal Components Analysis is appropriate. Within this method the researcher works from the premise that the factors extracted need not have any theoretical validity (Ho, 2000).

3.11.2.2 Common Factor Analysis

However, when the primary objective is to identify theoretical and meaningful underlying associations and causality, then the Common Factor Analysis is more appropriate. Given the more restrictive assumption underlying Common Factor Analysis, the principal components method has attracted more widespread use (Ho, 2000)

With the intention of this research to more deeply investigate the epistemological beliefs and belief structures of the participants, it was decided that the common factor analysis was more appropriate, and the Principal Axis Factoring methodology was selected as being able to provide the most detailed results for the study.

3.11.3 Determination of the Required Number of Factors

Factor analysis can be broadly characterized as a set of multivariate statistical methods for data reduction and for reaching a more parsimonious understanding of measured variables by determining the number and nature of common factors needed to account for the patterns of observed correlations (Fabrigar et al., 1999).

Although both exploratory and confirmatory approaches seek to account for as much variance as possible in a set of observed variables with a smaller set of latent variables, components, or common factors, exploratory factor analysis (EFA) is particularly appropriate for scale development or when there is little theoretical basis for specifying a priori the number and patterns of common factors (Hurley et al., 1997). Thus, one of the most critical methodological decisions for researchers using EFA is the number of factors to retain (Hayton et al., 2004).

There are several conventional criteria for ascertaining the initial number of factors that can be favourably extracted; these are Comprehensibility, Kaiser Criterion, Eigenvalues, Scree Tests and Parallel Analysis.

3.11.3.1 Comprehensibility

Though not strictly regarded as a mathematical criterion, there is some benefit in limiting the quantity of factors to those whose dimension of meaning is readily understandable. Often this can be seen to be the first two or three factors.

Using one or even several of the methods discussed in this chapter, the researcher can determine an appropriate series of solutions to examine. For example, the Kaiser criterion may indicate five factors while the scree test may indicate three factors, suggesting that the researcher may consider three, four and five factor solutions, selecting that solution which creates the most comprehensible factor construct (Lance et al., 2006)

3.11.3.2 Kaiser Criterion

Originally attributed to Guttman in 1954, this criterion is commonly connected to Kaiser’s (1960) study in which it was a critical component. The K1 rule suggests a heuristic rule for discarding the least important factor loadings from the overall analysis. This rule (K1) advocates the dropping of all those components with eigenvalues less than a value of 1.0. While this heuristic rule may overestimate or underestimate in some cases, the true number of factors; the prevalence of simulation study data suggests it is a conservative criterion which usually overestimates the true number of factors within the analysis (Lance et al., 2006)

The Kaiser criterion is currently the default method employed within the SPSS application, along with most other statistically based computer programs/equations but it is not really recommended when used as the sole cut-off criterion for calculating the number of factors required to be produced by the analysis process.

The justification for considering and using the Kaiser criterion is that the amount of common variance explained by the extracted factors should be at least equal to the variance explained by a single variable (unique variance), if that factor is to be retained for interpretation. An eigenvalue greater than or equal to 1.0 indicates that more common variance than unique variance is explained by that particular factor (Antonius, 2003, Ho, 2000).

3.11.3.3 Scree Plots

Factors are displayed in their order of extraction (on the X axis). The initial factors extracted are large factors (with high eigenvalues), followed by smaller factors. Graphically, the plot will show a abrupt slope between the larger factors and a more gradual sloping as the remaining factor loadings tend to level out (See Figure 3: Scree Plot Example). The point at which the curve first begins to straighten out is considered indicative of the maximum number of factors to extract. That is, those factors above this point of inflection are deemed meaningful and those below are not (Ho, 2000)

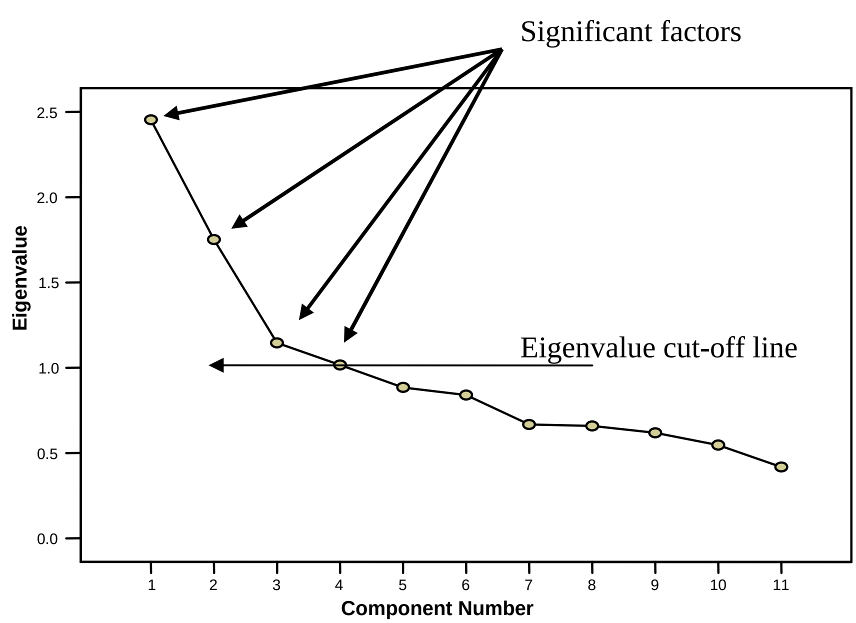


Figure 3: Scree Plot Example

In Table 13: Example Eigenvalues there can be seen a clear demarcation between the four significant factors of shared common variance and a value exceeding 1.0 (indicated in **bold** type with a greyed background) and the remaining factors.

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	**2.454**	22.306	22.306
2	**1.752**	15.925	38.231
3	**1.146**	10.416	48.647
4	**1.016**	9.237	57.884
5	.884	8.039	65.923
6	.840	7.636	73.559
7	.667	6.066	79.625
8	.658	5.985	85.610
9	.619	5.624	91.234
10	.546	4.967	96.201
11	.418	3.799	100.000

Table 13: Example Eigenvalues

Ho (2000) describes the Cattell scree test as “a graphical output that plots the components as the X axis and the corresponding eigenvalues as the Y axis. As one moves to the right, toward later components, the eigenvalues drop. When the drop ceases and the curve makes an elbow toward less steep decline, accordingly, Cattell's scree test rule says to drop all further components after the one starting the elbow”.

Ho (2000) goes on to criticize this rule because “sometimes this practice can be considered amenable to researcher-controlled fudging”. That is, as picking the elbow can be subjective because the curve has multiple elbows or is a smooth curve, the researcher may be tempted to set the cut-off at the number of factors desired by his or her research agenda. Researcher bias may be introduced due to the subjectivity involved in selecting the elbow. The scree criterion offers a broader scope than the Kaiser criterion and may result in fewer or more factors being considered for extraction (Ho, 2000).

In the example in Figure 3: Scree Plot Example, there are only four significant factors identified out of the ten identified factors pictorially represented within the scree test. However by following the curve of the graph a further two factors could be extracted for interpretation before the line indicates a more pronounced drop toward more unique variance by the remaining factors. This method can be considered to be very much open to interpretation and the experience of the analyst.

3.11.3.4 Parallel Analysis

Despite the importance of factor retention decisions and extensive research on methods for making retention decisions, there is no consensus on the appropriate criteria to use. A number of criteria are available to assist these decisions, but they do not always lead to the same or even similar results (Carraher and Buckley, 1991, Thompson and Daniel, 1996, Zwick and Velicer, 1986).

There is evidence, however, that Parallel Analysis (PA) is one of the most accurate methods for determining the number of factors to retain, while also being one of the most underutilized methods (Fabrigar et al., 1999, Ford et al., 1986, Horn, 1965).

Possible reasons for the lack of widespread use of Parallel Analysis includes a lack of training available, the lack of inclusion of the method in most textbook discussions of the topic, lack of awareness by researchers because much of the factor analysis literature is complex and heavily quantitative, difficulty in performing Parallel Analysis, and simply tradition within the realm of associated research (Fabrigar et al., 1999) in (Hayton et al., 2004).

Also known as the Humphrey-Ilgen method of parallel analysis; PA is now often recommended as the best method to assess the true number of factors (Lance et al., 2006, Velicer et al., 2000). Parallel Analysis selects the factors which are greater than random. The actual data are factor analysed, and separately one does a factor analysis of a matrix of random numbers representing the same number of cases and variables.

For both actual and random solutions, the numbers of factors are plotted on the (X) axis, and cumulative eigenvalues are plotted on the (Y) axis. Where these two lines intersect determines the number of appreciable factors that can be extracted from the analysis. Though not strictly available in SPSS there are several other applications available that can produce similar illustrative output (Lance et al., 2006, Watkins, 2006).

This study investigated the Monte Carlo Theory and “PCA for Parallel Applications” in order to predict the number of appreciable factors that could be extracted from the analysis process.

Monte Carlo Theory

The Monte Carlo theory is a computational algorithm relying on repetitive randomised sampling of the dataset to compute a comprehensible result. The Monte Carlo methodology is often used when replicating physical and/or mathematical systems. Because of the reliance on repeated computation and randomly generated numbers, Monte Carlo methods are, by their nature, usually most suited to computer based computational processes. Monte Carlo methodologies are mainly used when it is infeasible or impracticable to compute an exact finding with any form of a deterministic algorithm.

The term Monte Carlo was coined in the 1940s by physicists working on a nuclear weapon project in the Los Alamos National Laboratory. Monte Carlo research increasingly seems to favour the use of parallel analysis as a method for determining the ‘correct’ number of comprehensible factors within factor analysis methodologies, or components in principal components analysis (Longman et al., 1989).

To ensure that the SPSS output was producing reliable and logical results, all the original data was fed into the MonteCarlo PA application (Watkins, 2006).

The results from this algorithm confirmed the selection of the appropriate number of factors used within this study when combined with the Scree plot and Kaiser Criterion methods to extract the number of factors during all analyses.

3.11.4 Rotation of the Extracted Factors

In the initial extraction phase, factors are often difficult to interpret, mainly because the processes conducted during this stage tend to ignore the likely possibility that some of the variables identified as representing factors may already have very high loadings or correlations with factors that had been extracted earlier. This may result in significant cross-loadings in which many factors are correlated with many variables. This makes interpretation of each factor loading difficult, because different factors are represented by the same variables (Antonius, 2003, Ho, 2000).

By using a “rotation phase” in an attempt to clarify the factor loadings the researcher can identify those variables that may load on one factor and not on another. Ultimately, the rotation phase is an attempt to achieve a simpler, theoretically more meaningful factor pattern (Ho, 2000).

3.11.4.1 Rotation Methods

Orthogonal rotation assumes that the factors are independent, and the rotation process maintains the reference axes of the factors at 90 degrees.

There are three major methods of orthogonal rotation

1. Varimax
2. Quartimax, and
3. Equimax.

Of the three approaches, varimax has achieved the most widespread use as it seems to give the clearest separation of factors. It does this by producing the maximum possible simplification of the columns (factors) within the factor matrix. In contrast, both quartimax and equimax approaches have not proven very successful in producing simpler structures, and have not gained widespread acceptance (Ho, 2000).

Oblique rotation allows for more correlated factors instead of maintaining a sense of autonomy between the rotated factors. The oblique rotation process does not require that the reference axes be maintained at 90 degrees. Of the two rotation methods, oblique rotation is more flexible because the factor axes need not be orthogonal.

Moreover, at the theoretical level, it is more realistic to assume that influences in nature are correlated. By allowing for correlated factors, oblique rotation often represents the clustering of variables more accurately (Ho, 2000).

While the orthogonal approach to rotation has several choices provided by SPSS, the oblique approach is limited to one method: Oblimin (Antonius, 2003, Ho, 2000).

3.11.4.2 Orthogonal Versus Oblique Rotation

In choosing between orthogonal and oblique rotation, there is no compelling analytical reason to favour one method over the other. Indeed, there are no hard and fast rules to assist the researcher in their choice of either a particular orthogonal or oblique rotational technique (Antonius, 2003, Ho, 2000).

However, convention suggests that the following guidelines may be helpful in the selection process.

If the intention of the research project is to reduce the data to more manageable proportions, in spite of how significant the resultant factors may be and if there is reason to assume that the factors are uncorrelated, then orthogonal rotation should be used.

Conversely, if the goal of the research is to discover theoretically meaningful factors, and if there are theoretical reasons to assume that the factors will be correlated, then oblique rotation is appropriate (Antonius, 2003, Carraher and Buckley, 1991, Hayton et al., 2004, Ho, 2000, Thompson and Daniel, 1996).

3.11.4.3 Interpreting Factors

In interpreting factors, the size of the factor loadings will help in the interpretation. As a general rule, variables with large loadings indicate that they are representative of the factor, while small loadings suggest that they are not. In deciding what is large or small, a rule of thumb suggests factor loadings greater than ±0.33 are considered to meet the minimal level of practical significance. The reason for using the ±0.33 criterion is that, if the value is squared, the squared value represents the amount of the variable's total variance accounted for by the factor. According to Ho (2000), a factor loading of ±0.33 is considered to be indicative of a representative loading.

3.11.5 Adopted Factor Extraction Methodology

This researcher, after confirming that the EBS could in fact replicate similar results to the Schommer (1990) results, decided that the more theoretically meaningful methodologies should be used on the original statement data, instead of the reductionist method used in the Schommer (1990) study.

In the Schommer (1990) study the subset groupings were applied before the factor analysis on the data, more on this in chapter 5. In this research, the EBS harvested variables were passed through the factor analysis process to extract those initial significant factors. Subsets of variables were then segregated into these groups before being passed through the factor analysis process yet again to determine the final significant factors.

The factors were extracted using the multivariate factor analysis principles of the Common Factor Analysis (Principal Axis Factoring) using Oblique (Oblimin) rotation. This combination, as mentioned previously would divulge a more theoretically meaningful collation of factor groupings and representations.

3.12 Qualitative Data Analysis

Because of the complexity of the deeper analysis required for this project, a second phase of analysis was overlaid to the statement grouping results revealed by the quantitative SPSS analysis process.

This additional overlay analysis was designed to observe any emerging themes in the responses given by the participants, based on the groupings of those statements. By using the actual wording found within the statements, although unusual – as the statements were not the participant's actual words, it should be possible to observe any patterns or trends within the actual factor groupings.

The values that the participants associated with individual responses were also used to add weighting to each statement by giving a sense of positive or negative effect to the overall analysis.

This additional level of analysis would be critical to the fundamental understanding of the participant's comprehension of the statements, as well as adding insight into how their epistemological beliefs are constructed and maintained.

3.12.1 Qualitative Data Analysis

A quantitative researcher codes after all the data has been collected. The researcher arranges measures of variables, which are in the form of numbers, into a machine-readable form for statistical analysis. Coding has different meaning in qualitative research, as opposed to computer program coding for example. In qualitative coding, raw data is organised into theoretical categories and analysed to create themes or concepts. The coding is then formulated by conducting two simultaneous processes, mechanical calculated data reduction and analytic categorisation of the data into themes (Neuman, 2003).

Strauss and Corbin (1997), defines three different kinds of qualitative data coding: "open coding, axial coding and selective coding". The researcher reviews the data a minimum of three times using a different coding process each time thus coding the raw data. The iterative nature of the analysis may however require that the data be treated several times within each process before the researcher achieves an acceptable level of interpretation (Strauss, 1987, Strauss and Corbin, 1990).

The concept behind the grounded analysis approach is to read through a textual database (such as the research field notes and interview transcriptions) and keep rereading in an attempt to discover and label variables (which can be called categories, concepts or properties) as well as their interrelationships. Theoretical sensitivity is the phrase used to describe the ability to perceive variables and relationships. This ability can also be affected by a number of things including the researcher's reading of the literature and the researcher's use of techniques designed to enhance sensitivity (Borgatti, 2003, Glaser, 1978, Glaser, 1992).

3.12.2 Open Coding

Open coding is known as the process of naming or labelling things, categories, and properties. Open coding can be achieved in one of two ways, very formally and systematically or quite informally. Grounded analysis usually is associated with the latter style. In addition, as codes are developed, they can be used to write memos known as code notes that discuss the codes. These memos become essential information for later development into project reports.

Open coding is the component of the analysis process concerned with identifying, naming, categorizing and describing any observed phenomena found within the text. Essentially, each line, sentence, paragraph etc. is read in search of the answer to the repeated question "what is this about? What is being referenced here?" (Borgatti, 2003, Strauss and Corbin, 1990).

These labels refer to things like schools, information, meetings, friendships, etc. They form the nouns and verbs that relate to a conceptual world. Part of this analytic procedure is to try and identify those higher level or more general categories that these labels are instances of, such as institutions, work activities, social relations, social outcomes, etc (Martin and Turner, 1986, Strauss and Corbin, 1990).

As Borgatti (2003) states "the researcher is also trying to seek out the adjectives and adverbs - the properties of these categories. For example, about a friendship we might ask about its duration, and its closeness, and its importance to each party". Whether these properties or dimensions come from the data itself, from respondents, or from the mind of the researcher, depends on the goals of the research (Borgatti, 2003, Strauss and Corbin, 1997)

3.12.3 Axial Coding

Borgatti (2003) describes axial coding as "the process of relating codes (categories and properties) to each other, via a combination of inductive and deductive thinking". This approach tends to try and simplify the process by emphasizing causal relationships over all other possible kinds of relationships. Theorists using this approach also try to compartmentalise elements into a basic frame of generic relationships. Table 14: Basic Frame of Generic Relationships, illustrates those elements that can make up a frame.

Element	Description
Phenomenon	This is what in schema theory might be called the name of the schema or frame. It is the concept that holds the bits together. In grounded theory it is sometimes the outcome of interest, or it can be the subject.
Causal Conditions	These are the events or variables that lead to the occurrence or development of the phenomenon. It is a set of causes and their properties.
Context	Hard to distinguish from the causal conditions. It is the specific locations (values) of background variables. A set of conditions influencing the action/strategy. Researchers often make a quaint distinction between active variables (causes) and background variables (context). It has more to do with what the researcher finds interesting (causes) and less interesting (context) than with distinctions out in nature.
Intervening conditions	Similar to context. If we like, we can identify context with *moderating* variables and intervening conditions with *mediating* variables. But it is not clear that grounded theorists cleanly distinguish between these two.
Action strategies	The purposeful, goal-oriented activities that agents perform in response to the phenomenon and intervening conditions.
Consequences	These are the consequences of the action strategies, intended and unintended.
Source: (Glaser, 1992)	

Table 14: Basic Frame of Generic Relationships

A common misconception surrounding a grounded analysis approach is that the participants' comprehension of causality is taken as the absolute truth. This is mainly because the informant is seen as the "insider expert" and the model created is a model from the informant's perspective. This is of course a notable myth (Borgatti, 2003).

This concept has created some controversy over the past few years with the separation of Glaser and Straus (Smit, 1999). Glaser (1992) now argues that "this is a preconception on the part of the researcher and has no place in grounded analysis".

> *"In grounded theory the analyst humbly allows the data to control him as much as humanly possible, by writing a theory for only what emerges through his skilled induction"*
>
> *(Glaser, 1992)*

During the course of this study this researcher attempted to obtain and maintain a stance of not having speculative preconceptions or formulated theories, but simply to observe the data and allow it to develop and emerge into only those theories that were presented by the participants.

3.12.4 Selective Coding

Borgatti (2003) describes selective coding as "the process of choosing one category to be the core category, and relating all other categories to that category". The essential idea is to develop a single storyline around which everything else is connected (Borgatti, 2003, Dey, 1999).

3.13 Reliability and Validity

Reliability is the extent to which a procedure will produce the same results under constant conditions. In the case of this study, the reliability of the research results entailed whether or not the same findings would occur if the study were repeated in the same manner (Bell, 1992, Neuman, 2003).

3.13.1 Reliability

Benbasat et al (1987), states "that a clear description of the data sources and the manner in which they contribute to the overall findings of a study is an important aspect to the reliability and validity of the results".

For this reason, a clear description of the data sources and methods used to gather those sources have been provided. Data collected using the EBS Instrument was open to problems such as individual comprehension or understanding, issues of context, and possibly even culturally incompatible references. These issues were noted during the instrument's construction process and attempts were made to minimise these effects, although it is unlikely that interference was eradicated completely.

3.13.2 Validity

Validity describes whether an item measures or describes what it is supposed to measure or describe.(Neuman, 2003) It is a much more complex concept than reliability and there are many variations and sub-divisions to which researchers can investigate in attempts at ensuring validity of their results. Bell (1992) states that researchers involved with smaller projects without complex testing or measurements need not investigate the concept of validity too thoroughly but should examine results and methods critically. Noting this, a brief dialogue of the aspects of validity is discussed (Bell, 1992).

Face Validity

The easiest aspect to achieve and the most basic kind of validity is face validity. Face validity is a judgement by the scientific community as to whether or not the indicator really measures the construct (Neuman, 2003). This aspect relies on the fact that readers will accept the definition and measurement fit of the instrument presented.

Content Validity

Content validity addresses whether or not a definition is represented within a measure. A conceptional definition contains a 'space' for thoughts and ideas that the researcher put forward that surround and pertains to the construct. An example in this research would be the measure of perception of the level of comprehension of the statements within the EBS instrument by the participants.

- How valid is the definition of participant comprehension?
- Are the answers indicated expressive of the thoughts of the participants, or merely what they consider to be the required responses?

- Does this definition of participant comprehension need to be expanded or narrowed in an attempt to fulfil the requirements of the research and thus be eligible for inclusion in the study?

Criterion Validity

This form of validity uses a set standard or criterion, cross referenced to the construct, to indicate the level of validity that may be compared to a similar construct that has been known to be acceptable. A concurrent validity indicates that the construct agrees with pre-existing values confirming its validity, where predictive validity conforms to logically construed future values or events relative to the construct (Eisenhardt, 1989, Kirk and Miller, 1986).

Construct Validity

Put simply, validity means truthful. It refers to the bridge between the construct and the data. Qualitative researchers are more interested in authenticity than validity (Neuman, 2003). However, Peraklya (1997) argues that "construct validity is central to the overall validity of research. Construct validity is concerned with the relationship between a theoretical model and the observations made by the researcher" (Peraklya, 1997).

This is particularly relevant in this research, where the discussion of theoretical models and themes identified within the participants' data form a major component of the results. If the discussion of these theoretical concepts bears little relevance to the factual realities observed in the field, the findings of the research will be invalid and void.

To increase validity and to ensure accuracy, discourse was conducted on an ad hoc basis with individuals not associated with the research to see if they could also identify concepts and emerging patterns within the data. Where relevant, other portions of the research that discussed systems and observations were sent using e-mail to recognised experts for clarification, in those particular fields that were relevant to the research. This ensured that what was stated in the research was factual and accurate (Colbeck, 2003, Colbeck, 2007).

3.13.3 Validity and the Generalisation of Findings

Another facet of validity relates to the generalisation of research findings. This topic has already been discussed with regards to sampling methods. The result of this research was produced from a relatively large representation of the overall sample population.

Within the research, the data has been kept as pure and free of bias as possible. Definitions of measures used in the analytical stages have been done from as neutral a stance as possible, to ensure no bias from the researcher's viewpoint or previous life experiences. Any interpreted qualification of data is therefore based on observed grouping within the data and should be recognisable as being both conceivable and verifiable by readers of the research.

However, as previously stated, the intention of this research was not to produce definitive results that could be overly generalised and applied elsewhere. Therefore it is suggested that the findings presented are valid within the context as discussed.

3.14 Methodological Conclusion

Mixed-method research is a dynamic option for expanding the scope and improving the analytic power of studies. When done well, mixed-method studies dramatize the artfulness and versatility of research design. Mixed-method research operationally includes an almost limitless array of combinations of sampling, and data collection and analysis techniques (Sandelowski, 2000).

A combination of both quantitative and qualitative research methodologies was therefore considered appropriate, given the initial objective multivariate statistical analysis of the 'hard data' that was provided by the EBS survey instrument, and the following codified analysis of the weighted participants' responses.

It was decided that the almost monocular viewing of the data, if only selecting one particular methodology, would result in an abridged view of the results, where a combination of quantitative foundation analysis and qualitative reflection would provide a holistic and panoramic mental model of the research domain that had not been glimpsed before.

By using an initial quantitative foundation based on a logically provable mathematical substrate, it was felt that this would provide a secure foundation for any postulated hypotheses. By incorporating both grounded analysis (thus allowing the data, through an iterative analysis approach, to fully propagate emergent themes and/or ideas that are present in the data) and case study analysis techniques (because of the organisational and not technical issues involved), this would best provide the means for this research to expose the epistemological belief structures as manifested by the participants.

This approach would then also allow the researcher to learn how the participants perceive and construct their educational environment, as well as allowing insight into how those constructs are used when dealing with information. This research also has the added benefit in offering a detailed conceptual database of information for any future research in this, and associated domains.

3.14.1 Adopted Research Sampling Strategy

The combination of a purposive judgemental methodology with a stratified purposeful sampling strategy was considered the most probabilistic and effective way to overlay the larger sample population of all tertiary level learners with this particular sample of learner groups from each participatory cluster used within this study.

Due to the scope and nature of the study, it was therefore decided that a purposive judgemental sampling process with a stratified purposeful sampling approach be adopted.

3.15 Research Limitations

This research germinated from an idea to test an existing methodology and attempt to improve on that particular research outcome. With this in consideration, access to psychological expertise and the available timeframe for this project were both in short supply. Another consideration found restrictive to this study includes only being offered a brief window of opportunity to access a limited student population to initially deploy the EBS instrument.

Where other studies also have the luxury of engaging in a longitudinal study, this research is more about looking at a temporal moment in time, trying to scrutinise and observe what others can only experience as a fleeting glimpse of what is a dynamic happenstance associated with a particular of cluster of learners

3.16 Chapter Summary

This chapter highlights the careful and long drawn out considerations used to construct the final methodological approach used within this research. It is an approach that is as unbiased as possible, given the fact that humans are involved. The selected methodologies were designed to allow the data to manifest itself in its truest possible form, providing clear and unfettered observation of any emerging epistemological belief structures as maintained by the participants.

The journey undertaken in the stringent formulation of the methodologies used was truly exhaustive, with the one hope that the findings revealed by the final analyses would enhance the understanding of these fundamental core principles.

Chapter 4: Validating the EBS Instrument

> *"We can understand almost anything, but we can't understand how we understand"*
>
> Albert Einstein (1879-1955)

The purpose of this chapter is to explain the concepts behind the developmental methodologies designed to create the survey instrument used within this research. The researcher draws from a background embedded in computing and information technology, with a personal interest in the Social Sciences. Within these fields, responses and results are generally particular by nature. By adding a dimension of complexity, given the epigrammatically and mostly obscure nature of explanations as to how and why humans think and engage as we do with each other, particularly by researchers within the field of Psychology, really made this project interesting.

4.1 Introduction

It must be stated therefore that the time and expertise was not available to this researcher to construct and develop a pen and paper based instrument from the ground up.

Some argue that epistemological theories, particularly those based on pen and paper instruments such as the EBS do have major limitations, but, as Hjorland (2002) states, these theories are the best general models we have and that their importance is, and should be, widely recognised (Hjorland, 2002).

The decision was made therefore to quantitatively attempt to prove an existing survey instrument using newer computer based applications and techniques. The instrument selected was the Schommer (1990) Epistemological Beliefs survey instrument. However, after researching the studies done by Schommer and reviewing the comments made by many other researchers within the field, it became apparent that the instrument may have contained some degrees of inconsistency and uncertainty.

By examining Schommer's (1990) research, the development of a newer more precise instrument based on her research seemed a feasible alternative. Then conducting confirmatory analyses, and comparing the results gathered using this embryonic instrument with those reported results obtained by the original Schommer (1990) study, would ensure that the new instrument was capable of providing readable and reproducible results.

This strategy would also add an increased level of robustness to the study, as the findings from the original study would provide an extremely useful source for benchmarking the new instrument.

This new instrument would then be able to conduct exploratory analyses on the newly acquired data in an attempt to investigate, construe and comprehend epistemological beliefs and belief structures currently maintained by the participatory cluster of learners.

Thus after careful study of the original Schommer (1990) instrument the Epistemological Beliefs Sampler (EBS) was conceived in principle, with the aim of the research leaning toward understanding as well as providing graphical representation of the structures utilised within the knowledge genesis process.

The intrinsic goals for this new instrument would include;

(a) A format that would be easy to distribute, collate and analyse.

(b) The data gathered by the new instrument could illustrate a clear structure of the beliefs held by the participants.

(c) The EBS would be reliable enough to extend into additional exploratory research activities.

(d) The exploratory results would assist understanding of the belief structures used by the participants, and

(e) Provide insight into the knowledge genesis process.

4.2 Rationale behind the Research Decisions

This project commenced with the desire to understand more intimately the initial processes that humans undertake when creating knowledge. Providing a high degree of confidence within the research would be necessary so it was decided that peer acknowledged pieces of research be studied and if possible, extended to suit the needs of the study (Colbeck, 2007).

In 1990, Marlene Schommer developed the Epistemological Beliefs Questionnaire (EQ) within her dissertation (89-24938) that assessed her hypothesised structure of five more-or-less independent beliefs among college students (Schommer, 1990b). This original pencil & paper instrument, along with personal discussions, advice and encouragement from Marlene Schommer-Aikins, appeared to offer the capacity to provide the necessary baseline data for this research project (Schommer-Aikins, 2005).

Since the inception of her EQ instrument; many other researchers have taken it upon themselves to attempt the development of better instruments.

Schommer-Aikins (2002) states that there has been some discussion toward some of these developments insomuch as some researchers have found her instrument to be a useful predictor of a learner's belief structure (Hall et al., 1996, Schommer-Aikins, 2002, Windschitl and Andre, 1998).

Some researchers have worked towards a more psychometrically sound instrument. For example, Jehng et al (1993) followed up on Schommer-Aikins work by comparing epistemological beliefs of students across different majors and between educational levels (Jehng et al., 1993). His instrument was constructed based on questions developed by Schommer (1990) in (Schommer-Aikins, 2002).

Jehng et al.'s questionnaire attempted to measure four of the five epistemological beliefs hypothesized by Schommer (1990) including beliefs in the stability of knowledge, the source of knowledge, the speed of learning, and the ability to learn. A fifth belief, the orderly process of learning replaced Schommer's (1990) hypothesized belief about the structure of knowledge (Duell and Schommer-Aikins, 2001).

Other researchers have also used the instrument as a starting point to go on and develop their own method of measuring epistemological beliefs. Schraw et al (1995) proposed and created the Epistemological Beliefs Inventory (EBI). Their goal was to develop an alternate tool that would capture all the original beliefs initially hypothesised by Schommer (1990) (Duell and Schommer-Aikins, 2001, Kardash and Scholes, 1996, Schraw et al., 2002, Schraw et al., 1995).

The EBS instrument developed for this study would be found in the latter developmental discussions as it is also primarily based on the concepts explored by the Schommer (1990) sixty three questions Epistemological Beliefs Questionnaire.

However, like some of the researchers mentioned previously, some concepts in developing this new instrument would have to be re-examined, as it was essential that the results gathered and analysed by the research maintain a statistical reliability (Neuman, 2003).

4.3 Considerations during Construction of the EBS

The existing Schommer (1990) EQ survey instrument was re-crafted so that the instrument as a whole would be more easily comprehended by the participants and the analysis of the results being more explicit and particular to the purpose required within this research.

4.3.1 Vocabulary Review

Some statements within the new instrument were altered from an Australian lexical perspective, to ensure that comprehension of the statements would not be distorted by the participants.

To fit into an Australian University level educational environment, words like teacher or instructor were replaced with the word lecturer; the word school was replaced by the word University, etc.

Other statements required more than single word changes e.g. the statement “People who challenge authority are over-confident” was replaced with “People who challenge authority come across as a bit full of themselves”. This form of wording would relate more comfortably to Australian students and allow them to comprehend the underlying context of the statement.

However other statements were introduced to actively scope the participant’s comprehension e.g. “Events from the past do not influence events in the future”. This statement was designed to explore the student’s belief toward whether or not they viewed knowledge as conditional, and would they expect knowledge to be certain or changeable – implying contextually alterable knowledge (Colbeck, 2007).

4.3.2 EBS Acceptance

Whitmire (2004) states, "research would benefit from the inclusion of less obtrusive data collection techniques". To ensure this unobtrusiveness and to warrant easier acceptance of the EBS dissemination by both unit lecturers and participants, the EBS would be distributed during the participants' first orientation lecture at the University(Whitmire, 2004).

This proved acceptable to both the researcher and the lecturers, on two points;

(1) Less time by the participants to overtly think about the statements would produce more significant levels of first response answers, and

(2) It would also allow the instrument to be distributed, answered, and collected easily within the first fifteen minutes of the participant's first lecture of semester one while lecturers were concurrently completing other initial administrative tasks with the students.

This collaborative strategy enabled a response return rate of four hundred and thirty five (435) completed surveys out of the five hundred and fifteen (515) distributed surveys, an achievement of 84.4%.

Participant demographics

From the total of four hundred and thirty five (435) student responses received, one hundred and sixty six (166) were male, and two hundred and sixty nine (269) were female - see Table 15: Participant demographics

Age groups	**Gender M**	**Gender F**	**Survey totals**
< 20	106	140	246
20 – 24	29	43	72
25 – 29	12	15	27
30 – 39	13	37	50
40 – 49	3	28	31
50 +	3	6	9
	166	**269**	**435**

Table 15: Participant demographics

Students from four schools within the university, representing diverse content domains, participated in this study. The four domains being represented were from the School of Computing, the School of Information Systems, the School of Nursing and the School of Health Science.

4.3.3 Maintaining a Measurable Indicator

As this researcher's initial intention was a confirmatory analysis of the epistemological beliefs held by first year university level students, it was considered necessary that the demographics of the participants also conformed as closely as possible to the original Schommer (1990) test group (Colbeck, 2007).

Recognising the obvious distinction between the American participants used in the original study and the multi-cultural environment presented by current Australian universities, it was important that the integrity of the participatory clusters used was maintained, in respect to multicultural input (Harvey, 1997a, Harvey, 1997b, Harvey and Myers, 1995).

The higher incidence of mature age students currently studying at the University of Tasmania did cause some minor concerns but was dismissed due to the high rate of survey returns where it was realised that the inclusion of a small percentage of mature age students would not significantly impact on the factor analysis process (Harvey, 1997a).

4.4 The EBS Design

The EBS was designed and constructed after much collaboration with Marlene Schommer-Aikins, along with input from leading Australian researchers in the fields of Information Literacy and Epistemological research.

4.4.1 Statement Construction

After extensive study and examination of the research literature, two of the original Schommer (1990) pre-defined twelve subsets appeared to have negligible effect on the study, see (Table 16: EBS statement allocations).

In the original Schommer (1990) results, *"Concentrated Effort"* had the smallest loading coefficient value (0.09552), and *"Cant' learn how to learn"* posed statements that most learner's would not have had the experience or ability to answer with any measure of confidence or understanding (Clarebout et al., 2001, Dixon, 2000, Hofer and Pintrich, 2002). Both these subsets were consequently discarded.

Some researchers had also argued that some of the statements in the original Schommer-Aikins study may not have necessarily fulfilled the needs of the research initially proposed within the original data analysis (Schraw et al., 2002).

Still other researchers reached similar conclusions when attempting to recreate the results based on the Schommer (1990) study, or even during their efforts to modify the original EQ survey instrument (Hall et al., 1996, Jehng et al., 1993, Tolhurst and Debus, 2002).

The number of statements within each subset also appeared excessive, as several of the original Schommer (1990) statements appeared to be only reworked versions of other similar statements within her study.

After applying the Australian lexical perspective to the original statements and removing those statements considered redundant to the designs of the study, additional statements were added in an attempt to redress any perceived imbalance.

4.4.2 Statement Valences

Factor analysis is based on the assumption that the higher the score, the more naïve the individual. So, all statements that a naïve individual would disagree with would need to be changed, for example if the participant responded with a four (4) to a statement with a negative valence (-) then this would have to be recoded to a two (2), a response of five (5) recoded to a one (1). Positive valence statements would therefore maintain their original response value.

The statements that were finally selected for inclusion in the EBS were also objectively balanced to ensure that the total valence component use within each subset closely mirrored the percentage of negative valence to positive valence found in the original Schommer (1990) instrument being (27(-) and 36(+) = 75%) as compared to the EBS (15(-) and 19(+) = 78%).

Table 16: EBS statement allocations, illustrates the minor differences in statement distribution between the original Schommer (1990) EQ instrument and the EBS instrument proposed in this research.

No	Statement Subsets	EQ	EBS
1	Seek single answers	7(+) 4(-)	3(+) 3(-)
2	Avoid integration	4(+) 4(-)	2(+) 2(-)
3	Avoid ambiguity	4(+) 1(-)	3(+) 1(-)
4	Knowledge is certain	3(+) 3(-)	2(+) 2(-)
5	Depend on authority	3(+) 1(-)	1(+) 1(-)
6	Don't criticize authority	3(+) 3(-)	2(+) 2(-)
7	Ability to learn is innate	4(+)	1(+)
8	Learn the first time	2(+) 1(-)	2(+) 1(-)
9	Learning is quick	3(+) 2(-)	3(+) 2(-)
10	Success is unrelated to hard work	1(+) 3(-)	0(+) 1(-)
11	Can't Learn how to learn	1(+) 4(-)	Not used
12	Concentrated effort is a waste of time	1(+) 1(-)	Not used
	Total statements	**63**	**34**

Table 16: EBS statement allocations

The effect of this naïve recoding can easily be observed when the mean values are plotted in a simple line graph. Within Figure 4: Naive recoding effects, the result of applying the naïve recoding to the set of statements is fairly obvious, yet surprising in some areas.

Where the data has been recoded and plotted on the graph, some of the recoding values are quite contrastingly different, particularly in relation to statements 3, 9, 16, 25, etc. however some of the recoded statements did not appreciably alter in value, such as statements 1, 17, 27, 31, etc.

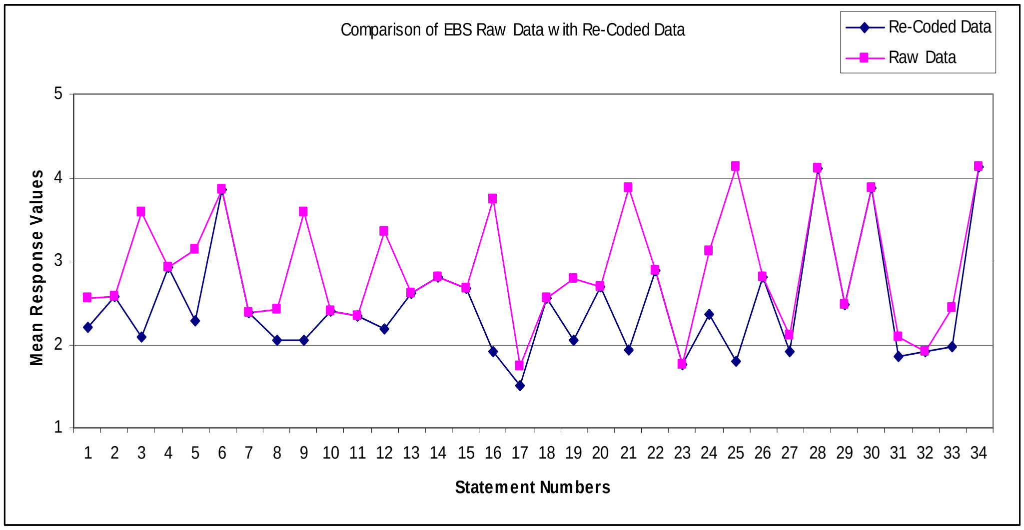


Figure 4: Naive recoding effects

4.4.3 The EBS Final Form

Finally the subset averages for each group of statements were amalgamated into a table ready for factor analysis. From the breakdown of the statement allocations seen in Table 16: EBS statement allocations; it can be seen that all subsets deemed to be critical within the original EQ instrument, are well represented. Detailed analysis of the gathered responses from the participants using EBS confirmed that this particular statement distribution matrix proved satisfactory.

The predefined subset groupings based on the Schommer (1990) research can be seen in Table 17: Predefined Subset Groupings

No	Subset Name	Statement No's
1	Seek Single Answers	1, 2, 3, 4, 5, 6
2	Avoid Integration	7, 8, 9, 10
3	Avoid Ambiguity	11, 12, 13, 14
4	Knowledge is Certain	15, 16, 17, 18
5	Depend on Authority	19, 20
6	Don't Criticize Authority	21, 22, 23, 24
7	Success is Unrelated to Hard Work	25
8	Innate Ability	26
9	Learn the First Time	27, 28, 29
10	Learning is Quick	30, 31, 32, 33, 34

Table 17: Predefined Subset Groupings

A full list of the actual statements used within the EBS can be found in Appendix A: EBS Statement structure.

4.5 Confirmatory Replication Analysis

The gathered data was initially entered into an MS Excel spreadsheet, which allowed quick calculation of the mean responses for each statement's participants' responses.

As mentioned earlier, since approximately half of the statements were worded so that a naïve individual would simply agree with them and the other half were worded so that the naïve individual would simply disagree with them, some of the statements need to be recoded as per the original instructions found in the Schommer (1990) study(Schommer, 1990b). Advice from psychological experts within the University of Tasmania along with consensus from other noted researchers, confirmed that the statement naïve recoding strategy was desirable; see Figure 4: Naive recoding effects (Hall et al., 1996, Ohtsuka et al., 1996).

4.5.1 Application of Multivariate Factor Analysis

The recoded subset data was entered into the application; Statistical Package for the Social Sciences v12.0.1 (SPSS) and a factor analysis conducted using Varimax rotation. This is a favourable departure from the original Schommer (1990) analysis which appears to have had to have been done more manually. From the detailed readout provided by this application, a definitive comparison was able to be made as to the suitability of the data for such an analysis, as well as favourable comparison to the original Schommer (1990) sample group.

It must also be mentioned that a new coefficient matrix was constructed for each testing analysis as several researchers have reported on the fact that Schommer insists on using her already existing matrix depending on the participatory groups' demographics. Consulted statistical experts advised that using pre-generated unrelated coefficient matrices will not allow the demonstration of reliable output, and that the matrix needs to be developed for each dataset used (Antonius, 2003, Ho, 2000, Hurley et al., 1997).

4.5.1.1 Statistical Validity

The Kaiser-Meyer-Olkin measure of Sampling Adequacy is a measure of whether or not the distribution of values is adequate for conducting factor analysis. A measure of >0.9 is marvellous, >0.8 is meritorious, >0.7 is middling, > 0.6 is mediocre, > 0.5 is miserable and < 0.5 is unacceptable. The EBS data returned a value sampling adequacy of 0.731 which is middling, almost meritorious (Colbeck, 2007).

Bartlett's test of Sphericity is a measure of the multivariate normality of the set of distributions. It also tests whether the correlation matrix conducted within the factor analysis is an identity matrix. Factor analysis would be meaningless with an identity matrix. A significance value < 0.05 indicates that the data do NOT produce an identity matrix and are thus approximately multivariate normal and acceptable for factor analysis (George and Mallery, 2003). The data within this study returned a significance value of 0.000, indicating the data is acceptable for factor analysis.

Cronbach's alpha was also calculated, in an endeavour to provide an absolute indication of the internal consistency of the dataset used in this project.

The formula used to calculate Cronbach's Alpha for each dataset is depicted in Equation 4-1: Cronbach's Alpha, where N is the number of statements, S_i^2 is the variance of the individual statements and S_x^2 is the variance of the whole test (Black, 1999, Yaffee, 2003).

$$\alpha = \frac{N}{N-1}\left[1-\frac{\sum_{i=1}^{N} S_i^2}{S_X^2}\right]$$

Equation 4-1: Cronbach's Alpha Formula

The resultant Cronbach's coefficient "α" for this dataset was determined to be 0.65, and deemed acceptable (Ho, 2000).

4.5.1.2 Factor Rotation and Extraction

Factors produced in the initial extraction phase are often difficult to interpret, because the procedure in this phase ignores the likely possibility that variables identified to represent factors may already have high loadings (correlations) with other previously extracted factors.

The rotation phase serves to "sharpen" the factors by identifying those variables that load on one factor and not on another. The ultimate effect of the rotation phase is to achieve a simpler, theoretically more meaningful factor pattern (Ho, 2000).

After the Eigenvalues for each subset were plotted on a bicoordinate plane to establish the number of significant components, the solution was then obliquely rotated (see section 3.11.4 Rotation of the Extracted Factors) to enhance the view of the results. There were four significant components extracted during the analysis that had maintained an acceptable Eigenvalue greater than 1.0, see Figure 5: Proximity Groupings within Euclidean Space.

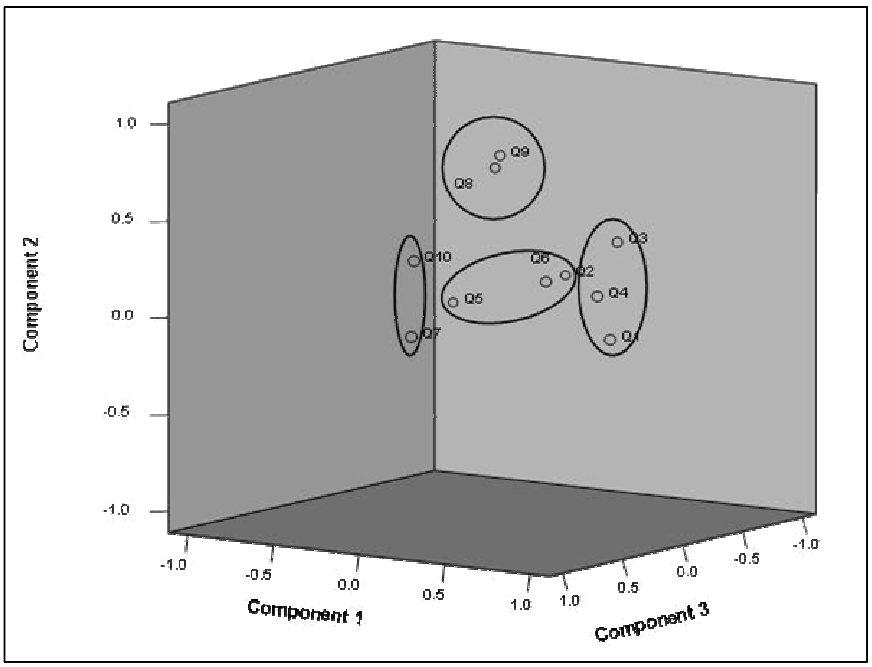


Figure 5: Proximity Groupings within Euclidean Space

These four extracted components comprised a total of 61.1% of the data analysed.

This is the same number of projected factors that Schommer had produced, and suggests that the EBS should be able to successfully produce comparable results.

4.5.1.3 Component Score Coefficient Matrix

Having accepted the rotated plot of the data, a component score coefficient matrix was generated to show how the pre-defined subgroups of statements had loaded within their respective factors. This also allowed a more direct comparison with the original Schommer (1990) results.

Finally, Table 18: Confirmatory Analysis Rotated Component Matrix illustrates the distribution of subset to factor relationships. The subset groupings are highlighted within the table in both bold type and grey background under each of the numbered factor loadings.

	Factor Loadings			
Subsets	**1**	**2**	**3**	**4**
SS03	**0.742**	0.023	0.183	-0.088
SS04	**0.705**	0.026	-0.098	0.148
SS01	**0.623**	-0.066	0.091	0.191
SS02	**0.545**	0.186	0.059	-0.349
SS06	**0.521**	0.507	-0.007	0.189
SS05	-0.123	**0.836**	0.131	0.091
SS09	0.112	0.096	**0.679**	0.014
SS07	0.258	0.441	**-0.587**	-0.250
SS08	0.229	0.353	**0.523**	-0.287
SS10	0.192	0.147	0.021	**0.806**

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Table 18: Confirmatory Analysis Rotated Component Matrix

All EBS factors appeared to load significantly higher than the results recorded in the original EQ study.

4.5.2 Results and Evaluations of the Confirmatory Analysis

When the subset loadings were considered in relation to their groupings, the four factors began to take on similar dimensions to those reported in the Schommer (1990) study.

Only one subset exhibited significant cross-loading, (subset six), and had a very close loading within both factors one and two. This particular subset (Don’t criticize authority), by its very nature, could have quite easily fitted into factor two

"Omniscient Authority" but it was decided that it would maintain its position within the factor "Simple Knowledge" where it had loaded highest.

This also sustained the groupings implied in the Schommer (1990) research.

Factor 1: Simple Knowledge

- SS3: Avoid ambiguity
- SS4: Knowledge is certain
- SS1: Seek single answers
- SS2: Avoid integration
- SS6: Don't criticize authority

Factor 2: Omniscient Authority

- SS5: Depend on authority

Factor 3: Fixed Ability

- SS9: Learn the first time
- SS7: Success is unrelated to hard work
- SS8: Ability to learn is innate

Factor 4: Quick Learning

- SS10: Learning is quick

The second subset appeared to be more similar in nature to the Omniscient Authority factor initially proposed by Schommer (1990) and further discussed by Schraw et al. (2002) in their research into the development of their Epistemic Beliefs Index (EBI) (Schraw et al., 2002). Certain Knowledge also appeared as a part of the set within the factor of Simple Knowledge, implying some reinforcement of comments made by other researchers in relation to concepts being "mixed" within factor loadings (Hofer and Pintrich, 2002, Tolhurst and Debus, 2002, Whitmire, 2004).

4.6 Correlational Relationship Analysis

After completing the factor analysis on the dataset, it was then decided to subject the dataset to a multiple regression correlation analysis. Whilst there can be no assertion of causality between factors using this form of analysis, logic decrees that there is indeed some form of implied relationship between the observed latent variables being represented within the constructed model.

Yaffee (2003) states that causal modelling may be performed with correlations, as standardized regression (correlation) between directly observed variables or scales. Other methods include the employment of path analysis between such variables with un-standardized regression coefficients. Other methodologies include using structural equation modelling and regressions among latent variables or factors. These methods seek to model, and hence control for, antecedent and intervening variables.

The latter methods seem to handle reciprocal as well as uni-directional relationships as well. They model the paths between variables, whether directly observed or latent. In so doing, they reveal the causal structure of the model(Yaffee, 2003).

Schommer (1990) quite explicitly stated within her research that “personal epistemology would be better portrayed as a system of more-or-less independent beliefs”.

This further scrutiny should then avail additional information as to how these factors are constructed and maintained by learners.

4.6.1 EBS Correlational Relationship Model

The correlational analysis was conducted by applying multiple regression principles to the subset loadings and a correlation matrix was calculated and produced within the SPSS application, see Table 19: Confirmatory Analysis Correlation Matrix. This form of analysis has a general purpose of predicting a dependant or criterion variable from several independent or predictor variables and creating an associational statistical method of representing an outcome measure that exposes any correlations between those variables(Leech et al., 2005).

Correlations										
	SS1	SS2	SS3	SS4	SS5	SS6	SS7	SS8	SS9	SS10
SS1	1	.212	**.286**	.282	.012	.245	.085	.103	.114	.142
SS2	.212	1	**.315**	.179	.064	.240	.170	.207	.079	.056
SS3	.286	.315	1	**.418**	.034	.332	.065	.263	.088	.094
SS4	.282	.179	**.418**	1	.040	.345	.151	.061	.083	.114
SS5	.012	.064	.034	.040	1	**.239**	.092	.154	.079	.043
SS6	.245	.240	.332	**.345**	.239	1	.200	.174	.113	.175
SS7	.085	.170	.065	.151	.092	**.200**	1	.029	-.052	.007
SS8	.103	.207	**.263**	.061	.154	.174	.029	1	.136	.046
SS9	.114	.079	.088	.083	.079	.113	-.052	**.136**	1	.011
SS10	.142	.056	.094	.114	.043	**.175**	.007	.046	.011	1

Table 19: Confirmatory Analysis Correlation Matrix

The bold text with grey background within the table highlight the calculated correlations observed within the dataset. e.g. SS1 has a correlational relationship with SS3 (.286), which is considerably lower than the relationship between SS3 and SS4 (.418).

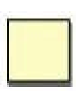
Any observed relationships between the variables and subsets were then modelled using a graphical representation tool (Mind-Mapper v.4.2). These relationships were further explored by additional qualitative coding analysis analysing the key word structures and commonalities within the grouped statements; the 10 pre-defined subsets from Schommer's (1990) research were maintained for this part of the study.

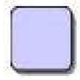
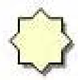
The model illustrated below in Figure 6: Confirmatory analysis; correlational relationship model, was created using Principal Component Analysis (PCA) combined with orthogonal rotation (Varimax) to ensure that similar analytical processes were used in an attempt to replicate the research methodologies as used by Marlene Schommer (1990).

4.6.2 Understanding the models

This model, and indeed all the models presented within this research have been constructed using the same principles, colours and calculated figures. This ensures that the models' structures can all be viewed and understood with relative ease.

Factor groupings are clearly defined by the shape and colours used to represent the structure. The colours and shapes have no significance other than to allow clarity of recognition between the factor loadings in this graphical form. Colours for when the models are reproduced in all their glory, differing shape designs for when viewing in black and white print.

-  Factor One: Red coloured, house shaped objects
-  Factor Two: Green coloured, circle shaped objects
-  Factor Three: Yellow coloured, square shaped objects

-  Factor Four: Blue coloured, round-corner square shaped objects
-  Factor Five: Red coloured, hexagon shaped objects
-  Factor Six: Yellow coloured, eight pointed star objects

Lines with arrowhead ends connecting the objects indicate correlational flow, with the calculated correlational decimal value inserted across the line at approximately the midpoint between each pair of objects. The value just below each object is indicative of the factor loading value calculated out within the analysis. Factor names have been inserted relational to the factor they are naming, directly under a smaller representation of the coloured factor object shape.

The model illustrates quite clearly the belief structure held by this particular group of participants, however there is clear early indications that the beliefs are NOT more-or-less independent as hypothesised by Schommer but appear to be in fact interrelated and dependent on other beliefs to varying degrees within the structure. This is explored further in Chapter 6: Analysis and Findings, and also discussed within Chapter 7: Conclusions and Recommendations.

The addition of this new analytical step reinforced the appropriateness of the design methodologies used within the EBS instrument research and convinced this researcher to conduct further exploratory research on the dataset.

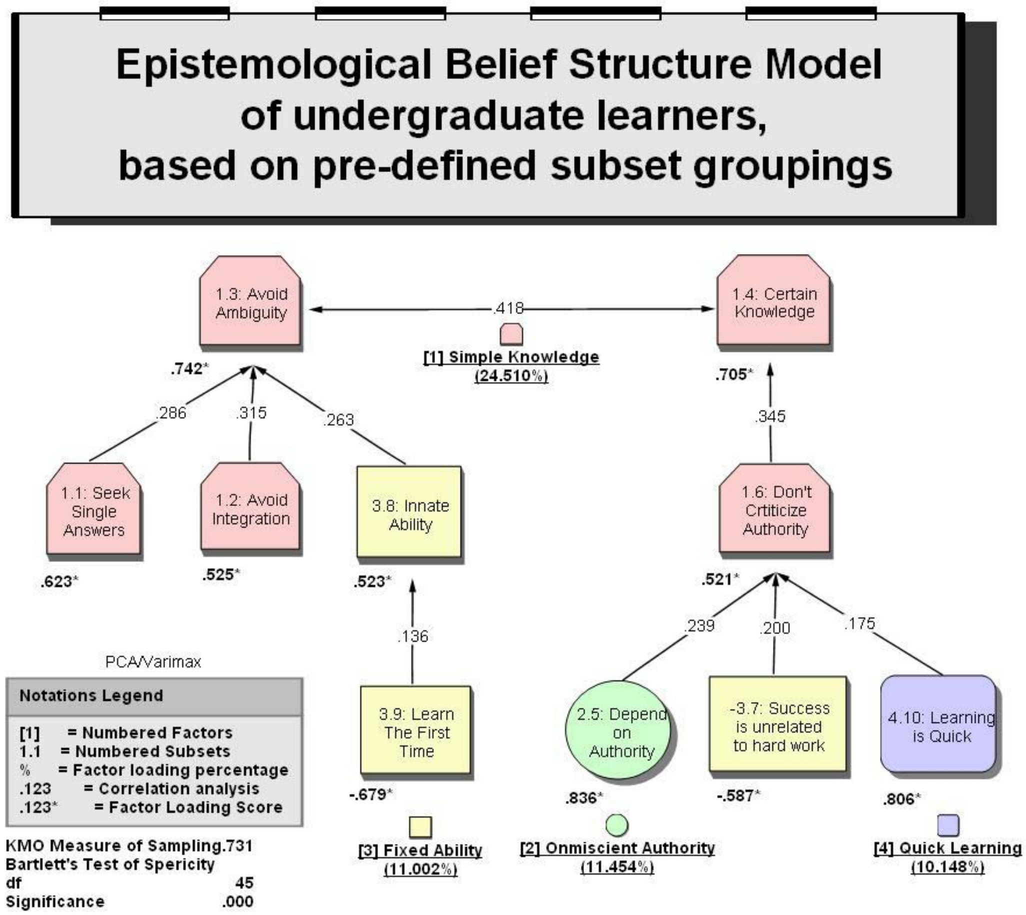


Figure 6: Confirmatory analysis; correlational relationship model

Whilst the model does not in essence produce a hierarchically based structure, the directionality of the correlational relationships does tend to indicate a tier based framework within the construction. By applying this method of ranking the relationships within the codification analysis, context should be able to be applied to the overall process adding considerable depth to the analysis.

4.7 Comments on the EBS Pilot Analyses

Within the scope of a broader research project on understanding knowledge genesis, the development and construction of an instrument capable of indicating a naissance framework of learners epistemological belief structures, presents a sound preliminary point of reference that provides valuable insight toward understanding how learners view, evaluate, and construct knowledge.

The statistical information provided by the multivariate factor analysis used in this initial phase of this study proves that the EBS has the capacity to tentatively elucidate epistemological beliefs structures from engaged participants.

The observed epistemological belief structure model containing perceptions toward the beliefs uncovered within this study can now be further identified and isolated. These principles may then be further compared, allowing contrasts and variances to be observed thereby illustrating any observable trends or changes within those beliefs.

It is widely acknowledged that Schommer's (1990) work is seminal in the understanding of epistemological beliefs, but given the arguments uncovered in the literature and throughout the developmental work on the EBS, more consideration does need to be given toward the instigation of better techniques of gathering these unique views of how learners construct their systems of belief. While the actual factor loadings did not mirror the original results reported in Schommer (1990), and many other researchers also reported similar anomalies, the obvious similarity of factor loading between the EQ and the EBS demonstrates that the theories behind personal epistemological beliefs can be considered reliable and reproducible.

4.8 Chapter Summary

The results of the multivariate factor analysis on the data from the EBS instrument revealed that by using the pre-defined subset groupings proposed by Schommer (1990) it was possible to reproduce a four factor belief structure. While these factors may differ slightly in make up from the original EQ study, this is not surprising given the difference in chronology, changed social attitudes since her research was conducted, let alone differences in geographical displacement of the participatory clusters.

Although the development, completion and future flexible online usability of the EBS instrument will help alleviate the problems of lengthy administration and scoring time, it is important to remember that the EBS instrument it is still being developed by this researcher.

A discussion on the structural designs and correlational relationships revealed during the course of this pilot analysis are presented within chapters five and six.

Chapter 5: EBS Exploratory Analysis

"All research ultimately has a qualitative grounding" - Donald Campbell in (Miles and Huberman, 1984, Miles and Huberman, 1997)

Having now completed a pilot exploratory analysis using a purposively constructed instrument that has demonstrated capacity to analyse and produce epistemological belief factors as maintained by a participatory cluster, the next logical step was to attempt to provide further extrapolations and comparisons by using the EBS instrument and the methodologies employed in analysing additional datasets.

5.1 Chapter Introduction

Subsequently, the original dataset was prepared for further analysis using the multivariate factor analysis methodology developed over the course of this research. This new phase of the project would use the naturally forming underlying subsets found in the first analysis pass. This has never been reported by Schommer-Aikins as having been done during her study, but has been attempted relatively unsuccessfully by other researchers (Hall et al., 1996, Hofer and Pintrich, 2002, Jehng et al., 1993, Tolhurst and Debus, 2002).

This progressional development and expansion of the initial study would not only prove valuable in reinforcing other postulated theories within the field of epistemological research, but would also go on to expose and promote discourse on personal belief structures within those theories, and how to best model them. Expanding the exploits of the analytical processes on different configurations of the dataset(s) could also allow further exploration of gender, domain, gender and even nationality based discrepancies to be investigated.

Researchers could then draw even more conclusions and comparisons within each domain. The use of depth within formative analysis would also provide an additional level of credence to this research as well as the hypotheses postulated by this researcher.

5.2 Exploratory Analysis; Comparing PCA and PAF Analysis

In the Schommer (1990) study, subset groupings were applied before factor analysing the data. It was decided to address the concerns expressed within the literature from other noted researchers about pre-defining the subsets prior to analysis. As Ho (2000) states, "it is not uncommon for a dataset to be subjected to a series of factor analysis and rotation before the obtained factors can be considered clean and interpretable" (Ho, 2000).

In the confirmatory analysis the dataset was subjected only to the PCA/Varimax analysis process in an attempt to reproduce findings comparable to the Schommer (1990) study.

Within this exploratory analysis, it was decided that the dataset should also be subjected to both the PCA/Varimax and then the PAF/Oblimin analysis processes in an attempt to observe which analytical process extracted a more meaningful understanding of the data. Mean values from the latent variables within the statement listings were calculated, factor analysed, and then segregated into dynamically produced subsets before being passed through the factor analysis process again to determine the final belief factor loadings for each analysis style. This double analysis technique should provide both comparison and confirmation of which of the two methodologies provides the more insightful technique of analysis.

The combination of PAF/Oblimin analysis, as mentioned previously, should divulge a more theoretically meaningful collation of factor groupings and representations instead of the simple reductionist method (PAF/Varimax) as used by Schommer in her 1990 study (Antonius, 2003, Garson, 2007, Ho, 2000, Kim and Mueller, 1978, Velicer et al., 2000).

5.2.1 First Pass: PCA/Varimax Exploratory Analysis

The first unrestricted exploratory analysis of the dataset was conducted on the original dataset using the PCA extraction method combined with the Varimax orthogonal rotation options. The data, as stated earlier, was not pre-grouped into subsets as prescribed by Schommer. This analysis revealed eleven (11) discernibly different subsets, See Table 20: Exploratory PCA Statement Loadings, as compared to the previously extrapolated ten subsets in Table 17: Predefined Subset Groupings.

The new subset headings were initially labelled using the most predominant original Schommer taxonomy from her study. This proved to be unsatisfactory and the subsets were then relabelled based on the three stage codification process where the key words grouped with the subsets were used to create new classifications of beliefs or even multiple instances of a similar beliefs and/or subsets. For example in Table 20: Exploratory PCA Statement Loadings, it was observed that the subset label “Seek Single Answers” appeared to manifest itself twice.

The other listed subset labels present in Table 17: Predefined Subset Groupings, seemed to coexist quite happily within other groupings, and did not present themselves as being dominant within their newly constructed subset.

No	Subset Name	Statement No’s
1	Avoid Ambiguity	12, 16, 21, 25, 3, 9, 5 and 17
2	Don’t Criticise Authority	23, 28 and 32
3	Avoid Ambiguity	10, 11 and 13
4	Learn the First Time	29, 30 and 34
5	Learning is Quick	33 and 31
6	Depend on Authority	20 and 22
7	Knowledge is Certain	15 and 14
8	Seek Single Answers (1)	2, 4 and 18
9	Seek Single Answers (2)	1, 27 and 24
10	Innate Ability	6, 19 and 26
11	Avoid Integration	8 and 7

Table 20: Exploratory PCA Statement Loadings

5.2.1.1 First Pass Statistical Validity

Within the first pass of the exploratory analysis the Kaiser-Meyer-Olkin measure of Sampling Adequacy was calculated to be 0.755. Bartlett’s test of Sphericity was calculated to contain Chi-square of 1997.079, Degrees of Freedom of 561, and a significance of 0.000. Cronbach’s coefficient “α” for this analysis was also determined to be 0.65. These eleven factors explained a total of 53.1% of the analysis.

5.2.2 Second Pass: PCA/Varimax Exploratory Analysis

This newly formed subset data then had the mean results for each subset calculated and then factor analysed once more, with the output revealing that the eleven subsets surprisingly - loaded only into three factors, see Table 21: Exploratory PCA Analysis - Rotated Component matrix.

In Figure 7: PCA/Varimax Scree Plot, the gently curving nature of the subset loadings is again repeated until reaching component five. Here the path follows a markedly different angle of descent in its downward gradient. This illustrates the expected tailing off of values within the subset loadings, providing clear graphical evidence of the number of factors that could be extracted from the analysis. Visually the researcher could have easily selected either three or five factors form this graph, as the 'tailing off' is not as distinct as would have been preferred. The application of the Monte Carlo theory however, indicated the number of factors that should be extracted from this analysis was three. This was also backed by the number of factors observed above the accepted cut off value of 1.0 eigenvalue.

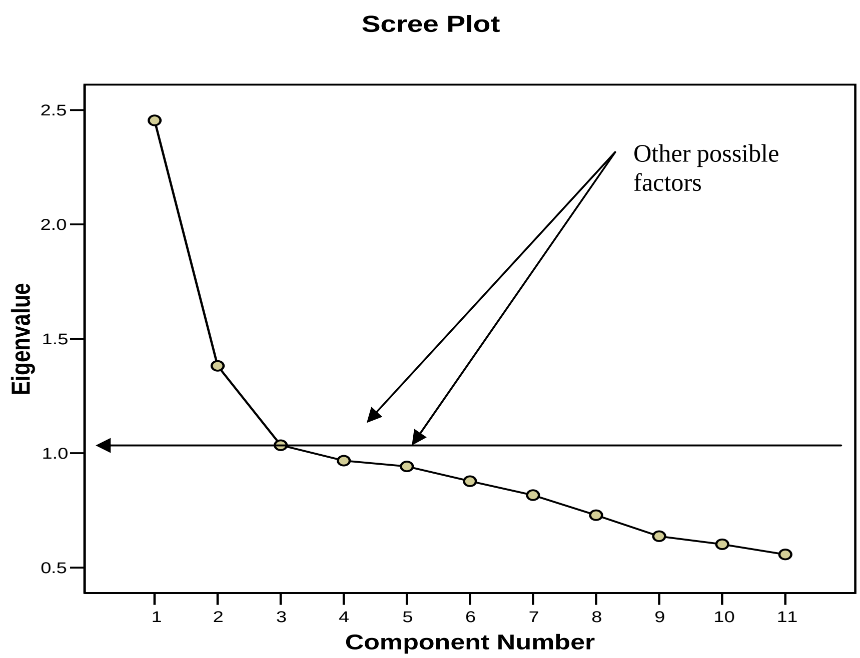


Figure 7: PCA/Varimax Scree Plot

This was not expected as the original analysis produced four subsets, and it was considered that there should not be that much difference in the initial loadings of the data. When the subset loadings were further analysed, it became apparent that not only were the statements not loading into the prescribed subsets as described by Schommer (1990), but the overall construct appeared radically different from that produced in the earlier analysis shown in Table 18: Confirmatory Analysis Rotated Component Matrix.

Sub-sets	Subset Loadings		
	1	**2**	**3**
SS1	**0.772**	-0.057	0.069
SS9	**0.622**	-0.112	0.245
SS5	**0.608**	0.292	-0.078
SS11	**0.301**	0.243	0.277
SS10	0.111	**0.672**	0.004
SS6	-0.155	**0.641**	0.142
SS3	0.135	**0.579**	0.425
SS2	0.324	**0.365**	0.124
SS7	-0.008	0.214	**0.661**
SS8	0.245	0.091	**0.568**
SS4	-0.436	-0.345	**0.465**

Extraction Method: Principal Axis Factor Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

Table 21: Exploratory PCA Analysis - Rotated Component matrix

The only subsets observed in this analysis as having the possibility of offering significant cross-loading was subset two which showed a possible cross-loading into factor one, and subset four possibly offering a cross-loading into both factor one and factor two. The factor components observed were: -

Factor 1: Simple Knowledge (subsets 1, 9, 5, and 11)

Factor 2: Fixed Ability (subsets 10, 6, 3, and 2)

Factor 3: Certain Knowledge (subsets 7, 8 and 4)

This reduction to only three factors was surprising, and the aggregation of the subsets into factors, although distinct, maintained loadings higher than those reported in the Schommer (1990) findings, but they did not appear to coalesce into the easily recognised factorial patterns described in Schommer's (1990) study, or even as observed within the confirmatory analysis conducted within this study. The loading appeared more simplistic in nature but somewhat convoluted in its structure.

5.2.2.1 Second Pass Statistical Validity

Within the second pass of the exploratory analysis the Kaiser-Meyer-Olkin measure of Sampling Adequacy was calculated to be .721. Bartlett's test of Sphericity was calculated to contain; Chi-square of 442.212, Degrees of Freedom of 55, and a significance of 0.000.

These three extracted factors explained a total of 44.3% of the second analysis.

5.2.3 PCA/Varimax Correlational Relationship Analysis

The final analytical task conducted was the Correlational Relationship analysis to observe the underlying relationships between the eleven (11) subsets and the three (3) factors extracted during the process. A Correlation Matrix was generated for the dataset, (see Table 22: PCA/Varimax - Correlation Matrix), and a Relational Model was again constructed, using Mind-Mapper v.4.2.

PCA/Varimax Correlation Matrix											
	SS1	**SS2**	**SS3**	**SS4**	**SS5**	**SS6**	**SS7**	**SS8**	**SS9**	**SS10**	**SS11**
SS1	1	0.202	0.121	-0.210	0.305	-0.024	0.064	0.132	**0.338**	0.075	0.145
SS2	0.202	1	0.214	-0.096	**0.237**	0.129	0.118	0.159	0.065	0.133	0.130
SS3	0.121	0.214	1	**-0.133**	0.154	0.210	0.316	0.233	0.080	0.284	0.270
SS4	-0.210	-0.096	-0.133	1	**-0.197**	0.016	0.004	0.019	-0.085	-0.120	-0.094
SS5	**0.305**	0.237	0.154	-0.197	1	0.120	0.012	0.190	0.214	0.175	0.143
SS6	-0.024	0.129	0.210	0.016	0.120	1	0.155	0.088	0.034	**0.234**	0.077
SS7	0.064	0.118	**0.316**	0.004	0.012	0.155	1	0.147	0.112	0.109	0.099
SS8	0.132	0.159	**0.233**	0.019	0.190	0.088	0.147	1	0.107	0.121	0.131
SS9	**0.338**	0.065	0.080	-0.085	0.214	0.034	0.112	0.107	1	0.140	0.147
SS10	0.075	0.133	**0.284**	-0.120	0.175	0.234	0.109	0.121	0.140	1	0.133
SS11	0.145	0.130	**0.270**	-0.094	0.143	0.077	0.099	0.131	0.147	0.133	1

Table 22: PCA/Varimax - Correlation Matrix

From this a newly constructed model, being illustrated in Figure 8: Exploratory PCA/Varimax Model, details the distinct factor groupings as well as the correlational relationships exposed during the previously described analysis.

The distinct factors can be clearly observed, but once again there are some subsets exhibiting correlational relationships with other subsets that are in entirely different factorial loadings. While a low correlational value could be explained as an outlier in relation to the main dataset, more than one correlational relationship can be observed as being within the threshold of acceptable values, but at first presentation offers no obvious reason for the relationship(s). This anomaly could also potentially explain why several other researchers could not reconstruct the clear four factor results as proclaimed by Schommer (1990) (Clarebout et al., 2001, Hall et al., 1996, Hofer and Pintrich, 2002, Jehng et al., 1993, Ohtsuka et al., 1996, Tolhurst and Debus, 2002).

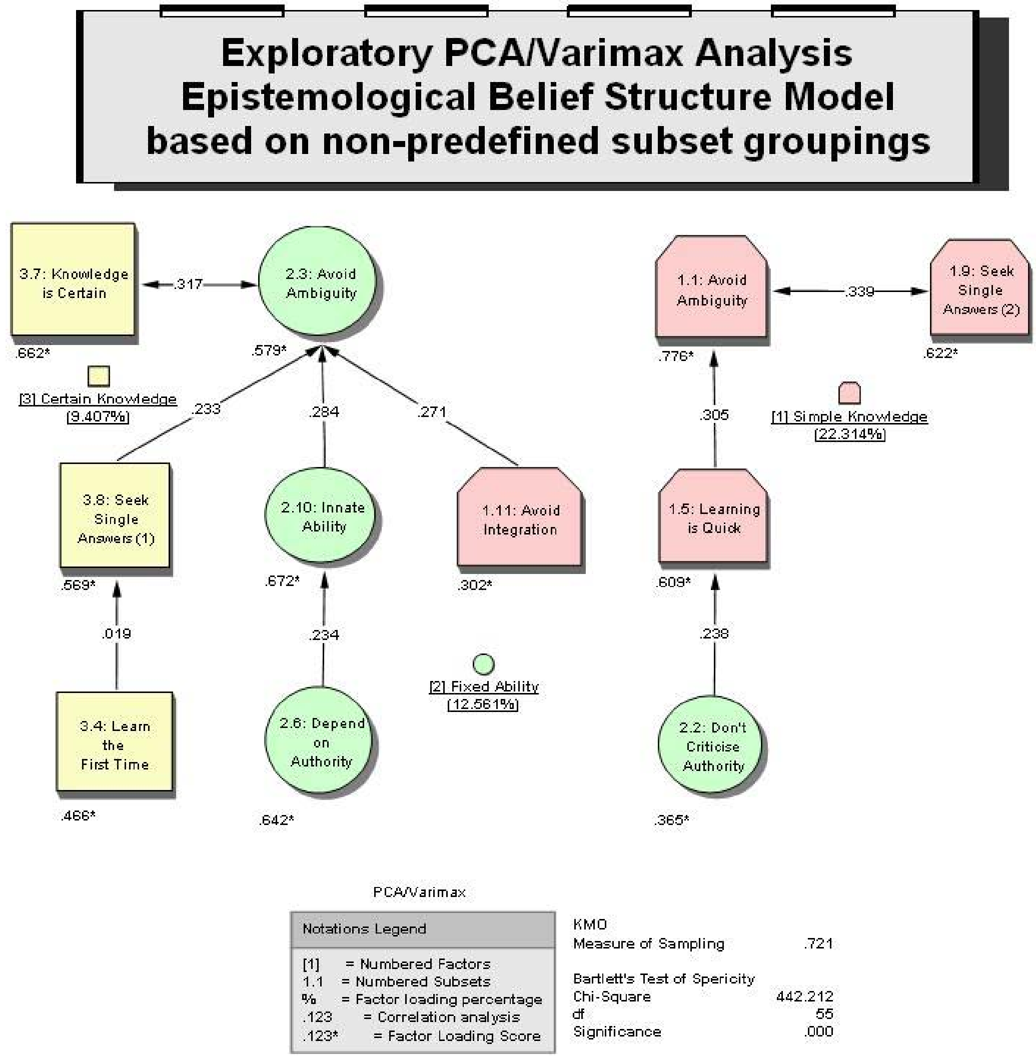


Figure 8: Exploratory PCA/Varimax Model

5.2.4 First Pass: PAF/Oblimin Exploratory Analysis

Suspecting that there was more unobserved meaning within this dataset than had been exposed thus far, another analysis process was prepared and then conducted in an attempt to observe if there was a more theoretically meaningful collation of the calculated factors.

This was conducted using the PAF extraction method and Oblique rotation options. The data was presented for analysis, again ungrouped, and again produced eleven (11) distinct subsets. See Table 23: Exploratory PAF Statement Loadings.

No	Subset	Statement No's
1	Don't criticize authority	23, 32 and 17
2	Avoid integration (1)	10, 11 and 7
3	Learning is quick (1)	30, 29, 28 and 34
4	Learning is quick (2)	31 and 33
5	Innate Ability	26, 27 and 6
6	Success is unrelated to hard work	25, 19, 16 and 21
7	Depend on Authority	20 and 22
8	Avoid integration (2)	8
9	Seek single answers (1)	3, 9, 12, 5 and 24
10	Seek single answers (2)	2, 18, 4 and 1
11	Knowledge is certain	15, 14 and 13

Table 23: Exploratory PAF Statement Loadings

5.2.4.1 First Pass Statistical Validity

Within the first pass of PAF/Oblimin exploratory analysis the Kaiser-Meyer-Olkin measure of Sampling Adequacy was calculated to be 0.755. Bartlett's test of Sphericity was calculated to contain; Chi-square of 1997.079, Degrees of Freedom of 561, and a significance of 0.000. Cronbach's coefficient "α" for this analysis was also determined to be 0.65.

The calculated Cronbach's coefficient "α" for the PAF/Oblimin analysis did not differ from the PCA/Varimax analysis as it was calculated using the exact same dataset, so, not surprisingly the result was seen to be identical.

These eleven calculated factors explained a total of 53.1% of the analysis. This slightly lower calculated percentage provided the first indication that the analysis was uncovering a potentially different subset loading.

5.2.5 Second Pass: PAF/Oblimin Exploratory Analysis

The newly formed subset data was then recalculated and reanalysed, with the output revealing that the eleven subsets loaded again into only three factors, see Table 24: Exploratory PAF Analysis Pattern Matrix. One important observation was the distinct changes in the behaviour of some of the subset loadings.

However when observing the Scree Plot for the PAF/Oblimin analysis, an anomaly presented itself in the shape of the gradient line; see Figure 9: PAF/Oblimin Scree Plot. As can be seen there is a distinct gradient change again after the plotting of the first three (3) factors, all with values greater that the acceptable 1.0 eigenvalue, but there appeared a second rapid gradient reduction down to another two (2) factors that were only marginally below the eigenvalue cut-off. At this point whether or not to proceed with three or in fact five factors was unclear.

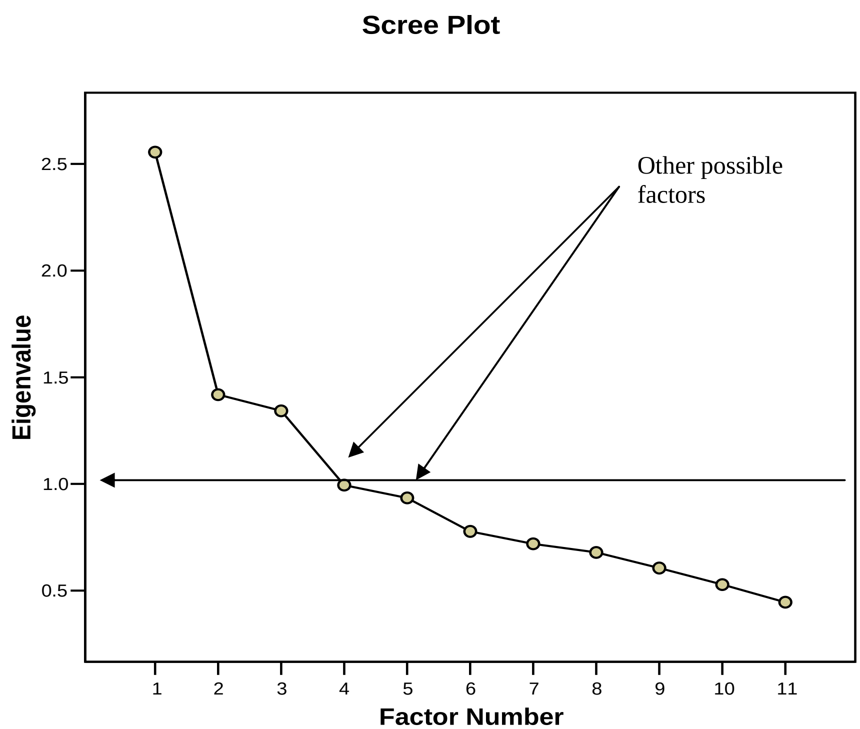


Figure 9: PAF/Oblimin Scree Plot

The Monte Carlo theory suggests three as the number of factors for extraction, given this dataset, so by maintaining the stricter creed of retaining only the values above the accepted cut-off level of 1.0 eigenvalue, the model was generated considering only three (3) factors.

The five (5) factor model was generated however out of curiosity and used as a comparison when qualitatively analysing the subset and factor loading labels for the three (3) factor model.

The revealing of only three (3) factors was surprising, again with only three of the four Schommer factors appearing to load within the results. Some of the subsets also appeared to load more indiscriminately within the table when compared to the earlier PCA/Varimax analysis. The factors were labelled as follows: -

Factor 1: Quick learning (subsets 3, 1, 4 and 8)
Factor 2: Simple knowledge (subsets 9, 10 and 6)
Factor 3: Knowledge is certain (subsets 11, 5, 7 and 2)

Sub-sets	**Subset Loadings**		
	1	**2**	**3**
SS3	**-0.843**	0.226	0.102
SS1	**0.497**	0.184	0.116
SS4	**0.297**	0.236	0.081
SS8	**0.224**	0.029	0.036
SS9	0.202	**0.821**	-0.164
SS10	-0.011	**0.471**	0.158
SS6	-0.079	**0.436**	-0.018
SS11	-0.052	0.039	**0.545**
SS5	0.095	-0.047	**0.516**
SS7	-0.049	-0.053	**0.446**
SS2	0.162	0.106	**0.421**

Extraction Method: Principal Axis Factor Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

Table 24: Exploratory PAF Analysis Pattern Matrix

5.2.5.1 Second Pass Statistical Validity

Within the second pass of the exploratory analysis the Kaiser-Meyer-Olkin measure of Sampling Adequacy was calculated to be 0.689. Bartlett's test of Sphericity was calculated to contain; Chi-square of 604.602, Degrees of Freedom of 55, and a significance of 0.000. These three extracted factors explained a total of 48.3% of the second analysis.

5.3 PAF/Oblimin Correlational Relationship Analysis

After completing the factor analysis on the data using the PAF/Oblimin options, the correlational analysis was also conducted, the correlational relationship matrix producing a very different model of the beliefs structure held by the participatory cluster. See Table 25: PAF/Oblimin - Correlation Matrix.

PAF/Oblimin Correlation Matrix											
	SS1	**SS2**	**SS3**	**SS4**	**SS5**	**SS6**	**SS7**	**SS8**	**SS9**	**SS10**	**SS11**
SS1	1	0.265	-0.372	0.304	0.182	0.130	0.104	0.135	**0.342**	0.156	0.141
SS2	0.265	1	-0.137	0.179	0.252	0.061	0.135	0.101	0.196	0.202	**0.324**
SS3	-0.372	-0.137	1	-0.209	-0.106	**0.121**	0.031	-0.166	-0.126	0.022	-0.015
SS4	**0.304**	0.179	-0.209	1	0.172	0.203	0.120	0.136	0.259	0.196	0.020
SS5	0.182	0.252	-0.106	0.172	1	0.017	0.251	0.053	0.057	0.137	**0.268**
SS6	0.130	0.061	0.121	0.203	0.017	1	0.063	-0.011	**0.326**	0.147	0.030
SS7	0.104	0.135	0.031	0.120	**0.251**	0.063	1	0.069	-0.046	0.079	0.215
SS8	0.135	0.101	-0.166	**0.136**	0.053	-0.011	0.069	1	0.102	0.088	0.009
SS9	0.342	0.196	-0.126	0.259	0.057	0.326	-0.046	0.102	1	**0.438**	0.107
SS10	0.156	0.202	0.022	0.196	0.137	0.147	0.079	0.088	**0.438**	1	0.192
SS11	0.141	**0.324**	-0.015	0.020	0.268	0.030	0.215	0.009	0.107	0.192	1

Table 25: PAF/Oblimin - Correlation Matrix

The completion of the multiple regression and correlation analyses exposed the differing underlying relationships between subsets and factors and also illustrated the relationships more easily, allowing a clearer comparison of the models produced by the two different methodologies. See Figure 10: Exploratory PAF/Oblimin (3 Factors) Model.

5.4 PAF/Oblimin Constructed Models

To further aid the understanding of the volatile nature of these two observed epistemological belief structures, both have been calculated and constructed so as to provide clear diagrammatic comparisons of each of the structures.

5.4.1 PAF/Oblimin Three Factor Model

The three (3) factor model as shown in Figure 10: Exploratory PAF/Oblimin (3 Factors) Model, illustrates a clearer and more concise structure that appears to suggest an easier form of understanding of the conceptual nature of the structure.

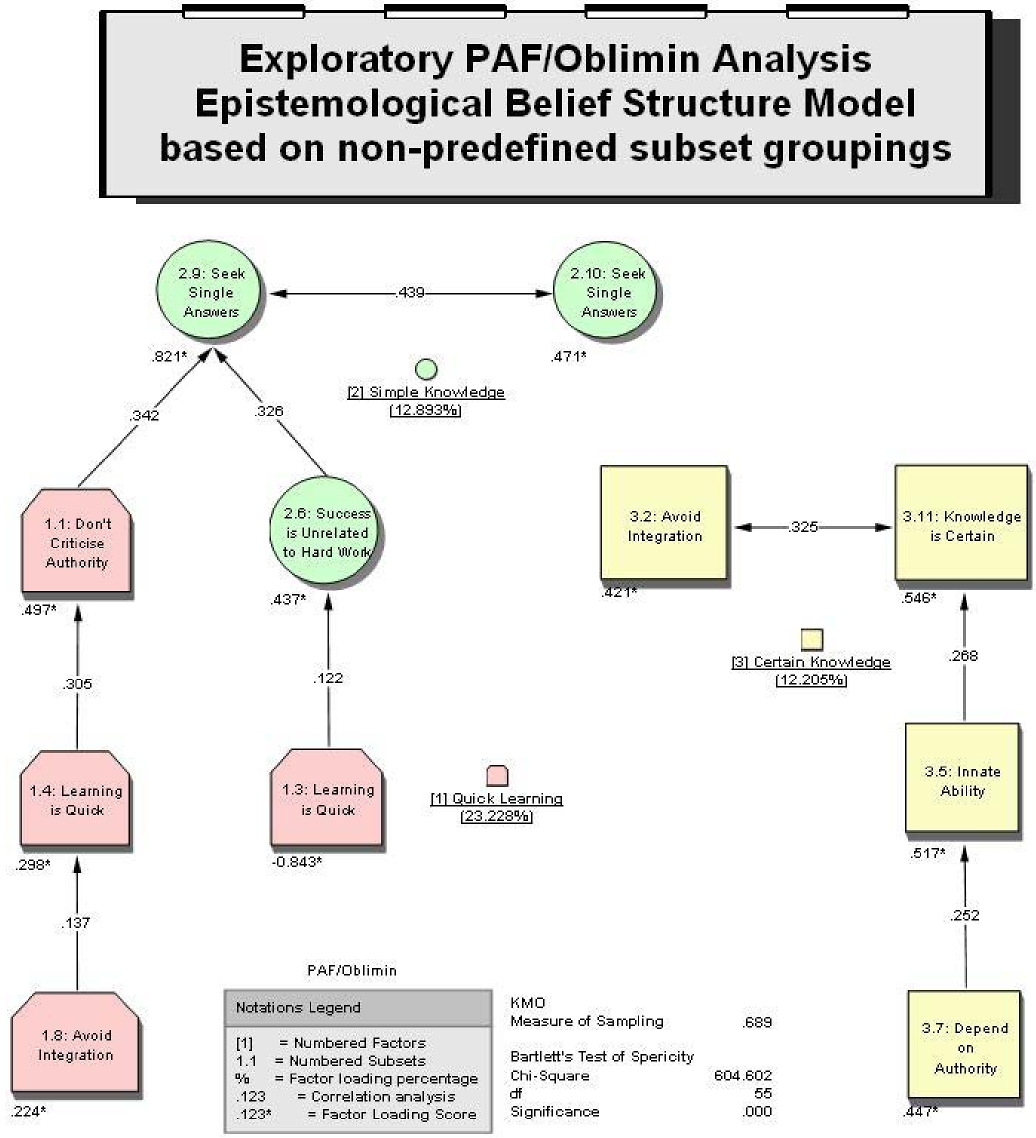


Figure 10: Exploratory PAF/Oblimin (3 Factors) Model

While each factor appears clearly defined within its own right, there is some interlinking of the subsets within what appears to be two distinct sub-constructs. These two sub constructs seem to support the earlier insistence by Schommer that personal epistemological beliefs are perhaps enveloped by a higher dimension of beliefs.

The smaller construct viewed on the right hand side of the model appears to support the ‘source of knowledge’. In this instance the model suggests that knowledge is and truth are both capable of change, and that to find the real solutions to problems the learner has to be prepared to work or study harder and work alongside authority in order to develop their own knowledge base. Innate abilities, as a concept does not have many supporters within this cluster.

The larger construct on the left of the model tends to reinforce the participants’ understanding that learning is a slow methodical process, where understanding is more prized than the ability to rote learn. They also seem to understand that by probing for, selecting, and accepting information that appears straightforward, will then also be easier to add to their existing personal database of knowledge, thereby validating and enforcing their own personal learning strategies.

There also appeared reluctance by this cluster to alter authoritative proffered information, but rather the perception that they needed to maintain it in its original form and context.

5.4.2 PAF/Oblimin Five Factor Model

Within the model illustrated in, Figure 11: Exploratory PAF/Oblimin (5 Factors) Model, some of the originally observed three (3) factor model subset groupings, can also be clearly seen.

The subsets 1, 4 and 8 have maintained their grouping and have also acquired a relationship with subset 10; this loading still maintains the label of “Quick Learning” because of the nature revealed within the qualitative analysis.

Subsets 5, 11 and 2 maintain their relationship and still retain the label of “Certain Knowledge”, while the last of the initial subset loadings is maintained by subsets 9 and 6.

With the exception of subset 10, which appears to have relocated and appears in a new factor loading, the two new factors (4 and 5) that appear within this model have been labelled "Requisite Authority" and a second instance of the factor "Quick Learning".

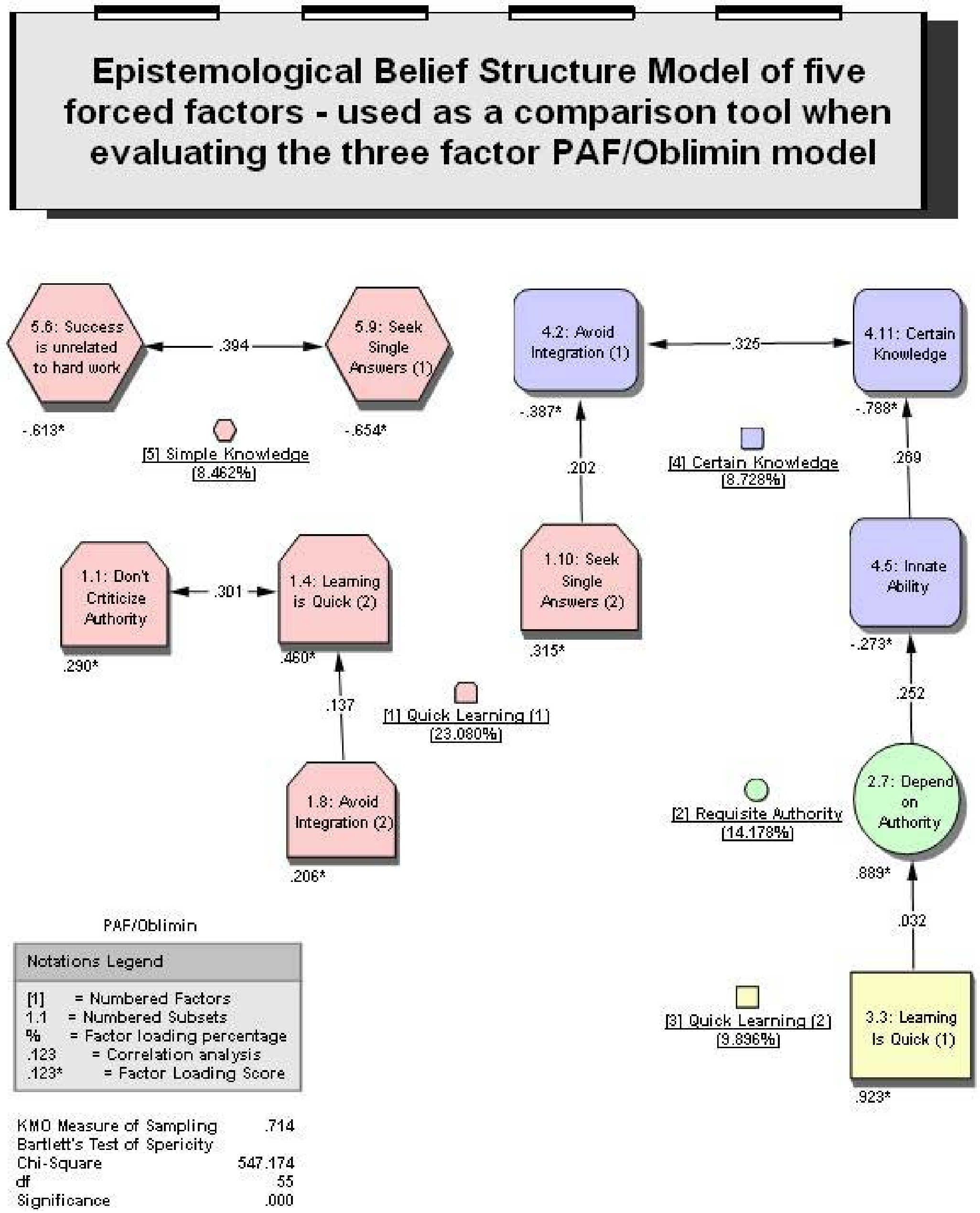


Figure 11: Exploratory PAF/Oblimin (5 Factors) Model

5.4.3 PCA/PAF Methodological Comparisons and Comments

The five (5) factor model disclosed the first indication that the structure did indeed rely on facets of individual beliefs to form an integrated holistic belief structure, one that was not composed of autonomous beliefs, but rather a structure that was maintained in more than one area, by the same or analogous beliefs supporting how the learner perceived information and its sources.

In attempting to decide the penultimate choice of analytical methodology, each process revealed differing ways at calculating the final placement of subset and consequently factor loadings within versions of a similar model that could be used to represent the epistemological belief structures of the participants.

The appearance of two (2) potentially additional factors within the PAF/Oblimin analysis process, even though they were below the accepted cut-off point of 1.0 eigenvalue, piqued another level of curiosity within this researcher and added a more receptive view toward the PAF/Oblimin methodology.

Further in the support of the PAF/Oblimin methodology is the favourable expression noted by other experts in the field of statistical analysis. Ho (2000) states that when the primary objective is to identify theoretical and meaningful underlying associations and causality, then the Common Factor Analysis (PAF) is more appropriate than the Principal Components (PCA) method (Ho, 2000).

5.5 Chapter Summary

The completed analysis comparing the two analytical methodologies (PCA/Varimax and PAF/Oblimin) as described and detailed within this chapter reinforced this researcher’s decision to apply the latter technique to this and subsequent dataset investigations. The PAF/Oblimin methodology appears to expose deeper and more theoretically significant belief structures, whilst also providing sound statistical evidence supporting the dynamically constructed frameworks and conceptually based designs of the models created by the analysis process.

Other participatory clusters would be added to this research during the next stage, driven purely by the international interest in the project after the publication of a paper detailing some of the preliminary research outcomes. These clusters would eventuate to be slightly different to the initial demographics as detailed in the Schommer study (1990), but would prove to be immensely beneficial in providing an opportunity to do comparisons between nationalities, and by also adding an increased level of validity to the overall project.

The additional clusters were from;

- A cluster of American students enrolled at the PRATT Institute in New York, studying Library and Information System courses. Some of these students are first year undergraduates, while some are enrolled in their first year of a Masters course.

- A cluster of Chinese students enrolled at the Zhejiang University of Technology in Hangzhou, Peoples Republic of China, studying the Bachelor of Computing course.

The analysis of any data harvested from these clusters should be used within the research as the rich assessments that could potentially be made as to the epistemological beliefs and structures based on international variances could prove to be extremely valuable to this and future studies.

Chapter 6: Analysis and Findings

> *"There is a great difference between knowing and understanding: you can know a lot about something and not really understand it"*
>
> Charles F. Kettering (1876-1958)

6.1 Chapter Introduction

At this point it was realised that the EBS instrument was capable of harvesting meaningful data, and that the associated analytical methodologies that had been constructed to support it, were robust and repeatable. It was now time to put all this theory to work and investigate the principle areas of concern as mentioned within the research questions framed at the commencement of this study. The fields of gender, domain and nationality-based discrepancies could now be analysed, observed, and presented for discussion within this study.

By analysing these responses at the finest granularity possible and then examining the resultant mean values by applying an overlay of qualitative codification analysis techniques, should allow taciturn meaning and/or intent to be extracted from the data. From these responses volunteered by the participants there would now be a clearer understanding of their actual epistemological beliefs and belief structures.

6.2 Gender Based Comparison and Analysis

The first investigation was in the form of a Gender comparative analysis conducted on the original dataset by using the adopted PAF extraction method and Oblimin oblique rotation options. In this analysis the dataset was divided into Male and Female gender datasets (see Table 26: Gender based demographics).

The raw data was used as a preliminary observation to see in graphical form if and how the mean values of each statement varied when compared with its opposite gender's mean response values.

Age groups	Gender M	Gender F	Survey totals
< 20	106	140	246
20 – 24	29	43	72
25 – 29	12	15	27
30 – 39	13	37	50
40 – 49	3	28	31
50 +	3	6	9
	166	**269**	**435**

Table 26: Gender based demographics

Figure 12: Observed Gender Discrepancies within the Raw Data, illustrates the comparison of these calculated mean response values within the recoded dataset, initially showing only two easily observable areas of discrepancies – mostly in two (2) regions of the statement ranges; being statements eighteen (18) to twenty (20) inclusive, and statements thirty-one (31) to thirty-three (33) inclusive.

Generally, the Male Gender responses calculated out to a slightly higher mean value per statement on average than their Female Gender counterparts overall, even though they had the lower overall participation numbers (166 male) when compared to the number of female participants (269).

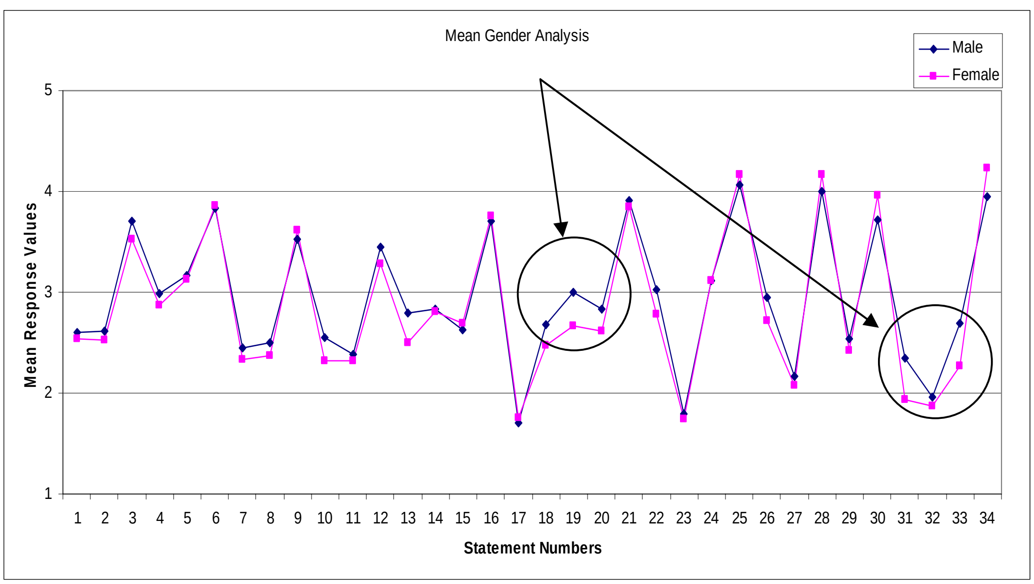


Figure 12: Observed Gender Discrepancies within the Raw Data

Some other minor statement response variations were also observed in the mean values for statements seven (7), eight (8), ten (10, and thirteen (13).

6.2.1 Female Gender Analysis: First Pass

Similar to the previous analysis, the data subsets (male and female) were not pre-grouped prior to the factor analysis as prescribed by Schommer. The first pass of the Female Gender dataset revealed twelve (12) discernibly different promising subsets. See Table 27: Female Gender Statement Loadings.

No	Subset	Statement No's
1	Learning is Quick	31, 33 and 32
2	Avoid Integration (1)	10, 22 and 24
3	Avoid Integration (2)	8
4	Knowledge is Certain (1)	15, 12, 14 and 3
5	Learn the First Time	27 and 26
6	Depend on Authority (1)	20
7	Don't Criticise Authority	23 and 1
8	Avoid Ambiguity	11, 7, 13 and 18
9	Seek Single Answers	2 and 4
10	Knowledge is Certain (2)	16, 25, 34 and 21
11	Learning is Quick (2)	30, 29 and 28
12	Depend on Authority (2)	19, 5, 6, 9 and 17

Table 27: Female Gender Statement Loadings

6.2.1.1 First Pass: Statistical Validity

Statistically the Gender based subset analysis calculated out very positive and reassuring results. Within the first pass of the exploratory analysis the Kaiser-Meyer-Olkin measure of Sampling Adequacy was calculated to be 0.692. Bartlett's test of Sphericity was calculated to contain; Chi-square of 1393.971, Degrees of Freedom of 561, and a significance of 0.000. Cronbach's coefficient "α" for the female gender analysis was calculated out to be 0.6239427.

These twelve subsets explained 58.1% of the total variance.

6.2.2 Female Gender Analysis: Second Pass

These newly formed subsets then had the mean results calculated and tabled for further analysis, with the second factor analysis output revealing that the twelve (12) subsets loaded into four primary factors. From the calculated matrix in Table 28: Female Gender Pattern Matrix, it can be noted that there were no significant cross loadings and only two subsets loaded lower than the accepted absolute value of 0.300.

Subsets	Subset Loadings			
	1	2	3	4
F5	**0.507**	0.047	-0.199	-0.165
F8	**0.427**	-0.042	0.291	0.089
F2	**0.423**	-0.006	0.210	-0.027
F7	**0.403**	0.106	0.086	-0.127
F6	**0.313**	-0.093	-0.060	0.041
F4	**0.308**	0.139	0.170	0.017
F10	**0.211**	0.198	0.054	-0.102
F3	0.126	**-0.782**	0.125	-0.179
F9	-0.071	-0.033	**0.680**	-0.062
F11	0.079	0.064	0.064	**0.542**
F1	0.111	0.010	0.166	**-0.528**
F12	0.162	-0.048	0.224	**-0.247**

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Table 28: Female Gender Pattern Matrix

The reduction to four (4) factors was not surprising as previous analyses had also produced a similar loading. This analysis also produced a loading matrix containing calculated values consistently higher than those reported in the Schommer (1990) study. These statement groupings were then subjected to a qualitative three stage codification analysis process in an attempt to gain insight into why the statements had loaded in the groups that they had. The four (4) factors emerged as; -

Factor 1: Quick learning (subsets 5, 8, 2, 7, 6, 4, and 10)

Factor 2: Simple knowledge (1) (subset 3)

Factor 3: Simple knowledge (2) (subset 9)

Factor 4: Requisite Authority (subsets 11, 1 and 12)

6.2.2.1 Second Pass: Statistical Validity

Within the second pass of the exploratory analysis the Kaiser-Meyer-Olkin measure of Sampling Adequacy was calculated to be .747. Bartlett's test of Sphericity was calculated to contain; Chi-square of 308.955, Degrees of Freedom of 66, and a significance of 0.000.

These three extracted factors explained a total of 51.2% of the second analysis.

6.2.3 Female Gender Correlational Relationship Analysis

The final analytical task conducted on this dataset was the Correlational Relationship analysis, revealing the relationships between the twelve (12) subsets and the four (4) factors extracted during the process. A Correlation Matrix was generated for the dataset, see Table 29: Female Gender Correlation Matrix, and a Relational Model was constructed, using Mind-Mapper v.4.2.

From this model it can be observed that this analysis produced an entirely different structure from the ones observed previously. The Female Gender belief structure model appears quite simplistic in nature width wise, but demonstrates an in depth hierarchical coalescence of belief factors not observed previously. See Figure 14: Female Gender Belief Structure Model.

Female Gender PAF/Oblimin Correlations												
	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12
F1	1	0.209	0.168	0.135	0.208	0.074	0.224	0.188	**0.235**	0.181	-0.282	0.252
F2	0.209	1	0.095	0.222	**0.218**	0.172	0.247	0.269	0.220	0.128	-0.045	0.257
F3	0.168	0.095	1	**-0.039**	0.067	0.105	0.032	0.138	0.119	-0.093	-0.171	0.155
F4	0.135	0.222	-0.039	1	**0.152**	0.036	0.212	0.288	0.157	0.123	-0.055	0.077
F5	**0.208**	0.218	0.067	0.152	1	0.127	0.284	0.166	-0.016	0.126	-0.095	0.145
F6	0.074	0.172	0.105	0.036	0.127	1	0.093	0.106	-0.008	**0.078**	0.017	0.071
F7	0.224	0.247	**0.032**	0.212	0.284	0.093	1	0.241	0.173	0.156	-0.088	0.177
F8	0.188	0.269	**0.138**	0.288	0.166	0.106	0.241	1	0.227	0.157	0.012	0.184
F9	**0.235**	0.220	0.119	0.157	-0.016	-0.008	0.173	0.227	1	0.070	-0.020	0.227
F10	0.181	0.128	**-0.093**	0.123	0.126	0.078	0.156	0.157	0.070	1	-0.018	0.167
F11	-0.282	-0.045	**-0.171**	-0.055	-0.095	0.017	-0.088	0.012	-0.020	-0.018	1	-0.147
F12	0.252	0.257	**0.155**	0.077	0.145	0.071	0.177	0.184	0.227	0.167	-0.147	1

Table 29: Female Gender Correlation Matrix

6.2.4 Female Gender Model Annotations

The Female Gender Beliefs Model offers insight into the supporting criteria maintaining thought processes not previously explored. Whilst there is an obvious disjointedness about the model, upon closer examination there appears a fundamental hierarchical rationalization of how this particular group of female participants justifies and constructs their knowledge beliefs. Figure 13: Female Gender Belief Values gives a graphical representation of the mean belief values that support this observation by presenting the observed factor loadings from highest loaded factor subsets (left side, 31←) to lowest loading factor subsets (right side, →17).

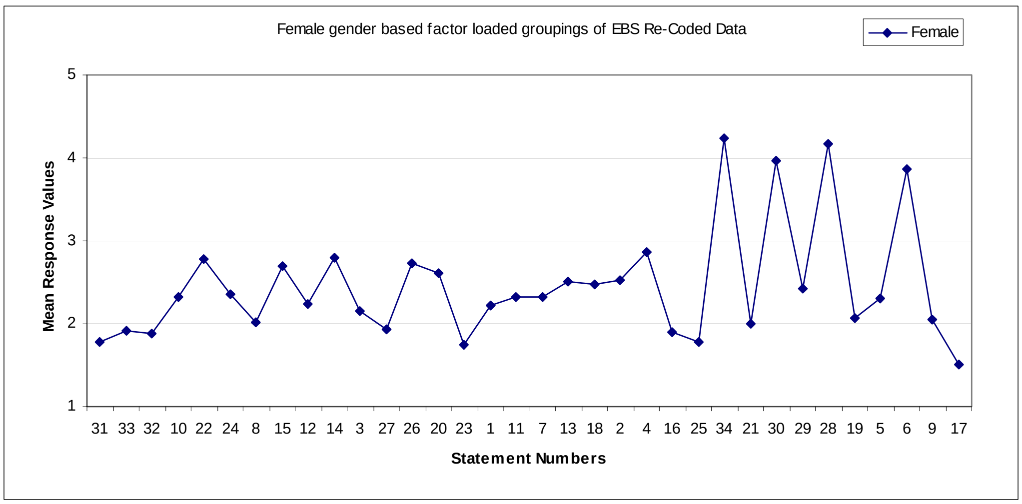


Figure 13: Female Gender Belief Values

6.2.4.1 Female Gender Subset Qualitative Observations

What follows now is a brief discussion of what was seen to emerge from this dataset analysis after the qualitative overlay process was applied to the findings. While this discussion does not imply causality, it does provide a richer understanding of what this particular iteration uncovered from within the dataset.

- The “Learning is Quick” subset had the participants responding in the negative, implying that the learning process is perceived as being slow and measured, and not really quick at all. The data also implied that by re-reading texts and other forms of information, was really the only way to ensure that the information required by the learner could be successfully retrieved and learned.

- The subsets "Avoid Integration (1) & (2)" implied that new forms of knowledge should not be integrated too quickly with an existing knowledge structure, and that detail rather than conceptual information appears more easily grasped.

- The subsets "Knowledge is Certain (1) & (2)", exposed the participants' beliefs that reliable forms of knowledge are usually composed of slowly gathered facts and information, often associated with an authoritative source. This source should also not be overly scrutinised or questioned.

- The "Learn the First Time" subset revealed an exact opposite stance with the learning process being seen as achieved only through rereading of the information, although there was some admission that maybe some learners have an ability to absorb new information more quickly that other learners

- "Depend on Authority (1), (2)" & "Don't Criticize Authority" subsets offered the most revealing insight into this group's beliefs, as they appear to need or even require some form of guiding authority within their learning activities. Not necessarily an all seeing all knowing type of presence, but rather one that was considered capable of offering guidance and facilitation as the learner enhanced their own personal knowledge base.

- The "Avoid Ambiguity" subset suggested that the participants were actually willing to engage in ambiguous problem solving activities, but that they preferred more structured and defined problem solving activities.

- Finally, the "Seek Single Answers" subset demonstrated that while this group maintained a preconception that meaning was temporal and contextual, and that scientific problem solving generally headed toward a one right solution as this style of problem usually involved mathematics.

6.2.4.2 Female Gender Factor Qualitative Observations

Some observations can now be offered for discussion as to the makeup of the constructed factor model. Factor two (Simple Knowledge) and Factor 3 (Simple Knowledge), combined with subset 10 (Certain Knowledge), appear to provide a belief structure founded on reasoning or assumptions that information needs to be reduced to as small as possible. These pieces of information are then combined with artefacts that they consider certain or un-refutable, the certainty of these values are justified through their own unique prior knowledge or experiences and also based on a varying level of trust as to the authoritative source of the information.

This justification of reliability is further reinforced by Factor 4 (Requisite Authority) where there appears a distinct reliance on an authoritative source having major influence on where the learner perceives the source of reliable knowledge to be, and underpins again, their overall perception that the learning process is seen as a slow methodical build up of facts and information gained through searching for and validating new information.

This concept has been previously stated by other researchers as being subjective and more of a perception of the difficulty of the task of learning and a general expectation or goal regarding learning rather than the learning process itself (Baxter Magolda, 1987, Baxter Magolda and Porterfield, 1985, Hofer and Pintrich, 2002). The participants' acceptance and willingness to engage in oblique problem solving activities supports this argument.

This last point sheds some credence on Schommer's fifth hypothesized dimension, "Omniscient Authority" which was originally presented from a naïve perspective. This analysis has revealed that the learner at the "Absolute" level may require more guidance from an accepted authority to facilitate the learning process(Hofer and Pintrich, 1997).

The meta level dimensions of sources of information and knowledge, as well as how information or knowledge is assimilated supports the earlier mentioned, yet previously empirically unproven hypothesis posited by both Schommer (1992) and many earlier researchers (Belenky et al., 1986, Hofer and Pintrich, 2002, Jehng et al., 1993, Schommer, 1992, Schommer et al., 1992).

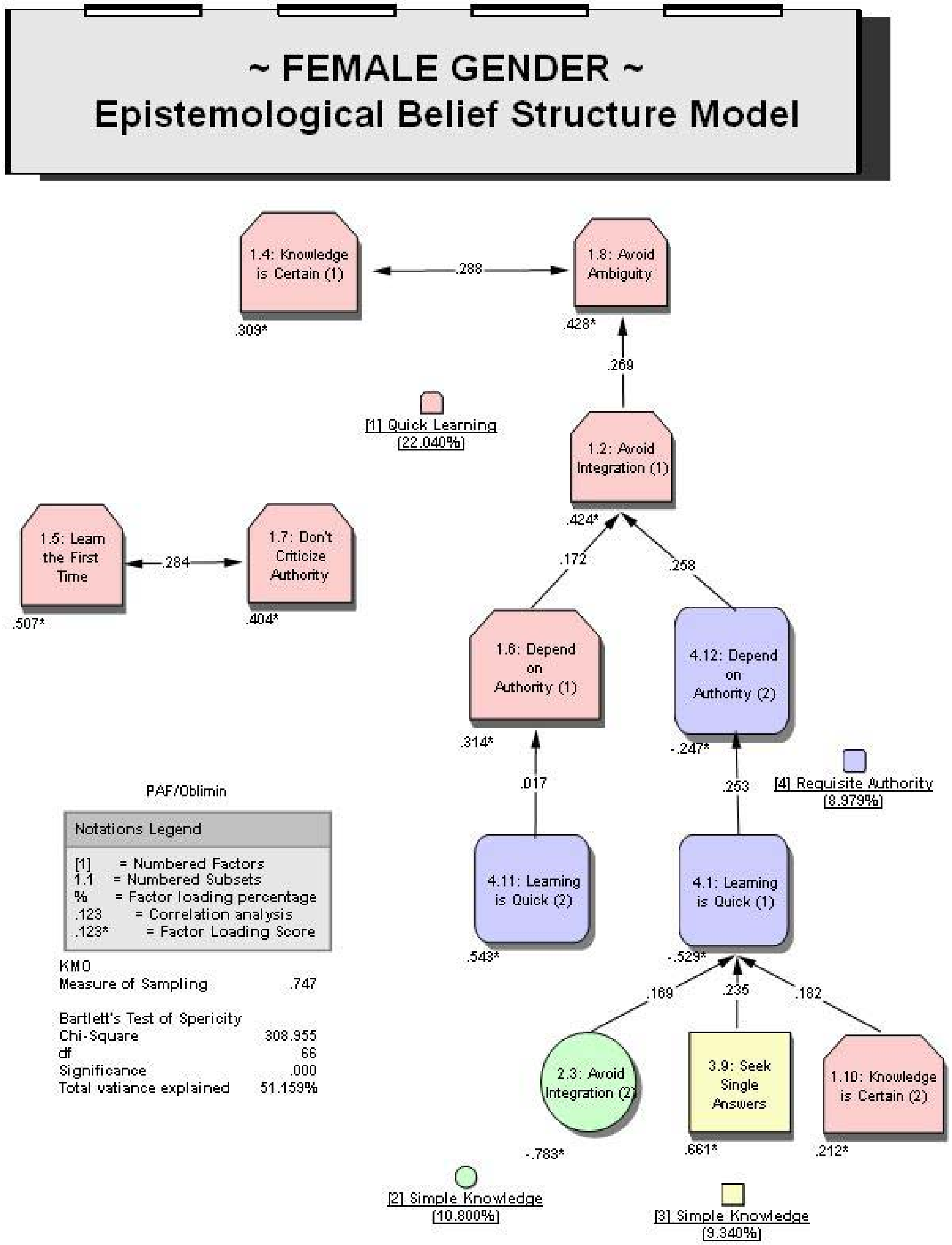


Figure 14: Female Gender Belief Structure Model

6.2.5 Male Gender Analysis: First Pass

The segregated data that pertained entirely to the male participants was now prepared and identical analytical steps were conducted on this data subset. This dataset, like the female gender dataset, was not pre-grouped into subsets as prescribed by Schommer. This analysis revealed eleven (11) demonstrably different subsets. See Table 30: Male Gender Statement Loadings.

No	Subset	Statement No's
1	Don't Criticise Authority	23, 32, 17, 28, 25, 11, and 27
2	Learn the First Time	29 and 30
3	Avoid Ambiguity	13, 15, 14 and 6
4	Knowledge is Certain	18, 2 and 4
5	Depend on Authority (1)	20 and 22
6	Avoid Integration (1)	8, 10, 1 and 33
7	Innate Ability	26 and 34
8	Seek Single Answers	3, 16 and 31
9	Avoid Integration (2)	7 and 5
10	Depend on Authority (2)	19, 21 and 24
11	Avoid Integration (3)	9 and 12

Table 30: Male Gender Statement Loadings

6.2.6 First Pass: Statistical Validity

Within the first pass of the exploratory analysis the Kaiser-Meyer-Olkin measure of Sampling Adequacy was calculated to be 0.681. Bartlett's test of Sphericity was calculated to contain; Chi-square of 1170.446, Degrees of Freedom of 561, and a significance of 0.000. Cronbach's coefficient "α" for the female gender analysis was calculated out to be 0.6054018.

These eleven factors explained 59.2% of the total variance.

6.2.7 Male Gender Analysis: Second Pass

The newly formed subset data then had the mean results for each subset calculated and then analysed again, with the output revealing that the eleven (11) subsets loaded into four primary factors, see Table 31: Male Gender Pattern Matrix.

Subsets	Components			
	1	2	3	4
M8	**0.639**	-0.048	-0.114	-0.028
M10	**0.592**	-0.038	0.065	-0.110
M11	**0.545**	0.045	0.040	0.034
M9	**0.297**	0.121	-0.119	0.075
M4	**0.166**	0.160	-0.072	0.006
M7	0.085	**0.955**	0.123	0.005
M1	0.220	-0.150	**-0.640**	-0.196
M6	0.225	-0.159	**-0.458**	0.123
M3	-0.067	0.188	**-0.301**	-0.076
M5	-0.180	0.174	**-0.292**	-0.012
M2	-0.046	-0.001	0.028	**0.638**

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Table 31: Male Gender Pattern Matrix

The reduction to four (4) factors was not surprising as the Female Gender analysis had also produce a similar number of factors. This Male Gender analysis also produced calculated loadings containing values higher than those reported in the general Schommer (1990) findings,

Factor 1: Simple Knowledge (subsets 8, 10, 11, 9 and 4)

Factor 2: Fixed Ability (subset 7)

Factor 3: Requisite Authority (subsets 1, 6, 3 and 5)

Factor 4: Quick learning (subset 2)

6.2.8 Second Pass: Statistical Validity

Within the second pass of the exploratory analysis the Kaiser-Meyer-Olkin measure of Sampling Adequacy was calculated to be .667. Bartlett’s test of Sphericity was calculated to contain; Chi-square of 180.209, Degrees of Freedom of 55, and a significance of 0.000.

These three extracted factors explained a slightly increased total of 54.8% of the second analysis.

6.2.9 Male Gender Correlational Relationship Analysis

The final analytical task conducted on this dataset was again the Correlational Relationship analysis. This was an attempt to reveal any observable relationships between the eleven (11) subsets and the final four extracted (4) factors. A Correlation Matrix was generated for the dataset, see Table 32: Male Gender Correlation Matrix, and a Relational Model was constructed, using Mind-Mapper v.4.2.

Male Gender PAF/Oblimin Correlations											
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11
M1	1	-0.197	0.189	0.127	0.142	0.359	-0.036	0.348	**0.161**	0.192	0.179
M2	-0.197	1	-0.087	-0.007	**-0.026**	0.024	-0.001	-0.041	0.022	-0.093	0.017
M3	0.189	-0.087	1	**0.110**	0.159	0.096	0.207	0.039	0.050	-0.052	0.020
M4	0.127	-0.007	0.110	1	**-0.053**	0.108	0.174	0.093	0.106	0.099	0.071
M5	**0.142**	-0.026	0.159	-0.053	1	0.066	0.218	-0.071	0.063	-0.040	-0.085
M6	0.359	0.024	0.096	0.108	0.066	1	-0.075	0.265	0.170	**0.175**	0.178
M7	-0.036	-0.001	**0.207**	0.174	0.218	-0.075	1	-0.011	0.131	-0.050	0.052
M8	0.348	-0.041	**0.039**	0.093	-0.071	0.265	-0.011	1	0.230	0.378	0.354
M9	**0.161**	0.022	0.050	0.106	0.063	0.170	0.131	0.230	1	0.188	0.154
M10	0.192	-0.093	**-0.052**	0.099	-0.040	0.175	-0.050	0.378	0.188	1	0.311
M11	0.179	0.017	**0.020**	0.071	-0.085	0.178	0.052	0.354	0.154	0.311	1

Table 32: Male Gender Correlation Matrix

6.2.10 Male Gender Analysis Annotations

Within the model depicted in Figure 16: Male Gender Belief Structure Model, it can be seen that the exclusively male based dataset coalesced into an entirely different structure than that observed emerging from the female gender dataset.

The Male structure appears segregated into three distinct formations, offering a broader construction than that of the female structure, but nonetheless still complex in its nature. Figure 16: Male Gender Belief Structure Model gives a graphical representation of the mean belief values that support this observation by presenting the observed factor loadings from highest loaded factor subsets (left side, 23←) to lowest loading factor subsets (right side, →12).

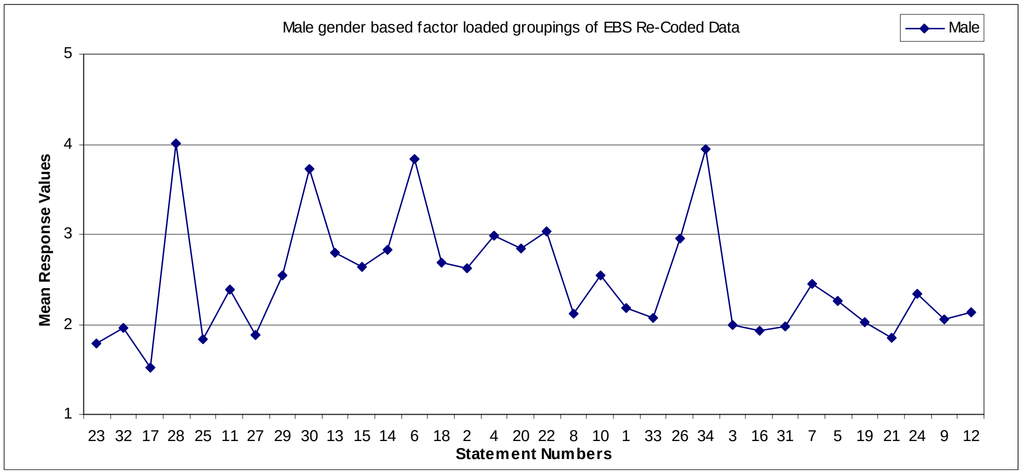


Figure 15: Male Gender Belief Values

6.2.10.1 Male Gender Subset Qualitative Observations

The discussion which follows is a brief account of the observations made after the qualitative overlay analysis was applied to this dataset's findings. While this discussion also does not imply causality, it does provide a richer understanding of what this particular iteration uncovered from within the male gender dataset.

- The "Don't Criticize Authority" subset indicated that while learning was seen to be a long and sometimes arduous process, by the learner accepting and not criticizing the works of authority they would be able to expand their personal knowledge. In particular, by re-reading texts, etc from accepted authority, the meaning and context would eventually be understood. Criticizing these works and/or the authoritative sources could severely hamper the learning process.

- The "Learn the First Time" subset revealed a similar sentiment to the female responses which was that the learning process was being seen as achieved only through re-reading the information and by the keeping on trying until the information was understood – at least in part.

- The "Avoid Ambiguity" subset offered a distinctive insight into the male gender based mindset. These learners were not that afraid of ambiguity in information or problem solving activities. There were strong suggestions that the males believed information to be primarily contextual by nature, and if context was missing then personal interpretation was seen as being acceptable to them. They also implied that truth would be altered if associated context was altered.

- The “Knowledge is Certain” subset seemed to support the beliefs previously mentioned in the “Avoid Ambiguity” subset by inferring that while the search for truth may be possible, differing factors partisan to the notion of truth may vary and the definition represented within that truth may shift. This would then allow a slightly different outcome to be portrayed within a problem solving activity. This raised the intriguing notion that the male gender learner suggests that certainty of knowledge is perhaps fleeting at best.

  The subsets “Depend on Authority (1), (2)” provided more fascinating insight into how authority is perceived. The male learner sees challenging authority and even boundaries as a good thing. They appear to find few reasons to unreservedly accept answers from an authority and are appear also quite prepared to challenge claims made by authorities, provided this is not done in a boorish manner. However, the male learner is also prepared to ask for guidance on a particular point or argument if they are not quite grasping the concept.

  Overlaying all these beliefs was a principle perception that authority, by its nature, should be available to guide or facilitate the learner as and when required - particularly if context was absent.

- The subsets “Avoid Integration (1), (2) & (3)” suggested that by memorising or integrating new information was unnecessary as truths and context could change. The male learner also indicated that they didn’t like to reorganize the information or knowledge as put forward by experts, but preferred to accept the authoritative source’s version of the information, building on that until a new assimilated version could be created.

- The male learner offered some credence toward the awareness that some learners had some form of “Innate Ability”, demonstrated by the fact that it was believed that some individuals seemed to be able to grasp concepts or ‘learn’ more quickly than others. There was no suggestion from the data as to how this actually occurred, nevertheless this belief was rationalised in the Male Gender mindset.

- The “Seek Single Answers” subset appeared to support the idea that from one set of attributed explanations, a particular answer could be found. By changing the makeup of the explanations, implying contextual change, a different answer could be found from the same set of explanations. The difficulty came in sorting through all the different configurations that the contextual form may take in regards a particular situation.

6.2.10.2 Male Gender Factor Qualitative Observations

The male gender epistemological beliefs structure presents quite differently to that of the female gender structure. Their belief in simple yet transitional knowledge is quite dominant.

Factor four (Quick Learning) appeared to express a belief that learning is not perceived as being a quick, painless experience, that the reading and re-reading of the text or information was the only way to eventually understand what was required in order for learning or the assimilation of new information to take place.

It was also observed within Factor two (Innate Ability), where the male participants appear to maintain a principal belief toward the fact that some students appear to display a predisposition toward learning more easily than others.

Perhaps it could be suggested that this may be some form of excuse reasoning by the male learner to satisfy their own needs to explain to themselves why some things are harder to learn than others?

Central to their core beliefs, observed within Factor three (Requisite Authority), is their need for an authoritative source to be able to guide or facilitate their endeavours in learning and understanding new information. This reliance is different to the female gender model as the male learner does not appear to be looking for definitive answers based on concrete information, but rather explanations as to why their version of the answer might not be quite accurate. The theme of “context” played a large role in the responses received within this dataset.

Finally, Factor one (Simple Knowledge) offers some insight into how they perceive knowledge and even how the interaction of a facilitating authority can enhance learning activities, making it easier to assimilate or just compare with those experiences already accrued within their own personal knowledge stockpile.

The consequence of their beliefs on the certainty of knowledge is also demonstrated by the interrelation this has within their beliefs about the innate abilities of some learners. This may be where they conceive that the better learner is more adept at sorting out the sequencing of information and is therefore better able to provide a more holistic response to a problem based activity.

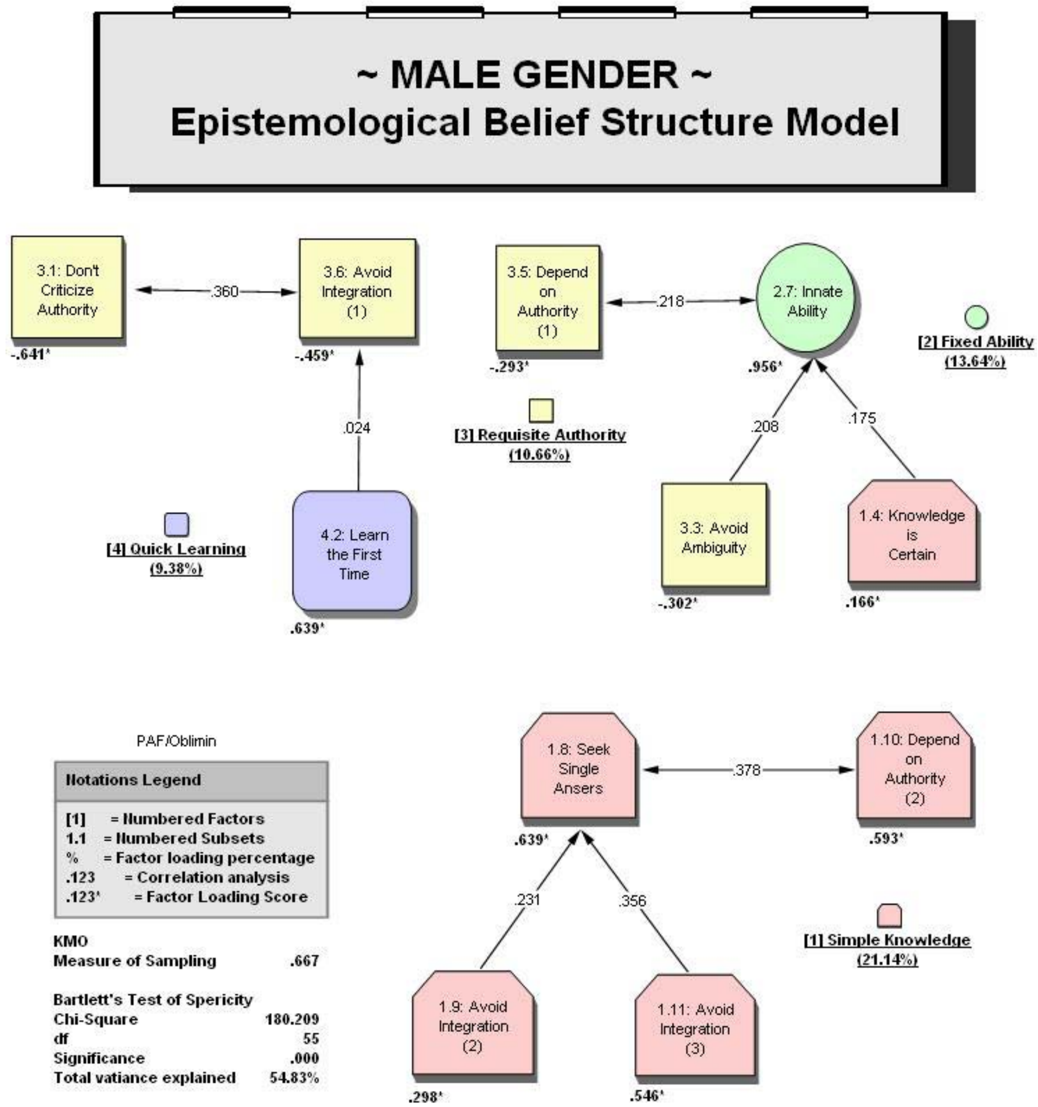


Figure 16: Male Gender Belief Structure Model

6.2.11 Gender Analysis: Comparisons and Comments

The Male beliefs model appears as three distinct groupings, sharing synchronic relationships between connected subsets, while also maintaining three distinct sub-structures.

These substructures appear as a shallow hierarchical construct that is revealed to be integrated and self-sustaining within the overall structure. By looking at the male gender beliefs model, there can be observed a distinct higher dependence on an authoritative source, as opposed to the female gender model.

The female gender beliefs model appears substantially different to the male gender model in that the larger primary structure appears far more integrated and diverse, relying on a construct of beliefs that exhibits a greater depth than that of the male.

This depth of construction also illustrates reliance for well founded knowledge, especially from authoritative sources, but indicates a higher level ability within the structure to focus on less ambiguous forms of information which can then be integrated into pre-existing personal knowledge bases.

Like the Male beliefs model, the Female beliefs model also appears to illustrate two principal over-riding meta-level belief factors. These beliefs appear to embody concepts related to the source of knowledge, as well as beliefs surrounding the perception of what knowledge is, or more particularly their perception of how the learning process should be.

6.3 Domain Based Comparison and Analysis

Having investigated possible gender related differences in personal epistemological belief structures, attention was now focussed on confirming what form these structures might take if re-analysed from a different perspective, that of domain.

In order to investigate any observable disparity between domains, and to also ensure the sample size would be adequate to ensure an appreciable result, the dataset was divided into two domains. From the four Schools that were initially approached to participate in this study, the Schools of Computing and Information Systems participants were pared off into the domain labelled “Science”, while the participants from the Schools of Nursing and Health Sciences were grouped under the domain labelled “Health”.

Having separated the original dataset into these two new disproportionate halves, the dataset now composed one hundred and sixty seven (167) participants in the Science Domain dataset and two hundred and sixty eight (268) participants within the Health Domain dataset, see Figure 17: Domain based demographics.

This division maintained the minimum acceptable requirements of one hundred (100) responses required for the factor analysis procedure (Antonius, 2003, Ho, 2000, Leech et al., 2005).

Age groups	Domain		Survey totals
	Health	Science	
< 20	123	123	246
20 – 24	47	25	72
25 – 29	21	6	27
30 – 39	41	9	50
40 – 49	28	3	31
50 +	8	1	9
	268	**167**	**435**

Figure 17: Domain based demographics

This analysis was conducted on the original dataset using the adopted PAF extraction method and Oblimin oblique rotation options.

Figure 18: Observed Domain Discrepancies within the Raw Data, illustrates the compared mean response values within the original dataset, showing two major areas of discrepancies and one minor area of alleviation. The observed major areas included statement eighteen (18) to twenty (20) inclusive and statement thirty-one (31) to thirty-three (33) inclusive. More minor discrepancies were observed in the region of statements four (4) and five (5).

It is interesting to note during this analysis that the Health domain, being predominately female, was observed as having similar patterns of discrepancy. This was particularly apparent in the areas of statements eighteen (18) to twenty (20) inclusive and statements thirty-one (31) to thirty-three (33), almost a repetition of the gender based responses observed in Figure 12: Observed Gender Discrepancies.

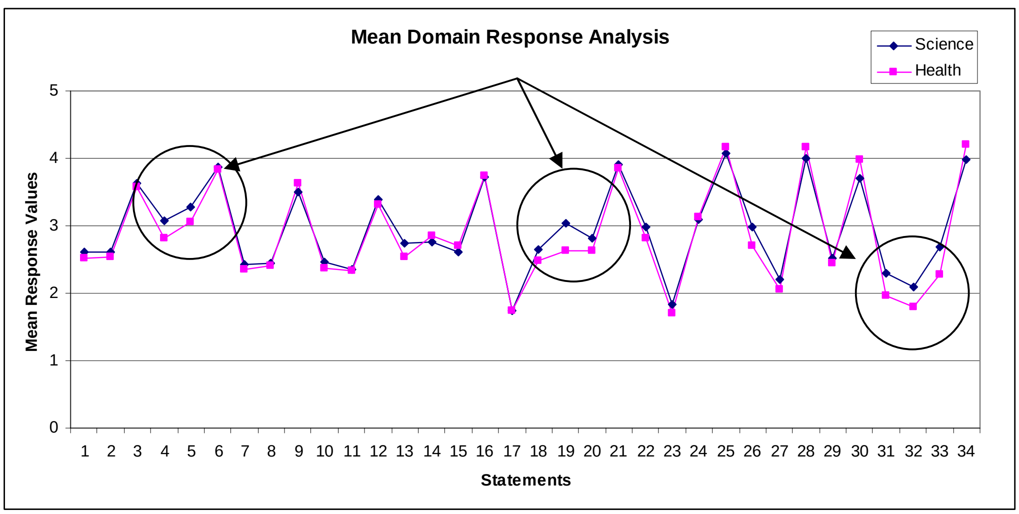


Figure 18: Observed Domain Discrepancies within the Raw Data

6.3.1 Science Domain Analysis: First Pass

The same method of analysis was conducted on the Science subset (167) as had been conducted on the complete original dataset. The first factor analysis pass calculated the new groupings within the Science Domain as shown in Table 33: Science Domain Statement Loadings.

No	Subset	Statement No's
1	Learning is Quick (1)	32, 6, 23
2	Learn the First Time	28, 29, 30
3	Seek Single Answers (1)	5, 16, 27
4	Depend on Authority (1)	20, 3, 22
5	Seek Single Answers (2)	2, 18,4
6	Avoid Integration (1)	7
7	Don't Criticise Authority	21, 12, 13, 17
8	Innate Ability	26, 34, 14
9	Learning is Quick (2)	33, 31, 24
10	Avoid Integration (2)	10, 11, 8
11	Depend on Authority (2)	19, 25
12	Knowledge is Certain	15, 9, 1

Table 33: Science Domain Statement Loadings

6.3.1.1 First Pass: Statistical Validity

Within the first pass of analysis of the Science Domain dataset, the Kaiser-Meyer-Olkin measure of Sampling Adequacy was calculated to be 0.648. Bartlett's test of Sphericity was calculated to contain; Chi-square of 1060.913, Degrees of Freedom of 561, and a significance of 0.000. Cronbach's coefficient "α" for this analysis was calculated as being 0.5599476, still significantly high.

These twelve factors explain a total of 60.7% of the analysis.

6.3.2 Science Domain Analysis: Second Pass

The newly formed subset data then had the mean results for each subset calculated and then analysed, with the output revealing that the twelve subsets loaded into four (4) factors, see Table 34: Science Domain Pattern Matrix.

The analysis process revealed that the subset data loaded into four (4) factors, this was not surprising. Cross loadings that had been observed in several of the previous analyses of the dataset as a whole now failed to materialise with only one significant cross loading being observed – that of subset SD03, implying potential cross loading across to factor one.

Sub-sets	Components			
	1	2	3	4
SD11	**0.745**	-0.101	0.063	-0.176
SD09	**0.408**	-0.123	-0.081	0.135
SD06	**0.388**	0.103	-0.004	0.172
SD02	-0.087	**0.559**	0.157	-0.056
SD08	-0.087	**0.433**	-0.202	0.254
SD04	0.104	**0.208**	-0.184	0.046
SD12	0.091	0.090	**-0.507**	-0.191
SD10	-0.051	-0.002	**-0.479**	0.086
SD01	-0.066	-0.179	**-0.389**	0.180
SD03	0.318	0.033	**-0.375**	-0.095
SD07	0.268	-0.095	**-0.371**	0.133
SD05	0.062	0.038	0.014	**0.484**

Extraction Method: Principal Axis Factor Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

Table 34: Science Domain Pattern Matrix

It is interesting to note that while the absolute values observed within the cross load were close (.318 and .375) one was of a positive integer origin and the other from a negative origin. It was decided to keep SD03 in its original loading within Factor three. With the exception of subset SD04, all the loading figures were well above the accepted minimum cut off point value of .300.

Factor 1: Requisite Authority (subsets 11, 9 and 6)

Factor 2: Foxed Ability (subsets 2, 8 and 4)

Factor 3: Certain Knowledge (subsets 12, 10, 1, 3 and 7)

Factor 4: Simple Knowledge (subset 5)

6.3.2.1 Second Pass: Statistical Validity

Within the second pass of the prescribed factor analysis the Kaiser-Meyer-Olkin measure of Sampling Adequacy was calculated to be .707. Bartlett’s test of Sphericity was calculated to contain; Chi-square of 207.107, Degrees of Freedom of 66, and a significance of 0.000.

These four (4) extracted factors explain a total of 52.2% of the second analysis.

6.3.3 Science Domain Correlational Relationship Analysis

The final analytical task conducted on the Science Domain oriented dataset was the Correlational Relationship analysis to observe any underlying relationships between the twelve (12) subsets and the four (4) factors extracted during the previous process. A Correlation Matrix was generated for the dataset, see Table 35: Science Domain Correlation Matrix, and a Relational Model was constructed, using the Mind-Mapper v.4.2 application.

Science Domain PAF/Oblimin Correlations												
	SC1	SC2	SC3	SC4	SC5	SC6	SC7	SC8	SC9	SC10	SC11	SC12
SC1	1	-0.180	0.159	0.084	0.054	0.120	**0.275**	0.110	0.154	0.220	-0.011	0.090
SC2	-0.180	1	-0.113	0.085	-0.035	-0.033	-0.171	**0.193**	-0.135	-0.082	-0.175	-0.044
SC3	0.159	-0.113	1	0.129	0.029	0.210	0.285	0.108	0.264	0.187	0.281	**0.290**
SC4	0.084	0.085	0.129	1	0.056	0.103	**0.180**	0.160	0.057	0.162	0.093	0.088
SC5	0.054	-0.035	0.029	0.056	1	0.128	0.173	**0.183**	0.133	0.173	-0.049	0.013
SC6	0.120	-0.033	0.210	0.103	0.128	1	0.160	0.129	0.215	0.070	**0.240**	0.133
SC7	0.275	-0.171	0.285	0.180	0.173	0.160	1	0.102	0.245	0.212	**0.286**	0.257
SC8	0.110	**0.193**	0.108	0.160	0.183	0.129	0.102	1	-0.027	0.133	-0.127	0.112
SC9	0.154	-0.135	0.264	0.057	0.133	0.215	0.245	-0.027	1	0.126	**0.287**	0.148
SC10	0.220	-0.082	0.187	0.162	0.173	0.070	0.212	0.133	0.126	1	0.057	**0.260**
SC11	-0.011	-0.175	0.281	0.093	-0.049	0.240	0.286	-0.127	**0.287**	0.057	1	0.145
SC12	0.090	-0.044	**0.290**	0.088	0.013	0.133	0.257	0.112	0.148	0.260	0.145	1

Table 35: Science Domain Correlation Matrix

From the calculations finalised within this matrix, the newly constructed model clearly illustrates the distinct factorial groupings and correlational relationships exposed during the analysis process.

6.3.4 Science Domain Model Annotations

Within the predominately male dataset (120 males as opposed to 47 females) it was not considered that it should differ greatly from the arrangement of the model constructed within the male gender analysis. The Science domain model however illustrates quite clearly the fact that there is an underlying structural mindset shift happening that seems peculiar to those learners studying units within a scientifically based educational environment.

Figure 19: Science Domain Belief Values offers a graphical representation of the calculated mean values supporting construct of the Science Domain model. The

graph is structured to portray the subset groupings as they were extracted from the factor analysis process with the observed factor loadings of the higher loading factor subsets (left side, 32←) to lowest loading factor subsets (right side, →1).

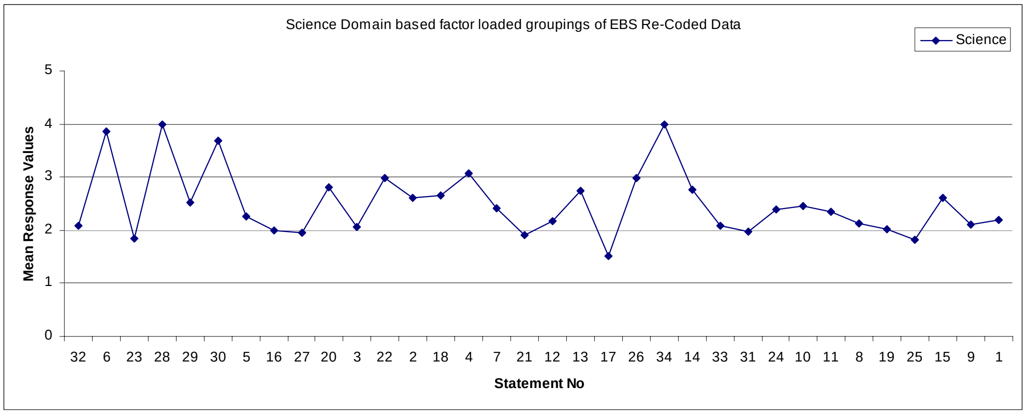


Figure 19: Science Domain Belief Values

6.3.4.1 Science Domain Subset Qualitative Observations

The discussion that follows is based on observations made by this researcher on the emergent results from this dataset analysis when the qualitative overlay process was applied to the findings. This discussion also does not imply causality but merely offers context to the overall analysis process conducted on the dataset.

- The "Learning is Quick" subset had the Science Domain participants reinforcing the fact that the learning process is perceived as being slow and arduous. The data also revealed that re-visiting texts under the auspices of a guiding authoritative source was considered the preferable form of assimilating new information.

- The "Learn the First Time" subset revealed the perception that much re-visitation of the texts was required to finally understand new information or concepts.

- The pair of "Seek Single Answers" subsets illustrated quite clearly that this group of participants saw truth as a changing commodity, and that often there was more than one solution to a single problem. Original thinking toward finding a clear new solution was dissuaded in preference to extending existing work in order to find some of these alternative solutions previously mentioned. This belief may have its roots in the relative inexperience of these science based learners.

- "Depend on Authority (1), (2)" & "Don't Criticize Authority" subsets reinforce the observations connected to the previous paragraph inasmuch as there appears to be a simmering reverence for past scientific works and/or authors. Yet it appears that this group also believes that it is quite okay to challenge these authoritative sources by extending the previous research within these works in order to offer differing solutions to the original problems posed.

- The subsets "Avoid Integration (1) & (2)" illustrated that some forms of information needed to be held in a personal knowledge base, but only fully integrated when the new knowledge had finally proved to be rationally acceptable to the learner within the situation or experience at hand.

- The "Innate Ability" subset revealed that science domain students did not necessarily consider ones innate inner abilities to be much of an assist in solving problems, rather that diligence and due understanding served as better indicators as to how well a particular individual might solve a problem.

- Finally, the "Knowledge is Certain" subset reinforced the earlier discussion on truth being subject to variation and interpretation, and that context or intention may or may not provide relevancy when considering new information in a problem solving procedure.

6.3.4.2 Science Domain Factor Qualitative Observations

Within the model illustrated in Figure 20: Science Domain Belief Structure Model, the factor groupings seen to impose an orderly four tier hierarchical coalescence of this clusters dominant epistemological beliefs. Being male dominated, the resemblance to the male gender model is apparent in the recognition of three distinct groupings, while this form is similar, the correlated relationships within each however, is decidedly different.

The model also illustrates quite clearly the interaction of subset components within a factor loaded group, with components from other direct factor loaded groupings.

These relationships offer an interlaced structure that appears to rely on an underpinning of similar beliefs in simple forms of knowledge toward higher level concepts as maintained by this cluster.

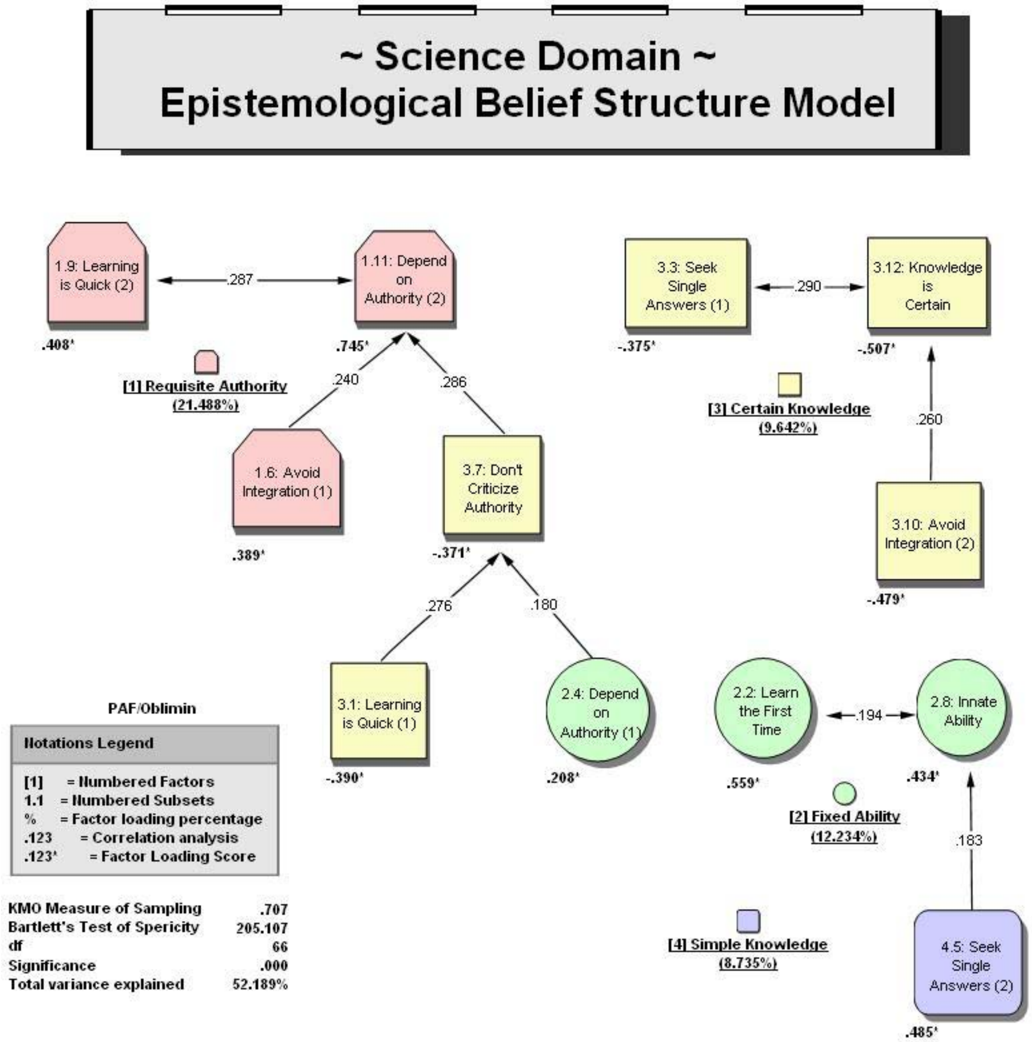


Figure 20: Science Domain Belief Structure Model

6.3.5 Health Domain Analysis: First Pass

The analysis methodology was then applied to the new Health Domain dataset as had been conducted on Science Domain dataset. The first pass calculated the new groupings within the Health Domain as shown in Table 36: Health Domain Statement Loadings.

No	Subset	Statement No’s
1	Success is Unrelated to hard work	25, 16, 34, 17
2	Avoid Ambiguity	13, 11, 7, 9, 33
3	Learn the First Time (1)	29, 30
4	Depend on Authority	20, 22
5	Knowledge is Certain (1)	15, 12, 14
6	Knowledge is Certain (2)	18
7	Seek Single Answers	2, 1, 3, 6
8	Learn the First Time (2)	27, 26, 4
9	Don’t Criticize Authority	28, 21, 5, 19
10	Avoid Integration (1)	8, 28
11	Avoid Integration (2)	10
12	Learning is Quick	32, 31, 23

Table 36: Health Domain Statement Loadings

6.3.5.1 First Pass: Statistical Validity

Within the first pass of analysis of the two hundred and sixty eight (268) Health Domain dataset responses, the Kaiser-Meyer-Olkin measure of Sampling Adequacy was calculated to be 0.701. Bartlett’s test of Sphericity was calculated to contain; Chi-square of 1430.526, Degrees of Freedom of 561, and a significance of 0.000. Cronbach’s coefficient “α” for this analysis was calculated as being 0.6475101.

These twelve factors explain a total of 58.2% of the analysis.

6.3.6 Health Domain Analysis: Second Pass

The newly formed subset data then had the mean results for each subset calculated and then further analysed, with the output revealing that the twelve subsets loaded once again into four (4) factors, see Table 37: Health Domain Pattern Matrix.

Factor 1: Requisite Authority (subsets 6, 5, 7 and 4)

Factor 2: Simple knowledge 1 (subsets 11, 2 and 8)

Factor 3: Simple Knowledge 2 (subsets 9, 1, 12 and 3)

Factor 4: Quick Learning (subset 10)

Sub-sets	Components			
	1	**2**	**3**	**4**
H06	**0.476**	0.080	-0.056	0.140
H05	**0.449**	-0.104	0.037	-0.166
H07	**0.400**	0.021	-0.150	-0.025
H04	**0.244**	-0.235	0.061	0.003
H11	-0.055	**-0.643**	0.022	0.006
H02	0.351	**-0.417**	-0.113	0.043
H08	0.185	**-0.391**	-0.256	0.095
H09	-0.055	-0.055	**-0.490**	0.031
H01	0.124	0.134	**-0.401**	0.010
H12	0.215	-0.155	**-0.374**	-0.109
H03	0.091	0.126	**0.163**	0.132
H10	-0.043	-0.081	-0.023	**0.550**

Extraction Method: Principal Axis Factor Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

Table 37: Health Domain Pattern Matrix

6.3.6.1 Second Pass: Statistical Validity

Within the second pass of the analysis methodology, the Kaiser-Meyer-Olkin measure of Sampling Adequacy was calculated to be .733. Bartlett's test of Sphericity was calculated to contain; Chi-square of 30.117, Degrees of Freedom of 66, and a significance of 0.000.

These four (4) extracted factors explain a total of 50.5% of the second analysis.

6.3.7 Health Domain Correlational Relationship Analysis

The final analytical task conducted on the Health Domain dataset was the Correlational Relationship analysis in an attempt to reveal any underlying relationships between the twelve (12) subsets and the four (4) final factors extracted during the previous process. A Correlation Matrix was calculated for this dataset, see Table 38: Health Domain Correlation Matrix, and a Relational Model was again constructed, using Mind-Mapper v.4.2.

Health Domain PAF/Oblimin Correlations												
	H1	H2	H3	H4	H5	H6	H7	H8	H9	H10	H11	H12
H1	1	0.114	-0.036	0.013	0.092	0.154	0.124	0.094	0.208	-0.004	0.005	**0.209**
H2	0.114	1	-0.085	0.189	0.288	0.254	0.210	**0.339**	0.179	0.013	0.338	0.300
H3	-0.036	-0.085	1	0.020	-0.036	0.028	-0.004	-0.088	-0.070	**0.072**	-0.103	-0.153
H4	0.013	0.189	0.020	1	0.206	0.101	0.074	**0.220**	0.041	0.009	0.149	0.159
H5	0.092	**0.288**	-0.036	0.206	1	0.139	0.234	0.182	0.074	-0.076	0.107	0.169
H6	0.154	**0.254**	0.028	0.101	0.139	1	0.205	0.118	0.000	0.085	-0.008	0.199
H7	0.124	0.210	-0.004	0.074	0.234	0.205	1	**0.277**	0.122	-0.024	0.030	0.181
H8	0.094	**0.339**	-0.088	0.220	0.182	0.118	0.277	1	0.217	0.049	0.275	0.316
H9	0.208	0.179	-0.070	0.041	0.074	0.000	0.122	**0.217**	1	0.003	0.056	0.208
H10	-0.004	0.013	0.072	0.009	-0.076	**0.085**	-0.024	0.049	0.003	1	-0.018	-0.088
H11	0.005	**0.338**	-0.103	0.149	0.107	-0.008	0.030	0.275	0.056	-0.018	1	0.170
H12	0.209	0.300	-0.153	0.159	0.169	0.199	0.181	**0.316**	0.208	-0.088	0.170	1

Table 38: Health Domain Correlation Matrix

While the correlational values appear low when compared to loading factor values, they are consistent with the values calculated so far within other correlational matrices used within this research. Available literature also expounds the view that using positive values will correctly display genuine nature or influence on the relationship between two factors.

6.3.8 Health Domain Model Annotations

The Health Domain analysis provided some curious anomalies within the resultant findings. Although this model was expected in most ways to mirror that of the Female Gender model, mainly due of the higher number of females (222) as opposed to males (46) within this cluster – the most striking similarity was in the total interlinking correlational relationships between all subset loadings. However, the Health Domain model displayed a flatter hierarchical construct that lacked the structural depth evident in the former Female Gender model.

Figure 21: Health Domain Belief Values gives a graphical representation of the mean belief values that support this observation by presenting the observed factor loadings from highest loaded subset values (left side, 25←) to lowest loading subset values (right side, →23).

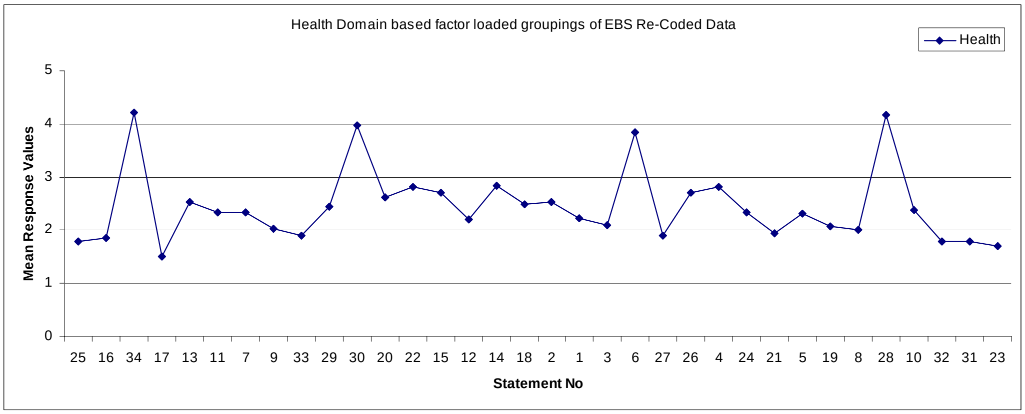


Figure 21: Health Domain Belief Values

6.3.8.1 Health Domain Subset Qualitative Observations

While some of the qualitative subset analysis supported that mentioned in previous discussion, those observed meanings that were seen to be markedly different are now discussed further. Again I must mention that the intention of this discussion is not to imply causality, rather it allows a context layer to be applied in an effort to understand more fully, the phenomena being observed by this research study.

- The "Success Unrelated" subset provides a glimpse of this clusters belief on their attitude toward success. It is implied that success is directly related to the amount of hard study and work undertaken by the learner. It was also made known that learning was again considered a slow process, not realistically aided by any innate abilities displayed by an individual, but rather by the application of experiences.

- The "Knowledge is Certain (1) & (2)" subsets, exposed the belief that truth was difficult to find, and also a relative concept. Pieces of information that were seen as only being endorsed by one expert in the field were looked upon as being less reliable and less desirable than information that had achieved expert group consensus or following. This exposed what may be considered as a rate condition of the "acceptability" of new knowledge.

- The "Depend on Authority (1), (2)" & "Don't Criticize Authority" subsets seemed to support this notion by the belief that experts (presumably those that shared a similar opinion) should not be overtly scrutinised. Perhaps this relates back to the "Doctor" as being seen as a fairly unimpeachable source of information within the Health Domain in general.

This was also be observed in the belief that if the learner is seen to be struggling with a concept, it was preferable that the authoritative source be contacted and consulted more readily within the Health Domain than those members of the Science Domain. Guidance and facilitation by those educators within the Health Domain appeared to be viewed as a more acceptable activity as well.

While leaning toward dependence on accepted authoritative sources, there also appeared an apparent requirement by the participants for these sources to offer anything more than firm facilitation within the learning environment.

6.3.8.2 Health Domain Factor Qualitative Observations

The factor structure illustrated in Figure 22: Health Domain Belief Structure Model clearly demonstrates the interlinking between subsets and differing factor groups. This supporting of ideas and beliefs is apparent when reading and comparing the discussion on the subset qualitative analysis.

As an example, Factor 4 (Quick Learning) supports not only a sideways integration with Factor 1 (Requisite Authority) but also supports Factor 2 (Simple Knowledge), as well as Factor 3 (Simple Knowledge), all within the same structure.

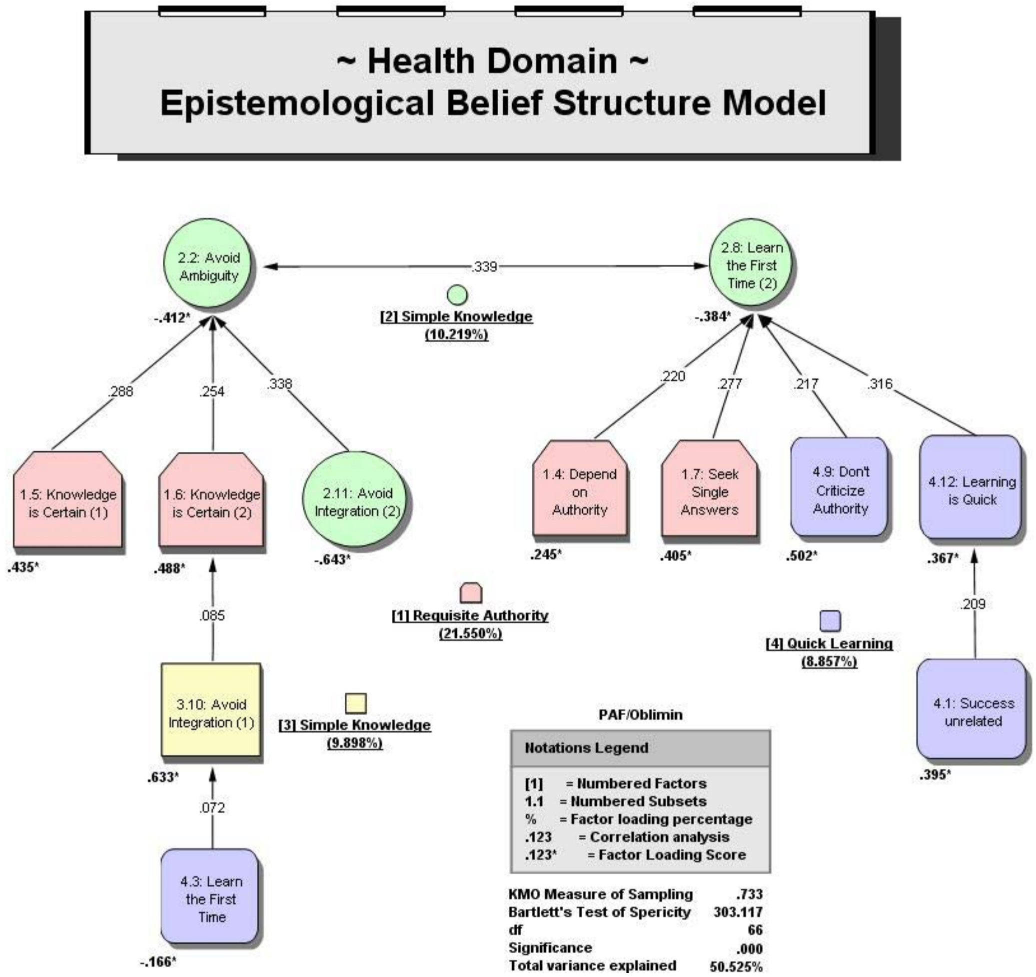


Figure 22: Health Domain Belief Structure Model

6.3.9 Domain Analysis: Comparisons and Comments

Within the predominately female dataset (222 females as opposed to 46 males) the models should have mimicked to some degree the models constructed within the Gender based analysis. This was not the case however as the models revealed by the Domain based analysis appeared very different.

The Science domain model appears to place a higher need on following the authoritative sources that are engaged with within the domain. The Health domain model suggests that there is some interconnection with authority, but that this is sought only within a guiding role. Answers to problem solving exercises appear to be actively sought and compared with the solutions offered by the authority, but appear to not always be accepted as face value.

Science Domain learners appear to logically progress through information acceptance and assimilation – looking for clear concise and unambiguous information and solutions. Health domain learners seem to apply a wider scope of investigation before they accept information or solutions, implying that they are more open to alternatives than Science learners.

The predominance of a Domain based mindset within these two models seems to have overpowered the previous Gender based models. There appears to be a minimum of influence of gender on the actual belief factors maintained by the participants when separated into Domain data subsets.

It appears therefore, that epistemological beliefs are in fact traceable across domains. This analysis also appears to confirm that participants within differing domains have the capacity to maintain or adapt their beliefs depending on their domain based educational environment, and that these beliefs can in fact now be identified as markers for comparison to new learners looking to enter particular domains of study.

6.4 Nationality Based Dataset Analysis

This section of the research was to prove both daunting and exciting, mainly by the potential of the level of insight that could be achieved by investigating the epistemological belief structures as maintained by participatory clusters from globally diverse geographical locations. It was decided to include this part of the study, as the analytical nature of the methodologies used would provide an interesting narrative with the inclusion of the international datasets. The already developed strategies and techniques have been rigidly maintained in order to replicate comparable analysis in order to compare these results within the context of the research findings thus far.

This Nationality based analysis has been included due to the unexpected international interest in the field of study being undertaken by this researcher. The analysis used to form the Australian dataset is the complete and original four hundred and thirty five (435) responses used in the initial research study. To this has been added two more datasets; one set from the United States of America, the other from the Peoples Republic of China.

6.4.1 International Dataset Analysis Overview

The combined dataset was now composed of five hundred and ninety seven (597) participatory responses. Having isolated these responses into three distinct nationality based entities, mean values were then calculated as a method of observing direct comparisons between the datasets. This first step was undertaken in order to minimise the effects of a larger dataset of responses offering a false finding by literally outnumbering any other dataset.

The mean statement responses of these three Nationality based datasets were then directly compared to scrutinize any initial discrepancies prior to the complete factor analysis process.

Figure 23: Observed Nationality Based Discrepancies, clearly demonstrates distinct disparities of mean response values right across the chart. The extreme levels of discrepancy observed within this initial comparison were totally unexpected and further demonstrates the potential flexibility of the EBS instrument to ably harvest accurate responses from even diverse participatory clusters such as the trans-global datasets used here.

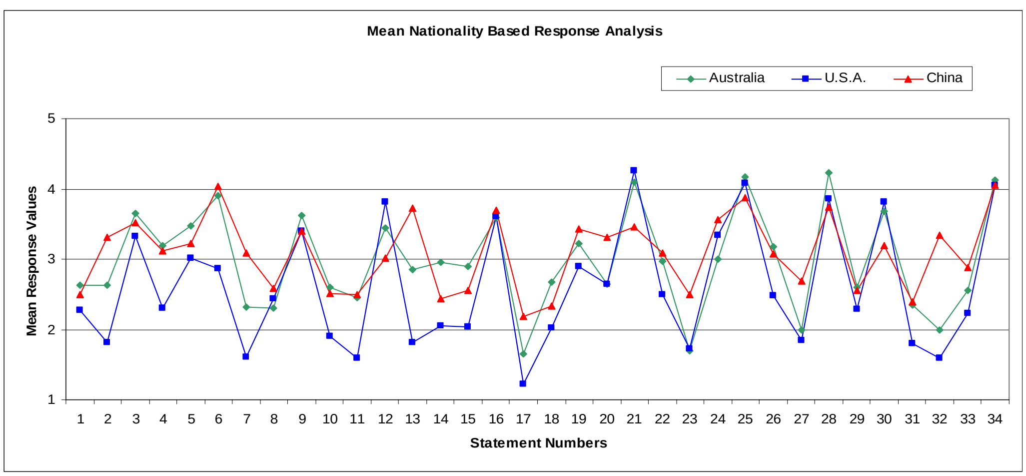


Figure 23: Observed Nationality Based Discrepancies

6.5 Australian Dataset Analysis

After initially considering using the entire Australian dataset, it was determined that if the entire dataset (435 responses) were included that there would be additional values that could offset the findings, and potentially could produce a false analysis output. It was therefore decided to reduce the Australian dataset down to (167) by only including those listed as Science participants. This would reduce the overall responses to three hundred and twenty nine (329), the reasons for this are as follows;

1. The (104) response dataset harvested from the People's Republic of China was from a cluster of Chinese Computing students (Science),
2. The (58) response dataset harvested from the United States of America was from a cluster if Library and Information Science students (Science)

Once the re-calculation of the dataset had been concluded and the new mean data from the Australian Science students replaced the mean data line representing the entire dataset in the line graph, the differences became immediately obvious.

The most noticeable increases were in the areas of statements no's 4, 5 and 27 where the words scientific appeared in two of the statements and in the last there was a direct connotation toward the ability to be able to learn information the first time it is read. The most noticeable decreases include statements 14 and 15 which related to unchanging truths and the seeking of single answers to problems.

These types of responses are more attributable to Science Domain learners as they have been proven to respond differently to such statements than Health Domain students, see Figure 24: Recalculated National Based Discrepancies.

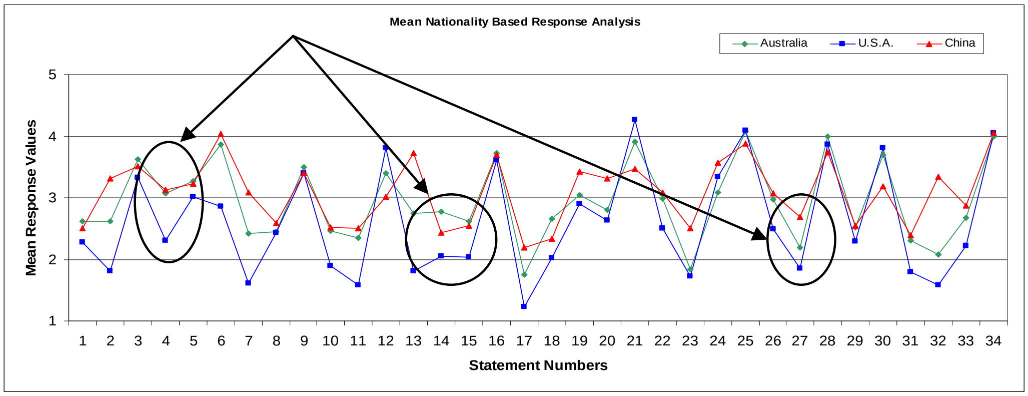


Figure 24: Recalculated National Based Discrepancies

As the Australian Science dataset had already been analysed earlier in this research there did not appear the need to reproduce the entire analysis again, therefore only the (Australian) Science Domain Epistemological Belief Structure diagram will be repeated here for ease of reference, and simply re-titled the Australian (Science) Epistemological Beliefs Model (see Figure 25: Australian (Science) Epistemological Beliefs Model).

All other tabulated data used in the Australian (Science) Dataset analysis can be seen in Section 6.3 Domain Based Comparison and Analysis, and as such only the model and the annotation discussion will be reproduced here.

6.5.1 Australian based Analysis Annotations

Within Figure 25: Australian (Science) Epistemological Beliefs Model, the factor groupings seem to impose a four tier hierarchical coalescence of the dominant epistemological beliefs maintained within the cluster.

Being male dominated, the resemblance to the male gender model is apparent in the recognition of three distinct groupings, while this form is similar, the correlated relationships within each however, is decidedly different.

The model also illustrates quite clearly the interaction of subset components within a factor loaded group with components from other factor groupings. These relationships offer an interlaced structure that appears to rely on a foundation of perceptions toward authoritative sources of information and the speed in which learning should be viable and maintainable.

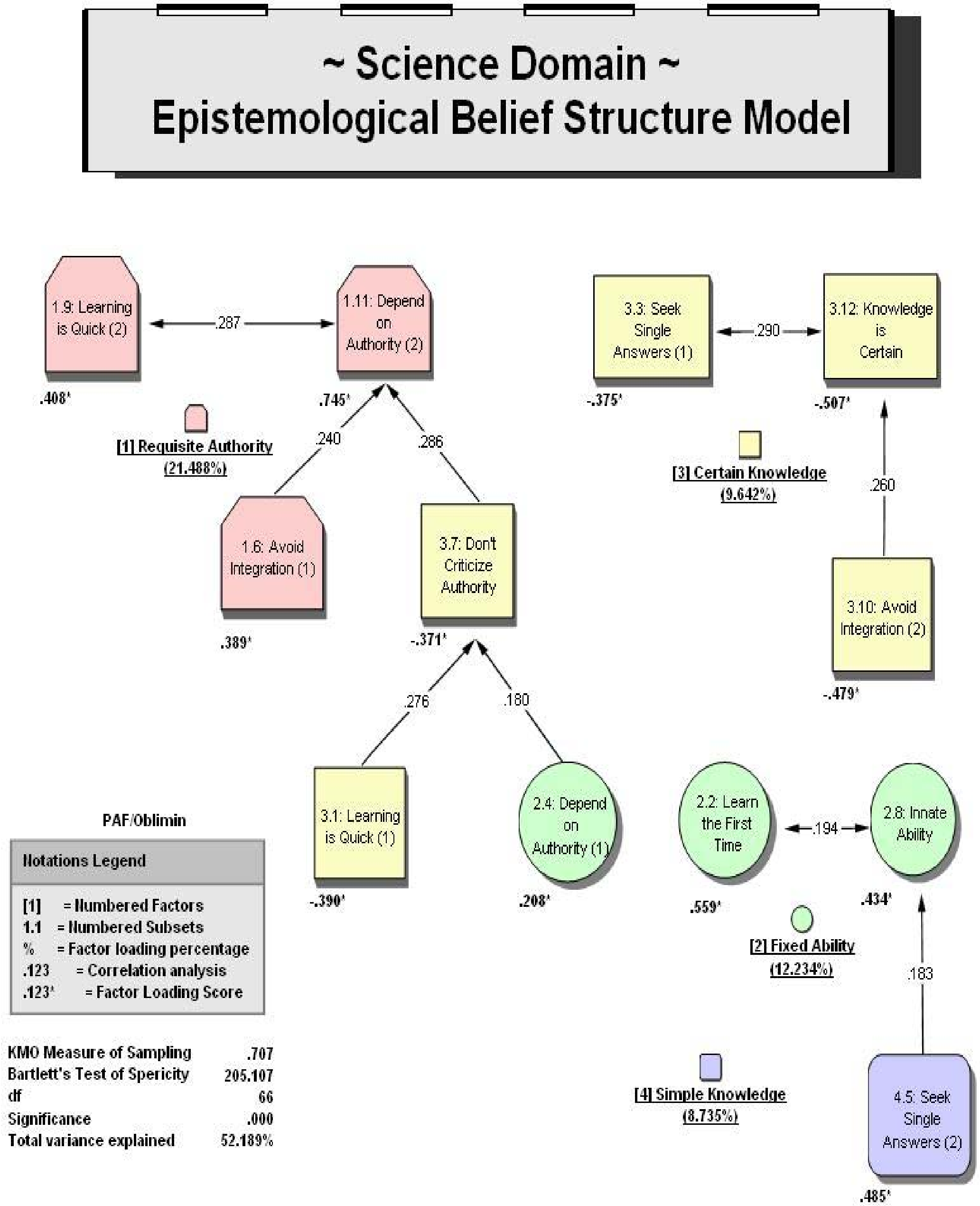


Figure 25: Australian (Science) Epistemological Beliefs Model

6.6 United States of America Dataset Analysis

The provision of eligible data for this part of the research was instigated and supported by two colleagues that were met during a conference in Boras, Sweden in 2007, being - Assistant Professors Debbie Rabina PhD, and David Walczyk EdD, both from the PRATT Institute's School of Information and Library Science, New York.

6.6.1 U.S.A. Participant Demographics

A total of fifty eight (58) student responses were received using the online EBS facility, purposely created in an attempt to demonstrate the ease in which data could be harvested from geographically dispersed participatory clusters. Fifteen respondents (15) were male, and forty three (43) were female - see Table 39: U.S.A. Dataset Demographics.

Although this participatory cluster's total responses numbers were less than the ideal cut-off of one hundred responses usually required for a complete factor analysis, it was decided to use this dataset in order to compare the analysed results with the Australian (Science) dataset analysis and to also confirm that the EBS instrument could in fact successfully harvest and analyse remotely obtainable information.

Age groups	**Gender**		**Survey totals**
	M	**F**	
< 20	-	-	-
20 – 24	-	8	8
25 – 29	3	16	19
30 – 39	7	14	21
40 – 49	3	4	7
50 +	2	1	3
	15	43	**58**

Table 39: U.S.A. Dataset Demographics

6.6.2 U.S.A. Based Analysis: First Pass

The analysis conducted on U.S.A. based datasets was by means of the PAF extraction method and Oblimin oblique rotation options as had been used extensively throughout this study.

The first pass on the U.S. based dataset calculated new statement sub-groupings for this cluster, as detailed in Table 40: U.S.A. Based Statement Loadings.

No	Subset	Statement No's
1	Don't Criticise Authority (1)	23, 32, 13, 17, 10
2	Don't Criticise Authority (2)	21, 11
3	Learning is Quick (1)	34, 25, 6
4	Avoid Ambiguity	14, 29
5	Seek Single Answers (1)	5, 12
6	Depend on Authority	20, 33
7	Avoid Integration	8, 18, 22
8	Seek Single Answers (2)	2, 27, 28, 3, 19
9	Don't Criticise Authority (3)	24, 7, 4
10	Avoid Integration	9, 1, 15
11	Learning is Quick	31, 26, 30
12	Knowledge is Certain	16

Table 40: U.S.A. Based Statement Loadings

6.6.2.1 First Pass: Statistical Validity

Within the first pass of analysis of the U.S. Nationality based dataset, the Kaiser-Meyer-Olkin measure of Sampling Adequacy was calculated to be 0.439 (predictably low because of the number of participants). Bartlett's test of Sphericity was calculated to contain; Chi-square of 869.145, Degrees of Freedom of 561, and a significance of 0.000. Cronbach's coefficient "α" for this analysis was calculated as being 0.6911155, still significantly high.

However, these twelve extracted factors explained a surprisingly high 73.8% of the response analysis.

6.6.3 U.S.A. Based Analysis: Second Pass

The newly formed subset data then had the mean results for each subset calculated and then further analysed, with the output revealing that the twelve subsets loaded into four (4) factors, see Table 41: U.S.A. based Pattern Matrix.

Sub-sets	Components			
	1	2	3	4
USA9	0.687	-0.0175	-0.012	-0.153
USA7	0.626	-0.050	-0.135	0.169
USA1	0.371	-0.050	0.291	-0.047
USA2	0.351	-0.091	0.286	0.159
USA3	-0.046	-0.821	0.283	-0.164
USA4	0.430*	0.487*	0.398*	-0.061
USA8	0.143	-0.293	-0.006	0.070
USA6	0.235	-0.254	0.023	-0.045
USA10	-0.113	-0.097	0.734	0.060
USA12	-0.025	0.072	0.150	0.417
USA5	0.115	-0.097	-0.034	0.357
USA11	0.196	-0.107	0.094	-0.329
Extraction Method: Principal Axis Factor Analysis. **Rotation Method:** Oblimin with Kaiser Normalization.				

Table 41: U.S.A. based Pattern Matrix

The analysis revealed that the subset data loaded once more into four (4) distinct factors, this was not surprising. What did surprise was that only one significant cross loading was observed in several, that of factor USA4, which when viewing the model it can be seen where this factor sits within the structure, and why it may have more than one direction of influence within the model. Only factors USA8 and USA6 presented loadings below the accepted level of .300, but this did not appear to have a major impact on the structure as they were both end nodes within the overall layout of the model.

The components were then subject to the codified analysis procedure and the emerging themes/factors were allocated the following descriptive labels.

Factor 1: Requisite Authority (subsets 9, 7, 1 and 2)

Factor 2: Quick Learning (subsets 3, 3, 8 and 6)

Factor 3: Simple Knowledge (subset 10)

Factor 4: Certain Knowledge (subsets 12, 5 and 11)

For this particular structure, the statements and sub-sets that loaded into Factor 4 just did not appear to comply with the descriptions offered within the original Schommer

(1990) study. Observed within this factor was more of a general commentary on what characteristics were thought applicable to how knowledge was founded rather than direct comment on a singular facet of knowledge, perhaps Knowledge Foundation could be more useful in describing this factor.

6.6.3.1 Second Pass: Statistical Validity

Within the second pass of the exploratory analysis the Kaiser-Meyer-Olkin measure of Sampling Adequacy was calculated to be .560. Bartlett's test of Sphericity was calculated to contain; Chi-square of 102.660, Degrees of Freedom of 66, and a significance of 0.003.These four (4) extracted factors explain a total of 54.8% of the second analysis.

6.6.4 U.S.A. Based Correlational Relationship Analysis

The final analytical task conducted on the U.S.A. based dataset was the Correlational Relationship analysis to observe underlying relationships between the twelve (12) subsets and the four (4) factors extracted during the previous process. A Correlation Matrix was duly generated for the dataset, see Table 42: U.S.A. Based Correlation Matrix, and a Relational Model was again constructed, using Mind-Mapper v.4.2.

U.S.A. PAF/Oblimin Correlations

	US1	US2	US3	US4	US5	US6	US7	US8	US9	US10	US11	US12
US1	1	0.336	0.250	0.289	0.084	0.044	0.173	0.166	0.362	0.212	0.254	0.056
US2	0.336	1	0.215	0.244	-0.036	0.271	0.291	0.144	0.267	0.243	0.024	0.164
US3	0.250	0.215	1	-0.166	0.048	0.257	0.144	0.257	0.243	0.281	0.220	-0.132
US4	0.289	0.244	-0.166	1	0.033	0.030	0.160	-0.044	0.289	0.326	0.058	-0.014
US5	0.0841	-0.036	0.048	0.032	1	0.025	0.237	0.155	-0.018	0.034	-0.080	0.139
US6	0.044	0.271	0.257	0.030	0.025	1	0.249	0.179	0.156	0.100	0.183	-0.100
US7	0.173	0.291	0.144	0.160	0.237	0.249	1	0.032	0.405	0.025	0.122	0.028
US8	0.166	0.144	0.257	-0.044	0.155	0.179	0.032	1	0.222	0.020	-0.025	-0.045
US9	0.362	0.267	0.243	0.289	-0.018	0.156	0.405	0.222	1	0.067	0.216	-0.018
US10	0.212	0.243	0.281	0.326	0.034	0.100	0.025	0.020	0.067	1	0.116	0.120
US11	0.254	0.024	0.220	0.058	-0.080	0.183	0.122	-0.025	0.216	0.116	1	-0.105
US12	0.056	0.164	-0.132	-0.014	0.139	-0.100	0.028	-0.045	-0.018	0.120	-0.105	1

Table 42: U.S.A. Based Correlation Matrix

From the model constructed by the correlation matrix, the distinct factor groupings can clearly be seen within the structure. See Figure 27: U.S.A. Based Belief Structure Model.

6.6.5 U.S.A. Based Model Annotations

The U.S.A. Based Beliefs Model illustrated a generally lower set of mean values than the other nationality based analyses. This could be explained by the demographically older percentile of respondents within this cluster, or it may be explained by the fact that this cluster was primarily engaged in higher levels of studies (Masters Degrees). Figure 26: USA Based Belief Values gives a graphical representation of the mean belief values that support this observation by presenting the observed factor loadings from highest loaded factor subsets (left side, 23←) to lowest loading factor subsets (right side, →16).

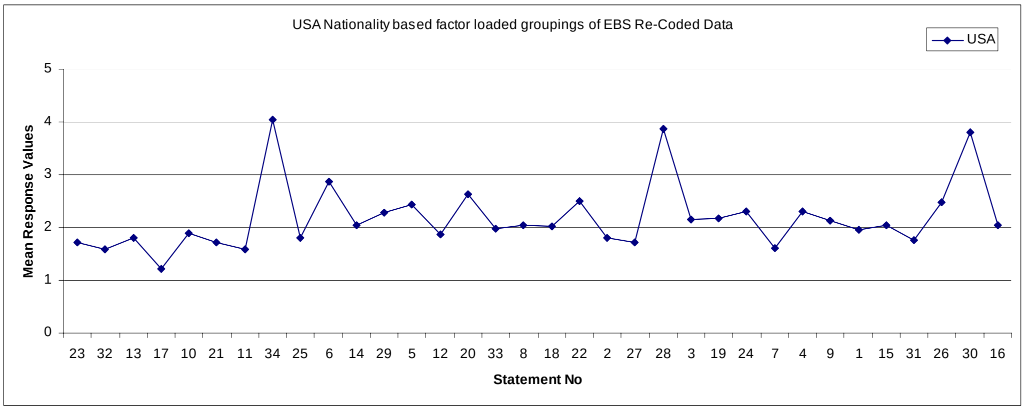


Figure 26: USA Based Belief Values

6.6.5.1 U.S.A. Based Subset Qualitative Observations

The dataset analysis revealed some very interesting facets of the American participatory cluster. Generally there was observed a repetition of earlier beliefs where learning was perceived as being a slow process. Interestingly though, solutions based on known information appeared to not be as highly prized than the ability to index or offer suggestions as where to look for possible sources in an attempt to find solutions.

Interestingly, authoritative sources that offered previous actual experience, as an adjunct in attempting to formalise solutions to problems, was seen as a more acceptable form of information rather than a mere statement by an expert in the field of investigation. This belief is similar to that observed within the Australian Health Domain analysis.

The questioning of experts seems to be both condoned in the first instance, but frowned upon if taken too far by an investigator as the “expert” is still perceived as being an unimpeachable as a source of knowledge.

6.6.5.2 U.S.A. Based Factor Qualitative Observations

The U.S.A. based model shares some similarities with the Australian (Science) model in that there was a dominant factor indicating reliance or need for an authority to interact within the belief structure. There are also clearly observable indications that participants that maintain this and similar belief structures do not look favourably on over-criticising authoritative sources.

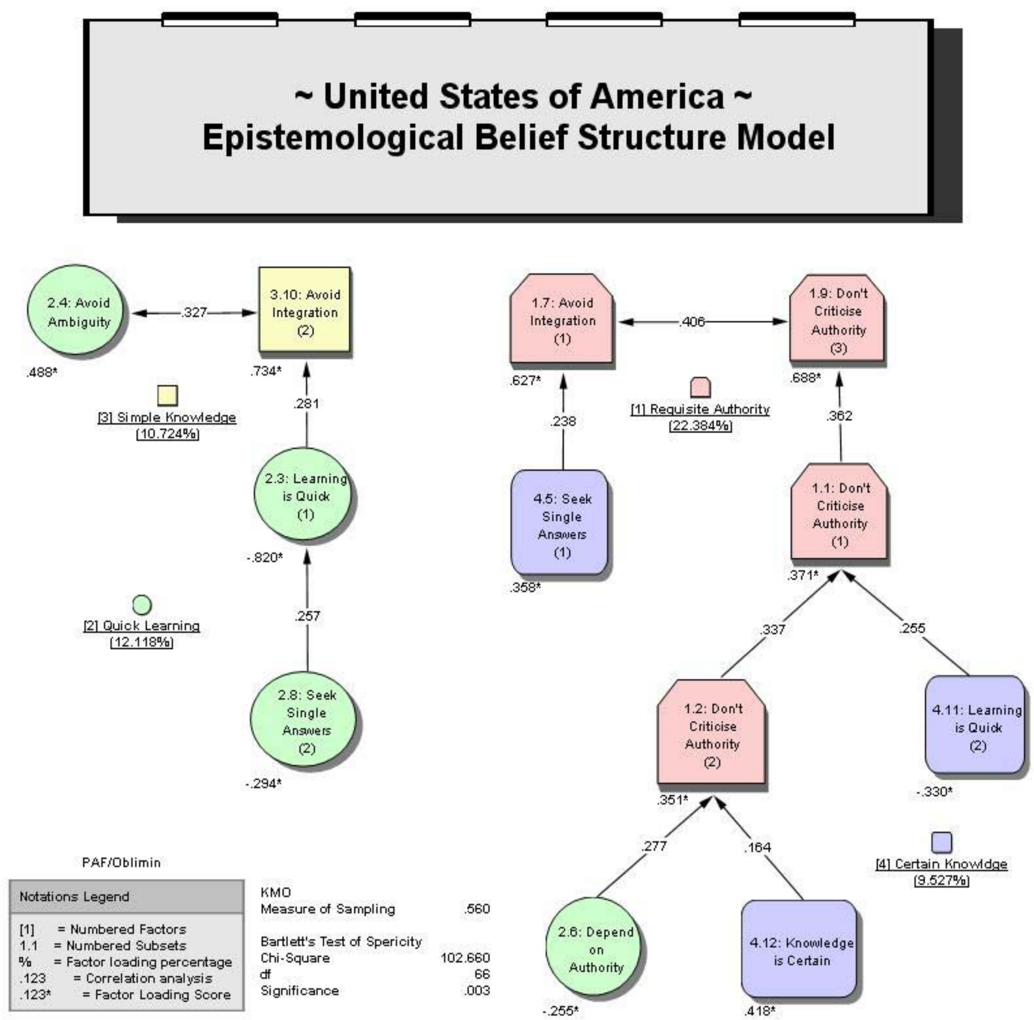


Figure 27: U.S.A. Based Belief Structure Model

The divisional split in the overall construct also provides some support for the theory regarding meta-level dimensions of beliefs. The left hand sub-structure in the model illustrated in Figure 27: U.S.A. Based Belief Structure Model, appears to support the dimension of how knowledge is or should be created, while the right hand structure offers evidence toward the source(s) of knowledge.

6.7 Peoples Republic of China Dataset Analysis

During an offshore teaching semester at the Zhejiang University of Technology, No.6 District, Zhaochui Xincun, Hangzhou, in the Peoples Republic of China, it was decided to try and harvest a dataset from students based participatory cluster, within their School of Computing, in order to compare the potential of the EBS instrument in comparing international datasets.

6.7.1 P.R.C. Participant Demographics

A total of one hundred and four (104) student responses were received from registered class lists of four cohorts totalling 117 students. This equated to an eighty eight (88%) percent return rate using the online EBS facility. Seventy Nine (79) were male, and twenty five (25) were female - see Table 43: P.R.C. Dataset Demographics.

This dataset exceeded the accepted one hundred responses required for successful factor analysis so was able to be used in comparison to the U.S.A. dataset and the Australian (Science) dataset. It must also be stated that this analysis does not infer or imply any cultural statutes or ideologies, but simply attempts to offer valuable insight into the unique epistemological beliefs as well as the epistemological belief structures held by each geographically dispersed participatory cluster.

Age groups	**Gender**		**Survey totals**
	M	**F**	
< 20	-	1	1
20 – 24	79	24	103
25 – 29	-	-	-
30 – 39	-	-	-
40 – 49	-	-	-
50 +	-	-	-
	79	25	**104**

Table 43: P.R.C. Dataset Demographics

6.7.2 P.R.C. Based Analysis: First Pass

The same method of analysis was again conducted on the PRC dataset as had been conducted on the original Australian (Science) dataset, as well as the recently added U.S.A. dataset. The first pass analysis extracted a total of thirteen (13) defined subsets, more than any other analysis had displayed, see Table 44: P.R.C. based Statement Loadings.

No	Subset	Statement No’s
1	Learning is Quick	31, 23, 32, 17, 28, 6, 25, 20
2	Knowledge is Certain (1)	15, 10
3	Avoid Ambiguity (1)	11, 5
4	Learn the First Time	27
5	Avoid Integration (1)	9, 19
6	Seek Single Answers (1)	2, 29, 13, 21
7	Innate Ability	26, 16
8	Learning is Quick	30, 8
9	Avoid Ambiguity (2)	14, 4, 3
10	Avoid Integration (2)	7, 12
11	Don’t Criticise Authority (1)	24
12	Don’t Criticise Authority (2)	22,, 1, 34
13	Knowledge is Certain (2)	18, 33

Table 44: P.R.C. based Statement Loadings

6.7.2.1 First Pass: Statistical Validity

Within the first pass of analysis on the PRC Nationality based dataset (104 responses), the Kaiser-Meyer-Olkin measure of Sampling Adequacy was calculated to be 0.564. Bartlett’s test of Sphericity was calculated to contain; Chi-square of 797.076, Degrees of Freedom of 561, and a significance of 0.000. Cronbach’s coefficient “α” for this analysis was calculated as being 0.5935596

These thirteen factors explain a total of 66.7% of the analysis.

6.7.3 P.R.C. Based Analysis: Second Pass

The newly formed subset data then had the mean results for each subset calculated and analysed, with the output revealing that the thirteen subsets appeared to load into an astonishing six (6) factors, see Table 45: P.R.C. Based Pattern Matrix.

Factor 1: Simple Knowledge (subsets 3, 10 and 4)

Factor 2: Requisite Authority (subsets 12, 1 and 5)

Factor 3: Omniscient Authority (subset 11)

Factor 4: Certain Knowledge [1] (subset 13)

Factor 5: Fixed Ability (subsets 7, 6 and 8)

Factor 6: Certain Knowledge [2] (subsets 9 and 2)

Sub-sets	**Components**					
	1	**2**	**3**	**4**	**5**	**6**
PRC3	**0.946**	0.021	-0.052	-0.153	-0.188	0.235
PRC10	**0.350**	0.072	0.179	0.139	0.156	-0.132
PRC4	**0.289**	-0.042	0.002	0.072	0.036	-0.094
PRC12	-0.067	**0.866**	0.169	0.086	0.059	0.181
PRC1	0.057	**0.405**	-0.068	-0.150	0.091	0.001
PRC5	0.123	**-0.267**	-0.005	0.088	0.143	0.051
PRC11	-0.006	0.045	**0.812**	-0.039	-0.066	-0.001
PRC13	0.007	-0.121	-0.031	**0.690**	-0.043	0.142
PRC7	0.002	-0.172	0.112	-0.188	**0.477**	0.136
PRC6	-0.061	0.068	-0.064	0.047	**0.407**	-0.007
PRC8	0.102	0.184	-0.044	0.032	**0.304**	-0.069
PRC9	-0.032	0.121	-0.001	0.107	0.036	**0.577**
PRC2	0.227	-0.105	-0.046	-0.029	0.012	**0.274**

Extraction Method: Principal Axis Factor Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

Table 45: P.R.C. Based Pattern Matrix

6.7.3.1 Second Pass: Statistical Validity

Within the second pass of the exploratory analysis the Kaiser-Meyer-Olkin measure of Sampling Adequacy was calculated to be .482. Bartlett's test of Sphericity was calculated to contain; Chi-square of 105.872, Degrees of Freedom of 78, and a significance of 0.020.

These six (6) extracted factors explain a total of 62.0% of the second pass analysis.

6.7.4 P.R.C. Based Correlational Relationship Analysis

The final analytical task conducted on the P.R.C. Nationality Based Dataset was the Correlational Relationship analysis to observe underlying relationships between the thirteen (13) subsets and the six (6) factors extracted during the previous analysis process. A Correlation Matrix was generated for the dataset, see Table 46: P.R.C. Based Correlation Matrix, and a graphical relational model was constructed, using Mind-Mapper v.4.2.

P.R.C. PAF/Oblimin Correlations													
	PRC 1	PRC 2	PRC 3	PRC 4	PRC 5	PRC 6	PRC 7	PRC 8	PRC 9	PRC 10	PRC 11	PRC 12	PRC 13
PRC 1	1	-0.042	-0.02	0.020	-0.08	0.068	0.016	0.133	0.020	-0.01	-0.03	**0.353**	-0.19
PRC 2	-0.042	1	**0.307**	0.012	0.116	-0.03	0.082	0.030	0.167	0.069	-0.06	-0.13	0.055
PRC 3	-0.020	**0.307**	1	0.265	0.198	-0.06	0.120	0.023	0.130	0.258	-0.06	-0.15	0.027
PRC 4	0.020	0.012	**0.265**	1	0.046	0.068	0.045	0.044	-0.04	0.099	0.024	-0.11	0.115
PRC 5	-0.077	0.116	**0.198**	0.046	1	0.051	0.119	-0.01	-0.01	0.055	-0.02	-0.23	0.166
PRC 6	0.068	-0.03	-0.07	0.068	0.051	1	**0.153**	0.090	0.062	0.132	-0.08	0.140	-0.03
PRC 7	0.016	0.082	0.120	0.045	0.119	**0.153**	1	0.137	0.068	0.042	0.075	-0.03	-0.08
PRC 8	0.133	0.030	0.023	0.044	-0.00	0.090	0.137	1	-0.01	0.178	-0.05	**0.182**	-0.02
PRC 9	0.020	**0.167**	0.130	-0.04	-0.01	0.062	0.068	-0.01	1	-0.05	-0.03	0.129	0.118
PRC 10	-0.01	0.069	**0.258**	0.099	0.055	0.132	0.042	0.178	-0.05	1	0.162	0.027	0.085
PRC 11	-0.03	-0.06	-0.06	0.024	-0.02	-0.08	0.075	-0.05	-0.03	0.162	1	**0.170**	-0.07
PRC 12	**0.353**	-0.13	-0.15	-0.12	-0.231	0.140	-0.04	0.182	0.129	0.027	0.170	1	-0.09
PRC 13	-0.19	0.055	0.027	0.115	**0.166**	-0.03	-0.08	-0.01	0.118	0.085	-0.07	-0.09	1

Table 46: P.R.C. Based Correlation Matrix

The PRC based model illustrates the distinct factor groupings as well as the correlational relationships exposed during the analysis. See Figure 29: P.R.C. Based Belief Structure Model.

6.7.5 P.R.C. Based Model Annotations

The PRC based model exposed a totally unique structure of beliefs, beyond the initial expectations of this researcher, and potentially offers an entirely new avenue for future research. The fundamental nature of this structure offers a tantalisingly brief insight into the beliefs system of an interesting and culturally diverse participatory cluster of learners.

Figure 28: P.R.C. Based Belief Values offers a graphical representation of the mean belief values supporting their structure by presenting the observed factor loadings from highest loaded factor subsets (left side, 31←) to lowest loading factor subsets (right side, →33).

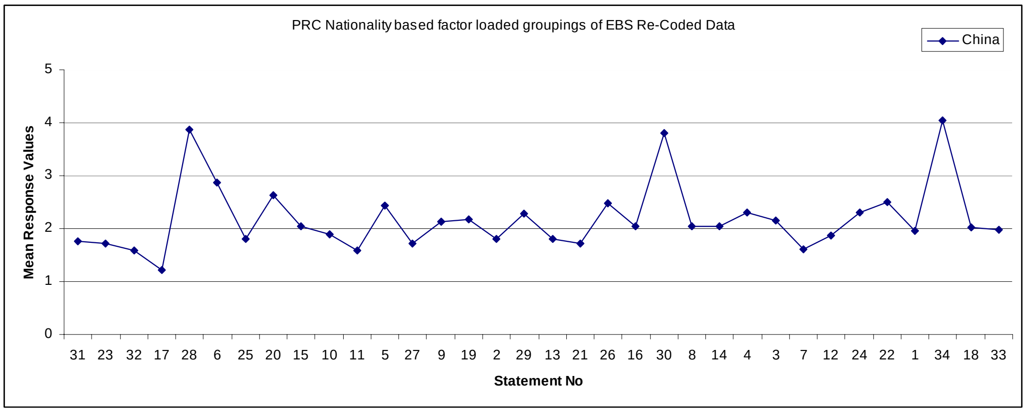


Figure 28: P.R.C. Based Belief Values

6.7.5.1 P.R.C. Based Subset Qualitative Observations

The thirteen subsets exposed within this dataset analysis numbered more than any other analysis. Upon closer observation it appears that the beliefs maintained within each subset were merely more concise than in the USA or Australian structures.

In the following discussion I must state again that while this discussion does not imply causality, it does provide a richer understanding of what this particular analysis iteration revealed from within this particular dataset.

- The "Learning is Quick" subset appeared to expose a strong belief that by rereading text or other information, the learner was better able to understand the information. There was also a strong tilt toward the authoritative source being an acceptable guide in the assimilation of new knowledge. Finally, the lessons from previous experiences definitely maintained an influence on the way information or knowledge is treated by this cluster.

- The subsets "Knowledge is Certain (1) & (2)", exposed the participants' beliefs that reliable truth does change and is sometimes so elusive that there may never be an exact solution for any one particular problem.

- The "Avoid Ambiguity (1) and (2)" subsets suggested that the participants believed that ambiguous problems or information provided no real dilemma as they understood most things to also require context in an effort to fully understand. As context appears to be seen as an individual trait and beyond the controlling ability of any one learner the majority were therefore comfortable with ambiguous information.

- The "Learn the First Time" subset revealed that this particular cluster of learners viewed the learning process as anything but quick. With a strong emphasis on the need to re-visit information as a necessity to understand or assimilate new information into their own knowledge base.

- The subsets "Avoid Integration (1) & (2)" exposed a belief that new information should maintain its originally presented form or structure as it is being assimilated. This differed from most other nationality based datasets, as it gave the impression that the learner should maintain and even adopt the current form of this new knowledge rather than just absorb the new information into their existing knowledge base. It seemed that the form had a level of implied importance as well.

  It was also apparent that this group appeared quite comfortable in asking for assistance from the authoritative sources of information, (rather than questioning the validity of the information), in an effort to better understand.

- From the "Seek Single Answers" subset there emerged a clear picture that questioning experts or authorities was not considered acceptable. When seeking guidance from an educator, it was revealed that this group of learners were more interested in pieces of information as an answer, rather than just simple facts as a response.

- Finally, the reference to an "Innate Ability" subset suggests that while some may appear to learn faster than others, generally it was accepted that the term "innate Ability" referred more to the individual's ability to pursue and complete harder study or work, rather than a generally constituted internal increase in learning capacity.

6.7.5.2 P.R.C. Based Factor Qualitative Observations

The diverse and segmented makeup of this particular model illustrated in Figure 29: P.R.C. Based Belief Structure Model, proved intriguing. However the repetition of factor labels gave rise to the discovery that the PRC participatory cluster was merely more concise about placing their beliefs in relation to particular concepts. Overall there actually appear only four factors, as the factor "Omniscient Authority" and "Certain Knowledge" is repeated, albeit in connection to differing levels of influence within the model.

The factor of "Certain Knowledge" appears to apply directly to both the degree of integration of the form that the new knowledge currently has, as well as the learners search for unambiguous concepts containing this new knowledge that they are able to understand by keeping it within its existing form.

The "Omniscient Authority" label was used in this model primarily as the learners seemed comfortable that some form of authority was always present, so they did not feel the need to seek it further. Authority, within the context of this particular cluster, appears to be revered and not to be trivially questioned but only as an effort to understand the concepts presented within any new information.

"Fixed Ability" is more of a social comment on the fact that learning is more likely to be attained from hard work or study rather than a reliance on an internal capacity to understand quickly.

The "Simple Knowledge" factor reiterates all the underlying principles associated with learning as a process by this cluster. The search for unambiguous information or the addition of authority engaged activities in an effort to clarify concepts within any new information, supported by re-visiting the information or knowledge in an effort to relay understand what it is.

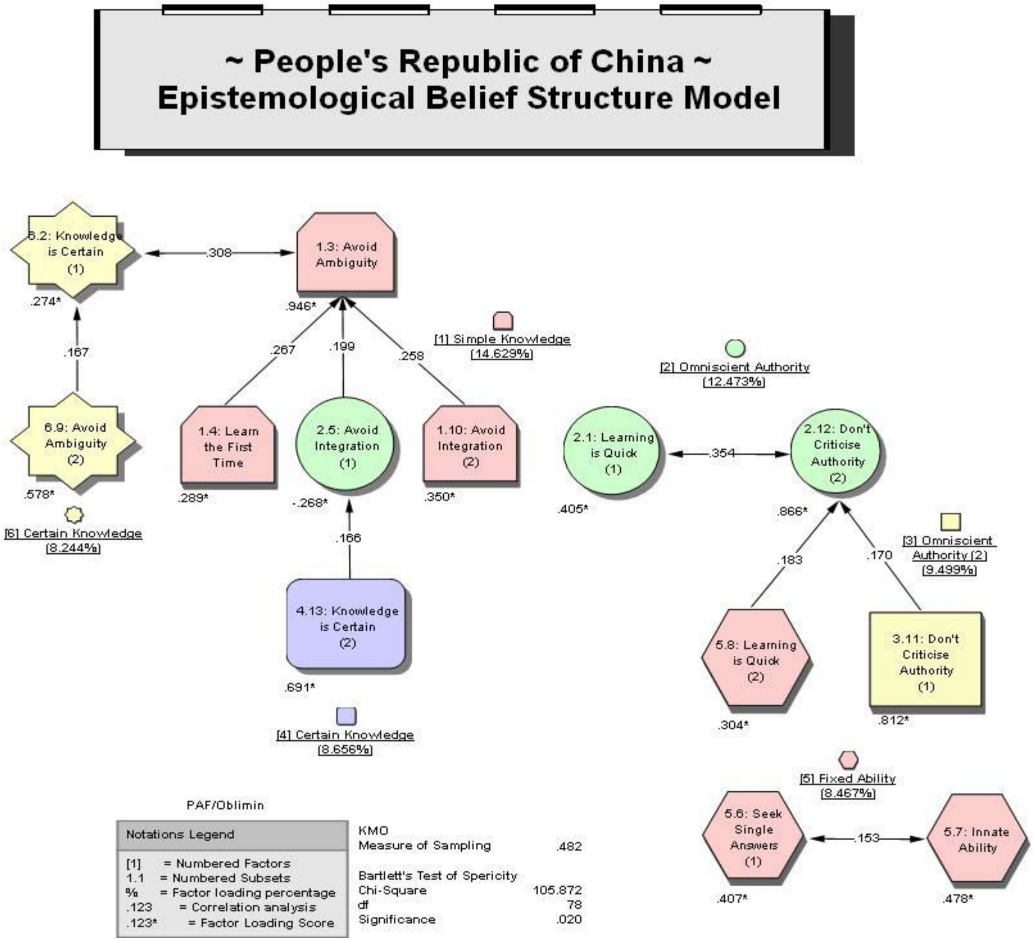


Figure 29: P.R.C. Based Belief Structure Model

While the overall structure looks complicated and convoluted, the meta-dimension principles appear to have again emerged, the left hand sub-structure offers suggestions in regards to how knowledge and the learning process is perceived, the right hand structure suggests as to the possible sources of the knowledge, and perhaps joining the two structures is a third dimension as to the speed at which learning is perceived to be able to take place.

6.7.6 Nationality Based Analysis: Comparisons and Comments

The final comparison of the epistemological belief structures illustrated within this nationality based analysis has produced some startling differences in the way each cluster maintains their own unique belief system. The dominant rating of the Requisite or Omniscient Authority belief is common across all three clusters, emerging as factor one within the American and Australian datasets, and emerging as factors two and three within the Chinese dataset.

The Fixed Ability factor rated as number two in the Australian dataset and at number five in the Chinese dataset, however it did not clearly rate at all in the American dataset. This could be explained by the average ages of each dataset;

- Australian average age was 23.7 years
- American average age was 32.2 years
- Chinese average age was 21.8 years

Most sources within the literature indicate that as the learner matures, the importance in the concept that one is born with a fixed ability to learn is diluted. The higher average age in the American sample data tends to support this position.

Finally, the varying levels in which learners revere or disdain or even just interact with differing forms of authoritative sources within their own educational environments proved very enlightening.

- The PRC cluster appears to hold their sources in high regard, asking only for facilitation in an attempt to understand,

- The USA based cluster seems to condone the direct questioning and almost scepticism of new knowledge unless the source's information can be rationalized before the learner attempts to integrate it into their own knowledge base.

- The Australian learner cluster appears to be in the middle ground, questioning some sources while accepting others.

6.8 Chapter Summary

Overall, the models constructed from the analysed datasets have proven invaluable tools in understanding the complex ways that different clusters of learners maintain unique perspectives on where knowledge comes from as well as how the learning process is perceived.

The EBS instrument handled the harvesting and collation of responses from all the clusters used within this research with great speed and clarity. The confidence in this instrument is elevated by the fact that two sets of responses were harvested using an on-line form specifically created for this study.

It must also be mentioned here that while there may have been no human presence when the participants were actually using the on-line form, that all the descriptive information was supplied, answers to pre-survey questions were answered and comprehension issues sorted by this researcher, in the case of the Chinese cluster at Zhejiang Institute of Technology in the Peoples' Republic of China, and by Assistant Professors Debbie Rabina and David Walczyk, with their American participatory cluster at the Pratt Institute in New York, the United States of America.

The analytical process created to analyse all the datasets have also proven to be reliable, repeatable and have added rigor to the study.

The graphically represented structures within this chapter, along with the codification analysis conducted on the statement groupings are forwarded as a basis for discussion within Chapter 7: Conclusions and Recommendations.

Chapter 7: Conclusions and Recommendations

> *"Since education deals with knowledge, epistemology is really education's most fundamental concern"*
>
> Peterson in (Fitzgerald and Cunningham, 2002)

7.1 Chapter Introduction

This study on the epistemological belief structures created and maintained by differing groups of learners, was undertaken in order to add to the existing literature relating to personal epistemology. An instrument was purposively created, and used to harvest data from participatory clusters based within Australia, the United States of America and the Peoples Republic of China.

These data sets were then analysed using the multivariate factor analysis principles of the Common Factor Analysis (Principal Axis Factoring) using Oblique (Oblimin) rotation within Euclidean space to expose more theoretically meaningful collations of factors, their groupings and representations.

A qualitative three stage codification process was then applied to the statement groupings in conjunction with the mean response values, in order to add even more richness to the entire study. This process added context and justification to the final correlational relationship models that were constructed using all of the findings from the holistic analysis process.

The overall goal was to find and present tangible proof in order to verify or refute existing theories in regards to how personal epistemological beliefs relate to knowledge genesis processes as created and maintained by learners.

7.2 Findings Limitations

The principle aim of this research was not to generalise any findings to a wider population or provide any axiomatic truths. Instead these findings should be viewed within the context in which they a represented.

It must also be stated that the analyses conducted on internationally based data sets does not infer or imply any cultural statutes or ideologies, but simply is an attempt to offer valuable insight into the unique epistemological beliefs and belief structures held by each geographically dispersed participatory cluster.

Whilst there can be no assertion of causality between factors by using the analysis processes conducted within this study, there can be assurance that there is indeed some implied relationships being represented within the models illustrated in this research.

7.3 Findings in Relation to the Initial Investigations

As presented within the introductory chapter of this study, the investigations that guided this study were based on the following questions;

Can epistemological beliefs be exposed and then reliably reproduced to quantitatively demonstrate varying datasets?

The analytical methodologies created and utilised within this research have proven to be robust and reliable. This has allowed the same analytical processes to be applied to differing data sets and sub-sets, resulting in dependable, readable and more importantly – understandable observations of the epistemological beliefs maintained by each participatory cluster.

While the initial investigation by this researcher did manage to reproduce results similar to the Schommer (1990) findings, some concerns were raised and addressed within the literature toward the pre-selection of subsets prior to the factor analysis procedure. Other researchers have also tried to replicate Schommer's findings but have met with disappointment. The solution to this concern used within this study was to factor analyse the entire 34 statement list and the placing each statement into previously untried configurations or factor loadings and then applying the label(s) that most closely represented each grouping.

The mean values for each new grouping were then factor analysed again, exposing the underlying factor loadings that revealed more clearly what the data was representing. Schommer's labels were maintained where possible, but it became apparent that some needed to be altered in order to apply a best fit solution to the new groups forming within the data.

This course of action was then able to be repeated for differing data sets with amazing clarity of results. From the factor analysis, structures began to form and add a hitherto unseen level of detail to an already profound body of knowledge.

Based on this evidence it is obvious why earlier researchers had apparently failed to reach the same or similar conclusions that Schommer (1990) had reached. Their groups of participants were simply different to those of the original reported research. As demonstrated by this research, being different does not imply being wrong, just – different. Perhaps given the opportunity and the reproducible procedures created within this study, those earlier groups could be reanalysed in the light of the new thoughts presented here. This could give interesting new insight into their original research.

This study does then confirm that the EBS instrument combined with the detailed analytical procedures described earlier, can indeed expose and quantitatively reproduce robust results for differing data sets.

Are epistemological beliefs distinguishable across gender, domain or national boundaries?

Being able to now reproduce epistemological belief factors with greater reliability, the trends and transformations became increasingly apparent when compared across these different fields of interest. The first comparison was between male and female genders with the beliefs becoming immediately visibly different to any observer. Underlying this level of beliefs however was the more succinct domain level of beliefs where the gender level seemed to only have a minor impact on the higher level differences between “Health” and “Science” domains.

Following the course of these beliefs structures down from the broad-spectrum level of the overall clusters, through the morphing gender level, then finally into specific domains provided firm evidence that these beliefs are transferable and traceable. These belief structures also appear to be socially constructed, that is – developed and maintained within communities of like minded individuals.

The nationality based analysis provided yet another valuable insight as to how learners within a similar domain yet also geographically dispersed, maintained similar beliefs toward some notions but were noticeably different in other areas – the principal area of concern for this researcher was the markedly differing rationalisation toward acceptance of information from authoritative sources.

By this research we now have the ability to uncover and compare differences between genders; domain and even nationality based personal epistemological beliefs.

This discovery alone could benefit institutions enormously in being able to assist learners in selecting preferred courses of study based on their intrinsic personal epistemological beliefs.

By being able to visualise an individual's personal structure and comparing it with clusters of other learners, simple pattern matching could provide choices, which could otherwise go unattended by both the learner and the educational institution, in making educational decisions for the future career paths of the learner.

What form or structure can epistemological beliefs adopt in comparison with current ideology within the literature?

Prior to this study, the prominent stance pervading the literature of how epistemological beliefs were understood to be was in the order of a series of "more or less independent beliefs" (Schommer, 1990).

This research now has the capacity to refute this position by offering instead that epistemological beliefs are not independent, but appear to be constructed from many different weights and nodes of beliefs. These nodes seem dependent on the level of importance or value of each belief that each learner maintains toward differing aspects of how they perceive things such as: -

- What are acceptable knowledge sources?
- What sense of information granularity are they more able to process?
- What is the speed of assimilation that each learner is capable of?

These structures also appeared to vary in depth as well as breadth depending on the responses within the dataset. This could be relational to the maturity of the participatory cluster or even varying depending on the sophistication level of beliefs within a cluster. This area would definitely benefit from further study so that these concepts can be further explored and added to the literature.

Can these epistemological belief structures provide insightful dialogue on how learners construct and rationalise their unique forms of knowledge genesis?

Looking closely at each of the structures presented with Chapter 6, similarly labelled beliefs can be observed within a structure, seeming to affect differing levels of influence on each of their relationally correlated neighbour. These relationships between nodes within the structure seem to imply alterable perspectives of how the learner does perceive the knowledge genesis process.

For example, one group of participants demonstrated that while they thought that authoritative sources were fine in providing information, they also then believed that the information from these sources was also open to challenges and restructuring. Another cluster maintained similar beliefs, but they had a less challenging procedure of accepting the information from that source and then maintained it in its original form until it could be assimilated or replaced with what would only be perceived as a better source/form of information that the learner was more able, or experienced enough to validate the information themselves.

So each cluster should and does – maintain differing values within their beliefs structure. These values are affected in turn by other correlationally related nodes of belief, influencing in turn the nodes that are connected higher in the construct.

By observing these nodes and the mean values associated with them, a series of valuable snippets of information can be interpreted into a succinct dialogue that has the potential to express the beliefs that go toward how a particular group of learners constructs and maintains their unique perception of their educational environment.

These interpretations should not be viewed out of context however, but rather, used to inform as to how and why a particular cluster of learners views information that they are being asked to accept from an educator. Understanding these motives will then allow the educator to devise strategies to augment the particular learning needs of their cluster.

7.4 Unexpected Findings

One of the surprising revelations discovered when conducting this analysis was the apparent emergence of three meta-level dimensions. These appear to connect with these belief structures and directly relate to;

- The *Form* that knowledge is perceived to take
- The *Speed* at which knowledge is perceived to be assimilated, and
- The *Source* from which knowledge is perceived to be acceptable

This differs slightly from the proposed dimensions initially postulated by Schommer, being; the Structure of knowledge, the Certainty of knowledge, the Source of knowledge, the Control of knowledge acquisition, and finally the Speed of knowledge acquisition.

While much debate has been had in relation to the learner having the ability to judge the speed at which knowledge can be gathered, the quantitative analysis conducted on the data sets within this study tend to support the fact that the learner does indeed have some grasp of this concept.

The certainty of knowledge supports the source of knowledge aspect, and appears to meld with that dimension providing a rationalisation of where reliable and more readily acceptable information is perceived as having originated. The learners' within this study all seem to place greater store in information that has been based on experience of more than on source rather than the profound postulations of only a single form of resource.

The form of knowledge does not seem to offer details as to the actual size within a structure that knowledge may take, but there are direct references to the differing levels of granularity that some learners find more acceptable and easier to cope with than others. Some learners seemed to prefer smaller particles of data in a breadcrumb-trail style approach, where others almost insisted on larger combined information "chunks" when information gathering and creating new knowledge.

These dimensions of knowledge once investigated further could play a significant role in how educators provide information or information sources to their learners.

7.5 Implications for Future Research

The investigation of how age affects epistemological beliefs should now be considered. With the analytical procedures described in this research there is the ability to revisit all the datasets and conduct research on how the age of the participants affects not only their beliefs but also how their belief structures are created. This could then develop new theories toward the instigation and maintenance of pedagogic and andragogic teaching designs.

Noting the initial scope of this study with regard to available time frame and sample size it would be interesting to expand this research to incorporate many more participants from not only different areas of Australia, but as has been initiated by this researcher already, the inclusion of additional data from international participatory clusters.

A future longitudinal study, engaging a larger sample size, utilising the robust methodologies already deployed, would make a remarkable contribution to educational instructional design principles, information management literature, artificial intelligence rule construction, the future directions of information literacy and even how we view information as a social construct within demographical groupings generally.

This research has also prompted the construction of an application, by a UTAS Computing Project Group as part of their undergraduate degree, to process the analyses algorithms used on the data sets, in order to identify individuals or small groups that have marked differences in comparison to the mean average of their cohort.

This would allow easy detection by an educator so that educational instructional design procedures could be put into place to assist those students in their learning capacity. By identifying how they create and maintain their epistemological belief structures, the forms of information or the sources of information could be adapted – allowing an easier assimilation of any new information by the learner.

This particular project is currently ongoing, and as such, more details will not be available until after the completion of the application by the project team.

7.5.1 The Importance of Epistemological Beliefs

Baxter Magolda (2004) describes the development of epistemological beliefs from a social constructivist perspective maintaining a context specific stance; "*People actively construct or make meaning of their experience – they interpret what happens to them, evaluate it using their current perspective, and draw conclusions about what experiences mean to them* (Baxter Magolda, 2004).

This then signifies that epistemological beliefs are social constructs which allow individuals to move from an implicit dependence on authoritative source(s) to a reliance on oneself as a knower. People make meaning in a context and changes takes place due to a combination of personal experience (personal epistemological beliefs, etc) and situational (contextual) factors (Baxter Magolda, 2004).

Brownlee's (2001) research with pre-service teacher education students found that relativistic epistemological beliefs were personal presage factors that affected transformative or deep approaches to learning and metacognitive reflection. It is therefore likely that individuals with relativistic epistemological beliefs and deep approaches to learning will have learning outcomes that are meaningful and linked to prior knowledge (Biggs, 1987). Within this model, epistemological beliefs are socially constructed, a stance supported by this study.

7.6 Implications for Educational Stakeholders

The current literature implies that the contemporary tertiary educational experience involves a rapidly morphing student population that fails to attend carefully and painstakingly produced lectures and tutorials that they feel are unsatisfactory and un-agreeable with the learner's concepts on what learning is actually about.

The currently utilised "Master – Apprentice" educational delivery and learning paradigms persisting in most higher educational institutions within Australia are simply failing to deliver a holistic learning experience for the modern, stereo typified as being 20 years of age with limited life experiences, as opposed to the current non-stereotypical multicultural learner, who can be typically of any adult age with a diverse plethora of personal and life experience.

To those within the system there are no surprises in this analogy. And educational bureaucracy still being a bureaucracy takes considerable time and much effort in an attempt to pervade new concepts or ideas. Thankfully though, most institutions are becoming more and more receptive to new ideas provided the idea is placed on solid well-researched foundations.

7.6.1 The Role of Educators

At the risk of being listed as a heretic, in today's tertiary level educational environments, the educator's role appears to be shifting from that of a repetitive instructor to a dynamic facilitator emphasizing more on andragogic rather than pedagogic paradigms, primarily because of the changing shift in experience levels of the current surging numbers of ubiquitous mature aged students.

Facilitation has been applied in teaching and training, and regarded as a critical dimension in self-directed learning, group learning and organizational learning, in both synchronous and distributed environment. A facilitator's role is to aid learning, engage students through interactive questions or exercises, and manage the process and structure of the learning interaction(Aakhus et al., 1997).

This is borne out in the discussion within this research where the learner appears more content to obtain authoritative-based forms of information, in their attempts to translate effort into assessment based progression. Clearly the educator must attempt to effectively sidestep this perception of the reason for their being in the educational environment (Omniscient Authority) into more of a facilitating authority.

This paradigm shift would then enable the educator to digress from being seen as a source of fine grained facts toward solutions to explicitly posed problems, but toward a source that facilitates and encourages the learner to investigate for themselves. This would then require the learner to seek, validate and rationalise new information in their attempts to assimilate new information with their own unique experiences, thus creating new unique forms of knowledge, rather than a simple regurgitation of basic, easily assessable factual data (Prosser et al., 2003).

7.6.2 The Role of Learners

The current literature implies that the contemporary tertiary educational experience involves a rapidly morphing student population that fails to attend carefully and painstakingly produced lectures and tutorials that they feel are unsatisfactory and un-agreeable with the learner's concepts on what learning is actually about.

Saying this, today's tertiary level learner is more demanding on educational institutions because of their increasingly higher levels of abilities to interact with all forms of modern technology. These learners require learning processes to be highly personalised, with flexible delivery available where, when they request – complete with instantaneous feedback and/or assessment of completed tasks.

As institutions struggle to invest in and keep pace with technologies, perhaps tomorrow's learner could invest in a little appreciation and patience and instead of just gathering information in profusion – slow down and actually examine what they are gathering, in an attempt to actually learn and understand something.

7.6.3 The Role of Epistemological Beliefs

The role of epistemological beliefs is subtle, yet ubiquitous. These beliefs do influence how students learn, how teachers instruct, and subsequently how teachers knowingly or unknowingly modify their students' epistemological beliefs.

Epistemological belief structures affect how the learner controls their information needs and the processes used when accepting new evidence as relevant or superfluous. This idea of information relevance and cognitive development based on pre-understandings is a fundamental concept in learner development as well as Information Science (Hjorland, 2000).

Evidence is also accumulating to support the notion that the student's epistemological beliefs play an important role in their learning. For example, various studies indicate that the more students believe in certain knowledge, the more likely they are to draw absolute conclusions from tentative text (Hofer, 2002).

The more students believe in fixed ability, simple knowledge, and quick learning, the more likely they are to display lower levels of reflective judgment. The more students believe in quick learning, the more likely they are to comprehend text poorly or earn lower grade point averages. The more students believe in fixed ability, the less likely they are to value schooling or persist on difficult academic tasks.

If educators can ascertain individual students' epistemological beliefs by comparison to group norms, they can adapt instruction to guide lower achieving students into higher level thinking, and conversely, they can adapt instruction for higher achieving students to assist their growth (Schommer-Aikins, 2002).

Understanding how humans create and develop personal epistemological knowledge is also of significant interest to AI rule-based development.

7.7 Chapter Summary

The chapter has presented the findings gained from this body of research and presented them as a form of explanation of the questions posed by this researcher. This research has proved that learners do indeed create and maintain hierarchical structures of their own personal epistemological beliefs. Once the research identified these beliefs, it became possible to understand what factors were influential to these learners in both positive and negative ways.

It also became apparent as to how these beliefs were constructed, rationalised and maintained in order to assist the learner to understand their perceptions of the educational environment that they find themselves in.

Studies of epistemological beliefs are still very much at the embryonic stage, but development of enabling tools such as the EBS, will allow easier and more fluid understanding of the knowledge genesis processes.

This understanding could then be used in order to positively enhance the experience of the learner, increasing their capability and desire toward constructive life-long learning practices.

References

Aakhus, M., Adkins, M. & Glynn, M. 1997, 'Layers of Learning: Facilitation in the Distributed Classroom', In *Proceedings of 30th Annual Hawaii International Conference on System Sciences*, Hawaii.

Adorno, T. W., Frenkel-Brunswick, E., Levinson, D. J. & Sanford, R. W. 1950, *The Authoritarian Personality*, New York, Harper and Row.

Aldred, S. 2003, *Addressing the Staff Development Needs for Problem Based Learning at C.Q.U.*, viewed 3rd January 2008, http://ausweb.scu.edu.au/aw03/papers/aldred/paper.html.

Anderson, D. D. & Piscitelli, B. D. 2002, *Young Children's Perspectives of Museums Settings and Experiences*, viewed 06-05-2006, http://www.fed.qut.edu.au/ec/museums/papers/kcl_present.ppt.

Antonius, R. 2003, *Interpreting Quantitative Data with SPSS*, London, Sage Publications.

Atherton, J. S. 2005, *Learning and Teaching: Constructivism in Learning*, viewed 18 December 2007, http://www.learningandteaching.info/learning/constructivism.htm.

Avramides, K. 2005, 'Can Technology Support the Development of Students' Epistemological Beliefs?' In *8th Human Centred Technology Postgraduate Workshop*, Brighton, UK.

Baxter Magolda, M. B. 1987, 'The Affective Dimension of Learning: Faculty-Student Relationships that Enhance Intellectual Development', *College Student Journal*, vol 21, pp 46-58.

Baxter Magolda, M. B. 1992, *Knowing and Reasoning in College; Gender-related Patterns in Students' Intellectual Development*, San Francisco, Jossey Bass.

Baxter Magolda, M. B. 2004, 'Evolution of a Constructivist Conceptualization of Epistemological Reflection', *Educational Psychologist*, vol 39, no. 1, pp 31-42.

Baxter Magolda, M. B. & Porterfield, W. D. 1985, *Accessing Intellectual Development: The Link between Theory and Practice*, Alexandria, VA, American College Personnel Association.

Belenky, M. F., Clinchy, B. M., Goldberger, N. R. & Tarule, J. M. 1986, *Women's Ways of Knowing: The Development of Self, Voice, and Mind*, New York, Basic Books.

Bell, J. 1992, *Doing Your Research Project*, Milton Keynes, Open University Press.

Ben Ari, M. 2001, 'Constructivism in Computer Science Education', *Journal of Computers in Mathematics and Science Teaching*, pp 45 - 73.

Benbasat, I., Goldstein, D. K. & Mead, M. 1987, 'The Case Research Strategy in Studies of Information Systems', *MIS Quarterly*, vol 5, no. 4, pp 369-386.

Bendixen, L., Dunkle, M. E., Grosskopf, K. & Schraw, G. 1994, 'The relationship between epistemological beliefs and causal reasoning', In *Annual meeting of the American Research Association*, New Orleans, LA.

Bernstein, R. J. 1983, *Beyond Objectivism and Relativism*, Pennsylvania, University of Pennsylvania Press.

Biggs, J. 1987, *Student approaches to learning and understanding* Hawthorne, Victoria, Australia, Australian Council for Educational Research.

Biggs, J. 1995, 'Teaching for Better Learning', in Biggs, J. & Watkins, D. (ed), *Classroom Learning: Educational Psychology for the Asian Teachers*, Prentice Hall, Singapore, pp. 261-279.

Biggs, J. 2002, 'Aligning the Curriculum to Promote Good Learning', In *Constructive Alignment in Action: Imaginative Curriculum Symposium*, LTSN Generic Centre.

Biggs, J. 2003, *Teaching for Quality Learning at University*, London, Great Britain, The Society for Research into Higher Education and Open University Press.

Black, T. R. 1999, *Doing Quantitative Research in the Social Sciences: An Integrated Approach to Research Design, Measurement and Statistics*, London, SAGE Publications.

Bleicher, J. 1980, *Contemporary Hermeneutics: Hermeneutics as Method, Philosophy and Critique*, London and Boston, Routledge & Kegan Paul.

Boland, R. 1985, 'Phenomenology: A Preferred Approach to Research in Information Systems', in Mumford, E., Hirschheim, R. A., Fitzgerald, G. & Wood-Harper, T. (ed), *Research Methods in Information Systems*, North-Holland, Amsterdam, pp. 193-201.

Boland, R. J. & Day, W. F. 1991, *Information System Use as a Hermeneutic Process: in Information Systems Research: Contemporary Approaches and Emergent Traditions*, viewed 06-05-2006, http://www.qual.auckland.ac.nz/Boland,%20R.

Boland, R. J., Jr. & Day, W. 1982, 'The Phenomenology of Systems Design', In *Third International Conference on Information Systems*, Ann Arbor MI.

Borgatti, S. 2003, *Introduction to Grounded Theory*, viewed 24-04-2006, http://www.analytictech.com/mb870/introtoGT.htm.

Bransford, J. D., Brown, A. L. & Cocking, R. R. 1999, *How People Learn: Brain, Mind, Experience, and School*, Washington, DC, National Academy Press.

Buehl, M. M. & Alexander, P. A. 1999, 'Beliefs about schooled knowledge: Domain specific or domain general', In *Annual Meeting of the American Educational Research Association*, Montreal.

Butler, D. L. & Winne, P. H. 1995, 'Feedback and Self-Regulated Learning; A Theoretical Synthesis', *Review of Educational Research*, vol 65, pp 245-281.

Butler, T. 1998, 'Towards a hermeneutic method for interpretive research in information systems', *Journal of Information Technology*, vol 13, no. 4, pp 285-300.

Carraher, S. M. & Buckley, M. R. 1991, 'The effect of retention rule on the number of components retained: The case of the Pay Satisfaction Questionnaire', In *Proceedings of the Southern Management Association.*

Clarebout, G., Elen, J., Luyten, L. & Bamps, H. 2001, 'Assessing Epistemological Beliefs: Schommer's Questionnaire Revisited', *Educational Research and Evaluation*, vol 7, no. 1, pp 53-77.

Colbeck, D. 2003, 'Perceptions of E-Learning within Primary Education in Tasmania with regards to future design, direction and policies', Honours Dissertation, University of Tasmania, Launceston.

Colbeck, D. 2007, 'Understanding knowledge genesis by means of multivariate factor analysis of epistemological belief structures', *Journal of Library and Information Science*, vol 12, no. 4.

Cole, R. P., Goetz, E. T. & Willson, V. 2000, 'Epistemological beliefs of underprepared college students', *Journal of College Reading and Learning*, vol 31, pp 60-72.

Cooper, P. & Branthwaite, A. 1977, 'Qualitative Technology: New Perspectives on Measurement and Meaning through Qualitative Research', In *Annual Conference of the Market Research Society*, Brighton, pp pp. 79-92.

Darke, P. & Shanks, G. 1997, 'User Viewpoint Modelling: Understanding and Representing User Viewpoints During Requirements Definition', *Information Systems Journal*, vol 7, no. 3.

Dey, I. 1999, *Grounding grounded theory: guidelines for qualitative inquiry*, San Diego, Academic Press.

Dick, B. 1998, *Qualitative and Quantitative - Occasional Pieces in Action Research Methodology*, viewed 25-04-2006, http://www.scu.edu.au/schools/gcm/ar/arm/op015.htm.

Dixon, N. 2000, *The Organizational Learning Cycle: How We Can Learn Collectively*, Aldershot, England, Gower Publishing, Ltd.

Driver, R. E. & Tiberghien, A. 1985, *Children's Ideas in Science*, Open University Press, Philadelphia.

Duell, O. & Schommer-Aikins, M. 2001, 'Measure of people's beliefs about knowledge and learning', *Educational Psychology Review*, vol 13, no. 4, pp 419-449.

Dweck, C. S. & Legget, E. L. 1988, 'A social-cognitive approach to motivation and personality', *Psychological Review*, vol 95, no. 2, pp 256-273.

Eisenhardt, K. M. 1989, 'Building Theories from Case Study Research', *Academy of Management Review*, vol 14, no. 4, pp 532-550.

Fabrigar, L. R., Wegener, D. T., Maccallum, R. C. & Strahan, E. J. 1999, 'Evaluating the use of exploratory factor analysis in psychological research', *Psychological Methods*, vol 4, pp 272-299.

Fay, B. 1984, *Social Theory and Political Practice*, London, George Allen & Unwin Publishers Limited.

Fay, B. 1987, *Critical Social Science: Liberation and its limits.*, Ithaca, NY., Cornell University Press.

Feyerabend, P. 1975, 'Against Method', pp p 23.

Fitzgerald, J. & Cunningham, J. 2002, 'Mapping basic issues for identifying epistemological outlooks', in Hofer, B. & Pintrich, P. (ed), *Personal Epistemology: The psychological beliefs about knowledge and knowing*, Lawrence Erlbaum, New Jersey, pp. 209-228.

Flavell, J. 1971, 'Stage Related Properties of Cognitive Development', *Cognitive Psychology*, vol 2, no. 4, pp 421-453.

Ford, J. K., Maccallum, R. C. & Tait, M. 1986, 'The applications of exploratory factor analysis in applied psychology: A critical review and analysis', *Personnel Psychology*, vol 39, pp 391-314.

Garson, D. 2007, *Factor Analysis*, viewed 5th May 2007, http://www2.chass.ncsu.edu/garson/pa765/factor.htm#cases.

George, D. & Mallery, P. 2003, *SPSS for Windows Step by Step: A Simple Guide and Reference, 11.0 Update (4th Edition).*

Gilligan, C. 1982, *In a Different Voice: Psychological Theory and Women's Development*, Cambridge, MA, Harvard University Press.

Glaser, B. G. 1978, *Theoretical Sensitivity: Advances in the Methodology of Grounded Theory*, Mill Valley, CA, The Sociology Press.

Glaser, B. G. 1992, *Emergence vs. Forcing: Basics of Grounded Theory Analysis*, Mill Valley, CA, Sociology Press.

Glynn, S. M., Yeany, R. H. & Britton, B. K. 1991, *The Psychology of Learning Science.*, Lawrence Erlbaum Associates.

Goede, R. & De Villiers, C. 2003, 'The Applicability of Grounded Theory as Research Methodology in studies on the use of Methodologies in IS Practices', In *Proceedings of SAICSIT*, South Africa, pp 208-217.

Gruber, T. R. 1992, *Toward Principles for the Design of Ontologies used for Knowledge Sharing*, viewed 05-05-2006, http://ksl-web.stanford.edu/KSL_Abstracts/KSL-93-04.html.

Gruber, T. R. 1993, *A Translation Approach to Portable Ontology Specifications*, viewed 05-05-2006, http://ksl-web.stanford.edu/KSL_Abstracts/KSL-92-71.html.

Guarino, N. 1998, 'Formal Ontology in Information Systems', In *Proceedings of FOIS'98*, (Ed, Guarino, N.) IOS Press, Trento, Italy, pp 3-15.

Habermas, J. 1984, *The Theory of Communicative Action: Reason and the Rationalization of Society*, Boston, MA, Beacon Press.

Hall, V., Chiarello, K. & Edmondson, B. 1996, 'Deciding where knowledge comes from depends on where you look', *Journal of Educational Psychology*, vol 88, pp 305-313.

Hamel, J. 2000, *Sociology, Common Sense, and Qualitative Methodology*, viewed 24-03-2006, http://www.arts.ualberta.ca/cjscopy/articles/Hamel.html.

Hammersley, M. 1999, 'Some Reflections on the Current State of Qualitative Research', *Research Intelligence*, no. No.70.

Harvey, L. 1997a, 'A Discourse on Ethnography', in Lee, A. S., Liebenau, J. & Degross, J. I. (ed), *Information Systems and Qualitative Research*, Chapman and Hall, London, pp. 207-224.

Harvey, L. 1997b, 'A genealogical exploration of gendered genres in IT cultures', *Information Systems Journal*, vol 7, no. 2, pp 153-172.

Harvey, L. & Myers, M. D. 1995, 'Scholarship and practice: the contribution of ethnographic research methods to bridging the gap', *Information Technology & People*, vol 8, no. 3, pp 13-27.

Hawkins, J. N. 2008, 'The Intractable Dominant Educational Paradigm', in Mason, M., Hershock, P. D. & Hawkins, J. N. (ed), *Changing Education: Leadership, Innovation and Development in a Globalizing Asia Pacific*, Springer Netherlands, pp. 137-162.

Hayton, J. C., Allen, D. G. & Scarpello, V. 2004, 'Factor Retention Decisions in Exploratory Factor Analysis: a Tutorial on Parallel Analysis', *Organizational Research Methods*, vol 7, no. 2, pp 191-205.

Hirschheim, R. & Klein, H. 1994, 'Realizing Emancipatory Principles in Information Systems Development: The Case for ETHICS', *MIS Quarterly*, vol 18, no. 1, pp 83-109.

Hjorland, B. 2000, 'Relevance research: The missing perspectives(s); "Non-relevance" and "Epistemological relevance"', *Journal of the American Society for Information Science*, vol 51, no. 2, pp 209-211.

Hjorland, B. 2002, 'Epistemology and the socio-cognitive perspective in information science', *Journal of the American Society for Information Science*, vol 53, no. 4, pp 257-270.

Ho, R. 2000, *Handbook of Univariate and Multivariate Data Analysis and Interpretation: An SPSS Approach*, Central Queensland University Publishing Unit.

Hofer, B. 1994, 'Epistemological Beliefs and First Year College Students: Motivation and Cognition in Different Instructional Contexts', In The American Psychological Association, Los Angeles.

Hofer, B. & Pintrich, P. 2002, *Personal Epistemology: The psychology of beliefs about knowledge and knowing*, Mahwah, New Jersey, Lawrence Erlbaum Associates.

Hofer, B. K. & Pintrich, P. R. 1997, 'The Development of Epistemological Theories: Beliefs About Knowledge and Knowing and Their Relation to Learning', *Review of Educational Research*, vol 67, no. 1, pp 88 - 140.

Horn, J. L. 1965, 'A rationale and test for the number of factors in factor analysis', *Psychometrika*, vol 32, pp 179-185.

Hurley, A. E., Scandura, T. A., Schriesheim, C. A., Brannick, M. T., Seers, A. & Vandenberg, R. J. 1997, 'Exploratory and confirmatory factor analysis: Guidelines, issues, and alternatives', *Journal of Organizational Behavior*, vol 18, pp 667-683.

Husserl, E. 1982, *Ideas pertaining to a pure phenomenology and to a phenomenological philosophy*, Boston, Kluwer.

Jehng, J. J., Johnson, S. & Andersen, R. C. 1993, 'Schooling and students' epistemological beliefs about learning', *Contemporary Education*, vol 18, pp 23-35.

Kaplan, B. & Duchon, D. 1988, 'Combining Qualitative and Quantitative Methods in Information Systems Research: A Case Study', *MIS Quarterly*, vol 12, no. 4, pp 571-587.

Kardash, C. & Scholes, R. 1996, 'Effects of preexisting beliefs, epistemological beliefs, and need for cognition on interpretation of controversial issues', *Journal of Educational Psychology*, vol 88, pp 260-271.

Keegan, R. 1982, *The Evolving Self: Problem and Process in Human Development*, Cambridge, MA, Harvard University Press.

Kim, J.-O. & Mueller, C. W. 1978, 'Factor Analysis: Statistical methods and practical issues', *Quantitative Applications in the Social Sciences*, vol 14.

King, P. M. & Kitchener, K. S. 1994, *Developing Reflective Judgement: Understanding and Promoting Intellectual Growth and Critical Thinking in Adolescents and Adults,* San Francisco, Jossey-Bass.

King, P. M., Kitchener, K. S., Davison, M. L., Parker, C. A. & Wood, P. K. 1983, 'The Justification of Beliefs in Young Adults: A Longitudinal Study', *Human Development*, vol 26, pp 106-116.

King, P. M., Kitchener, K. S., Wood, P. K. & Davison, M. L. 1989, 'Relationships across developmental domains: A longitudinal study of intellectual, moral, and ego development', in Commons, M. L., Sinnott, J. D., Richards, F. A. & C., A. (ed), *Adult development: Comparisons and applications of developmental models*, Praeger, New York, pp. 57-78.

Kirk, J. & Miller, M. L. 1986, *Reliability and Validity in Qualitative Research*, Newbury Park, California, Sage Publications.

Kitchener, K. S. 1983, 'Cognition, metacognition, and epistemic cognition', *Human Development*, vol 26, pp 222-232.

Kitchener, K. S. 1986, 'The Reflective Judgment Model: Characteristics, Evidence and Measurement', in Mines, R. A. & Kitchener, K. S. (ed), *Adult Cognitive Development: Methods and Models*, Praeger, New York, pp. 76-91.

Kitchener, K. S. & Fischer, K. W. 1990, 'A Skill Approach to the Development of Reflective Thinking', in Kuhn, D. (ed), *Developmental Perspectives on Teaching and Learning Skills*, Karger, New York, pp. 48-62.

Kitchener, K. S. & King, P. M. 1981, 'Reflective Judgment: Concepts of justification and their relationship to age and education', *Journal of Applied Developmental Psychology*, vol 2, pp 89-116.

Kitchener, K. S. & King, P. M. 1989, 'Sequentially and consistency in the development of reflective judgment: A six year longitudinal study', *Journal of Applied Developmental Psychology*, vol 10, pp 73-95.

Kitchener, K. S., Lynch, C. L., Fischer, K. W. & Wood, P. K. 1993, 'Developmental range of reflective judgment: The effect of contextual support and practice on developmental stage', *Developmental Psychology*, vol 29, no. 5, pp 893-906.

Klein, H. K. & Myers, M. D. 1999, 'A Set of Principles for Conducting and Evaluating Interpretive Field Studies in Information Systems', *MIS Quarterly*, vol 23, no. 1, pp 67-93.

Knefelkamp, L. L. 1974, 'Developmental Instruction: Fostering Intellectual and Personal Growth of College Students', Unpublished Doctoral Dissertation, University of Minnesota.

Knefelkamp, L. L. & Slepitza, R. 1978, 'A Cognitive-developmental Model of Career Development: An Adaptation of the Perry Scheme', in Parker, C. A. (ed), *Encouraging Development in College Students*, University of Minnesota Press, Minneapolis, pp. 135-150.

Kohlberg, L. 1969, 'Stage and Sequence: The Cognitive Developmental Approach to Socialization', in Goslin, D. (ed), *Handbook of Socialization Theory and Research*, Rand McNally, New York, pp. 347-480.

Kohlberg, L. 1971, 'From is to Ought: How to Commit the Naturalistic Fallacy and Get Away With It In the Study of Moral Development', in Mischel, T. (ed), *Cognitive Development and Epistemology*, Academic Press, New York, pp. 151-235.

Kramer, D. & Woodruff, D. 1986, 'Relativistic and dialectic thought in three adult age groups', *Human Development*, vol 29, pp 280-290.

Kuhn, D. 1991, *The Skills of Argument*, Cambridge, England, Cambridge University Press.

Kuhn, D. 1993, 'Science as an Argument: Implications for Teaching and Learning Scientific Thinking', *Science Education*, vol 77, no. 3, pp 319-337.

Kurfiss, J. G. 1988, *Critical Thinking: Theory, Research Practice, and Possibilities*, Washington, DC, Association for the Study of Higher Education.

Kwok, R., Chi-Wai, Ma, J. & Vogel, D. 2000, 'Effect of GSS and Facilitation on Knowledge Restructuring', In *Proceedings of the 33rd Hawaii International Conference on System Sciences*, Hawaii.

Lance, C. E., Butts, M. M. & Michels, L. C. 2006, 'The sources of four commonly reported cutoff criteria: What did they really say?' *Organizational Research Methods*, vol 9, no. 2, pp 202-220.

Leech, N., L, Barret, K., C & Morgan, G., A 2005, *S.P.S.S. for Intermediate Statistics: Use and Interpretation*, Mahwah, NJ, Lawrence Erlbaum Associates Inc.

Lodewijks, H. G. L. C., Vermetten, Y. & Schellings, G. 1999, 'How to assess epistemological beliefs?' In *8th EARLI conference*, Goteborg.

Longman, R. S., Cota, A. A., Holden, R. R. & Fekken, G. C. 1989, 'A Regression Equation for the Parallel Analysis Criterion in Principal Components Analysis: Mean and 95th Percentile Eigenvalues', *Multivariate Behavioural Research*, vol 24, no. 1, pp 59-69.

Mackay, N. 1997, 'Constructivism and the Logic of Explanation', *Journal of Constructivist Psychology*, vol 10, no. 4, pp 339-361.

Madison, S. K. 1995, 'A Study of College Students' Construct of Parameter Passing: Implications for Instruction', PhD, University of Wisconsin.

Mani, A. 1999, *Short Note on Qualitative Research*, viewed 08-05-2003, http://www.interventions.org.

Martin, P. Y. & Turner, B. A. 1986, 'Grounded Theory and Organizational Research', *The Journal of Applied Behavioural Science*, vol 22, no. 2, pp 141-157.

Marton, F. 1981, 'Phenomenography: Describing conceptions of the world around us', *Instructional Science*, vol 10, pp 177-200.

Marton, F., Hounsell, D. & Entwistle, N. 1984, *The experience of learning*, Edinburgh, Scottish Academic Press.

Marton, F., Tsui, A. & Chik, P. 2004, *Classroom Discourse and the Space of Learning*, Lawrence Erlbaum Associates.

Miles, M. B. & Huberman, A. M. 1984, *Qualitative Data Analysis: A Sourcebook of New Methods*, Newbury Park, CA, Sage Publications.

Miles, M. B. & Huberman, A. M. 1997, *Qualitative Data Analysis: An Expanded Sourcebook*, Thousand Oaks, Sage Publications.

Mintzes, J. J. 2006, *Research on Cognition and Learning*, viewed 05-05-2006, http://people.uncw.edu/mintzes/index.htm.

Mintzes, J. J., Wandersee, J. H. & Novak, J. D. 2000, *Assessing Science Understanding: A Human Constructivist View*, San Diego, CA, USA, Academic Press, Inc.

Moore, W. S. 1989, 'The Learning Environment Preferences: Exploring the Construct Validity of an Objective Measure of the Perry Scheme of Intellectual Development', *Journal of the College Student Development*, vol 30, pp 504-514.

Moore, W. S. 1994, 'Student and Faculty Epistemology in the College Classroom: The Perry Schema of Intellectual and Ethical Development', in Prichard, K. W. & Sawyer, R. M. (ed), *Handbook of College Teaching: Theory and Applications*, Greenwood Press, Westport, CT, pp. 45-67.

Myers, M. D. 1994, 'Quality in Qualitative Research in Information Systems', In *5th Australasian Conference on Information Systems*, pp 763-766.

Myers, M. D. 1997a, 'Critical Ethnography in Information Systems', in Lee, A. S., Liebenau, J. & Degross, J. I. (ed), *Information Systems and Qualitative Research*, Chapman and Hall, London, pp. 276-300.

Myers, M. D. 1997b, 'Qualitative Research in Information Systems', *MIS Quarterly*, vol 21, no. 2, pp 241-242.

Myers, M. D. 2003, *Qualitative Research in Information Systems*, viewed 06-05-2003, http://www.qual.auckland.ac.nz/.

Myers, M. D. & Avison, D. E.° (Ed.)^(Eds.) 2002, *Qualitative Research in Information Systems: A Reader*, Sage Publications, London, pp. 328.

Myers, M. D. & Walsham, G. 1998, 'Guest Editorial: Exemplifying Interpretive Research in Information Systems: An Overview', *Journal of Information Technology*, vol 13, no. 4, pp 233-234.

Neill, J. 2003, *Quantitative Research Design: Sampling & Measurement*, viewed 25-01-2008, http://wilderdom.com/OEcourses/PROFLIT/Class5QuantitativeResearchDesignSamplingMeasurement.htm.

Neuman, W. L. 2003, *Social Research Methods: Qualitative and Quantitative Approaches*, Boston, Allyn and Bacon.

Ngwenyama, O. K. 1991, 'The Critical Social Theory Approach to Information Systems: Problems and Challenges', in Nissen, H.-E., Klein, H. K. & Hirschheim, R. A. (ed), *Information Systems Research: Contemporary Approaches and Emergent Traditions*, North Holland, Amsterdam, pp. 267-280.

Ohtsuka, K., Mallamace, J., Milonas, M. & Scicluna, A. 1996, 'Normative data from Australian university students on Schommer's (1990) epistemological questionnaire', In *Educational Research Association (Singapore) / Australian Association for Research in Education joint annual conference*, Singapore.

Paulsen, M. B. & Wells, C. T. 1998, 'Domain differences in the epistemological beliefs of college students', *Research in Higher Education*, vol 39, no. 4, pp 365-384.

Peraklya, A. 1997, 'Reliability and Validity in Research based on Tapes and Transcripts', in Silverman, D. (ed), *Qualitative Research: Theory, Method and Practice*, Sage Publishing, London.

Perry, W. G. 1970, *Forms of Intellectual and Ethical Development in the College Years: A Scheme*, San Francisco, Jossey-Bass.

Piaget, J. 1950, *Introduction a l'epistemologie genetique*, Paris, Presses University de France.

Powers, K. D. & Powers, D. T. 2000, 'Constructivist Implications of Preconceptions in Computing', In *ISECON 2000*.

Prosser, M., Ramsden, P., Trigwell, K. & Martinn, E. 2003, 'Dissonance in Experience of Teaching and its Relation to the Quality of Student Learning', *Studies in Higher Education*, vol 28, no. 1, pp 37-48.

Prosser, M. & Trigwell, K. 2004, 'Improving the quality of student learning: the influence of learning context and student approaches to learning on learning outcomes', *Higher Education*, vol 22, no. 3, pp 251-266.

Qian, G. & Alvermann, D. 1995, 'Role of Epistemological Beliefs and Learned Helplessness in Secondary School Students' Learning Science Concepts from Text', *Journal of Educational Psychology*, vol 87, no. 2, pp 282-292.

Ragin, C. C. 1987, *The Comparative Method: Moving Beyond Qualitative and Quantitative Strategies*, Berkeley and London, University of California Press.

Ragin, C. C. & Becker, H. S. 1992, *What Is a Case?: Exploring the Foundations of Social Inquiry*, Cambridge, Cambridge University Press.

Rathswohl, E. J. 1991, 'Applying Don Idhe's Phenomenology of Instrumentation as a Framework for Designing Research in Information Science', in Nissen, H.-E., Klein, H. K. & Hirschheim, R. A. (ed), *Information Systems Research: Contemporary Approaches and Emergent Traditions*, North Holland, Amsterdam, pp. 421-438.

Ratner, C. 2002, *Subjectivity and Objectivity in Qualitative Methodology*, viewed 24-04-2006, http://www.qualitative-research.net/fqs-texte/3-02/3-02ratner-e.pdf.

Rust, L. 2003, *For Discovering Guidelines that Work*, viewed 03-06-2003, http://www.langrust.com/.

Ryan, M. P. 1984a, 'Conceptions of Prose Coherence: Individual Differences in Epistemological Standards', *Journal of Educational Psychology*, vol 76, no. 6, pp 1226-1238.

Ryan, M. P. 1984b, 'Monitoring Text Comprehension: Individual Differences in Epistemological Standards', *Journal of Educational Psychology*, vol 76, no. 2, pp 249-258.

Sandelowski, M. 2000, 'Focus on Research Methods: Combining Qualitative and Quantitative Sampling, Data Collection, and Analysis Techniques in Mixed-Method Studies', *Journal of Research in Nursing and Health*, vol 23, pp 246-255.

Schoenfeld, A. H. 1983, 'Beyond the purely cognitive: Belief systems, social cognitions, and metacognitions as driving forces in intellectual performance', *Cognitive Science*, vol 7, no. 4, pp 329-363.

Schoenfeld, A. H. 1985, *Mathematical problem solving*, San Diego, CA, Academic Press.

Schoenfeld, A. H. 1988, 'When good teaching leads to bad results: The disasters of "well taught" mathematics classes', *Educational Psychologist*, vol 23, pp 145-166.

Schommer-Aikins 2004, 'Explaining the epistemological belief system: Introducing the embedded systemic model and coordinated research approach', *Educational Psychologist*, vol 39, no. 1, pp 19-29.

Schommer-Aikins, M. 2002, 'An evolving theoretical framework for an epistemological belief system', in Hofer, B. & Pintrich, P. (ed), *Personal Epistemology: The psychology of beliefs about knowledge and knowing*, Lawrence Erlbaum Associates, Mahwah, New Jersey.

Schommer-Aikins, M. 2005, *Personal communication* (Colbeck, D.), via e-mail.

Schommer, M. 1990a, 'Effects and Beliefs about the Nature of Knowledge on Comprehension', *Journal of Educational Psychology*, vol 82, pp 498-504.

Schommer, M. 1990b, 'Schommer epistemological questionnaire [for college students]', *The British Journal of Educational Psychology*, vol 82, no. 3, pp 498-50.

Schommer, M. 1992, 'Predictors of Epistemological Beliefs; Comparing Adults with only a Secondary Education to Adults with Post Secondary Education', In *Mid-Western American Educational Research Association*, Chicago.

Schommer, M. 1993a, 'Comparisons of Beliefs about the Nature of Knowledge and Learning among Postsecondary Students', *Research in Higher Education*, vol 34, no. 3, pp 355-370.

Schommer, M. 1993b, 'Epistemological development and academic performance among secondary students', *Journal of Educational Psychology*, vol 85, no. 3, pp 406-411.

Schommer, M. 1994a, 'An emerging conceptualisation of epistemological beliefs and their role in learning', in Garner, R. & Alexander, P. A. (ed), *Beliefs about text and instruction with text*, Erlbaum, Hillsdale, NJ.

Schommer, M. 1994b, 'Synthesizing Epistemological Belief Research; Tentative Understandings and Provocative Confusions', *Educational Psychology Review*, vol 6, no. 4, pp 293-319.

Schommer, M., Crouse, A. & Rhodes, N. 1992, 'Epistemological Belies and Mathematical Text Comprehension; Believing it is simple does not make it so', *Journal of Educational Psychology*, vol 84, no. 4, pp 435-443.

Schommer, M. & Dunnell, P. A. 1994, 'A comparison of epistemological beliefs between gifted and non-gifted high school students', *Roeper Press*, vol 16, no. 3, pp 207-210.

Schommer, M. & Walker, K. 1995, 'Are epistemological beliefs similar across domains?' *Journal of Educational Psychology*, vol 87, no. 3, pp 424-432.

Schraw, G., Bendixen, L. & Dunkle, M. 2002, 'Development and Validation of the Epistemic Belief Inventory (EBI)', in Hofer, B. & Pintrich, P. (ed), *Personal Epistemology: The psychology of beliefs about knowledge and knowing*, Lawrence Erlbaum Associates, Mahwah, New Jersey, pp. 430.

Schraw, G., Dunkle, M. & Bendixen, L. 1995, 'Cognitive processes in well-defined and ill-defined problem solving', *Applied Cognitive Psychology*, vol 9, pp 523-538.

Schutz, P. A., Pintrich, P. & Young, A. J. 1993, 'Epistemological Beliefs, Motivation, and Student Learning', In *Annual Meeting of the American Educational Research Association*, Atlanta, GA.

Silverman, D. 1993, *Interpreting Qualitative Data*, London, Sage Publications.

Silverman, D. 1998, 'Qualitative research: meanings or practices?' *Information Systems Journal*, vol 8, no. 1, pp 3-20.

Smit, J. 1999, 'Grounded Theory Methodology in IS Research: Glaser versus Strauss', *South African Computer Journal*, vol 24, no. November, pp 219-222.

Smith, J. P., Disessa, A. A. & Roschelle, J. 1993, 'Misconceptions Reconceived: A Constructivist Analysis of Knowledge in Transition', *Journal of The Learning Sciences*, vol 3, no. 2, pp 115-163.

Steffe, L. F. & Gale, J. 1995, *Constructivism in Education*, Lawrence Erlbaum Associates.

Stern, G. G. 1953, *Inventory of Beliefs*, Chicago, University of Chicago Press.

Strauss, A. 1987, *Qualitative Analysis for Social Scientists*, Cambridge, Cambridge University Press.

Strauss, A. & Corbin, J. 1990, *Basics of Qualitative Research: Grounded Theory Procedures and Techniques*, Newbury Park, CA, Sage Publications.

Strauss, A. & Corbin, J.° (Ed.)^(Eds.) 1997, *Grounded Theory in Practice*, Sage Publications, London.

Susman, G. I. 1983, 'Action Research: A Sociotechnical systems perspective', in Morgan, G. (ed), *Beyond Method: Strategies for Social Science Research*, Sage Publications, London.

Tarricone, P. & Luca, J. 2002, 'Successful Teamwork: A Case Study', In *HERDSA 2002*, Edith Cowen University, Perth, Australia.

Taylor, S. & Bogdan, R. 1984, *Introduction to qualitative research methods: The search for meanings*, New York, John Wiley.

Thompson, B. & Daniel, L. G. 1996, 'Factor analytic evidence for the construct validity of scores: A historical overview and some guidelines', *Educational and Psychological Measurement*, vol 56, pp 197-208.

Tolhurst, D. 2004, 'The influence of web-supported independent activities and small group work on students' epistemological beliefs.' In *Proceedings of the sixth conference on Australian computing education*, Vol. 30 Dunedin, New Zealand, pp 311-316.

Tolhurst, D. & Debus, R. 2002, 'Influence of prior knowledge, attitudes, ability, and activity structure on student's learning and use of software', *Journal of Educational Computing Research*, vol 27, no. 3, pp 275-313.

Trochim, W. M. K. 2002, *Positivism & Post-Positivism*, viewed 06-05-2006, http://trochim.human.cornell.edu.

Velicer, W. F., Eaton, C. A. & Fava, J. L. 2000, 'Construct explication through factor or component analysis: A review and evaluation of alternative procedures for determining the number of factors or components', in Goffin, R. D. & Helmes, E. (ed), *Problems and solutions in human assessment*, Kluwer, Boston.

Von Glaserseld, E. 1995, *A constructivist approach to teaching*, Lawrence Erlbaum.

Vygotsky, L. S. 1962, *Thought and Language*, Cambridge, MA, Bradford/MIT Press.

Watkins, M. 2006, *Monte Carlo PCA for Parallel Analysis*, v. 1.00, Available from http://www.softpedia.com/get/Others/Home-Education/Monte-Carlo-PCA-for-Parallel-Analysis.shtml.

Whitmire, E. 2004, 'The relationship between undergraduates' epistemological beliefs, reflective judgment, and their information seeking behaviour', *Information Processing and Management*, vol 40, pp 97-111.

Widick, C. 1975, 'An Attribute-treatment interaction model of Instruction Based on Cognitive Developmental Theory', Unpublished Doctoral Dissertation, University of Minnesota.

Windschitl, M. & Andre, T. 1998, 'Using computer simulations to enhance conceptual change: The roles of constructivist instruction and student epistemological beliefs', *Journal of Research in Science Teaching*, vol 35, pp 145-160.

Woo, C. 2001, *Constructivism and Arts Education - Using Mind Tools for Learning Art History*, viewed 05-05-2006, www.calebwoo.org/paper423.doc.

Wood-Harper, A. T. 1992, 'Viewpoint: Action Research', *Journal of Information Systems*, vol 2, pp 235-236.

Woodruff-Smith, D. 2003, *Phenomenology*, viewed 19th February 2007, http://plato.stanford.edu/entries/phenomenology/.

Yaffee, R. A. 2003, *Common Correlation and Reliability Analysis with SPSS for Windows*, viewed 30th March 2008, http://www.nyu.edu/acf/socsci/Docs/intracls.html.

Yin, R. K. 1981a, 'The Case Study as a Serious Research Strategy', *Science Communication*, vol 3, pp 97-114.

Yin, R. K. 1981b, 'The Case Study Crisis: Some Answers', *Administrative Science Quarterly*, vol 26, pp 58-65.

Yin, R. K. 1994, *Case Study Research: Design and Methods*, Newbury Park, Sage Publications.

Yoong, P. A. 1996, 'Grounded Theory of Reflective Facilitation: Making The Transition From Traditional To GSS Facilitation', PhD Thesis, Victoria University, Wellington.

Zwick, W. R. & Velicer, W. F. 1986, 'Factors influencing five rules for determining the number of components to retain', *Psychological Bulletin*, vol 99, pp 432-442.

Appendix A: EBS Statement structure

EBS Statement structure			
Subset	**No**	**Statement**	**Valence**
Subset 1: Seek Single Answers	**1**	You never know what a book is about unless you know the intentions of the author.	(-)
	2	Most words have one clear meaning.	(+)
	3	A sentence has little meaning unless you know the context in which it is used.	(-)
	4	The best thing about science courses is that most problems have only one right answer.	(+)
	5	The most important part of scientific work is original thinking.	(-)
	6	A good lecturer will keep their students from wandering off the right track.	(+)
Subset 2: Avoid integration	**7**	You will just get confused if you try and integrate new ideas in a textbook with knowledge that you already have about the subject.	(+)
	8	Studying means understanding the big issues, rather than details.	(-)
	9	A really good way to understand a textbook is to reorganise the information according to your own personal way of looking at it.	(-)
	10	Being a good student means that you can memorise a lot of facts.	(+)
Subset 3: Avoid ambiguity	**11**	It is a waste of time working on problems that have no possibility of coming out with a clear cut and unambiguous answer.	(+)
	12	I find it refreshing to think about issues that experts can't agree on.	(-)
	13	If lecturers would stick more to the facts and less about theory, students would get more out of University.	(+)
	14	I don't like movies that don't have a clear-cut ending.	(+)
Subset 4: Knowledge is certain	**15**	Truth is unchanging.	(+)
	16	The only thing certain in life is uncertainty itself.	(-)
	17	Events from the past do not influence events in the future.	(-)
	18	If scientists try hard enough, they can find out the truth about almost everything.	(+)
Subset 5: Depend on Authority	**19**	When you first encounter a difficult concept in a textbook, it is better for you to work it out on your own rather than ask your lecturer.	(-)
	20	Sometimes you need to accept answers from a lecturer even though you don't understand them.	(+)
Subset 6: Don't criticize Authority	**21**	Even advice from experts should be questioned.	(-)
	22	People who challenge authority come across as a bit full of themselves.	(+)
	23	You can believe almost everything you read.	(+)
	24	If you believe you are familiar with the topic, you should evaluate the accuracy of the information in your textbook.	(-)
Subset 7: Success is unrelated to hard work	**25**	Wisdom is not necessarily knowing the answers, but knowing how to find the answers.	(-)
Subset 8: Ability to learn is innate	**26**	Some people are born to be good learners; others are stuck with a limited ability.	(+)
Subset 9: Learn the first time	**27**	Almost all the information you can learn from a text you will get from the first reading.	(-)
	28	If you find the time to re-read a textbook chapter, you would get more out of it the second time around.	(+)
	29	Going over and over a difficult textbook chapter usually won't help you understand it.	(+)
Subset 10: Learning is quick	**30**	If you can't understand something within a short period of time, you should just keep on trying.	(+)
	31	Working hard on a difficult problem for an extended period of time only pays off for really smart students.	(-)
	32	If you are ever going to understand something, it will make sense to you the first time.	(+)
	33	Successful students understand things quickly.	(-)
	34	Learning is a slow process of building up knowledge.	(+)

Appendix B: Participant Forms

Research Participant Information Letter

Title of Project:
Knowledge Genesis ~ Bridging Gaps Between Learning and Understanding

To selected participants
University of Tasmania
All Campuses
Tasmania

1st June 2005

Dear Participant,

My name is Douglas Colbeck and I am currently undertaking a Doctor of Philosophy (Computing) degree at the University of Tasmania, School of Computing.

In order to fulfil part of the requirements of my study I am undertaking a study on personal epistemological belief structures of University level students'. This will be under the supervision of Professor Young Choi, Head of School within the School of Computing.

The study will be conducted with as many university members that are willing to volunteer. If any member wishes to participate in this study you will be asked to engage in a short personal interview, or fill out a short online or paper questionnaire. Either activity only needs to be completed once. The interview/form completion time and place can be negotiated between the researcher and yourself, keeping in mind issues of your convenience, comfort and privacy.

Details for Participants:
Title of the Research Project: Knowledge Genesis ~ bridging gaps between learning and understanding

Principal Investigator: Professor Young Choi.
Student Investigator: Douglas Colbeck B.Comp, B.InfoSys (1st Hons)

Procedure: Any participation in this study is completely voluntary, and is not part of any course requirements. Your participation involves either completing a paper questionnaire or completing the questionnaire using an online survey form.

On-Line Survey: Please note that apart from very basic demographic data, the survey does not require your name or other identifying information. It follows that the researchers will not know who has completed the online survey forms, and the activity should take you no longer than 15 minutes. This research requests you to share your feelings, thoughts and opinions on how you view knowledge, its attainment and your personal utilisation of knowledge.

Risks: There are no risks anticipated beyond those that occur in daily life. Participants will be volunteers and, and may withdraw from the project at any time with no penalty.

Data Collection and Storage: Confidentiality will be strictly adhered to, both during, and after the conclusion of my research.

All research data will be securely stored on the University of Tasmania premises for a period of 5 years. The data will be destroyed at the end of 5 years.

The findings from this study will be presented both in a doctoral thesis and public presentations. The findings may also have the potential to be published in an academic journal. If you would like to receive a summary of the results of the study, please contact either of the investigators.

Contact Information: For any questions regarding the study please contact:

Principal Investigator:
Professor Young Choi on (03) 6324 3469, email Y.Choi@utas.edu.au

Or the Student Investigator,
Douglas Colbeck, on (03) 6324 3211, email Doug.Colbeck@utas.edu.au

Ethics approval: This study has been approved by the Human Research Ethics Committee (Tasmania) Network. If you have any ethical concerns as to the conduct of the study, you may direct these to the Executive Officer of the Network by phoning 03 6226 7479 or by email: Human.ethics@utas.edu.au

Thank you for taking the time to read this information and I look forward to receiving your completed surveys.

Regards

Douglas Colbeck (B.Comp, B.InfoSys-1st Hons)
Graduate Research Student
University of Tasmania,
Australia

Research Participation Consent Form

Title of Project:
Knowledge Genesis ~ Bridging Gaps Between Learning and Understanding

1. I have read and understood the 'Information Sheet' for this study.
2. The nature and possible effects of the study have been explained to me.
3. I understand that the study involves my participation in completing a 15 minute questionnaire survey, and the analysis of any and all information I put forward to the researcher.
4. I understand that there is no personal risk involved, and confidentiality is assured and will be maintained during the entire project.
5. I understand that all research data will be securely stored on the University of Tasmania premises for a period of 5 years. The data will be destroyed at the end of 5 years.
6. I agree that research data gathered for the study may be published provided that I cannot be identified as a subject.
7. I agree to participate in this investigation and understand that I may withdraw at any time without any effect to my person. I also understand that I may if I wish withdraw any data I have provided within 28 days of submission of the survey.

Name of participant____

Signature of participant________________________________ Date___/___/2005

8. I have explained this project and the implications of participation in it to this volunteer and I believe that the consent is informed and that he/she understands the implications of participation.

Name of Student Investigator_______ **Douglas Colbeck** ___________________

Signature of Student Investigator________________________ Date___/___/2005

Appendix C: Exploratory Correlation Analysis Tables

Exploratory Factor Analysis using PCA/Varimax

Rotated Component Matrix(a)

	SS1	SS2	SS3	SS4	SS5	SS6	SS7	SS8	SS9	SS10	SS11
VAR12	0.677808	0.070643	-0.00567	-0.02859	0.046815	-0.04305	0.207687	0.001599	-0.06431	0.040899	-0.03891
VAR16	0.56543	0.191435	0.050346	0.019836	-0.06254	0.09294	-0.16848	0.166112	0.121943	0.083133	-0.03779
VAR21	0.498241	0.07041	-0.05162	0.069817	0.09067	0.301683	0.137562	0.093314	0.105144	-0.27194	-0.0574
VAR25	0.487367	0.316202	0.113406	-0.05227	0.022631	0.036252	-0.22951	-0.07382	0.147618	-0.22385	-0.03074
VAR03	0.474478	-0.05572	0.003703	0.126947	0.189577	-0.26924	0.297109	-0.18473	-0.13099	-0.07511	-0.10618
VAR09	0.467816	-0.12105	-0.1203	0.073074	0.311639	-0.2542	-0.11997	0.002821	0.107823	0.19333	0.051964
VAR05	0.374652	-0.0416	0.152521	-0.06591	0.104954	-0.07365	-0.04026	-0.01169	0.306301	-0.09666	0.136252
VAR17	0.355378	0.343241	0.057647	0.112459	0.0545	0.035793	0.101942	0.041615	0.049358	-0.13912	0.249444
VAR23	0.14374	0.680639	0.060194	-0.10759	0.146072	0.10217	0.15754	0.063881	-0.17005	0.110571	-0.02333
VAR28	-0.04087	-0.6057	0.040045	-0.47353	0.092285	0.098198	0.053506	0.036451	-0.08631	0.05738	-0.09085
VAR32	0.044598	0.595029	0.137952	0.194683	0.280609	-0.01989	-0.00442	0.042847	0.06647	-0.05783	-0.02812
VAR10	0.020713	0.007206	0.669799	0.020405	0.186107	0.064713	0.009878	-0.13982	0.011037	0.184395	0.15328
VAR11	0.007773	0.223083	0.635959	0.057434	0.058661	-0.01955	0.310301	0.126552	-0.02226	-0.02243	0.093884
VAR13	0.052543	0.009044	0.434587	0.196455	-0.1375	0.32724	0.247226	0.163455	0.089841	0.128188	-0.22356
VAR29	-0.0401	-0.01838	-0.03096	0.780708	0.005121	0.018691	0.057043	0.080022	-0.01297	-0.0215	-0.0579
VAR30	-0.05197	-0.17687	-0.12493	-0.71724	-0.17335	-0.02831	0.007544	0.042697	0.012653	0.039147	-0.04046
VAR34	-0.19172	-0.41768	-0.13232	-0.42386	0.061773	0.005606	0.289284	0.155701	-0.09408	-0.09215	-0.21796
VAR33	0.161651	0.110665	0.073659	0.012689	0.665817	0.048357	-0.13228	0.01644	0.01697	-0.02206	0.141344
VAR31	0.131554	0.19401	0.150292	0.100645	0.561776	0.195542	-0.03379	0.097203	0.119712	-0.15138	-0.03204
VAR20	-0.06963	0.040991	-0.16545	0.05683	0.209166	0.714615	0.080564	-0.09396	-0.00773	0.001806	0.13982
VAR22	0.018853	-0.01553	0.261765	-0.05447	-0.03434	0.645466	0.064887	0.123915	-0.05434	0.135141	-0.06858
VAR15	0.117995	0.111401	0.111303	-0.02902	-0.27268	0.099345	0.667427	0.065714	0.03026	-0.04285	0.060733
VAR14	-0.00157	-0.01663	0.241149	0.028265	0.085498	0.148978	0.524883	0.011156	0.101696	0.214577	-0.05267

VAR02	0.00565	0.083798	-0.1088	-0.02689	0.004397	0.086547	0.0401	0.700034	0.213629	0.137014	-0.03004
VAR04	0.194608	-0.15772	0.354327	0.029397	0.118096	-0.00059	-0.04135	0.54789	-0.07411	-0.06532	0.070086
VAR18	-0.10845	0.136914	0.028431	0.087584	0.476289	-0.08898	0.268544	0.486085	-0.06758	0.073364	-0.05608
VAR01	0.051966	-0.06083	0.031523	0.016279	-0.03963	-0.04636	-0.05052	0.187248	0.669279	0.00704	0.050132
VAR27	0.088669	0.373829	-0.02609	-0.02591	0.15047	0.135639	0.227622	-0.14908	0.546587	0.038789	-0.04052
VAR24	0.216222	-0.08486	-0.08627	0.076916	0.147551	-0.09022	0.240897	0.036058	0.400378	-0.37672	0.159504
VAR06	0.032954	-0.06207	0.126244	0.011993	-0.06059	0.203203	0.045525	0.212179	0.062968	0.611947	0.113938
VAR19	0.151799	-0.0492	0.073576	0.149421	0.069814	0.24023	-0.29503	0.001603	0.202612	-0.49319	0.045358
VAR26	-0.00059	0.084279	0.214084	0.082661	0.293888	0.259603	0.034084	-0.2454	0.310879	0.430308	-0.2886
VAR08	-0.03887	0.126009	0.201869	0.019425	0.085008	0.031773	-0.00751	0.028405	0.149801	-0.02304	0.729824
VAR07	0.032856	0.176885	0.468924	-0.00288	-0.00767	-0.03972	-0.00597	0.079965	0.123328	-0.16798	-0.50733

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a Rotation converged in 36 iterations.

Exploratory Factor Analysis using PAF/Oblimin

Pattern Matrix(a)

	1	2	3	4	5	6	7	8	9	10	11
VAR23	0.684559	0.045313	0.066904	8.42E-05	0.028719	-0.038	0.099654	-0.01365	0.057255	-0.06694	0.033047
VAR32	0.343475	0.001023	-0.18078	0.262242	0.081136	0.039499	-0.10403	0.045794	-0.07163	-0.02941	-0.00028
VAR17	0.195566	0.069678	-0.10306	0.069287	-0.08824	0.151445	0.069672	0.144927	0.17899	0.005162	0.083788
VAR10	0.013159	0.554822	0.000733	0.010187	0.123574	-0.00305	0.030662	0.132043	0.015371	0.079878	-0.03693
VAR11	0.097567	0.496302	-0.09265	0.037995	-0.0327	-0.06058	-0.03716	0.112128	0.014874	-0.04809	0.241062
VAR07	0.062368	0.181735	-0.05622	0.036674	0.077894	0.118026	-0.06172	-0.16542	0.020698	-0.05856	0.062657
VAR30	0.010592	-0.09877	0.612487	-0.09424	-0.03329	0.013078	-0.0217	-0.01318	-0.04284	-0.06081	0.030016
VAR29	-0.07376	-0.0146	-0.57824	-0.03944	-0.01635	-0.05688	0.052347	-0.06228	0.014933	-0.04738	0.007272
VAR28	-0.35563	0.154705	0.463355	0.022017	-0.03397	-0.12637	0.144115	-0.15537	0.137021	-0.02402	-0.05997
VAR34	-0.19286	-0.05422	0.322916	-0.01042	-0.13018	-0.24642	0.119041	-0.18564	0.095953	-0.10718	0.103926
VAR31	-0.06863	-0.05358	0.02265	1.035423	-0.01304	-0.0298	-0.00581	-0.06335	-0.1453	0.057944	0.0225

VAR33	0.076105	0.060911	0.011972	0.335495	0.047588	-0.05511	0.046398	0.139804	0.144347	-0.03045	-0.17104
VAR26	-0.00654	0.060604	-0.04418	0.031403	0.754775	-0.0757	0.103195	-0.1101	0.0827	0.076608	-0.09599
VAR27	0.140726	-0.11435	-0.00821	0.085579	0.26686	0.106321	0.050309	0.15787	0.053847	-0.00194	0.186222
VAR06	0.003044	0.111521	0.056993	-0.04295	0.185817	-0.07907	0.033111	0.011044	-0.11936	-0.18577	0.057262
VAR25	0.162143	0.05969	0.019442	0.08736	-0.01576	0.424394	-0.0087	0.020889	0.185611	0.056319	-0.07004
VAR19	-0.08201	-0.02309	-0.10595	0.080007	-0.04999	0.321546	0.07968	0.073528	0.017748	-0.01837	-0.10723
VAR16	0.105821	-0.00269	0.022842	0.099542	0.049408	0.298984	-0.04592	-0.04004	0.136505	-0.11312	0.016063
VAR21	0.048152	-0.04286	-0.04927	0.060275	-0.02297	0.290033	0.18271	-0.06496	0.275555	-0.08808	0.113463
VAR20	0.06361	-0.06451	-0.0719	-0.01653	0.07327	0.020783	0.702959	0.078308	-0.03672	0.065948	-0.02311
VAR22	0.014086	0.192937	0.078079	0.080635	0.058535	0.138645	0.289291	-0.12831	-0.22649	-0.08717	0.123216
VAR08	0.031149	0.138577	-0.01329	0.045182	-0.03689	-0.00798	0.037156	0.458525	-0.07007	-0.02007	0.022855
VAR03	0.039905	0.03893	-0.06618	0.018949	-0.01956	-0.01824	-0.07697	-0.1055	0.458305	0.105643	0.094837
VAR09	-0.00921	-0.01709	-0.0014	0.019489	0.062808	0.016718	-0.04118	0.060525	0.393301	-0.0687	-0.1652
VAR12	0.115274	-0.00943	0.074827	0.064384	0.017208	0.137353	-0.03721	-0.07933	0.391775	-0.00426	0.168661
VAR05	-0.02804	0.066265	0.05041	-0.00391	0.058215	0.184577	-0.01827	0.153743	0.250043	-0.06999	-0.00539
VAR24	-0.14643	-0.13296	-0.0543	0.099095	-0.01182	0.096344	-0.01787	0.196303	0.238172	-0.05329	0.168687
VAR02	0.049929	-0.09999	0.012497	-0.01486	0.013222	0.005908	0.005242	0.010723	-0.0775	-0.53369	0.024019
VAR18	0.130445	0.060184	-0.13434	0.099728	-0.02666	-0.36402	0.081034	-0.00127	0.162846	-0.38586	-0.02885
VAR04	-0.05821	0.221908	0.000509	0.062959	-0.08723	0.047402	-0.03523	-0.02013	0.07083	-0.34566	-0.03041
VAR01	-0.11954	-0.0385	0.006156	0.024242	0.092542	0.151443	-0.01906	0.139063	0.021565	-0.16799	0.031369
VAR15	0.044721	0.018681	0.018189	-0.04616	-0.05494	-0.0522	0.016256	0.046051	0.039036	0.005283	0.624796
VAR14	-0.02621	0.11755	0.011896	0.084745	0.184548	-0.15097	0.029831	-0.03354	0.006236	-0.04121	0.32694
VAR13	-0.06075	0.249999	-0.14342	0.015107	0.147373	0.140563	0.044458	-0.20463	-0.15307	-0.1512	0.272944

Extraction Method: Principal Axis Factoring.
Rotation Method: Oblimin with Kaiser Normalization.
a Rotation converged in 49 iterations.

Appendix D: Confirmatory Analysis SPSS Data

Confirmatory Factor Analysis on the Complete Australian Dataset
Subset to Final Factors PCA/Varimax Reduction

Notes

Output Created		30-OCT-2007 10:01:50
Comments		
Input	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	435
Missing Value Handling	Definition of Missing	MISSING=EXCLUDE: User-defined missing values are treated as missing.
	Cases Used	LISTWISE: Statistics are based on cases with no missing values for any variable used.
Syntax		FACTOR /VARIABLES SS01 SS02 SS03 SS04 SS05 SS06 SS07 SS08 SS09 SS10 /MISSING LISTWISE /ANALYSIS SS01 SS02 SS03 SS04 SS05 SS06 SS07 SS08 SS09 SS10 /PRINT UNIVARIATE INITIAL CORRELATION SIG DET KMO ROTATION /FORMAT SORT /PLOT EIGEN ROTATION /CRITERIA MINEIGEN(1) ITERATE(25) /EXTRACTION PC /CRITERIA ITERATE(25) /ROTATION VARIMAX /METHOD=CORRELATION .
Resources	Elapsed Time	0:00:00.16
	Maximum Memory Required	13480 (13.164K) bytes

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
SS01	2.6529	.41042	435
SS02	2.2455	.45467	435
SS03	2.5154	.58595	435
SS04	2.1821	.52658	435
SS05	2.3747	.67274	435
SS06	2.2552	.44431	435
SS07	1.7977	.66892	435
SS08	2.8092	1.11252	435
SS09	2.8345	.40476	435
SS10	2.7467	.35960	435

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.731
Bartlett's Test of Sphericity	Approx. Chi-Square	426.169
	df	45
	Sig.	.000

Communalities

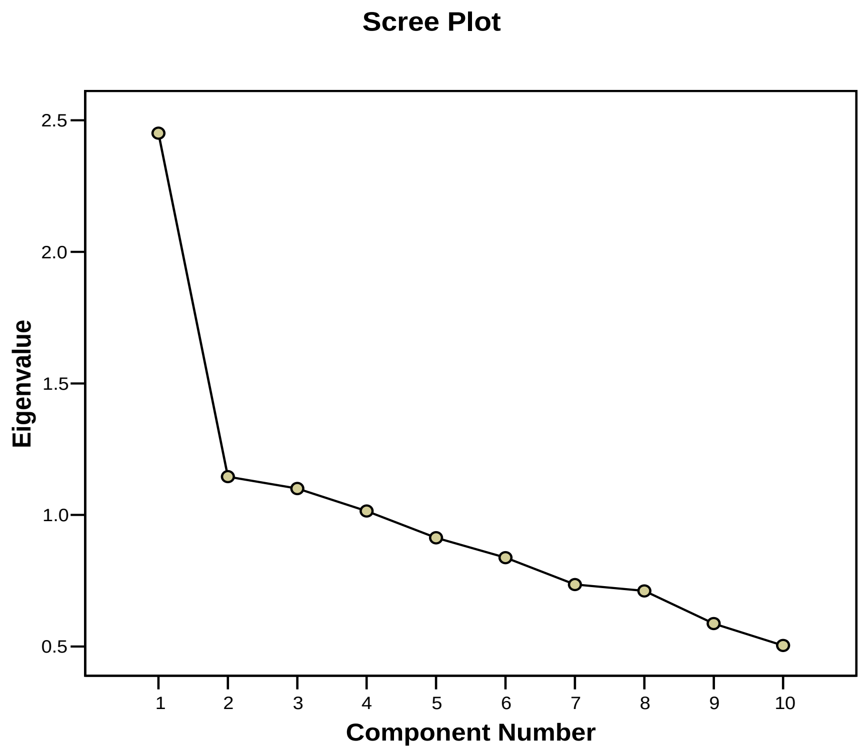
	Initial
SS01	1.000
SS02	1.000
SS03	1.000
SS04	1.000
SS05	1.000
SS06	1.000
SS07	1.000
SS08	1.000
SS09	1.000
SS10	1.000

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.451	24.510	24.510	2.186	21.858	21.858
2	1.145	11.454	35.964	1.346	13.460	35.318
3	1.100	11.002	46.966	1.152	11.520	46.838
4	1.015	10.148	57.114	1.028	10.276	57.114
5	.913	9.133	66.247			
6	.838	8.377	74.624			
7	.735	7.354	81.978			
8	.711	7.113	89.091			
9	.587	5.871	94.962			
10	.504	5.038	100.000			

Extraction Method: Principal Component Analysis.



Rotated Component Matrix(a)

	Component			
	1	2	3	4
SS03	.742	.023	.183	-.088
SS04	.705	.027	-.098	.148
SS01	.623	-.066	.091	.191
SS02	.545	.186	.059	-.349
SS06	.521	.507	-.007	.189
SS05	-.123	.836	.131	.091
SS09	.112	.096	.679	.014
SS07	.258	.441	-.587	-.250
SS08	.229	.353	.523	-.287
SS10	.192	.147	.021	.806

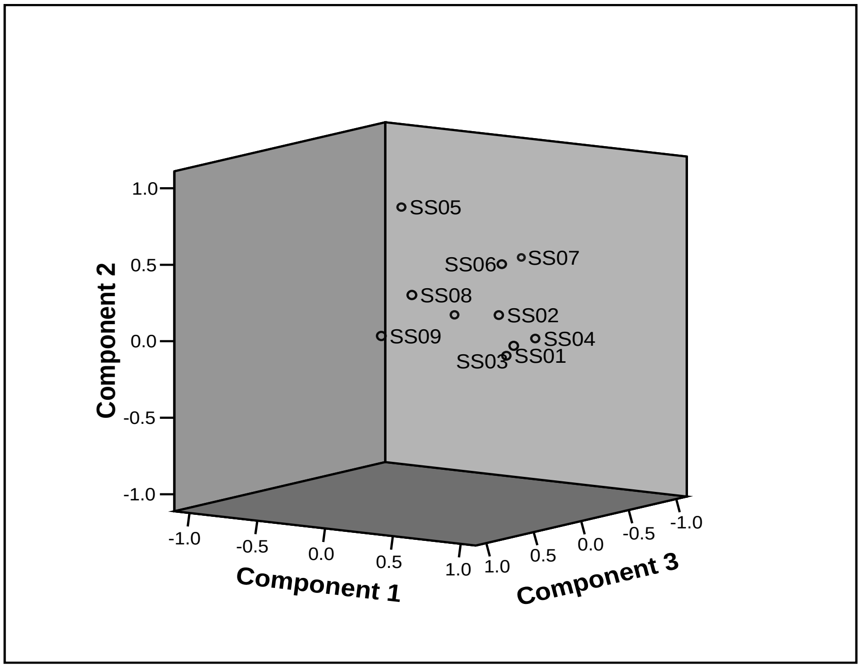
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
a Rotation converged in 9 iterations.

Component Transformation Matrix

Component	1	2	3	4
1	.895	.414	.161	.053
2	-.392	.641	.613	-.244
3	-.137	.611	-.772	-.110
4	-.164	.210	.058	.962

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

Component Plot in Rotated Space



Confirmatory Factor Analysis on the Complete Australian Dataset
Subset to Final Factor PAF/Oblimin Reduction

Output Created		30-OCT-2007 10:04:13
Comments		
Input	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	435
Missing Value Handling	Definition of Missing	MISSING=EXCLUDE: User-defined missing values are treated as missing.
	Cases Used	LISTWISE: Statistics are based on cases with no missing values for any variable used.
Syntax		FACTOR /VARIABLES SS01 SS02 SS03 SS04 SS05 SS06 SS07 SS08 SS09 SS10 /MISSING LISTWISE /ANALYSIS SS01 SS02 SS03 SS04 SS05 SS06 SS07 SS08 SS09 SS10 /PRINT UNIVARIATE INITIAL CORRELATION SIG DET KMO ROTATION /FORMAT SORT /PLOT EIGEN ROTATION /CRITERIA MINEIGEN(1) ITERATE(25) /EXTRACTION PAF /CRITERIA ITERATE(25) DELTA(0) /ROTATION OBLIMIN /METHOD=CORRELATION .
Resources	Elapsed Time	0:00:00.05
	Maximum Memory Required	13480 (13.164K) bytes

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
SS01	2.6529	.41042	435
SS02	2.2455	.45467	435
SS03	2.5154	.58595	435
SS04	2.1821	.52658	435
SS05	2.3747	.67274	435
SS06	2.2552	.44431	435
SS07	1.7977	.66892	435
SS08	2.8092	1.11252	435
SS09	2.8345	.40476	435
SS10	2.7467	.35960	435

KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.731
Bartlett's Test of Sphericity	Approx. Chi-Square	426.169
	df	45
	Sig.	.000

Communalities

	Initial
SS01	.153
SS02	.159
SS03	.306
SS04	.255
SS05	.083
SS06	.264
SS07	.076
SS08	.123
SS09	.045
SS10	.045

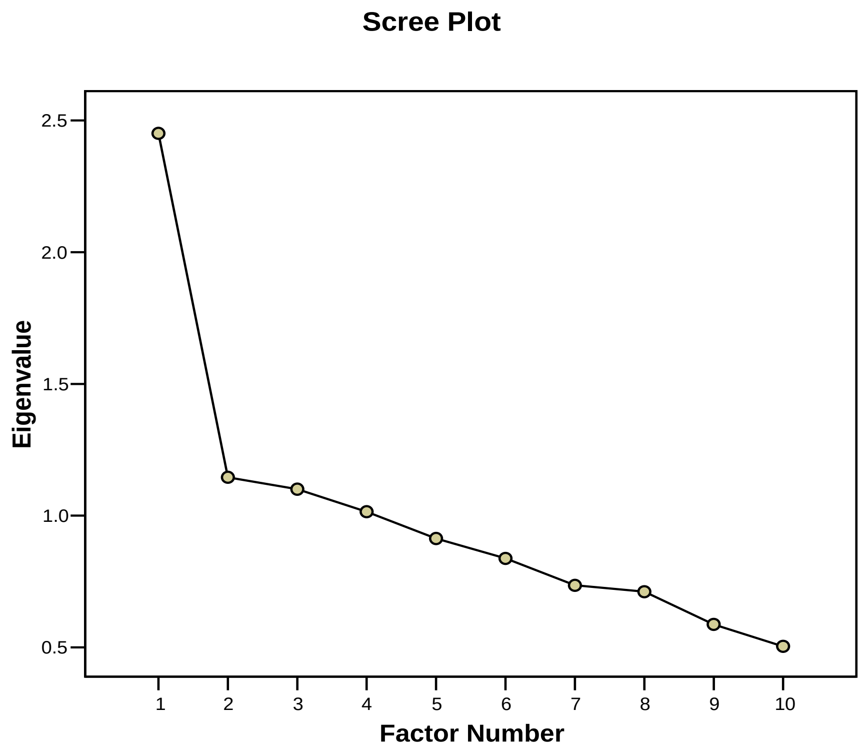
Extraction Method: Principal Axis Factoring.

Total Variance Explained

	Total	% of Variance	Cumulative %	Total
1	2.451	24.510	24.510	1.570
2	1.145	11.454	35.964	.560
3	1.100	11.002	46.966	1.097
4	1.015	10.148	57.114	.505
5	.913	9.133	66.247	
6	.838	8.377	74.624	
7	.735	7.354	81.978	
8	.711	7.113	89.091	
9	.587	5.871	94.962	
10	.504	5.038	100.000	

Extraction Method: Principal Axis Factoring.

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



Pattern Matrix(a)

	Factor			
	1	2	3	4
SS04	.642	.088	-.032	-.094
SS06	.502	.146	.041	.355
SS03	.491	.002	.379	-.209
SS01	.414	.028	.100	-.071
SS10	.243	-.042	-.044	.086
SS07	.033	.610	-.002	.107
SS08	-.090	-.030	.589	.120
SS02	.156	.202	.358	-.049
SS09	.092	-.125	.160	.090
SS05	-.010	.067	.097	.450

Extraction Method: Principal Axis Factoring. Rotation Method: Oblimin with Kaiser Normalization.
a Rotation converged in 20 iterations.

Structure Matrix

	Factor			
	1	2	3	4
SS04	.629	.192	.214	.000
SS03	.612	.108	.538	-.058
SS06	.598	.221	.320	.439
SS01	.447	.102	.255	.013
SS10	.232	-.008	.068	.117
SS07	.148	.613	.068	.099
SS08	.163	-.012	.574	.219
SS02	.325	.249	.423	.039
SS09	.151	-.103	.207	.138
SS05	.111	.061	.183	.465

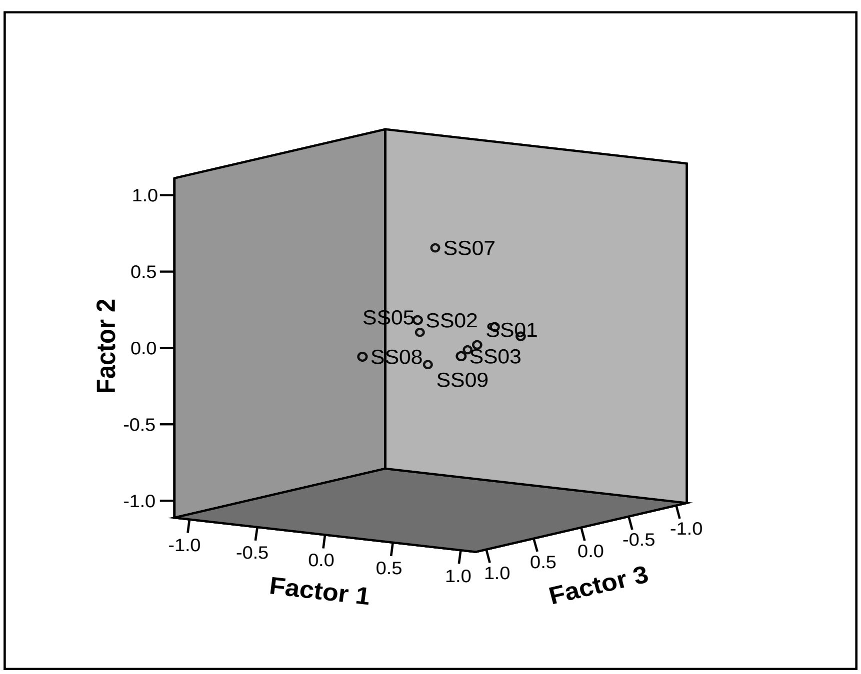
Extraction Method: Principal Axis Factoring. Rotation Method: Oblimin with Kaiser Normalization.

Factor Correlation Matrix

Factor	1	2	3	4
1	1.000	.160	.404	.159
2	.160	1.000	.058	-.022
3	.404	.058	1.000	.192
4	.159	-.022	.192	1.000

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

Factor Plot in Rotated Factor Space



Confirmatory Correlation Analysis on the Complete Australian Dataset

Notes

Output Created		30-OCT-2007 10:05:33
Comments		
Input	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	435
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each pair of variables are based on all the cases with valid data for that pair.
Syntax		CORRELATIONS /VARIABLES=SS01 SS02 SS03 SS04 SS05 SS06 SS07 SS08 SS09 SS10 /PRINT=TWOTAIL NOSIG /STATISTICS DESCRIPTIVES /MISSING=PAIRWISE .
Resources	Elapsed Time	0:00:00.02

Descriptive Statistics

	Mean	Std. Deviation	N
SS01	2.6529	.41042	435
SS02	2.2455	.45467	435
SS03	2.5154	.58595	435
SS04	2.1821	.52658	435
SS05	2.3747	.67274	435
SS06	2.2552	.44431	435
SS07	1.7977	.66892	435
SS08	2.8092	1.11252	435
SS09	2.8345	.40476	435
SS10	2.7467	.35960	435

Correlations

		SS01	SS02	SS03	SS04	SS05	SS06	SS07	SS08	SS09	SS10
SS01	Pearson Correlation	1	.212(**)	**.286(**)**	.282(**)	.012	.245(**)	.085	.103(*)	.114(*)	.142(**)
	Sig. (2-tailed)		.000	.000	.000	.804	.000	.076	.031	.017	.003
	N	435	435	435	435	435	435	435	435	435	435
SS02	Pearson Correlation	.212(**)	1	**.315(**)**	.179(**)	.064	.240(**)	.170(**)	.207(**)	.079	.056
	Sig. (2-tailed)	.000		.000	.000	.186	.000	.000	.000	.099	.241
	N	435	435	435	435	435	435	435	435	435	435
SS03	Pearson Correlation	.286(**)	.315(**)	1	**.418(**)**	.034	.332(**)	.065	.263(**)	.088	.094
	Sig. (2-tailed)	.000	.000		.000	.474	.000	.176	.000	.067	.050
	N	435	435	435	435	435	435	435	435	435	435
SS04	Pearson Correlation	.282(**)	.179(**)	**.418(**)**	1	.040	.345(**)	.151(**)	.061	.083	.114(*)
	Sig. (2-tailed)	.000	.000	.000		.404	.000	.002	.207	.083	.018
	N	435	435	435	435	435	435	435	435	435	435
SS05	Pearson Correlation	.012	.064	.034	.040	1	**.239(**)**	.092	.154(**)	.079	.043
	Sig. (2-tailed)	.804	.186	.474	.404		.000	.055	.001	.102	.373
	N	435	435	435	435	435	435	435	435	435	435
SS06	Pearson Correlation	.245(**)	.240(**)	.332(**)	**.345(**)**	.239(**)	1	.200(**)	.174(**)	.113(*)	.175(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000	.000	.019	.000
	N	435	435	435	435	435	435	435	435	435	435
SS07	Pearson Correlation	.085	.170(**)	.065	.151(**)	.092	**.200(**)**	1	.029	-.052	.007
	Sig. (2-tailed)	.076	.000	.176	.002	.055	.000		.553	.283	.888
	N	435	435	435	435	435	435	435	435	435	435
SS08	Pearson Correlation	.103(*)	.207(**)	**.263(**)**	.061	.154(**)	.174(**)	.029	1	.136(**)	.046
	Sig. (2-tailed)	.031	.000	.000	.207	.001	.000	.553		.005	.339

	N	435	435	435	435	435	435	435	435	435	435
SS09	Pearson Correlation	.114(*)	.079	.088	.083	.079	.113(*)	-.052	**.136(**)**	1	.011
	Sig. (2-tailed)	.017	.099	.067	.083	.102	.019	.283	.005		.823
	N	435	435	435	435	435	435	435	435	435	435
SS10	Pearson Correlation	.142(**)	.056	.094	.114(*)	.043	**.175(**)**	.007	.046	.011	1
	Sig. (2-tailed)	.003	.241	.050	.018	.373	.000	.888	.339	.823	
	N	435	435	435	435	435	435	435	435	435	435

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Appendix E: Exploratory Analysis SPSS Data

Exploratory Analysis on the Complete Australian Dataset Statement to Subset Reduction

Output Created		04-APR-2008 13:18:34
Comments		
Input	Data	C:\Documents and Settings\dcolbeck.COMPUTING\Desktop\ExpOutput 040408\Exp_PAF\exp34_PAF_040408.sav
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	435
Missing Value Handling	Definition of Missing	MISSING=EXCLUDE: User-defined missing values are treated as missing.
	Cases Used	LISTWISE: Statistics are based on cases with no missing values for any variable used.
Syntax		FACTOR /VARIABLES VAR01 VAR02 VAR03 VAR04 VAR05 VAR06 VAR07 VAR08 VAR09 VAR10 VAR11 VAR12 VAR13 VAR14 VAR15 VAR16 VAR17 VAR18 VAR19 VAR20 VAR21 VAR22 VAR23 VAR24 VAR25 VAR26 VAR27 VAR28 VAR29 VAR30 VAR31 VAR32 VAR33 VAR34 /MISSING LISTWISE /ANALYSIS VAR01 VAR02 VAR03 VAR04 VAR05 VAR06 VAR07 VAR08 VAR09 VAR10 VAR11 VAR12 VAR13 VAR14 VAR15 VAR16 VAR17 VAR18 VAR19 VAR20 VAR21 VAR22 VAR23 VAR24 VAR25 VAR26 VAR27 VAR28 VAR29 VAR30 VAR31 VAR32 VAR33 VAR34 /PRINT UNIVARIATE INITIAL CORRELATION SIG DET KMO EXTRACTION ROTATION FSCORE /FORMAT SORT /PLOT EIGEN ROTATION /CRITERIA MINEIGEN(1) ITERATE(250) /EXTRACTION PAF /CRITERIA ITERATE(250) DELTA(0) /ROTATION OBLIMIN /METHOD=CORRELATION .
Resources	Elapsed Time	0:00:00.45
	Maximum Memory Required	133672 (130.539K) bytes

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
VAR01	2.2115	.66260	435
VAR02	2.5655	1.03051	435
VAR03	2.0874	.64879	435
VAR04	2.9149	1.15588	435
VAR05	2.2897	.65378	435
VAR06	3.8506	1.01064	435
VAR07	2.3747	.97186	435
VAR08	2.0529	.66821	435
VAR09	2.0529	.66128	435
VAR10	2.4069	1.04173	435
VAR11	2.3402	.96916	435
VAR12	2.1931	.68523	435
VAR13	2.6184	.94632	435
VAR14	2.8138	1.16389	435
VAR15	2.6667	1.27061	435
VAR16	1.9126	.74469	435
VAR17	1.5057	.61983	435
VAR18	2.5494	1.12131	435
VAR19	2.0506	.68035	435
VAR20	2.6989	1.11499	435
VAR21	1.9356	.66200	435
VAR22	2.8782	.99601	435
VAR23	1.7586	.93036	435
VAR24	2.3540	.64665	435
VAR25	1.7977	.66892	435
VAR26	2.8092	1.11252	435
VAR27	1.9195	.65498	435
VAR28	4.1034	.80658	435
VAR29	2.4713	.99352	435
VAR30	3.8690	.90764	435
VAR31	1.8598	.66935	435
VAR32	1.9080	.90355	435
VAR33	1.9747	.69680	435
VAR34	4.1218	.90892	435

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.755
Bartlett's Test of Sphericity	Approx. Chi-Square	1997.079
	df	561
	Sig.	.000

Communalities

	Initial	Extraction
VAR01	.090	.118
VAR02	.119	.274
VAR03	.161	.253
VAR04	.133	.216
VAR05	.140	.183
VAR06	.136	.150
VAR07	.127	.133
VAR08	.121	.236
VAR09	.150	.212
VAR10	.214	.353
VAR11	.297	.425
VAR12	.226	.291
VAR13	.275	.400
VAR14	.196	.247
VAR15	.197	.390
VAR16	.179	.216
VAR17	.214	.244
VAR18	.204	.361
VAR19	.139	.181
VAR20	.166	.522
VAR21	.214	.302
VAR22	.232	.315
VAR23	.257	.503
VAR24	.141	.228
VAR25	.268	.344
VAR26	.228	.611
VAR27	.215	.259
VAR28	.346	.538
VAR29	.190	.303
VAR30	.290	.442
VAR31	.295	.893
VAR32	.320	.360
VAR33	.235	.261
VAR34	.316	.397

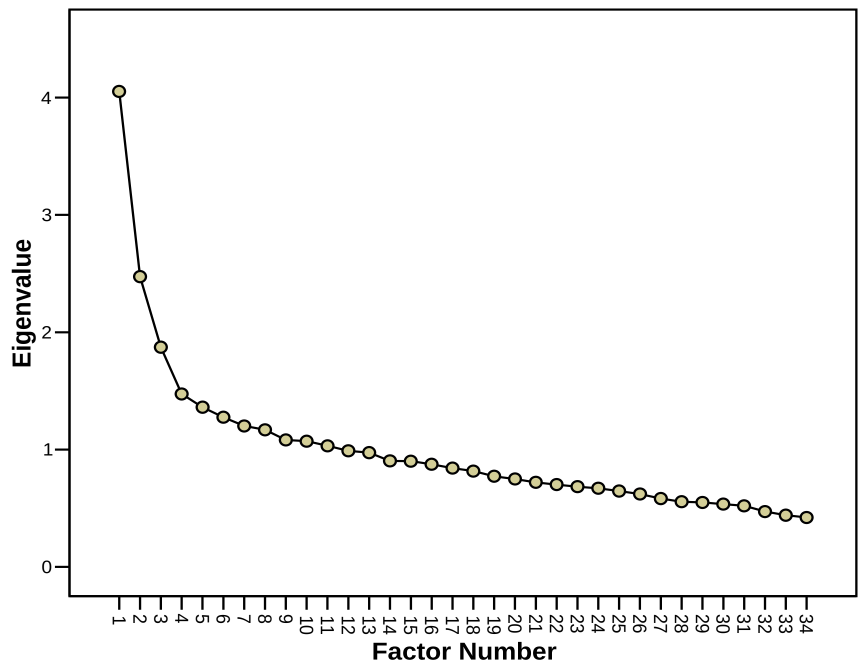
Extraction Method: Principal Axis Factoring.

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings (a)
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	4.052	11.918	11.918	3.439	10.115	10.115	1.586
2	2.474	7.276	19.194	1.805	5.310	15.425	1.421
3	1.872	5.507	24.701	1.221	3.591	19.016	1.684
4	1.474	4.335	29.036	.921	2.710	21.726	2.228
5	1.361	4.003	33.038	.749	2.202	23.928	1.340
6	1.275	3.751	36.789	.624	1.834	25.762	1.433
7	1.201	3.533	40.323	.586	1.722	27.484	.911
8	1.169	3.437	43.760	.538	1.583	29.067	.915
9	1.082	3.181	46.941	.496	1.457	30.524	1.498
10	1.071	3.151	50.092	.409	1.203	31.727	1.108
11	1.032	3.034	53.126	.370	1.089	32.816	1.223
12	.989	2.909	56.035				
13	.974	2.864	58.899				
14	.903	2.656	61.555				
15	.901	2.649	64.204				
16	.874	2.572	66.776				
17	.842	2.475	69.251				
18	.816	2.401	71.652				
19	.773	2.272	73.924				
20	.749	2.203	76.127				
21	.721	2.119	78.246				
22	.701	2.063	80.309				
23	.684	2.011	82.320				
24	.670	1.972	84.292				
25	.646	1.900	86.192				
26	.621	1.827	88.019				
27	.582	1.712	89.731				
28	.555	1.633	91.364				
29	.549	1.615	92.979				
30	.535	1.572	94.551				
31	.520	1.529	96.081				
32	.471	1.386	97.466				
33	.440	1.295	98.761				
34	.421	1.239	100.000				

Extraction Method: Principal Axis Factoring.
a When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Scree Plot



Factor Matrix(a)

	Factor										
	1	2	3	4	5	6	7	8	9	10	11
VAR 31	.575	-.026	.087	.539	-.300	-.113	.121	-.355	-.138	-.026	.030
VAR 32	.515	-.071	-.204	-.013	-.069	-.111	.118	-.018	-.044	-.117	-.033
VAR 23	.431	.097	-.097	-.190	.109	-.215	.402	.153	-.024	-.015	-.137
VAR 30	-.429	.109	.380	.019	.137	-.102	.143	.077	-.159	-.144	-.006
VAR 17	.426	-.159	.046	-.091	.035	.057	.073	.052	-.063	.100	.005
VAR 11	.412	.339	-.016	-.210	-.165	-.041	-.097	.082	-.169	.146	.039
VAR 34	-.412	.247	.341	.043	-.096	.007	.139	-.051	.097	.088	.005
VAR 25	.400	-.301	.153	-.026	.168	-.034	-.071	.004	-.106	.012	-.153
VAR 27	.399	.020	.036	.001	.211	.021	.060	-.016	.004	-.140	.172
VAR 21	.386	-.110	.263	-.031	.143	.153	.024	-.066	.086	.070	-.098
VAR 33	.367	-.116	.061	.250	-.106	-.112	.048	.121	.003	.054	.049
VAR 16	.358	-.129	.196	-.033	.073	.012	-.046	-.018	-.011	-.102	-.116
VAR 10	.301	.284	-.051	.005	-.016	-.165	-.236	.186	-.170	.181	.009
VAR 05	.258	-.152	.236	-.011	.064	.031	-.117	.123	-.011	-.004	.054
VAR 07	.241	.145	.036	-.106	-.015	-.071	-.107	-.068	.009	-.022	-.138

VAR 03	.210	-.188	.199	-.207	-.038	-.158	-.013	-.087	.167	.168	.031
VAR 13	.295	.461	.003	-.115	.011	.116	-.173	-.161	-.001	-.054	-.120
VAR 22	.168	.442	.033	.121	.137	.121	.011	-.061	-.105	.035	-.161
VAR 14	.207	.394	.075	-.082	-.014	-.026	.007	-.106	.035	-.014	.150
VAR 26	.318	.345	-.099	.206	.315	-.292	-.199	.015	.289	-.130	.116
VAR 06	.065	.345	.007	.026	.003	.013	-.035	.099	.016	-.118	.024
VAR 09	.183	-.261	.208	.032	-.031	-.088	-.062	.148	.170	.042	.035
VAR 19	.199	-.235	.040	.137	.083	.180	-.124	.001	-.055	.008	-.088
VAR 28	-.421	.266	.454	.207	-.020	-.088	-.084	.028	.012	.155	-.026
VAR 29	.207	-.049	-.328	-.063	-.142	.207	-.096	-.086	.237	.098	-.020
VAR 12	.324	-.130	.328	-.180	.062	-.091	.043	-.079	.082	.042	-.004
VAR 24	.227	-.217	.229	-.003	-.010	.176	-.040	-.031	.035	-.014	.204
VAR 15	.162	.282	.152	-.356	.032	.144	.139	-.204	-.084	.024	.209
VAR 20	.156	.213	-.115	.324	.366	.261	.226	.072	.085	.263	-.007
VAR 18	.256	.210	.035	.023	-.329	.028	.187	.205	.248	.033	.008
VAR 04	.207	.135	.208	.004	-.231	.099	-.105	.143	.009	-.023	-.128
VAR 01	.153	-.032	.143	.071	.027	.158	-.117	.067	-.010	-.137	.070
VAR 08	.221	-.037	-.070	.079	-.030	.121	-.008	.243	-.229	.025	.217
VAR 02	.132	.178	.150	.022	-.145	.240	.083	.167	.102	-.268	-.078

Extraction Method: Principal Axis Factoring.
a 11 factors extracted. 140 iterations required.

Pattern Matrix(a)

	Factor										
	1	2	3	4	5	6	7	8	9	10	11
VAR 23	.685	.045	.067	8.417 E-05	.029	-.038	.100	-.014	.057	-.067	.033
VAR 32	.343	.001	-.181	.262	.081	.039	-.104	.046	-.072	-.029	.000
VAR 17	.196	.070	-.103	.069	-.088	.151	.070	.145	.179	.005	.084
VAR 10	.013	.555	.001	.010	.124	-.003	.031	.132	.015	.080	-.037
VAR 11	.098	.496	-.093	.038	-.033	-.061	-.037	.112	.015	-.048	.241
VAR 07	.062	.182	-.056	.037	.078	.118	-.062	-.165	.021	-.059	.063
VAR 30	.011	-.099	.612	-.094	-.033	.013	-.022	-.013	-.043	-.061	.030
VAR 29	-.074	-.015	-.578	-.039	-.016	-.057	.052	-.062	.015	-.047	.007
VAR 28	-.356	.155	.463	.022	-.034	-.126	.144	-.155	.137	-.024	-.060
VAR 34	-.193	-.054	.323	-.010	-.130	-.246	.119	-.186	.096	-.107	.104
VAR 31	-.069	-.054	.023	1.035	-.013	-.030	-.006	-.063	-.145	.058	.023

VAR 33	.076	.061	.012	.335	.048	-.055	.046	.140	.144	-.030	-.171
VAR 26	-.007	.061	-.044	.031	.755	-.076	.103	-.110	.083	.077	-.096
VAR 27	.141	-.114	-.008	.086	.267	.106	.050	.158	.054	-.002	.186
VAR 06	.003	.112	.057	-.043	.186	-.079	.033	.011	-.119	-.186	.057
VAR 25	.162	.060	.019	.087	-.016	.424	-.009	.021	.186	.056	-.070
VAR 19	-.082	-.023	-.106	.080	-.050	.322	.080	.074	.018	-.018	-.107
VAR 16	.106	-.003	.023	.100	.049	.299	-.046	-.040	.137	-.113	.016
VAR 21	.048	-.043	-.049	.060	-.023	.290	.183	-.065	.276	-.088	.113
VAR 20	.064	-.065	-.072	-.017	.073	.021	.703	.078	-.037	.066	-.023
VAR 22	.014	.193	.078	.081	.059	.139	.289	-.128	-.226	-.087	.123
VAR 08	.031	.139	-.013	.045	-.037	-.008	.037	.459	-.070	-.020	.023
VAR 03	.040	.039	-.066	.019	-.020	-.018	-.077	-.106	.458	.106	.095
VAR 09	-.009	-.017	-.001	.019	.063	.017	-.041	.061	.393	-.069	-.165
VAR 12	.115	-.009	.075	.064	.017	.137	-.037	-.079	.392	-.004	.169
VAR 05	-.028	.066	.050	-.004	.058	.185	-.018	.154	.250	-.070	-.005
VAR 24	-.146	-.133	-.054	.099	-.012	.096	-.018	.196	.238	-.053	.169
VAR 02	.050	-.100	.012	-.015	.013	.006	.005	.011	-.078	-.534	.024
VAR 18	.130	.060	-.134	.100	-.027	-.364	.081	-.001	.163	-.386	-.029
VAR 04	-.058	.222	.001	.063	-.087	.047	-.035	-.020	.071	-.346	-.030
VAR 01	-.120	-.039	.006	.024	.093	.151	-.019	.139	.022	-.168	.031
VAR 15	.045	.019	.018	-.046	-.055	-.052	.016	.046	.039	.005	.625
VAR 14	-.026	.118	.012	.085	.185	-.151	.030	-.034	.006	-.041	.327
VAR 13	-.061	.250	-.143	.015	.147	.141	.044	-.205	-.153	-.151	.273

Extraction Method: Principal Axis Factoring. Rotation Method: Oblimin with Kaiser Normalization.
a Rotation converged in 49 iterations.

Structure Matrix

	Factor										
	1	2	3	4	5	6	7	8	9	10	11
VAR 23	.685	.185	-.113	.198	.169	.033	.116	.025	.124	-.095	.162
VAR 32	.465	.135	-.354	.401	.198	.163	-.053	.153	.091	-.085	.072
VAR 17	.295	.105	-.223	.271	.025	.273	.052	.226	.287	-.074	.122
VAR 11	.239	.568	-.180	.210	.166	.002	.035	.072	.050	-.207	.346
VAR 10	.128	.559	-.077	.161	.259	.024	.090	.103	.007	-.069	.076
VAR 07	.135	.251	-.100	.130	.160	.124	-.021	-.130	.063	-.122	.157
VAR 30	-.195	-.155	.645	-.272	-.107	-.103	-.016	-.117	-.093	-.003	-.001

VAR 28	-.466	.075	.576	-.163	-.087	-.223	.152	-.255	-.005	-.060	-.059
VAR 29	.056	.031	-.530	.078	.011	-.002	.034	.001	.006	-.043	.016
VAR 34	-.319	-.073	.445	-.203	-.181	-.324	.116	-.292	-.038	-.090	.075
VAR 31	.145	.134	-.195	.924	.167	.167	.120	.111	.132	-.151	.050
VAR 33	.172	.114	-.119	.432	.122	.097	.074	.237	.245	-.121	-.122
VAR 26	.124	.241	-.084	.180	.751	.001	.209	-.067	.012	-.055	.057
VAR 27	.240	.021	-.119	.247	.337	.232	.104	.217	.144	-.103	.233
VAR 06	.008	.205	.059	.001	.242	-.097	.116	-.031	-.146	-.228	.139
VAR 25	.239	.053	-.120	.278	.058	.502	-.037	.160	.342	-.004	-.013
VAR 21	.136	.025	-.118	.262	.073	.387	.166	.052	.368	-.179	.182
VAR 16	.173	.060	-.080	.259	.123	.373	-.030	.073	.271	-.169	.092
VAR 19	-.025	-.048	-.151	.180	-.011	.357	.062	.181	.127	-.042	-.100
VAR 20	.079	.009	-.076	.096	.177	.030	.698	.101	-.100	-.021	.029
VAR 22	.041	.302	.052	.118	.219	.070	.374	-.138	-.210	-.196	.237
VAR 08	.087	.127	-.102	.157	.049	.080	.065	.449	.003	-.086	.009
VAR 12	.192	.044	-.008	.217	.065	.259	-.057	-.004	.459	-.090	.217
VAR 03	.129	.036	-.097	.131	-.027	.101	-.134	-.054	.455	.047	.105
VAR 09	.036	-.035	-.042	.161	.029	.143	-.080	.144	.415	-.088	-.139
VAR 24	-.055	-.111	-.090	.204	.004	.239	-.026	.260	.321	-.123	.130
VAR 05	.035	.063	-.015	.167	.092	.284	-.023	.218	.319	-.137	.031
VAR 02	.017	.030	.006	.084	.084	.024	.079	.040	-.015	-.508	.114
VAR 18	.175	.195	-.159	.225	.066	-.248	.128	.016	.147	-.418	.070
VAR 04	-.019	.267	-.025	.177	.018	.079	.014	.014	.129	-.394	.069
VAR 01	-.078	-.002	-.018	.117	.119	.205	.017	.183	.092	-.205	.053
VAR 15	.111	.127	.008	-.001	.055	-.007	.057	-.037	.043	-.108	.615
VAR 13	.055	.400	-.148	.122	.305	.110	.149	-.204	-.125	-.274	.405
VAR 14	.067	.261	-.006	.127	.279	-.099	.119	-.081	-.014	-.174	.390

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

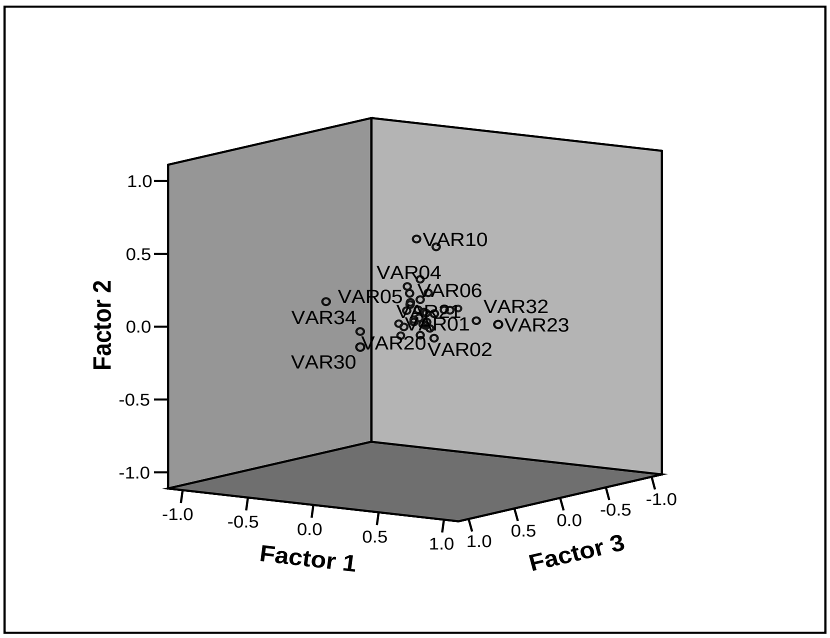
Factor Correlation Matrix

Factor	1	2	3	4	5	6	7	8	9	10	11
1	1.000	.155	-.262	.243	.156	.089	-.001	.072	.128	.013	.135
2	.155	1.000	-.081	.196	.253	-.024	.095	-.068	-.023	-.218	.206
3	-.262	-.081	1.000	-.254	-.073	-.137	.027	-.144	-.063	.013	-.017
4	.243	.196	-.254	1.000	.206	.252	.118	.204	.296	-.232	.061
5	.156	.253	-.073	.206	1.000	.104	.166	.045	-.029	-.158	.179
6	.089	-.024	-.137	.252	.104	1.000	-.017	.210	.275	-.062	.067

7	-.001	.095	.027	.118	.166	-.017	1.000	.008	-.112	-.135	.091
8	.072	-.068	-.144	.204	.045	.210	.008	1.000	.132	-.064	-.103
9	.128	-.023	-.063	.296	-.029	.275	-.112	.132	1.000	-.106	.035
10	.013	-.218	.013	-.232	-.158	-.062	-.135	-.064	-.106	1.000	-.198
11	.135	.206	-.017	.061	.179	.067	.091	-.103	.035	-.198	1.000

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

Factor Plot in Rotated Factor Space



Factor Score Coefficient Matrix

	Factor										
	1	2	3	4	5	6	7	8	9	10	11
VAR 01	-.063	-.024	.004	.010	.054	.086	-.005	.102	.011	-.106	.020
VAR 02	-.011	-.051	.011	.010	.038	.019	.016	.033	-.038	-.338	.019
VAR 03	.028	.015	-.035	.032	-.030	-.019	-.048	-.084	.240	.073	.047
VAR 04	-.043	.117	-.003	.028	-.036	.033	-.010	-.003	.041	-.208	-.023
VAR 05	-.030	.019	.025	.037	.032	.103	-.009	.107	.115	-.055	-.003
VAR 06	-.006	.048	.032	-.001	.082	-.032	.018	.019	-.061	-.104	.028
VAR 07	.016	.080	-.018	.005	.019	.057	-.029	-.101	.008	-.027	.028
VAR 08	-.013	.054	.008	.016	.010	.001	.023	.307	-.031	-.034	-.004
VAR 09	-.009	-.010	.000	.035	.023	.013	-.027	.052	.192	-.048	-.084
VAR 10	.001	.326	.015	.028	.063	-.009	.014	.087	-.004	.038	-.043
VAR 11	.063	.326	-.044	.019	-.026	-.049	-.030	.059	.004	-.036	.143
VAR 12	.053	-.007	.037	.021	.006	.077	-.037	-.063	.221	-.006	.097

VAR 13	-.039	.160	-.072	.000	.101	.104	.025	-.185	-.109	-.124	.193
VAR 14	-.005	.055	.013	.000	.082	-.072	.011	-.022	.000	-.034	.178
VAR 15	.020	-.015	.018	-.010	-.001	-.029	.015	.011	.018	.007	.412
VAR 16	.029	-.002	.018	.021	.025	.157	-.025	-.013	.073	-.074	.013
VAR 17	.070	.025	-.034	.017	-.034	.074	.030	.082	.096	-.002	.038
VAR 18	.062	.044	-.073	.041	-.028	-.235	.051	.001	.108	-.264	-.034
VAR 19	-.060	-.013	-.040	.023	-.017	.164	.041	.059	.019	-.028	-.055
VAR 20	.020	-.065	-.038	.005	.008	.007	.598	.095	-.051	.044	-.017
VAR 21	.000	-.034	-.021	.045	-.015	.174	.104	-.039	.150	-.069	.073
VAR 22	.006	.115	.039	-.007	.046	.086	.167	-.093	-.130	-.070	.074
VAR 23	.487	.045	.061	.034	.003	-.073	.066	-.067	.027	-.007	.026
VAR 24	-.086	-.083	-.020	.037	.007	.070	-.009	.148	.128	-.055	.087
VAR 25	.072	.029	.025	.021	-.005	.257	-.019	.009	.119	.032	-.042
VAR 26	-.002	.053	.001	.008	.633	-.048	.050	-.087	.034	.038	-.051
VAR 27	.040	-.076	.018	.017	.133	.069	.024	.128	.026	-.018	.106
VAR 28	-.239	.137	.297	.003	-.035	-.076	.138	-.119	.108	-.046	-.054
VAR 29	-.053	-.008	-.268	-.011	-.033	-.038	.033	-.059	.013	-.031	-.001
VAR 30	.016	-.063	.360	-.026	.018	.029	-.020	.012	-.036	-.045	.035
VAR 31	-.043	-.023	-.008	.813	-.014	-.007	.040	-.031	-.056	.008	.002
VAR 32	.172	.003	-.074	.052	.040	.011	-.067	.031	-.022	-.012	-.006
VAR 33	.034	.039	.007	.057	.025	-.027	.024	.109	.095	-.036	-.105
VAR 34	-.083	-.028	.140	-.019	-.066	-.145	.083	-.143	.062	-.073	.076

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

Factor Score Covariance Matrix

Factor	1	2	3	4	5	6	7	8	9	10	11
1	1.052	.327	.902	-.090	.497	1.909	.441	.281	.296	1.973	.999
2	.327	1.266	-.339	.454	1.809	1.446	.050	-.435	2.037	.755	1.596
3	.902	-.339	2.362	-.323	.427	.486	2.890	.532	-.527	1.246	1.030
4	-.090	.454	-.323	1.876	.367	1.263	-.074	.884	2.115	.127	.210
5	.497	1.809	.427	.367	3.280	.920	.681	-.771	3.409	-.069	2.741
6	1.909	1.446	.486	1.263	.920	3.591	-.221	.735	.991	2.866	1.791
7	.441	.050	2.890	-.074	.681	-.221	3.015	.425	.582	-.529	1.498
8	.281	-.435	.532	.884	-.771	.735	.425	.963	.244	.247	-.070
9	.296	2.037	-.527	2.115	3.409	.991	.582	.244	5.683	.102	.531
10	1.973	.755	1.246	.127	-.069	2.866	-.529	.247	.102	2.959	.831
11	.999	1.596	1.030	.210	2.741	1.791	1.498	-.070	.531	.831	3.542

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

Confirmatory Analysis on the Complete Australian Dataset Subset to Final Factors Reduction

Notes

Output Created		04-APR-2008 13:32:18
Comments		
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	Filter	<none>
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	Split File	<none>
	N of Rows in Working Data File	435
Missing Value Handling	Definition of Missing	MISSING=EXCLUDE: User-defined missing values are treated as missing.
	Cases Used	LISTWISE: Statistics are based on cases with no missing values for any variable used.
Syntax		FACTOR /VARIABLES SS1 SS2 SS3 SS4 SS5 SS6 SS7 SS8 SS9 SS10 SS11 /MISSING LISTWISE /ANALYSIS SS1 SS2 SS3 SS4 SS5 SS6 SS7 SS8 SS9 SS10 SS11 /PRINT UNIVARIATE INITIAL CORRELATION SIG DET KMO EXTRACTION ROTATION FSCORE /FORMAT SORT /PLOT EIGEN ROTATION /CRITERIA MINEIGEN(1) ITERATE(250) /EXTRACTION PAF /CRITERIA ITERATE(250) DELTA(0) /ROTATION OBLIMIN /METHOD=CORRELATION .
Resources	Elapsed Time	0:00:00.06
	Maximum Memory Required	16004 (15.629K) bytes

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
SS1	1.7207	.59342	435
SS2	2.3733	.69134	435
SS3	3.6655	.47612	435
SS4	1.9172	.56393	435
SS5	2.8577	.61902	435
SS6	2.3637	.35046	435
SS7	2.7885	.83216	435
SS8	2.0529	.66821	435
SS9	2.1752	.39047	435
SS10	2.5860	.60012	435
SS11	2.6977	.79081	435

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.689
Bartlett's Test of Sphericity	Approx. Chi-Square	604.602
	df	55
	Sig.	.000

Communalities

	Initial	Extraction
SS1	.292	.382
SS2	.198	.284
SS3	.216	.647
SS4	.192	.209
SS5	.162	.289
SS6	.166	.177
SS7	.124	.181
SS8	.054	.061
SS9	.352	.732
SS10	.244	.285
SS11	.184	.298

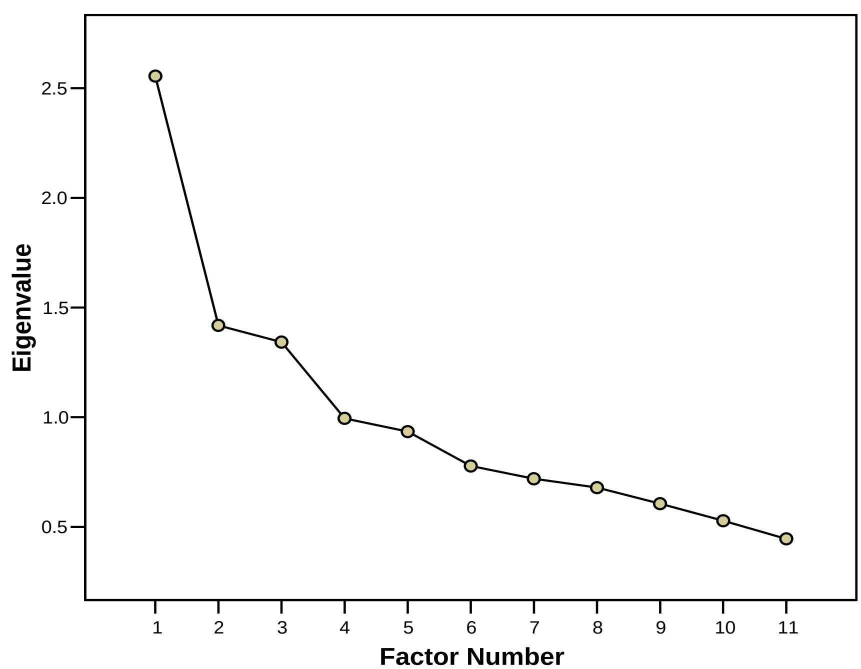
Extraction Method: Principal Axis Factoring.

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings (a)
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	2.555	23.228	23.228	1.941	17.646	17.646	1.410
2	1.418	12.893	36.122	.832	7.567	25.213	1.469
3	1.343	12.205	48.326	.772	7.018	32.231	1.249
4	.994	9.041	57.367				
5	.934	8.495	65.862				
6	.777	7.068	72.929				
7	.719	6.539	79.468				
8	.679	6.173	85.641				
9	.606	5.507	91.148				
10	.528	4.802	95.949				
11	.446	4.051	100.000				

Extraction Method: Principal Axis Factoring.
a When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Scree Plot



Factor Matrix(a)

	Factor		
	1	2	3
SS9	.665	.432	-.320
SS1	.576	-.184	-.129
SS2	.468	-.089	.240
SS10	.450	.282	.056
SS4	.448	-.031	-.086
SS5	.363	-.164	.360
SS8	.208	-.115	-.063
SS3	-.376	.609	.368
SS6	.261	.326	-.047
SS11	.340	-.029	.426
SS7	.209	-.074	.364

Extraction Method: Principal Axis Factoring.
a 3 factors extracted. 40 iterations required.

Pattern Matrix(a)

	Factor		
	1	2	3
SS3	-.843	.227	.103
SS1	.497	.185	.117
SS4	.298	.237	.082
SS8	.224	.029	.036
SS9	.202	.821	-.164
SS10	-.011	.471	.158
SS6	-.079	.437	-.019
SS11	-.052	.040	.546
SS5	.096	-.048	.517
SS7	-.049	-.053	.447
SS2	.162	.107	.421

Extraction Method: Principal Axis Factoring. Rotation Method: Oblimin with Kaiser Normalization.
a Rotation converged in 8 iterations.

Structure Matrix

	Factor		
	1	2	3
SS3	-.761	.049	-.056
SS1	.573	.339	.298
SS4	.377	.332	.226
SS8	.241	.094	.103
SS9	.360	.825	.117
SS10	.145	.513	.286
SS6	.022	.412	.081
SS11	.101	.178	.543
SS5	.220	.119	.529
SS2	.299	.263	.493
SS7	.055	.059	.419

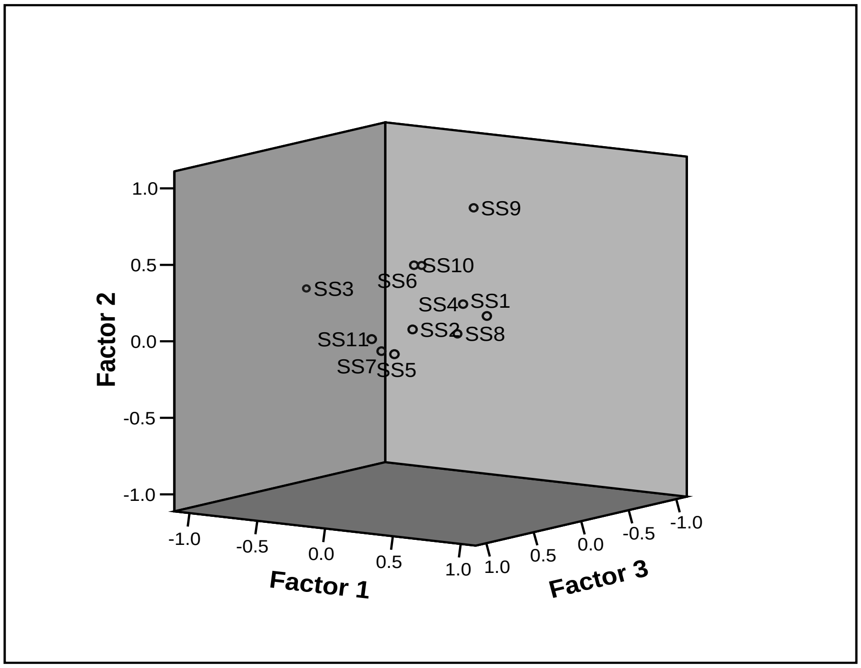
Extraction Method: Principal Axis Factoring. Rotation Method: Oblimin with Kaiser Normalization.

Factor Correlation Matrix

Factor	1	2	3
1	1.000	.244	.262
2	.244	1.000	.277
3	.262	.277	1.000

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

Factor Plot in Rotated Factor Space



Factor Score Coefficient Matrix

	Factor		
	1	2	3
SS1	.218	.077	.119
SS2	.085	.061	.244
SS3	-.608	.180	.055
SS4	.107	.102	.067
SS5	.060	.015	.291
SS6	-.013	.109	.012
SS7	.016	.026	.208
SS8	.066	.010	.027
SS9	.157	.683	-.082
SS10	.005	.136	.120
SS11	-.007	.035	.309

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

Factor Score Covariance Matrix

Factor	1	2	3
1	1.238	.976	1.976
2	.976	1.180	1.311
3	1.976	1.311	2.596

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

Correlation Analysis on the Complete Australian Dataset

Output Created		04-APR-2008 13:37:15
Comments		
Input	Data	C:\Documents and Settings\dcolbeck.COMPUTING\Desktop\ExpOutput 040408\Exp_PAF\exp11_PAF_040408.sav
	Filter	<none>
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	Split File	<none>
	N of Rows in Working Data File	435
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each pair of variables are based on all the cases with valid data for that pair.
Syntax		CORRELATIONS /VARIABLES=SS1 SS2 SS3 SS4 SS5 SS6 SS7 SS8 SS9 SS10 SS11 /PRINT=TWOTAIL NOSIG /MISSING=PAIRWISE .
Resources	Elapsed Time	0:00:00.03

Correlations

		SS1	SS2	SS3	SS4	SS5	SS6	SS7	SS8	SS9	SS10	SS11
SS1	Pearson Correlation	1	.266 (**)	-.372 (**)	.305 (**)	.182 (**)	.131 (**)	.105 (*)	.136 (**)	.342 (**)	.157 (**)	.142 (**)
	Sig. (2-tailed)		.000	.000	.000	.000	.006	.029	.005	.000	.001	.003
	N	435	435	435	435	435	435	435	435	435	435	435
SS2	Pearson Correlation	.266 (**)	1	-.138 (**)	.180 (**)	.252 (**)	.061	.135 (**)	.102 (*)	.196 (**)	.202 (**)	.325 (**)
	Sig. (2-tailed)	.000		.004	.000	.000	.201	.005	.034	.000	.000	.000
	N	435	435	435	435	435	435	435	435	435	435	435
SS3	Pearson Correlation	-.372 (**)	-.138 (**)	1	-.210 (**)	-.106 (*)	.121 (*)	.032	-.167 (**)	-.126 (**)	.022	-.015
	Sig. (2-tailed)	.000	.004		.000	.027	.011	.511	.000	.008	.642	.751
	N	435	435	435	435	435	435	435	435	435	435	435
SS4	Pearson Correlation	.305 (**)	.180 (**)	-.210 (**)	1	.172 (**)	.204 (**)	.121 (*)	.137 (**)	.259 (**)	.197 (**)	.020
	Sig. (2-tailed)	.000	.000	.000		.000	.000	.012	.004	.000	.000	.674
	N	435	435	435	435	435	435	435	435	435	435	435
SS5	Pearson Correlation	.182 (**)	.252 (**)	-.106 (*)	.172 (**)	1	.018	.252 (**)	.053	.058	.137 (**)	.269 (**)
	Sig. (2-tailed)	.000	.000	.027	.000		.715	.000	.267	.230	.004	.000
	N	435	435	435	435	435	435	435	435	435	435	435
SS6	Pearson Correlation	.131 (**)	.061	.121 (*)	.204 (**)	.018	1	.064	-.011	.326 (**)	.148 (**)	.031
	Sig. (2-tailed)	.006	.201	.011	.000	.715		.185	.812	.000	.002	.522
	N	435	435	435	435	435	435	435	435	435	435	435
SS7	Pearson Correlation	.105 (*)	.135 (**)	.032	.121 (*)	.252 (**)	.064	1	.070	-.046	.080	.216 (**)
	Sig. (2-tailed)	.029	.005	.511	.012	.000	.185		.146	.335	.096	.000
	N	435	435	435	435	435	435	435	435	435	435	435
SS8	Pearson Correlation	.136 (**)	.102 (*)	-.167 (**)	.137 (**)	.053	-.011	.070	1	.102 (*)	.089	.010
	Sig. (2-tailed)	.005	.034	.000	.004	.267	.812	.146		.033	.065	.838

	N	435	435	435	435	435	435	435	435	435	435	435
SS9	Pearson Correlation	.342 (**)	.196 (**)	-.126 (**)	.259 (**)	.058	.326 (**)	-.046	.102 (*)	1	.439 (**)	.108 (*)
	Sig. (2-tailed)	.000	.000	.008	.000	.230	.000	.335	.033		.000	.024
	N	435	435	435	435	435	435	435	435	435	435	435
SS10	Pearson Correlation	.157 (**)	.202 (**)	.022	.197 (**)	.137 (**)	.148 (**)	.080	.089	.439 (**)	1	.192 (**)
	Sig. (2-tailed)	.001	.000	.642	.000	.004	.002	.096	.065	.000		.000
	N	435	435	435	435	435	435	435	435	435	435	435
SS11	Pearson Correlation	.142 (**)	.325 (**)	-.015	.020	.269 (**)	.031	.216 (**)	.010	.108 (*)	.192 (**)	1
	Sig. (2-tailed)	.003	.000	.751	.674	.000	.522	.000	.838	.024	.000	
	N	435	435	435	435	435	435	435	435	435	435	435

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Appendix F: Gender Analysis SPSS Data

Analysis on the Female Gender Dataset

Statements to Subset Reduction

Notes

Output Created		21-APR-2008 15:31:04
Comments		
Input	Data	C:\Documents and Settings\dcolbeck.COMPUTING\Desktop\Final Data Collection 170408\Gender Analysis\Female Analysis\FemGender Analysis 210408.sav
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	269
Missing Value Handling	Definition of Missing	MISSING=EXCLUDE: User-defined missing values are treated as missing.
	Cases Used	LISTWISE: Statistics are based on cases with no missing values for any variable used.
Syntax		FACTOR /VARIABLES F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12 F13 F14 F15 F16 F17 F18 F19 F20 F21 F22 F23 F24 F25 F26 F27 F28 F29 F30 F31 F32 F33 F34 /MISSING LISTWISE /ANALYSIS F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12 F13 F14 F15 F16 F17 F18 F19 F20 F21 F22 F23 F24 F25 F26 F27 F28 F29 F30 F31 F32 F33 F34 /PRINT UNIVARIATE INITIAL CORRELATION SIG DET KMO EXTRACTION ROTATION FSCORE /FORMAT SORT /PLOT EIGEN ROTATION /CRITERIA MINEIGEN(1) ITERATE(500) /EXTRACTION PAF /CRITERIA ITERATE(500) DELTA(0) /ROTATION OBLIMIN /METHOD=CORRELATION .
Resources	Elapsed Time	0:00:02.16
	Maximum Memory Required	133672 (130.539K) bytes

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
F1	2.2268	.63236	269
F2	2.5316	1.00183	269
F3	2.1487	.64081	269
F4	2.8699	1.09006	269
F5	2.3123	.66290	269
F6	3.8625	1.02562	269
F7	2.3271	.96817	269
F8	2.0112	.66626	269
F9	2.0520	.66712	269
F10	2.3197	1.00837	269
F11	2.3160	.93070	269
F12	2.2305	.69570	269
F13	2.5056	.89201	269
F14	2.8030	1.14043	269
F15	2.6877	1.27515	269
F16	1.9033	.74184	269
F17	1.5019	.59616	269
F18	2.4684	1.04557	269
F19	2.0669	.68784	269
F20	2.6134	1.07515	269
F21	1.9926	.66351	269
F22	2.7881	.93626	269
F23	1.7398	.89731	269
F24	2.3606	.66921	269
F25	1.7770	.65965	269
F26	2.7212	1.08602	269
F27	1.9405	.64371	269
F28	4.1636	.77460	269
F29	2.4275	.97322	269
F30	3.9628	.84117	269
F31	1.7844	.65076	269
F32	1.8736	.92176	269
F33	1.9108	.69071	269
F34	4.2305	.89299	269

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.692
Bartlett's Test of Sphericity	Approx. Chi-Square	1393.971
	df	561
	Sig.	.000

Communalities

	Initial	Extraction
F1	.129	.171
F2	.180	.358
F3	.236	.345
F4	.231	.349
F5	.182	.211
F6	.186	.240
F7	.164	.236
F8	.222	.486
F9	.203	.226
F10	.216	.381
F11	.332	.492
F12	.230	.287
F13	.326	.431
F14	.237	.295
F15	.267	.400
F16	.249	.420
F17	.201	.193
F18	.260	.324
F19	.189	.323
F20	.225	.578
F21	.249	.310
F22	.282	.390
F23	.272	.394
F24	.191	.318
F25	.317	.470
F26	.276	.392
F27	.253	.435
F28	.339	.488
F29	.159	.234
F30	.281	.368
F31	.332	.437
F32	.334	.442
F33	.268	.370
F34	.315	.434

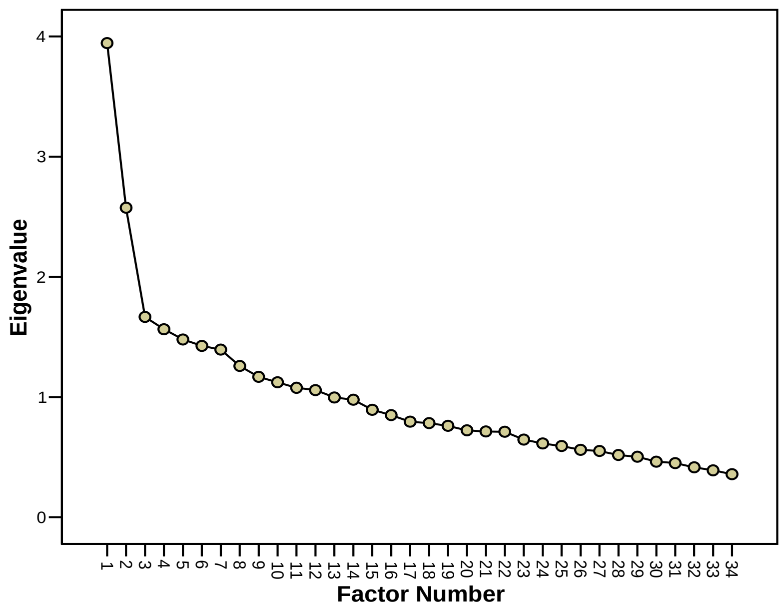
Extraction Method: Principal Axis Factoring.

Total Variance Explained

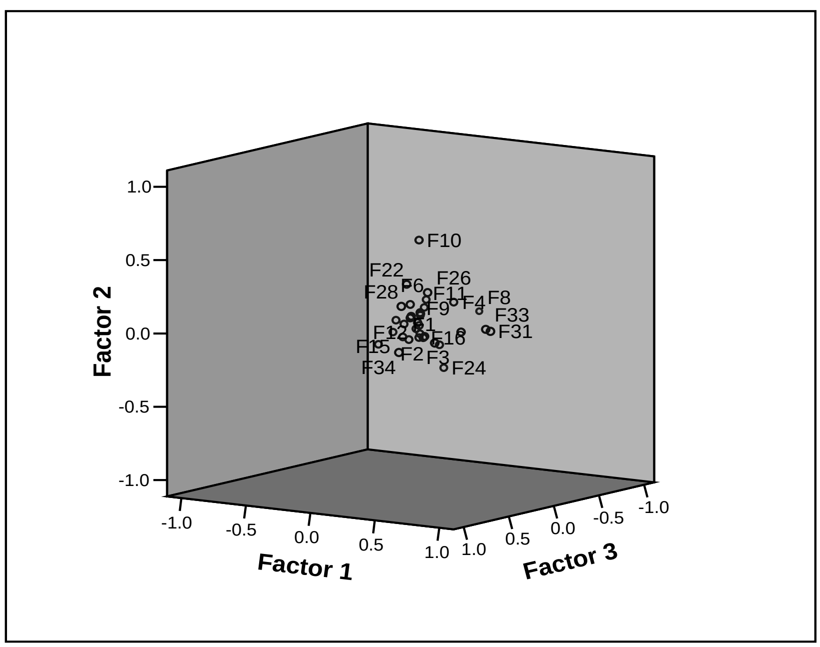
Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings (a)
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	3.944	11.601	11.601	3.326	9.781	9.781	1.765
2	2.575	7.574	19.175	1.953	5.744	15.525	1.162
3	1.667	4.902	24.077	1.047	3.081	18.605	1.219
4	1.565	4.602	28.679	.945	2.780	21.385	1.259
5	1.479	4.351	33.030	.865	2.544	23.929	1.245
6	1.426	4.194	37.223	.813	2.391	26.320	1.165
7	1.394	4.101	41.325	.753	2.215	28.535	.704
8	1.258	3.701	45.026	.637	1.874	30.409	1.660
9	1.168	3.436	48.462	.532	1.565	31.974	1.204
10	1.123	3.303	51.765	.510	1.499	33.473	1.715
11	1.077	3.167	54.932	.435	1.278	34.751	1.252
12	1.058	3.112	58.045	.412	1.212	35.963	1.459
13	.996	2.931	60.975				
14	.977	2.874	63.850				
15	.894	2.629	66.479				
16	.850	2.499	68.978				
17	.795	2.338	71.316				
18	.783	2.304	73.620				
19	.761	2.237	75.857				
20	.723	2.128	77.985				
21	.713	2.098	80.083				
22	.711	2.092	82.175				
23	.646	1.900	84.074				
24	.613	1.804	85.878				
25	.592	1.743	87.620				
26	.561	1.651	89.271				
27	.551	1.620	90.892				
28	.517	1.521	92.413				
29	.503	1.480	93.893				
30	.462	1.360	95.253				
31	.451	1.325	96.578				
32	.415	1.220	97.799				
33	.390	1.148	98.947				
34	.358	1.053	100.000				

Extraction Method: Principal Axis Factoring.
a When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Scree Plot



Factor Plot in Rotated Factor Space



Factor Matrix (a)

	Factor											
	1	2	3	4	5	6	7	8	9	10	11	12
F32	.518	-.113	-.122	-.038	.072	-.085	-.194	-.166	.129	.150	.167	-.023
F31	.488	-.027	.002	.257	.101	.089	.012	-.240	.008	.167	.046	.162
F21	.417	-.116	.190	.025	-.154	.082	.183	.059	-.116	.019	-.037	.059
F16	.412	-.148	.115	.053	-.066	-.128	.099	-.155	-.085	-.305	.106	.214
F23	.406	.165	.094	.026	-.092	.115	-.306	.023	.123	-.201	.077	-.122
F11	.401	.361	-.027	-.203	.245	.001	-.100	.257	-.090	.062	.101	.000
F30	-.384	.186	.260	.074	-.033	.055	.056	.228	.166	-.106	.111	.045
F17	.349	-.162	.060	-.005	-.027	.049	.076	.071	-.102	-.016	-.108	-.075
F12	.336	-.097	.283	-.194	.013	.067	-.028	-.100	-.034	-.116	-.130	-.014
F5	.319	-.182	.083	.002	.028	-.002	.065	.155	.049	.064	-.075	-.166
F7	.218	.157	.120	-.135	.077	-.153	-.079	.200	-.143	-.050	.173	.058
F22	.277	.417	.006	.212	-.071	-.080	.171	-.144	-.027	-.096	-.058	-.140
F25	.363	-.412	.284	.064	.003	-.101	.102	.194	-.095	-.080	.074	.069
F13	.371	.394	-.065	-.082	-.006	-.189	.151	.001	-.152	.137	.158	.039
F34	-.358	.378	.192	.090	.011	.244	.081	.022	.046	.159	.155	.013
F14	.242	.376	.082	-.175	-.104	.010	.018	-.107	-.050	.090	-.155	.033
F6	.162	.373	-.081	.062	.026	-.096	-.003	.007	.111	-.146	-.067	.127
F26	.274	.280	.122	.221	-.248	-.241	-.187	-.013	.015	.104	-.021	.095
F9	.163	-.268	.256	.047	.175	.061	.027	.034	.040	-.118	-.029	-.089
F8	.267	-.045	-.447	.070	.127	.033	-.066	.294	.096	-.009	-.195	.231
F28	-.349	.350	.362	.217	.147	.035	.109	.003	-.070	.127	-.074	.067
F3	.250	-.186	.282	-.152	.040	.222	-.180	-.104	-.052	.219	-.001	-.031
F29	.136	-.013	-.277	-.191	-.009	.036	.078	-.184	-.221	.017	.078	-.074
F15	.220	.293	.038	-.409	-.151	.186	.060	-.022	.118	-.059	-.129	-.045
F33	.339	-.113	.025	.364	.111	.228	-.084	-.110	.149	.031	.007	.046
F27	.335	-.023	.035	.031	-.445	-.095	-.093	.148	.250	.133	.017	-.037

F4	.296	.135	-.060	.070	.396	.047	.216	-.062	.110	-.046	-.106	-.009
F20	.176	.217	-.229	.309	-.331	.386	.074	.082	-.233	-.129	.002	-.101
F18	.262	.231	-.011	-.054	.173	.336	-.087	.123	-.026	-.073	.153	.060
F1	.122	.034	.078	-.014	-.070	-.195	.303	.050	.052	.080	-.038	.038
F24	.223	-.182	-.028	-.145	-.113	.231	.246	.129	.060	.190	-.085	.153
F2	.247	.162	-.032	-.111	.077	-.040	.304	-.084	.331	-.078	.128	-.137
F10	.243	.240	.098	.154	.201	-.188	-.185	.097	-.102	.043	-.255	-.184
F19	.193	-.226	-.148	.221	.052	-.064	.176	.170	-.029	.123	.143	-.246

Extraction Method: Principal Axis Factoring.
a 12 factors extracted. 37 iterations required.

Pattern Matrix (a)

	Factor											
	1	2	3	4	5	6	7	8	9	10	11	12
F31	.600	.022	-.028	.048	-.026	.031	.094	.010	.027	-.107	.110	.063
F33	.518	.019	-.091	.054	-.019	.097	-.134	-.121	.049	-.065	-.104	-.065
F32	.361	-.008	-.043	.050	-.235	-.220	-.136	.128	.135	-.002	.281	-.047
F10	.021	.581	-.063	-.052	.005	-.012	-.023	.118	-.067	.084	-.033	-.133
F22	.059	.311	.129	-.004	-.043	.311	.084	-.017	.270	-.063	.050	.042
F24	.112	-.301	-.207	-.248	-.037	.042	.261	-.010	-.026	.018	-.007	-.127
F8	.049	.008	-.689	.062	-.002	.031	.015	.074	-.057	.048	.007	.045
F15	-.150	-.056	-.019	-.519	-.081	.079	-.023	.079	.219	.077	.058	.097
F12	.046	.072	.070	-.374	.027	-.075	-.054	.016	.006	-.269	.031	-.042
F14	.034	.160	.052	-.335	-.088	.077	.144	.110	.048	.071	.093	.180
F3	.301	-.059	.163	-.310	-.039	-.149	-.072	.077	-.181	.038	.058	-.144
F27	.025	-.057	-.068	-.080	-.622	.035	.015	-.032	.058	.017	-.080	-.119
F26	.162	.253	.042	.059	-.424	.063	.085	.093	-.078	-.049	-.079	.172
F20	.014	-.021	-.040	.010	-.050	.766	-.091	-.042	-.092	-.011	.069	-.092
F23	.084	.105	.014	-.142	-.247	.133	-.397	.149	.121	-.106	-.060	-.022
F1	-.048	.012	.005	-.004	-.075	-.043	.331	.006	.149	-.084	-.039	-.061

F11	.007	.110	-.141	-.091	.041	-.023	-.029	.606	.059	.121	.040	-.059
F7	-.101	.035	.018	.042	-.036	-.062	-.001	.471	-.044	-.133	-.018	-.011
F13	.053	.085	.070	.055	-.086	.079	.250	.410	.138	.017	.211	.067
F18	.163	-.121	-.087	-.107	.139	.176	-.192	.371	.053	.038	-.067	.012
F2	.021	-.081	.049	-.048	-.022	-.054	.029	.019	.596	.001	.009	-.076
F4	.217	.163	-.166	-.045	.307	-.030	.077	.043	.318	-.015	-.003	-.043
F16	.107	-.064	.013	.045	-.014	.040	.018	.050	.071	-.623	.082	.149
F25	.049	-.075	-.023	.042	-.043	-.082	.096	.135	-.115	-.463	-.110	-.304
F34	.101	-.128	.274	.009	.086	.156	.071	.112	.037	.324	-.301	.094
F21	.117	-.055	.011	-.175	-.078	.161	.189	.063	-.061	-.276	-.002	-.167
F30	-.171	-.123	.113	.064	.001	.043	-.016	.073	.069	.049	-.494	.044
F29	-.031	-.069	.043	-.018	.109	.093	.007	.056	.024	.008	.466	.004
F28	.102	.182	.249	.010	.212	.059	.232	.040	-.086	.154	-.380	.119
F19	.049	.007	-.025	.298	-.039	.088	.060	.028	.088	.046	.097	-.485
F5	.026	.079	-.074	-.104	-.077	-.032	.026	.020	.052	-.038	-.013	-.368
F6	.005	.159	-.166	-.004	-.044	.084	.009	.098	.190	-.053	-.087	.268
F9	.082	.039	.040	-.079	.132	-.098	-.097	-.036	.038	-.225	-.136	-.250
F17	.027	.069	-.069	-.150	-.005	.088	.046	.012	-.047	-.169	.079	-.242

Extraction Method: Principal Axis Factoring. Rotation Method: Oblimin with Kaiser Normalization.
a Rotation converged in 29 iterations.

Structure Matrix

	Factor											
	1	2	3	4	5	6	7	8	9	10	11	12
F31	.625	.133	-.147	-.077	-.120	.110	.074	.133	.133	-.244	.182	-.106
F33	.551	.077	-.180	-.026	-.057	.124	-.150	-.024	.080	-.180	-.035	-.188
F32	.434	.084	-.199	-.088	-.297	-.137	-.130	.218	.184	-.200	.367	-.176
F10	.138	.579	-.085	-.070	-.063	.032	-.010	.241	.048	-.020	-.030	-.066
F22	.150	.397	.053	-.047	-.133	.385	.158	.176	.381	-.076	.054	.117
F24	.159	-.289	-.235	-.281	-.073	.051	.239	.012	.014	-.083	.080	-.242

F8	.135	.038	-.684	.042	-.055	.088	-.017	.111	.060	-.012	.133	-.066
F15	-.048	-.011	-.034	-.522	-.129	.149	.017	.231	.277	.041	.099	.115
F12	.179	.084	.019	-.423	-.057	-.091	-.051	.123	.040	-.349	.073	-.156
F3	.334	-.064	.101	-.374	-.061	-.159	-.111	.105	-.175	-.118	.075	-.240
F14	.087	.226	.040	-.355	-.159	.172	.165	.268	.172	.030	.106	.192
F27	.115	.006	-.132	-.144	-.627	.082	.062	.068	.094	-.134	.022	-.158
F26	.191	.361	.025	-.005	-.467	.155	.113	.214	.047	-.108	-.040	.156
F20	.118	.005	-.110	-.019	-.110	.731	-.045	.052	.020	.021	.084	-.015
F1	-.015	.050	-.011	-.028	-.115	-.009	.358	.047	.183	-.122	-.005	-.077
F23	.235	.197	-.074	-.239	-.300	.174	-.349	.287	.177	-.190	.007	-.038
F11	.144	.238	-.200	-.219	-.055	.091	-.013	.659	.220	.022	.104	-.024
F13	.127	.234	-.017	-.067	-.194	.203	.294	.496	.304	-.042	.244	.098
F7	-.009	.132	-.006	-.061	-.101	-.023	.015	.447	.045	-.149	.015	-.010
F18	.240	-.013	-.134	-.207	.084	.234	-.193	.405	.141	.013	-.017	.004
F2	.089	.014	-.047	-.110	-.059	.035	.101	.134	.578	-.064	.065	-.058
F4	.293	.222	-.229	-.095	.220	.048	.084	.164	.386	-.084	.047	-.085
F6	.045	.262	-.150	-.025	-.096	.187	.039	.216	.290	-.012	-.045	.269
F16	.226	.041	-.069	-.070	-.139	.029	.039	.120	.135	-.607	.157	-.053
F25	.199	-.045	-.098	-.076	-.128	-.155	.093	.102	-.095	-.564	-.023	-.468
F34	-.059	-.088	.355	.043	.172	.201	.068	.056	.008	.417	-.380	.255
F21	.255	-.003	-.071	-.270	-.183	.145	.202	.144	.028	-.376	.073	-.281
F30	-.260	-.102	.233	.112	.094	.036	-.004	-.021	-.008	.181	-.530	.159
F28	-.038	.190	.370	.070	.259	.088	.210	.012	-.077	.257	-.474	.242
F29	.008	-.075	-.044	-.047	.052	.089	.017	.074	.064	-.005	.451	-.002
F19	.134	-.007	-.149	.224	-.063	.051	.089	-.004	.081	-.087	.132	-.449
F5	.166	.067	-.159	-.163	-.128	-.050	.044	.075	.072	-.200	.053	-.403
F9	.172	.017	-.006	-.120	.100	-.158	-.101	-.028	-.005	-.296	-.106	-.327
F17	.178	.062	-.151	-.209	-.091	.055	.056	.083	.012	-.281	.136	-.314

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

Factor Correlation Matrix

Factor	1	2	3	4	5	6	7	8	9	10	11	12
1	1.000	.137	-.157	-.170	-.088	.104	-.051	.155	.107	-.231	.093	-.224
2	.137	1.000	-.016	.008	-.106	.075	.040	.231	.164	-.079	-.029	.106
3	-.157	-.016	1.000	.014	.078	-.060	.036	-.073	-.132	.100	-.192	.179
4	-.170	.008	.014	1.000	.089	-.030	.004	-.222	-.079	.139	-.061	.096
5	-.088	-.106	.078	.089	1.000	-.082	-.070	-.130	-.066	.174	-.113	.040
6	.104	.075	-.060	-.030	-.082	1.000	.071	.143	.165	.091	.005	.136
7	-.051	.040	.036	.004	-.070	.071	1.000	.025	.124	-.026	.015	-.021
8	.155	.231	-.073	-.222	-.130	.143	.025	1.000	.219	-.071	.071	.039
9	.107	.164	-.132	-.079	-.066	.165	.124	.219	1.000	-.051	.081	.061
10	-.231	-.079	.100	.139	.174	.091	-.026	-.071	-.051	1.000	-.109	.294
11	.093	-.029	-.192	-.061	-.113	.005	.015	.071	.081	-.109	1.000	-.072
12	-.224	.106	.179	.096	.040	.136	-.021	.039	.061	.294	-.072	1.000

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

Factor Score Coefficient Matrix

	Factor											
	1	2	3	4	5	6	7	8	9	10	11	12
F1	-.027	.007	-.008	.000	-.041	-.002	.200	-.005	.079	-.039	-.019	-.037
F2	.000	-.051	.007	-.014	-.002	-.015	.039	-.005	.386	.001	-.011	-.048
F3	.169	-.047	.107	-.210	.003	-.077	-.070	.036	-.149	.027	.026	-.099
F4	.111	.100	-.105	-.030	.193	-.004	.052	.012	.212	-.015	-.019	-.037
F5	.015	.037	-.036	-.059	-.026	-.013	.024	-.004	.023	-.016	-.016	-.183
F6	-.004	.086	-.089	.013	-.024	.047	.004	.040	.109	-.031	-.055	.137
F7	-.057	.019	.022	.026	-.020	-.024	-.009	.208	-.030	-.065	-.012	.004
F8	.027	.006	-.509	.048	.011	.031	.017	.026	-.020	.050	-.023	.027
F9	.045	.026	.015	-.052	.077	-.053	-.068	-.014	.020	-.102	-.079	-.132
F10	.013	.382	-.043	-.025	.003	-.022	-.021	.044	-.047	.028	-.035	-.078

F11	-.005	.066	-.090	-.059	.039	-.004	-.039	.397	.031	.082	.015	-.039
F12	.024	.042	.048	-.212	.028	-.050	-.040	.006	-.016	-.134	-.006	-.034
F13	.000	.045	.062	.056	-.068	.053	.219	.240	.101	.014	.154	.068
F14	.012	.080	.030	-.181	-.051	.040	.104	.048	.014	.029	.044	.095
F15	-.081	-.053	-.014	-.330	-.042	.051	.000	.034	.134	.036	.038	.066
F16	.034	-.022	.023	.032	-.002	.030	.011	.027	.055	-.361	.034	.109
F17	.005	.033	-.029	-.076	.005	.018	.043	.001	-.021	-.061	.021	-.116
F18	.092	-.084	-.044	-.067	.100	.085	-.142	.178	.026	.022	-.053	.009
F19	.020	.000	-.014	.171	-.015	.039	.063	.004	.058	.029	.043	-.276
F20	.026	-.049	-.041	.010	-.021	.590	-.070	-.024	-.073	.014	.060	-.052
F21	.050	-.032	.011	-.107	-.039	.067	.146	.028	-.032	-.122	-.015	-.089
F22	.017	.206	.068	.019	-.023	.165	.080	-.019	.194	-.042	.028	.042
F23	.040	.067	.017	-.083	-.126	.061	-.308	.096	.062	-.063	-.065	.005
F24	.055	-.188	-.120	-.160	-.017	.028	.196	-.012	-.010	.025	-.004	-.088
F25	.020	-.043	-.005	.013	-.023	-.061	.085	.083	-.092	-.292	-.112	-.225
F26	.063	.178	.040	.050	-.273	.022	.080	.054	-.050	-.038	-.053	.123
F27	-.005	-.043	-.043	-.041	-.413	.014	.045	-.026	.034	.021	-.075	-.075
F28	.091	.140	.159	-.005	.136	.041	.176	.026	-.065	.069	-.267	.062
F29	-.018	-.048	.033	-.002	.058	.043	.012	.025	.005	.018	.240	.007
F30	-.078	-.067	.052	.037	-.020	.021	-.016	.048	.059	.003	-.293	.023
F31	.344	.012	-.007	.025	.003	.041	.073	-.008	.005	-.044	.064	.038
F32	.193	-.006	-.011	.041	-.135	-.134	-.107	.058	.072	.021	.163	-.021
F33	.280	.013	-.062	.027	.016	.043	-.111	-.080	.033	-.016	-.093	-.040
F34	.078	-.112	.162	.003	.046	.104	.042	.084	.024	.189	-.177	.047

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

Factor Score Covariance Matrix

Factor	1	2	3	4	5	6	7	8	9	10	11	12
1	1.057	.442	1.137	-.599	.250	1.562	-.147	.049	-.076	1.163	-.309	.085
2	.442	.918	.041	-.190	1.172	.427	-.045	.369	1.383	.051	-.006	.140
3	1.137	.041	2.259	-.335	.510	1.458	1.557	-.345	-.187	1.826	-.100	1.905
4	-.599	-.190	-.335	.734	-.199	.131	-.274	.152	1.198	.327	.163	-.506
5	.250	1.172	.510	-.199	2.615	-.277	.114	-.099	1.711	-.594	1.704	-.015
6	1.562	.427	1.458	.131	-.277	2.916	-.578	.177	.181	2.097	.451	-.322
7	-.147	-.045	1.557	-.274	.114	-.578	2.018	.287	.377	-.425	-.227	1.129
8	.049	.369	-.345	.152	-.099	.177	.287	.821	.238	-.079	.334	-.247
9	-.076	1.383	-.187	1.198	1.711	.181	.377	.238	4.002	-.785	-.551	.795
10	1.163	.051	1.826	.327	-.594	2.097	-.425	-.079	-.785	2.420	-.191	-.040
11	-.309	-.006	-.100	.163	1.704	.451	-.227	.334	-.551	-.191	2.824	-.517
12	.085	.140	1.905	-.506	-.015	-.322	1.129	-.247	.795	-.040	-.517	2.725

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

Analysis on the Female Gender Dataset Subset to Final Factors Reduction

Output Created		22-APR-2008 10:11:59
Comments		
Input	Data	C:\Documents and Settings\dcolbeck.COMPUTING\Desktop\Final Data Collection 170408\Gender Analysis\Female Analysis\FemGender12 Analysis 210408.sav
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	269
Missing Value Handling	Definition of Missing	MISSING=EXCLUDE: User-defined missing values are treated as missing.
	Cases Used	LISTWISE: Statistics are based on cases with no missing values for any variable used.
Syntax		FACTOR /VARIABLES F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12 /MISSING LISTWISE /ANALYSIS F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12 /PRINT UNIVARIATE INITIAL CORRELATION SIG DET KMO EXTRACTION ROTATION FSCORE /FORMAT SORT /PLOT EIGEN ROTATION /CRITERIA MINEIGEN(1) ITERATE(50) /EXTRACTION PAF /CRITERIA ITERATE(50) DELTA(0) /ROTATION OBLIMIN /METHOD=CORRELATION .
Resources	Elapsed Time	0:00:00.05
	Maximum Memory Required	18744 (18.305K) bytes

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
F1	1.8520	.55217	269
F2	2.4881	.51319	269
F3	2.0112	.66626	269
F4	2.4922	.58639	269
F5	2.3309	.70593	269
F6	2.6134	1.07515	269
F7	1.9833	.52963	269
F8	2.4268	.62368	269
F9	2.7007	.81876	269
F10	2.4989	.37907	269
F11	3.5186	.46475	269
F12	2.3591	.35697	269

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.747
Bartlett's Test of Sphericity	Approx. Chi-Square	308.955
	df	66
	Sig.	.000

Communalities

	Initial	Extraction
F1	.225	.405
F2	.200	.290
F3	.112	.682
F4	.143	.183
F5	.153	.302
F6	.058	.090
F7	.180	.264
F8	.201	.317
F9	.160	.454
F10	.098	.128
F11	.120	.274
F12	.164	.208

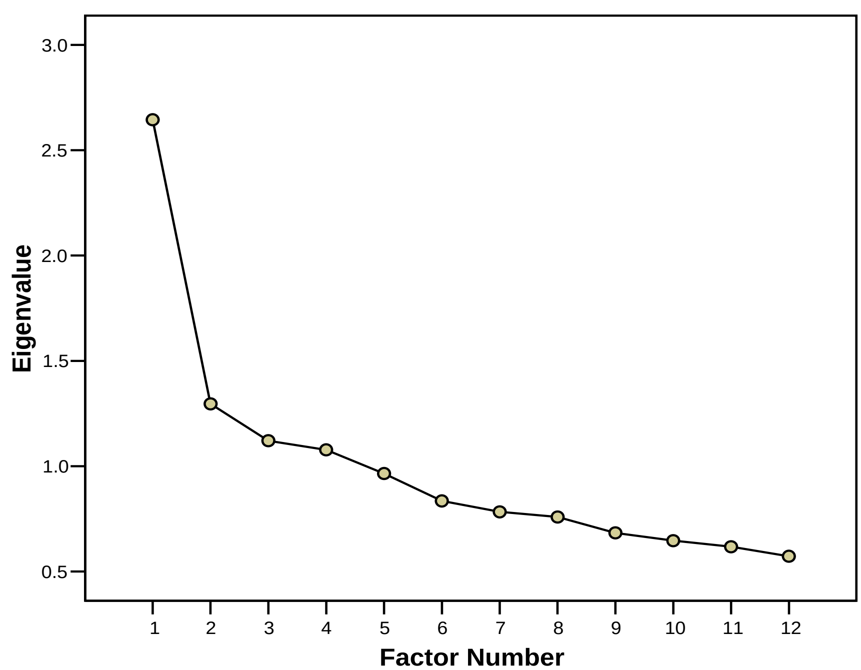
Extraction Method: Principal Axis Factoring.

Total Variance Explained

Factor	Initial Eigenvalues Total	Initial Eigenvalues % of Variance	Initial Eigenvalues Cumulative %	Extraction Sums of Squared Loadings Total	Extraction Sums of Squared Loadings % of Variance	Extraction Sums of Squared Loadings Cumulative %	Rotation Sums of Squared Loadings (a) Total
1	2.645	22.040	22.040	1.952	16.270	16.270	1.513
2	1.296	10.800	32.840	.761	6.345	22.615	.704
3	1.121	9.340	42.180	.478	3.987	26.602	1.118
4	1.077	8.979	51.159	.406	3.382	29.984	1.079
5	.965	8.041	59.200				
6	.835	6.959	66.159				
7	.783	6.525	72.684				
8	.759	6.322	79.006				
9	.683	5.695	84.701				
10	.646	5.386	90.087				
11	.617	5.145	95.232				
12	.572	4.768	100.000				

Extraction Method: Principal Axis Factoring.
a When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Scree Plot



Factor Matrix(a)

	Factor			
	1	2	3	4
F1	.540	-.107	-.142	-.287
F2	.510	.108	.047	.125
F8	.493	.118	.159	.187
F7	.475	.166	-.093	.045
F12	.442	-.060	.019	-.098
F5	.398	.103	-.329	.158
F4	.358	.223	.048	.052
F10	.277	.208	-.073	-.055
F3	.307	-.727	.061	.235
F9	.429	-.010	.475	-.209
F11	-.237	.246	.263	.296
F6	.197	.000	-.083	.211

Extraction Method: Principal Axis Factoring.
a Attempted to extract 4 factors. More than 50 iterations required. (Convergence=.004). Extraction was terminated.

Pattern Matrix(a)

	Factor			
	1	2	3	4
F5	.507	.047	-.199	-.166
F8	.428	-.043	.291	.089
F2	.424	-.007	.210	-.027
F7	.404	.106	.086	-.127
F6	.314	-.093	-.060	.041
F4	.309	.139	.170	.018
F10	.212	.199	.054	-.103
F3	.127	-.783	.125	-.180
F9	-.071	-.033	.681	-.062
F11	.079	.064	.064	.543
F1	.111	.011	.167	-.529
F12	.163	-.049	.224	-.247

Extraction Method: Principal Axis Factoring. Rotation Method: Oblimin with Kaiser Normalization.
a Rotation converged in 29 iterations.

Structure Matrix

	Factor			
	1	2	3	4
F5	.499	.063	.001	-.282
F2	.498	.042	.350	-.202
F8	.489	.015	.405	-.104
F7	.478	.141	.250	-.269
F4	.367	.177	.278	-.111
F6	.275	-.076	.022	-.045
F10	.275	.217	.161	-.177
F3	.167	-.765	.131	-.256
F9	.162	.023	.668	-.181
F1	.329	.026	.312	-.598
F11	-.065	.084	-.017	.506
F12	.307	-.020	.322	-.345

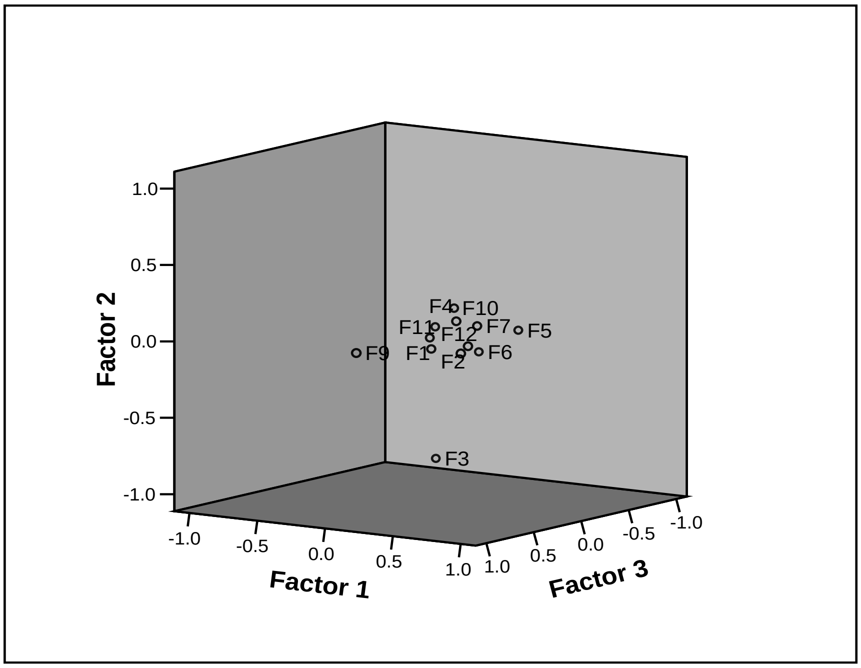
Extraction Method: Principal Axis Factoring. Rotation Method: Oblimin with Kaiser Normalization.

Factor Correlation Matrix

Factor	1	2	3	4
1	1.000	.071	.318	-.311
2	.071	1.000	.091	.014
3	.318	.091	1.000	-.206
4	-.311	.014	-.206	1.000

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

Factor Plot in Rotated Factor Space



Factor Score Coefficient Matrix

	Factor			
	1	2	3	4
F1	.077	.078	.104	-.398
F2	.227	.023	.126	-.018
F3	.077	-.785	.023	-.113
F4	.143	.078	.098	.000
F5	.271	.044	-.115	-.117
F6	.124	-.030	-.030	.024
F7	.209	.083	.054	-.088
F8	.233	.028	.185	.067
F9	-.045	.050	.517	-.029
F10	.099	.090	.041	-.065
F11	.040	-.007	.048	.330
F12	.077	.019	.110	-.137

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

Factor Score Covariance Matrix

Factor	1	2	3	4
1	1.112	.221	1.770	.028
2	.221	.705	.689	-.005
3	1.770	.689	2.356	-.228
4	.028	-.005	-.228	1.066

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

Correlation Analysis on the Female Gender Dataset

Notes

Output Created		21-APR-2008 17:17:57
Comments		
Input	Data	C:\Documents and Settings\dcolbeck.COMPUTING\Desktop\Final Data Collection 170408\Gender Analysis\Female Analysis\FemGender12 Analysis 210408.sav
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	269
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each pair of variables are based on all the cases with valid data for that pair.
Syntax		CORRELATIONS /VARIABLES=F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12 /PRINT=TWOTAIL NOSIG /MISSING=PAIRWISE .
Resources	Elapsed Time	0:00:00.03

Correlations

		F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12
F1	Pearson Correlation	1	.210(**)	.169(**)	.136(*)	.209(**)	.075	.225(**)	.188(**)	.235(**)	.182(**)	-.283(**)	.253(**)
	Sig. (2-tailed)		.001	.006	.026	.001	.221	.000	.002	.000	.003	.000	.000
	N	269	269	269	269	269	269	269	269	269	269	269	269
F2	Pearson Correlation	.210(**)	1	.095	.223(**)	.219(**)	.172(**)	.247(**)	.269(**)	.221(**)	.129(*)	-.045	.258(**)
	Sig. (2-tailed)	.001		.119	.000	.000	.005	.000	.000	.000	.035	.460	.000
	N	269	269	269	269	269	269	269	269	269	269	269	269
F3	Pearson Correlation	.169(**)	.095	1	-.040	.067	.105	.032	.138(*)	.119	-.093	-.172(**)	.156(*)
	Sig. (2-tailed)	.006	.119		.515	.270	.086	.598	.023	.051	.128	.005	.011
	N	269	269	269	269	269	269	269	269	269	269	269	269
F4	Pearson Correlation	.136(*)	.223(**)	-.040	1	.152(*)	.037	.212(**)	.288(**)	.157(**)	.123(*)	-.055	.077
	Sig. (2-tailed)	.026	.000	.515		.012	.550	.000	.000	.010	.044	.366	.207
	N	269	269	269	269	269	269	269	269	269	269	269	269
F5	Pearson Correlation	.209(**)	.219(**)	.067	.152(*)	1	.127(*)	.284(**)	.167(**)	-.017	.126(*)	-.096	.146(*)
	Sig. (2-tailed)	.001	.000	.270	.012		.037	.000	.006	.783	.039	.118	.017
	N	269	269	269	269	269	269	269	269	269	269	269	269
F6	Pearson Correlation	.075	.172(**)	.105	.037	.127(*)	1	.093	.106	-.009	.079	.017	.071
	Sig. (2-tailed)	.221	.005	.086	.550	.037		.126	.082	.883	.199	.776	.243
	N	269	269	269	269	269	269	269	269	269	269	269	269
F7	Pearson Correlation	.225(**)	.247(**)	.032	.212(**)	.284(**)	.093	1	.242(**)	.173(**)	.157(**)	-.089	.178(**)
	Sig. (2-tailed)	.000	.000	.598	.000	.000	.126		.000	.004	.010	.146	.003

	N	269	269	269	269	269	269	269	269	269	269	269	269
F8	Pearson Correlation	.188(**)	.269(**)	.138(*)	.288(**)	.167(**)	.106	.242(**)	1	.227(**)	.157(**)	.013	.184(**)
	Sig. (2-tailed)	.002	.000	.023	.000	.006	.082	.000		.000	.010	.834	.002
	N	269	269	269	269	269	269	269	269	269	269	269	269
F9	Pearson Correlation	.235(**)	.221(**)	.119	.157(**)	-.017	-.009	.173(**)	.227(**)	1	.070	-.021	.227(**)
	Sig. (2-tailed)	.000	.000	.051	.010	.783	.883	.004	.000		.249	.736	.000
	N	269	269	269	269	269	269	269	269	269	269	269	269
F10	Pearson Correlation	.182(**)	.129(*)	-.093	.123(*)	.126(*)	.079	.157(**)	.157(**)	.070	1	-.019	.168(**)
	Sig. (2-tailed)	.003	.035	.128	.044	.039	.199	.010	.010	.249		.757	.006
	N	269	269	269	269	269	269	269	269	269	269	269	269
F11	Pearson Correlation	-.283(**)	-.045	-.172(**)	-.055	-.096	.017	-.089	.013	-.021	-.019	1	-.148(*)
	Sig. (2-tailed)	.000	.460	.005	.366	.118	.776	.146	.834	.736	.757		.015
	N	269	269	269	269	269	269	269	269	269	269	269	269
F12	Pearson Correlation	.253(**)	.258(**)	.156(*)	.077	.146(*)	.071	.178(**)	.184(**)	.227(**)	.168(**)	-.148(*)	1
	Sig. (2-tailed)	.000	.000	.011	.207	.017	.243	.003	.002	.000	.006	.015	
	N	269	269	269	269	269	269	269	269	269	269	269	269

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Analysis on the Male Gender Dataset

Statement to Subset Reduction

Output Created		22-APR-2008 12:37:43
Comments		
Input	Data	C:\Documents and Settings\dcolbeck.COMPUTING\Desktop\Final Data Collection 170408\Gender Analysis\Male Analysis\MaleGender34 Analysis 220408.sav
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	166
Missing Value Handling	Definition of Missing	MISSING=EXCLUDE: User-defined missing values are treated as missing.
	Cases Used	LISTWISE: Statistics are based on cases with no missing values for any variable used.
Syntax		FACTOR /VARIABLES M1 M2 M3 M4 M5 M6 M7 M8 M9 M10 M11 M12 M13 M14 M15 M16 M17 M18 M19 M20 M21 M22 M23 M24 M25 M26 M27 M28 M29 M30 M31 M32 M33 M34 /MISSING LISTWISE /ANALYSIS M1 M2 M3 M4 M5 M6 M7 M8 M9 M10 M11 M12 M13 M14 M15 M16 M17 M18 M19 M20 M21 M22 M23 M24 M25 M26 M27 M28 M29 M30 M31 M32 M33 M34 /PRINT UNIVARIATE INITIAL CORRELATION SIG DET KMO EXTRACTION ROTATION FSCORE /FORMAT SORT /PLOT EIGEN ROTATION /CRITERIA MINEIGEN(1) ITERATE(50) /EXTRACTION PAF /CRITERIA ITERATE(50) DELTA(0) /ROTATION OBLIMIN /METHOD=CORRELATION .
Resources	Elapsed Time	0:00:01.80
	Maximum Memory Required	133672 (130.539K) bytes

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
M1	2.1879	.71000	166
M2	2.6182	1.07575	166
M3	1.9879	.65123	166
M4	2.9819	1.25274	166
M5	2.2485	.63633	166
M6	3.8363	.98652	166
M7	2.4485	.97487	166
M8	2.1152	.66429	166
M9	2.0485	.64953	166
M10	2.5455	1.08127	166
M11	2.3637	1.00960	166
M12	2.1394	.65963	166
M13	2.8000	1.00423	166
M14	2.8303	1.20416	166
M15	2.6363	1.26535	166
M16	1.9213	.74661	166
M17	1.5151	.65695	166
M18	2.6728	1.22184	166
M19	2.0242	.66925	166
M20	2.8303	1.16319	166
M21	1.8485	.64766	166
M22	3.0242	1.07281	166
M23	1.7879	.98343	166
M24	2.3394	.60800	166
M25	1.8303	.68423	166
M26	2.9455	1.14020	166
M27	1.8849	.67335	166
M28	4.0121	.84558	166
M29	2.5334	1.01822	166
M30	3.7212	.98834	166
M31	1.9758	.67825	166
M32	1.9636	.87311	166
M33	2.0728	.69250	166
M34	3.9455	.90958	166

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.681
Bartlett's Test of Sphericity	Approx. Chi-Square	1170.446
	df	561
	Sig.	.000

Communalities

	Initial	Extraction
M1	.237	.211
M2	.256	.300
M3	.249	.301
M4	.190	.260
M5	.199	.221
M6	.202	.149
M7	.294	.644
M8	.283	.415
M9	.241	.417
M10	.354	.473
M11	.445	.477
M12	.364	.470
M13	.399	.574
M14	.261	.289
M15	.265	.324
M16	.291	.331
M17	.397	.461
M18	.297	.529
M19	.300	.546
M20	.318	.674
M21	.338	.355
M22	.296	.362
M23	.359	.391
M24	.298	.324
M25	.322	.320
M26	.360	.542
M27	.338	.316
M28	.517	.570
M29	.347	.529
M30	.431	.470
M31	.368	.389
M32	.459	.509
M33	.350	.346
M34	.462	.532

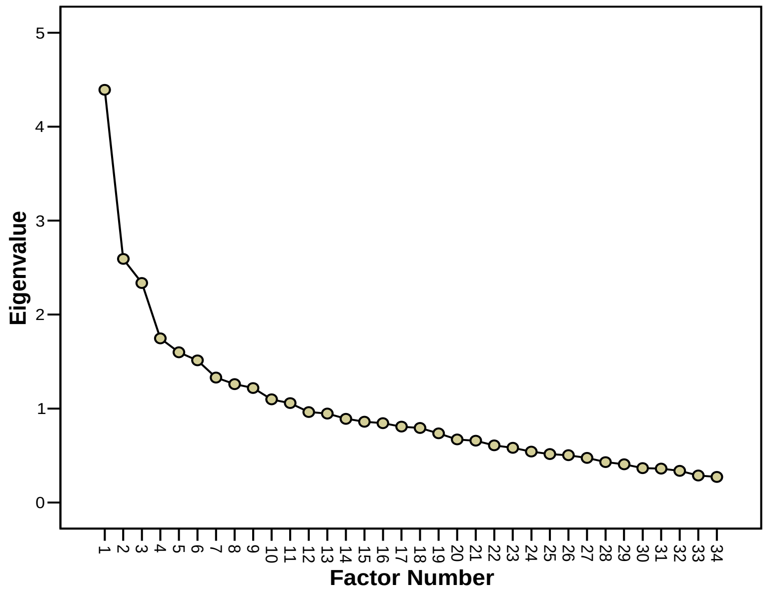
Extraction Method: Principal Axis Factoring.

Total Variance Explained

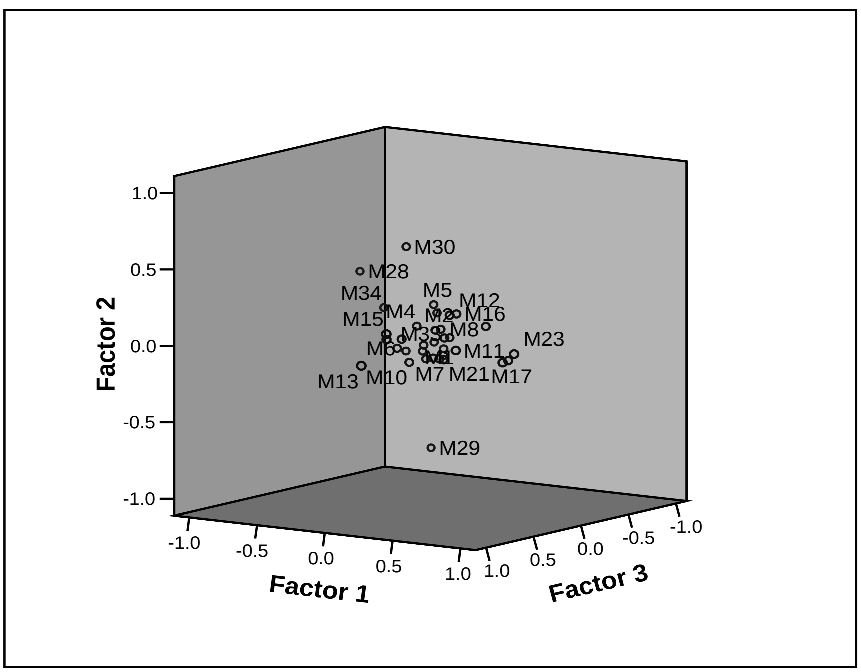
Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings (a)
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	4.393	12.919	12.919	3.829	11.261	11.261	2.744
2	2.593	7.625	20.545	2.007	5.904	17.165	1.769
3	2.336	6.870	27.414	1.770	5.206	22.371	1.624
4	1.746	5.136	32.551	1.156	3.401	25.772	1.234
5	1.599	4.704	37.254	1.086	3.195	28.967	1.099
6	1.513	4.450	41.704	1.006	2.958	31.925	1.485
7	1.329	3.910	45.614	.755	2.220	34.144	1.531
8	1.260	3.706	49.319	.700	2.059	36.203	1.119
9	1.219	3.584	52.904	.664	1.954	38.157	1.430
10	1.098	3.228	56.132	.550	1.617	39.775	1.846
11	1.058	3.112	59.244	.498	1.463	41.238	1.673
12	.963	2.833	62.077				
13	.946	2.784	64.860				
14	.891	2.621	67.481				
15	.859	2.527	70.008				
16	.844	2.483	72.492				
17	.808	2.375	74.867				
18	.793	2.331	77.198				
19	.736	2.165	79.364				
20	.671	1.974	81.337				
21	.658	1.935	83.273				
22	.608	1.788	85.061				
23	.582	1.713	86.774				
24	.542	1.594	88.367				
25	.516	1.517	89.884				
26	.503	1.479	91.363				
27	.475	1.396	92.760				
28	.430	1.265	94.025				
29	.407	1.196	95.221				
30	.366	1.077	96.298				
31	.362	1.063	97.361				
32	.337	.991	98.353				
33	.288	.847	99.199				
34	.272	.801	100.000				

Extraction Method: Principal Axis Factoring.
a When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Scree Plot



Factor Plot in Rotated Factor Space



Factor Matrix(a)

	Factor										
	1	2	3	4	5	6	7	8	9	10	11
M17	.559	.091	-.054	-.123	.072	.270	.149	.029	.026	.143	.013
M32	.552	-.172	-.211	.046	.076	.140	.042	-.305	-.037	-.072	.036
M27	.510	-.007	.161	.105	.045	.063	.017	-.003	.079	-.047	.066
M28	-.503	.275	.421	.225	.043	.018	-.041	.014	.071	-.065	-.021
M34	-.483	.198	.354	-.009	-.156	.146	.161	.016	.163	.108	.155
M31	.478	.103	.052	.264	-.013	-.060	-.037	-.208	-.080	-.143	.042
M30	-.456	.268	.300	.000	.165	.059	-.096	-.221	-.082	.051	-.044
M23	.445	-.160	-.102	-.187	.100	.200	.169	-.177	-.021	.102	-.031
M25	.437	.156	.009	-.123	.217	-.055	.121	-.036	-.014	.028	-.149
M11	.431	-.294	.261	-.188	.004	.210	-.128	.041	.053	.064	-.180
M33	.419	.168	-.062	.214	-.151	.018	-.223	-.116	.033	-.070	.017
M21	.402	.219	.144	-.027	5.295E-05	-.042	.298	.074	.100	-.108	.081
M10	.355	-.261	.243	.043	.020	.079	-.347	.227	.130	-.009	-.151
M24	.266	.423	.054	-.003	-.087	-.172	-.113	-.005	-.057	-.009	-.134
M12	.370	.409	.206	-.056	.043	-.021	.101	-.020	-.259	.137	.148
M16	.306	.371	.183	-.198	.050	.024	.036	.065	.021	.078	-.108
M9	.228	.343	-.050	.201	-.040	.049	-.161	.099	-.182	.133	.338
M5	.174	.338	.168	.049	.029	-.081	-.135	-.083	.050	.102	-.013
M1	.227	.228	.030	.212	.031	.096	-.089	.077	.189	-.032	.013
M13	.163	-.377	.485	-.235	-.031	-.115	.085	.109	-.161	-.188	.143
M29	.329	-.213	-.362	.069	-.259	-.081	.008	.297	.181	.018	.209
M14	.155	-.237	.360	.110	-.006	.081	-.134	-.026	-.135	-.127	.090
M15	.098	-.094	.354	-.306	.117	-.036	-.033	-.094	-.009	-.173	.180
M22	-.001	-.295	.352	.055	.209	-.067	.046	-.099	.265	.041	.130
M4	.100	.119	.322	-.086	-.263	-.033	.075	.099	.022	.024	-.195
M6	-.050	-.178	.201	.103	-.045	.072	.015	.174	-.156	.003	.044
M3	.203	.238	.055	-.307	-.088	.019	-.014	.275	.004	.138	.049

M2	-.023	.040	.215	.303	-.200	.179	.250	.037	.096	.024	-.117
M20	.099	-.194	.077	.430	.517	-.201	.271	.129	.071	.180	-.012
M18	.221	-.090	.136	.324	-.461	.236	.218	-.080	-.101	-.093	-.083
M19	.260	.337	-.084	-.006	.089	-.392	.118	.123	.095	-.390	-.078
M7	.301	-.101	.181	-.062	-.292	-.392	-.106	-.291	.343	.219	.081
M8	.164	.171	.011	.118	.326	.380	-.212	.114	.153	-.108	.036
M26	.297	-.285	.164	.251	.020	-.344	-.095	.097	-.302	.202	-.118

Extraction Method: Principal Axis Factoring.
a 11 factors extracted. 50 iterations required.

Pattern Matrix(a)

	Factor										
	1	2	3	4	5	6	7	8	9	10	11
M23	.637	-.034	.028	.016	.017	-.023	.029	.000	.021	.096	-.034
M32	.559	-.096	.038	.022	-.049	.060	-.021	-.334	.062	-.021	.046
M17	.549	-.095	-.036	.086	.028	.146	.058	.194	-.017	.033	.141
M28	-.492	.396	.038	.171	.102	.122	.118	.009	-.019	-.010	.013
M25	.385	.113	-.034	-.052	.098	.041	-.104	.117	.015	-.251	-.001
M11	.340	-.013	.218	.067	-.075	.253	-.220	.179	.091	.167	-.215
M27	.214	-.093	.165	.126	.083	.213	-.040	-.030	.116	-.112	.116
M29	-.044	-.730	-.070	.002	.002	.035	.021	.061	.100	-.032	.081
M30	-.174	.584	.005	-.048	-.001	-.003	.083	-.034	-.010	.137	.050
M13	-.013	-.078	.708	.030	.028	-.144	-.096	.091	-.025	-.079	-.054
M15	.051	.111	.537	-.156	-.046	.003	.122	.022	.078	-.070	-.007
M14	-.035	.049	.411	.106	-.017	.125	-.157	-.148	-.009	.084	.067
M6	-.112	-.048	.189	.135	.069	-.003	-.129	.048	-.155	.116	.058
M18	.117	-.095	.028	.676	-.160	-.066	-.034	-.174	-.024	.034	.036
M2	-.033	.037	-.098	.531	.110	.041	.066	.020	-.006	.023	-.051
M4	-.055	.085	.064	.291	-.116	-.041	-.095	.281	.109	-.093	-.094
M20	.062	-.005	-.117	-.007	.791	.041	-.193	-.070	-.044	-.096	.021
M22	-.020	.033	.273	-.025	.356	.097	.095	-.064	.268	.106	-.131

M8	.070	.067	-.009	-.083	.039	.606	.111	-.018	-.186	.007	.060
M10	-.039	-.136	.166	-.007	-.021	.452	-.344	.127	.100	.075	-.175
M1	-.048	-.045	-.108	.102	.042	.340	.043	.004	.073	-.110	.109
M33	.048	-.073	-.072	.094	-.195	.222	-.114	-.193	.187	-.098	.197
M26	-.015	-.038	.049	.007	.235	-.162	-.653	-.023	.088	.027	.129
M34	-.299	.181	.062	.238	.061	-.063	.392	.204	.082	.213	.065
M3	.045	-.118	.034	-.083	-.109	.032	.024	.470	.007	-.026	.156
M16	.186	.178	-.009	.021	-.048	.101	-.012	.331	.058	-.169	.096
M31	.162	.031	.083	.144	-.029	.086	-.131	-.310	.123	-.225	.221
M7	-.009	-.129	.034	-.008	.002	-.151	-.032	-.002	.805	.065	-.015
M5	-.025	.209	-.071	-.020	-.010	.119	-.059	.074	.221	-.068	.196
M19	-.150	-.091	.042	-.065	.013	.018	.008	-.018	-.026	-.786	-.054
M21	.170	-.094	.147	.192	.114	.007	.165	.136	.044	-.359	.119
M24	-.032	.147	-.117	.015	-.164	.038	-.168	.111	.123	-.282	.161
M9	-.078	-.095	-.030	-.054	-.029	.094	-.017	.011	-.011	.079	.643
M12	.221	.191	.112	.036	.018	-.105	-.041	.180	.007	-.099	.502

Extraction Method: Principal Axis Factoring. Rotation Method: Oblimin with Kaiser Normalization.
a Rotation converged in 49 iterations.

Structure Matrix

	Factor										
	1	2	3	4	5	6	7	8	9	10	11
M23	.612	-.168	.108	.003	-.007	.090	-.074	.007	.096	-.046	.019
M32	.611	-.263	.065	.020	-.055	.192	-.165	-.306	.159	-.146	.128
M17	.600	-.170	.034	.108	-.031	.288	-.058	.210	.110	-.185	.259
M28	-.572	.528	.012	.186	.156	.034	.229	.057	-.072	.102	-.010
M25	.446	.038	.017	-.037	.046	.158	-.144	.165	.155	-.378	.156
M11	.401	-.117	.380	.131	-.047	.310	-.328	.184	.199	.083	-.131
M27	.355	-.134	.217	.199	.076	.340	-.187	.016	.253	-.224	.228
M29	.148	-.703	-.086	.021	-.052	.062	-.116	-.028	.098	-.068	.077
M30	-.341	.630	-.016	-.053	.038	-.062	.225	.025	-.077	.159	-.005

M13	.070	-.064	.724	.115	.106	-.096	-.224	.144	.075	.039	-.135
M15	.099	.138	.500	-.095	.007	.032	.037	.107	.143	-.038	-.044
M14	.027	.015	.445	.190	.059	.168	-.249	-.107	.065	.119	.033
M6	-.114	-.037	.220	.172	.109	-.008	-.145	.028	-.141	.180	-.015
M18	.117	-.157	.089	.662	-.126	.027	-.148	-.138	.053	.027	.103
M2	-.080	.055	-.017	.514	.128	.066	.040	.028	.011	.041	.009
M20	.062	-.033	.001	.027	.773	.092	-.186	-.146	-.039	-.072	.009
M22	-.017	.058	.357	.033	.405	.099	.022	-.067	.233	.147	-.193
M8	.135	.068	-.023	-.045	.054	.586	.085	-.007	-.111	-.051	.163
M10	.129	-.183	.299	.096	.011	.456	-.429	.104	.196	.047	-.082
M1	.064	-.019	-.100	.142	.018	.380	-.006	.026	.141	-.199	.236
M26	.078	-.140	.188	.101	.222	-.054	-.672	-.062	.153	-.019	.108
M34	-.434	.346	.046	.230	.086	-.128	.442	.226	-.028	.254	-.037
M3	.131	-.053	.033	-.039	-.174	.080	.000	.482	.076	-.157	.204
M16	.249	.190	.025	.060	-.104	.197	-.029	.404	.187	-.330	.250
M4	-.021	.113	.138	.315	-.121	.002	-.114	.331	.186	-.119	.004
M7	.111	-.124	.137	.065	-.040	-.045	-.152	.027	.770	-.098	.013
M19	.059	-.037	-.078	-.068	-.025	.064	-.023	.069	.131	-.716	.152
M21	.291	-.057	.131	.220	.076	.137	.044	.212	.191	-.431	.253
M24	.085	.149	-.129	.053	-.223	.129	-.159	.191	.239	-.415	.327
M9	.036	-.051	-.105	.033	-.089	.205	-.061	.032	.038	-.119	.623
M12	.280	.194	.095	.111	-.046	.082	-.089	.275	.148	-.319	.560
M31	.297	-.050	.078	.197	-.035	.238	-.247	-.227	.264	-.331	.347
M33	.204	-.125	-.076	.146	-.220	.323	-.206	-.142	.284	-.243	.334
M5	.041	.226	-.051	.039	-.051	.197	-.058	.137	.279	-.221	.293

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

Factor Correlation Matrix

Factor	1	2	3	4	5	6	7	8	9	10	11
1	1.000	-.214	.101	-.015	-.055	.201	-.152	.036	.165	-.248	.146
2	-.214	1.000	.021	-.004	.037	-.006	.183	.138	.013	-.031	.052
3	.101	.021	1.000	.130	.127	.058	-.188	.095	.125	.124	-.113
4	-.015	-.004	.130	1.000	.039	.106	-.111	.051	.102	.003	.122
5	-.055	.037	.127	.039	1.000	.023	.002	-.090	-.055	.070	-.096
6	.201	-.006	.058	.106	.023	1.000	-.098	.023	.141	-.123	.223
7	-.152	.183	-.188	-.111	.002	-.098	1.000	.039	-.138	.053	-.072
8	.036	.138	.095	.051	-.090	.023	.039	1.000	.075	-.141	.078
9	.165	.013	.125	.102	-.055	.141	-.138	.075	1.000	-.243	.115
10	-.248	-.031	.124	.003	.070	-.123	.053	-.141	-.243	1.000	-.315
11	.146	.052	-.113	.122	-.096	.223	-.072	.078	.115	-.315	1.000

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

Factor Score Coefficient Matrix

	Factor										
	1	2	3	4	5	6	7	8	9	10	11
M1	-.026	-.004	-.040	.050	-.011	.149	.013	.010	.018	-.037	.056
M2	-.013	.007	-.027	.253	.073	.029	.020	.018	-.006	.006	-.023
M3	.021	-.037	-.004	-.040	-.049	.014	.004	.242	.001	-.021	.067
M4	-.012	.039	.007	.134	-.042	-.015	-.061	.151	.041	-.049	-.045
M5	-.001	.085	-.036	-.009	-.011	.065	-.023	.036	.098	-.044	.080
M6	-.033	-.031	.050	.066	.038	.010	-.046	.003	-.045	.048	.024
M7	-.015	-.026	-.002	-.009	.008	-.067	.017	-.015	.658	-.002	-.031
M8	.020	.018	.018	-.042	.046	.354	.082	-.023	-.055	.017	.048
M9	-.053	-.056	-.012	-.029	-.014	.077	-.010	-.010	-.011	.036	.368
M10	-.054	-.056	.076	.023	-.050	.292	-.217	.085	.059	.063	-.096
M11	.132	.015	.114	.034	-.030	.146	-.119	.131	.051	.075	-.144

M12	.094	.121	.064	.025	-.002	-.073	-.021	.130	-.004	-.063	.299
M13	-.022	-.049	.483	.037	.050	-.118	-.062	.092	-.054	-.015	-.038
M14	-.024	.011	.163	.050	-.007	.066	-.068	-.082	-.018	.057	.032
M15	.034	.054	.218	-.093	-.002	.013	.067	-.013	.041	-.023	-.003
M16	.065	.091	-.024	.012	-.012	.057	-.006	.201	.048	-.087	.045
M17	.204	-.023	-.017	.053	.013	.081	.053	.140	-.011	.011	.073
M18	.026	-.058	.005	.469	-.091	-.039	-.043	-.115	-.025	.022	.025
M19	-.054	-.023	-.001	-.039	-.013	.005	.026	.006	.020	-.486	-.036
M20	.031	-.013	-.070	.023	.669	.044	-.063	-.065	-.026	-.055	.008
M21	.062	-.026	.031	.099	.053	-.001	.101	.089	.036	-.156	.053
M22	.004	.019	.135	-.011	.172	.053	.082	-.044	.107	.053	-.068
M23	.221	.009	.030	.002	.025	-.029	.047	.022	-.009	.043	-.038
M24	-.012	.077	-.063	.016	-.074	.021	-.080	.068	.086	-.140	.075
M25	.134	.069	-.017	-.019	.025	.006	-.023	.075	.034	-.122	-.008
M26	-.052	-.007	.041	.029	.066	-.127	-.456	.012	-.003	.047	.088
M27	.054	-.006	.067	.068	.035	.116	-.002	-.015	.065	-.049	.060
M28	-.226	.217	.035	.130	.081	.123	.052	-.009	.055	-.017	.026
M29	-.064	-.412	-.047	.017	.024	.034	.043	.040	.039	.007	.059
M30	-.042	.280	-.012	-.027	-.007	.020	.031	-.032	.048	.042	.032
M31	.039	.033	.029	.065	-.027	.063	-.067	-.188	.066	-.102	.122
M32	.238	-.017	.006	-.023	-.026	.047	.040	-.268	.059	-.019	.025
M33	-.002	-.021	-.020	.043	-.090	.117	-.061	-.104	.077	-.046	.111
M34	-.108	.049	.068	.164	.078	-.033	.238	.168	.042	.111	.048

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

Factor Score Covariance Matrix

Factor	1	2	3	4	5	6	7	8	9	10	11
1	1.337	-.664	1.933	.354	-.569	2.026	.545	.091	-.295	1.442	-.236
2	-.664	1.038	-.278	.065	1.454	-.298	-.015	.460	1.718	-.870	.883
3	1.933	-.278	2.664	.380	1.049	1.896	1.989	.144	1.274	1.768	.382
4	.354	.065	.380	.928	-.160	1.195	.077	.189	1.502	.908	.035
5	-.569	1.454	1.049	-.160	2.956	.625	-.205	.522	2.213	-.482	2.161
6	2.026	-.298	1.896	1.195	.625	3.382	-.158	.582	.954	1.899	1.113
7	.545	-.015	1.989	.077	-.205	-.158	2.167	-.105	.528	.715	.005
8	.091	.460	.144	.189	.522	.582	-.105	.898	.791	-.359	1.177
9	-.295	1.718	1.274	1.502	2.213	.954	.528	.791	4.540	-.250	.375
10	1.442	-.870	1.768	.908	-.482	1.899	.715	-.359	-.250	2.520	.384
11	-.236	.883	.382	.035	2.161	1.113	.005	1.177	.375	.384	2.988

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

Analysis on the Male Gender Dataset Subset to Final Factors Reduction

Notes

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	Split File	<none>
	N of Rows in Working Data File	166
Missing Value Handling	Definition of Missing	MISSING=EXCLUDE: User-defined missing values are treated as missing.
	Cases Used	LISTWISE: Statistics are based on cases with no missing values for any variable used.
Syntax		FACTOR /VARIABLES M1 M2 M3 M4 M5 M6 M7 M8 M9 M10 M11 /MISSING LISTWISE /ANALYSIS M1 M2 M3 M4 M5 M6 M7 M8 M9 M10 M11 /PRINT UNIVARIATE INITIAL CORRELATION SIG DET KMO EXTRACTION ROTATION FSCORE /FORMAT SORT /PLOT EIGEN ROTATION /CRITERIA MINEIGEN(1) ITERATE(50) /EXTRACTION PAF /CRITERIA ITERATE(50) DELTA(0) /ROTATION OBLIMIN /METHOD=CORRELATION .
Resources	Elapsed Time	0:00:00.05
	Maximum Memory Required	16004 (15.629K) bytes

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
M1	2.1940	.39091	166
M2	3.1271	.51244	166
M3	3.0500	.70227	166
M4	2.7560	.80870	166
M5	2.9271	.88121	166
M6	2.2590	.48768	166
M7	3.4452	.62528	166
M8	1.9614	.45135	166
M9	2.3488	.61897	166
M10	2.0687	.45191	166
M11	2.0940	.52969	166

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.667
Bartlett's Test of Sphericity	Approx. Chi-Square	180.209
	df	55
	Sig.	.000

Communalities

	Initial	Extraction
M1	.283	.564
M2	.065	.413
M3	.106	.164
M4	.080	.069
M5	.120	.153
M6	.188	.310
M7	.153	.860
M8	.295	.462
M9	.107	.146
M10	.211	.346
M11	.185	.290

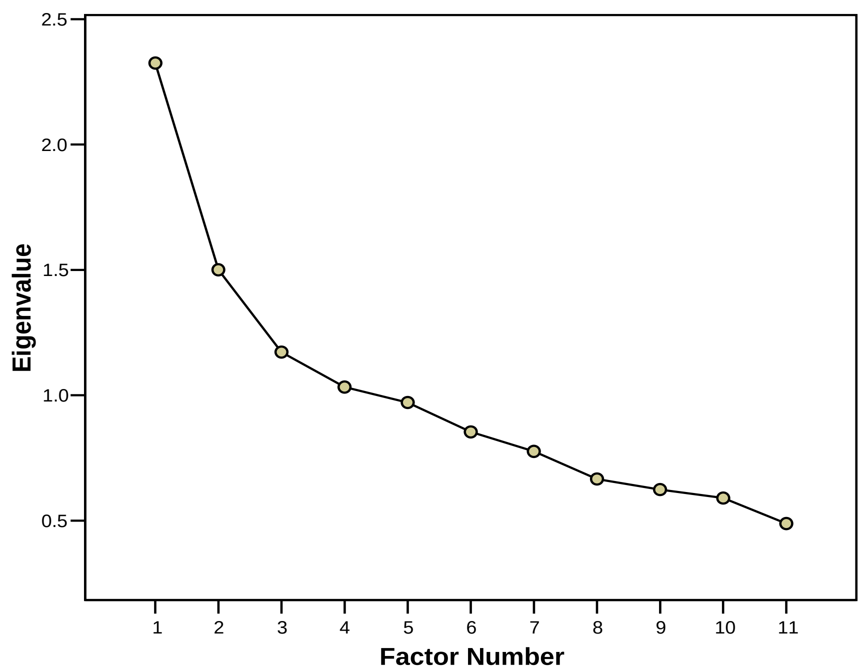
Extraction Method: Principal Axis Factoring.

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings (a)
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	2.325	21.139	21.139	1.705	15.499	15.499	1.489
2	1.501	13.642	34.781	1.049	9.540	25.039	1.048
3	1.172	10.657	45.437	.618	5.620	30.659	1.075
4	1.033	9.389	54.826	.403	3.665	34.324	.510
5	.971	8.829	63.655				
6	.854	7.762	71.418				
7	.776	7.054	78.472				
8	.666	6.054	84.526				
9	.624	5.670	90.196				
10	.590	5.364	95.560				
11	.488	4.440	100.000				

Extraction Method: Principal Axis Factoring.
a When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Scree Plot



Factor Matrix(a)

	Factor			
	1	2	3	4
M8	.645	-.113	.173	-.056
M1	.629	.012	-.397	.104
M10	.497	-.145	.203	-.192
M6	.471	-.065	-.099	.271
M11	.459	-.053	.269	-.065
M9	.343	.106	.114	.068
M4	.207	.154	.048	.010
M7	.068	.898	.202	-.086
M3	.161	.289	-.220	.078
M5	.045	.287	-.222	.138
M2	-.145	-.031	.392	.487

Extraction Method: Principal Axis Factoring.
a Attempted to extract 4 factors. More than 50 iterations required. (Convergence=.004). Extraction was terminated.

Pattern Matrix(a)

	Factor			
	1	2	3	4
M8	.639	-.049	-.114	-.029
M10	.593	-.039	.066	-.111
M11	.546	.046	.041	.035
M9	.298	.122	-.119	.075
M4	.166	.160	-.072	.006
M7	.086	.956	.124	.005
M1	.220	-.151	-.641	-.196
M6	.225	-.159	-.459	.124
M3	-.068	.188	-.302	-.076
M5	-.180	.175	-.293	-.012
M2	-.047	-.001	.028	.639

Extraction Method: Principal Axis Factoring. Rotation Method: Oblimin with Kaiser Normalization.
a Rotation converged in 11 iterations.

Structure Matrix

	Factor			
	1	2	3	4
M8	.670	-.044	-.269	-.017
M10	.573	-.081	-.087	-.082
M11	.534	.011	-.109	.058
M9	.326	.141	-.222	.073
M4	.178	.173	-.158	.003
M7	.014	.918	-.158	.009
M1	.385	.017	-.676	-.250
M6	.355	-.045	-.461	.088
M3	-.001	.274	-.343	-.110
M5	-.113	.262	-.295	-.050
M2	-.031	-.014	.103	.640

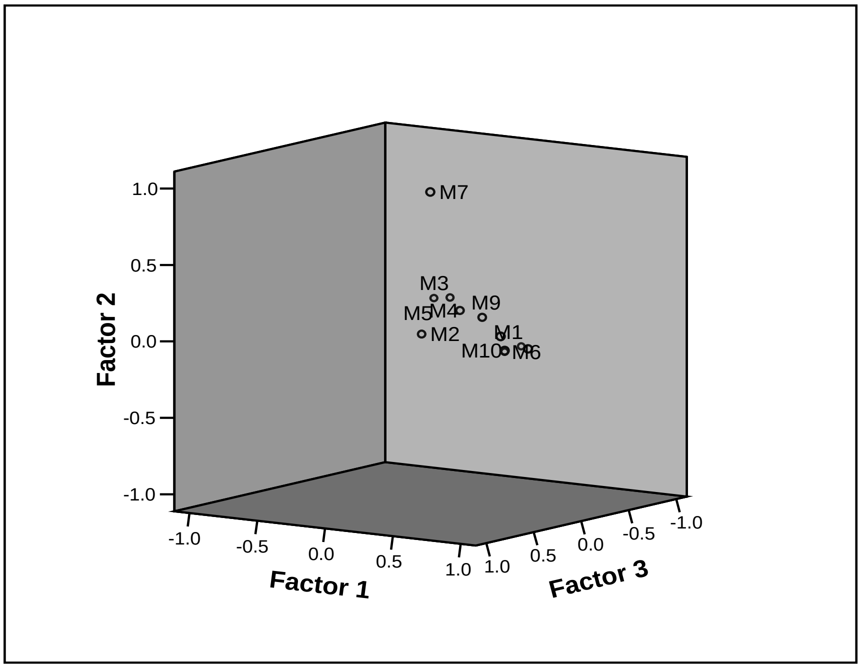
Extraction Method: Principal Axis Factoring. Rotation Method: Oblimin with Kaiser Normalization.

Factor Correlation Matrix

Factor	1	2	3	4
1	1.000	-.042	-.258	.036
2	-.042	1.000	-.272	-.012
3	-.258	-.272	1.000	.098
4	.036	-.012	.098	1.000

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

Factor Plot in Rotated Factor Space



Factor Score Coefficient Matrix

	Factor			
	1	2	3	4
M1	.118	.043	-.531	-.190
M2	.021	-.001	-.010	.588
M3	-.042	.072	-.161	-.045
M4	.054	.010	-.031	.013
M5	-.082	.042	-.148	-.009
M6	.107	.011	-.244	.129
M7	.035	.891	-.115	.009
M8	.372	-.041	-.042	.026
M9	.108	.025	-.065	.065
M10	.288	-.023	.056	-.056
M11	.243	-.026	.037	.056

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

Factor Score Covariance Matrix

Factor	1	2	3	4
1	.560	-.224	1.447	-.420
2	-.224	1.048	-.736	-.462
3	1.447	-.736	2.262	-.562
4	-.420	-.462	-.562	.517

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

Correlation analysis on the Male Gender Dataset

Notes

Output Created		22-APR-2008 14:19:04
Comments		
Input	Data	C:\Documents and Settings\dcolbeck.COMPUTING\Desktop\Final Data Collection 170408\Gender Analysis\Male Analysis\MaleGender11 Analysis 220408.sav
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	166
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each pair of variables are based on all the cases with valid data for that pair.
Syntax		CORRELATIONS /VARIABLES=M1 M2 M3 M4 M5 M6 M7 M8 M9 M10 M11 /PRINT=TWOTAIL NOSIG /MISSING=PAIRWISE .
Resources	Elapsed Time	0:00:00.02

Correlations

		M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11
M1	Pearson Correlation	1	-.197(*)	.190(*)	.127	.142	.360(**)	-.036	.348(**)	.162(*)	.193(*)	.180(*)
	Sig. (2-tailed)		.011	.014	.102	.068	.000	.645	.000	.038	.013	.020
	N	166	166	166	166	166	166	166	166	166	166	166
M2	Pearson Correlation	-.197(*)	1	-.088	-.008	-.026	.024	-.002	-.042	.023	-.094	.017
	Sig. (2-tailed)	.011		.261	.922	.735	.755	.980	.595	.773	.229	.824
	N	166	166	166	166	166	166	166	166	166	166	166
M3	Pearson Correlation	.190(*)	-.088	1	.111	.160(*)	.096	.208(**)	.039	.051	-.053	.021
	Sig. (2-tailed)	.014	.261		.155	.040	.216	.007	.614	.514	.500	.791
	N	166	166	166	166	166	166	166	166	166	166	166
M4	Pearson Correlation	.127	-.008	.111	1	-.053	.108	.175(*)	.093	.107	.100	.071
	Sig. (2-tailed)	.102	.922	.155		.494	.165	.024	.232	.172	.202	.362
	N	166	166	166	166	166	166	166	166	166	166	166
M5	Pearson Correlation	.142	-.026	.160(*)	-.053	1	.066	.218(**)	-.072	.063	-.040	-.086
	Sig. (2-tailed)	.068	.735	.040	.494		.395	.005	.357	.419	.609	.271
	N	166	166	166	166	166	166	166	166	166	166	166
M6	Pearson Correlation	.360(**)	.024	.096	.108	.066	1	-.076	.266(**)	.170(*)	.175(*)	.179(*)
	Sig. (2-tailed)	.000	.755	.216	.165	.395		.332	.001	.028	.024	.021
	N	166	166	166	166	166	166	166	166	166	166	166
M7	Pearson Correlation	-.036	-.002	.208(**)	.175(*)	.218(**)	-.076	1	-.012	.131	-.050	.052
	Sig. (2-tailed)	.645	.980	.007	.024	.005	.332		.880	.092	.522	.505
	N	166	166	166	166	166	166	166	166	166	166	166
M8	Pearson Correlation	.348(**)	-.042	.039	.093	-.072	.266(**)	-.012	1	.231(**)	.378(**)	.355(**)

	Sig. (2-tailed)	.000	.595	.614	.232	.357	.001	.880		.003	.000	.000
	N	166	166	166	166	166	166	166	166	166	166	166
M9	Pearson Correlation	.162(*)	.023	.051	.107	.063	.170(*)	.131	.231(**)	1	.189(*)	.154(*)
	Sig. (2-tailed)	.038	.773	.514	.172	.419	.028	.092	.003		.015	.047
	N	166	166	166	166	166	166	166	166	166	166	166
M10	Pearson Correlation	.193(*)	-.094	-.053	.100	-.040	.175(*)	-.050	.378(**)	.189(*)	1	.311(**)
	Sig. (2-tailed)	.013	.229	.500	.202	.609	.024	.522	.000	.015		.000
	N	166	166	166	166	166	166	166	166	166	166	166
M11	Pearson Correlation	.180(*)	.017	.021	.071	-.086	.179(*)	.052	.355(**)	.154(*)	.311(**)	1
	Sig. (2-tailed)	.020	.824	.791	.362	.271	.021	.505	.000	.047	.000	
	N	166	166	166	166	166	166	166	166	166	166	166

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

Appendix G: Domain Analysis SPSS Data

Analysis on the Science Domain Dataset

Statement to Subset Reduction

Output Created		02-MAY-2008 14:19:17
Comments		
Input	Data	C:\Documents and Settings\dcolbeck.COMPUTING\Desktop\Final Data Collection 280408\Domain Analysis\Science34 ExpAnalysis 020508.sav
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	167
Missing Value Handling	Definition of Missing	MISSING=EXCLUDE: User-defined missing values are treated as missing.
	Cases Used	LISTWISE: Statistics are based on cases with no missing values for any variable used.
Syntax		FACTOR /VARIABLES S01 S02 S03 S04 S05 S06 S07 S08 S09 S10 S11 S12 S13 S14 S15 S16 S17 S18 S19 S20 S21 S22 S23 S24 S25 S26 S27 S28 S29 S30 S31 S32 S33 S34 /MISSING LISTWISE /ANALYSIS S01 S02 S03 S04 S05 S06 S07 S08 S09 S10 S11 S12 S13 S14 S15 S16 S17 S18 S19 S20 S21 S22 S23 S24 S25 S26 S27 S28 S29 S30 S31 S32 S33 S34 /PRINT UNIVARIATE INITIAL CORRELATION SIG DET KMO EXTRACTION ROTATION FSCORE /FORMAT SORT /PLOT EIGEN ROTATION /CRITERIA MINEIGEN(1) ITERATE(250) /EXTRACTION PAF /CRITERIA ITERATE(250) DELTA(0) /ROTATION OBLIMIN /METHOD=CORRELATION .
Resources	Elapsed Time	0:00:00.98
	Maximum Memory Required	133672 (130.539K) bytes

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
S01	2.1976	.69629	167
S02	2.6168	1.03398	167
S03	2.0659	.65984	167
S04	3.0778	1.17193	167
S05	2.2635	.64194	167
S06	3.8683	1.01525	167
S07	2.4192	.94633	167
S08	2.1317	.64519	167
S09	2.1018	.62705	167
S10	2.4671	1.11282	167
S11	2.3533	.98224	167
S12	2.1737	.68532	167
S13	2.7485	.92956	167
S14	2.7665	1.16653	167
S15	2.6108	1.23625	167
S16	1.9880	.76037	167
S17	1.5210	.63851	167
S18	2.6527	1.17159	167
S19	2.0120	.70273	167
S20	2.8084	1.14036	167
S21	1.9102	.63839	167
S22	2.9820	1.06688	167
S23	1.8383	.97138	167
S24	2.3892	.59970	167
S25	1.8204	.67042	167
S26	2.9760	1.12449	167
S27	1.9461	.69644	167
S28	3.9940	.86077	167
S29	2.5150	.95600	167
S30	3.6946	.92302	167
S31	1.9701	.62503	167
S32	2.0838	.92106	167
S33	2.0778	.67658	167
S34	3.9880	.89165	167

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.648
Bartlett's Test of Sphericity	Approx. Chi-Square	1060.913
	df	561
	Sig.	.000

Communalities

	Initial	Extraction
S01	.235	.251
S02	.214	.366
S03	.230	.345
S04	.202	.233
S05	.253	.297
S06	.197	.292
S07	.360	.786
S08	.256	.365
S09	.209	.288
S10	.299	.406
S11	.388	.508
S12	.368	.484
S13	.321	.368
S14	.208	.233
S15	.271	.374
S16	.238	.298
S17	.273	.299
S18	.288	.448
S19	.279	.391
S20	.231	.313
S21	.353	.456
S22	.293	.343
S23	.288	.287
S24	.288	.281
S25	.359	.355
S26	.314	.456
S27	.286	.348
S28	.512	.732
S29	.352	.481
S30	.388	.402
S31	.412	.575
S32	.429	.524
S33	.330	.492
S34	.450	.682

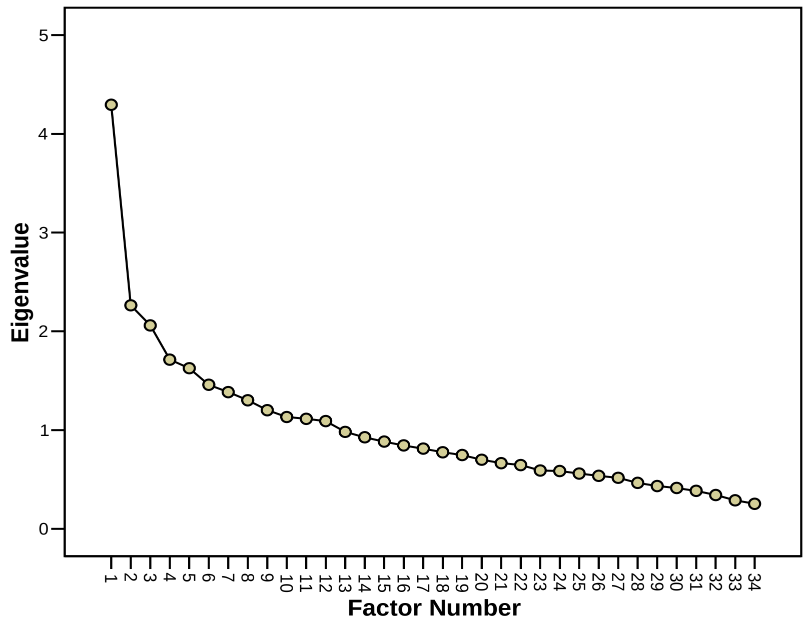
Extraction Method: Principal Axis Factoring.

Total Variance Explained

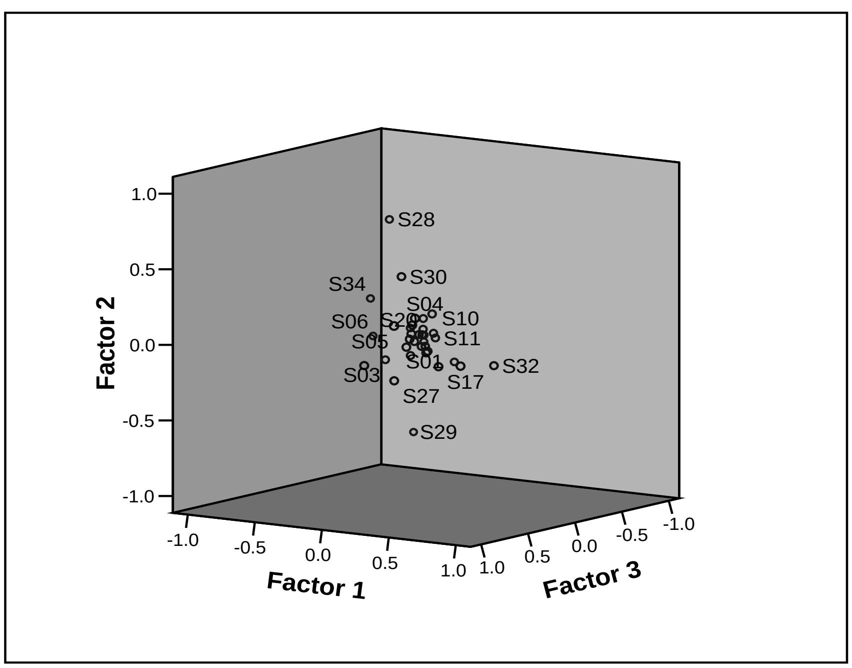
Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings(a)
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	4.294	12.631	12.631	3.762	11.064	11.064	1.292
2	2.264	6.658	19.289	1.703	5.008	16.072	2.083
3	2.060	6.059	25.348	1.467	4.315	20.387	1.410
4	1.713	5.040	30.387	1.097	3.227	23.614	1.075
5	1.627	4.785	35.172	1.007	2.963	26.577	1.016
6	1.459	4.291	39.463	.948	2.790	29.367	1.359
7	1.385	4.074	43.537	.793	2.331	31.698	1.857
8	1.302	3.830	47.367	.713	2.098	33.796	1.247
9	1.202	3.535	50.902	.629	1.851	35.647	2.000
10	1.133	3.331	54.233	.610	1.793	37.440	1.540
11	1.114	3.276	57.509	.552	1.624	39.065	1.286
12	1.091	3.209	60.718	.479	1.409	40.474	1.023
13	.982	2.888	63.606				
14	.927	2.727	66.334				
15	.884	2.599	68.932				
16	.845	2.485	71.417				
17	.812	2.390	73.807				
18	.776	2.282	76.088				
19	.747	2.198	78.286				
20	.700	2.059	80.345				
21	.665	1.957	82.302				
22	.646	1.900	84.202				
23	.591	1.738	85.939				
24	.585	1.721	87.661				
25	.560	1.648	89.308				
26	.536	1.577	90.885				
27	.516	1.519	92.404				
28	.466	1.369	93.773				
29	.434	1.276	95.050				
30	.414	1.217	96.267				
31	.385	1.132	97.399				
32	.343	1.008	98.406				
33	.288	.848	99.254				
34	.254	.746	100.000				

Extraction Method: Principal Axis Factoring.
a When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Scree Plot



Factor Plot in Rotated Factor Space



Factor Matrix(a)

	Factor											
	1	2	3	4	5	6	7	8	9	10	11	12
S32	.556	-.135	-.204	.035	-.029	-.047	-.117	.043	-.141	-.263	.144	-.159
S31	.521	.006	.189	.254	.177	-.092	.002	.028	.267	-.293	.061	-.045
S34	-.497	.364	.191	-.112	.117	-.026	.128	.276	.115	.009	.364	-.024
S30	-.483	.298	.154	.003	-.108	-.091	-.031	-.047	-.132	-.061	.101	.040
S25	.470	-.031	.232	-.006	-.204	.027	.020	.005	.026	.077	-.142	-.099
S17	.441	-.033	.076	-.082	-.082	.189	-.008	.113	-.077	-.056	.148	-.059
S21	.431	.074	.242	-.033	-.119	.119	.365	-.004	-.043	-.180	-.055	-.077
S33	.430	.085	.004	.153	.257	.022	-.245	.039	.234	-.153	-.121	.236
S27	.428	.168	-.098	.123	-.200	-.056	.031	.099	.040	.087	.124	.184
S12	.406	.165	.356	-.149	.000	.000	-.008	-.271	-.162	-.171	.117	.017
S11	.405	.302	-.206	-.310	-.035	.190	-.145	.085	.165	-.009	-.020	-.147
S29	.380	-.349	-.209	-.047	.128	-.044	.197	.021	.222	.214	.110	.060
S16	.307	.145	.229	-.016	-.180	.052	.109	-.054	.031	.179	.084	.200
S23	.304	.012	-.258	-.106	-.163	-.172	-.110	-.011	-.187	-.069	-.001	.088
S09	.255	.022	.231	.172	.155	.083	-.110	-.117	-.072	.082	.245	-.106
S01	.245	.090	.097	.215	.046	.176	.062	.116	-.098	.164	.105	-.171
S28	-.490	.542	.222	.152	.132	.009	-.153	-.134	.164	-.046	-.117	-.159
S22	.036	.360	-.202	.135	-.204	-.217	.129	.159	.127	-.073	.030	.002
S02	-.016	.326	-.038	.007	.139	.121	.226	.172	-.284	.014	-.158	.192
S10	.251	.317	-.307	.077	.010	.160	-.155	.021	.013	.230	-.112	-.163
S14	.140	.307	-.201	-.013	.087	.047	-.065	-.228	-.094	-.015	-.044	-.042
S04	.070	.290	.054	-.187	.245	.079	.097	.023	-.113	.014	-.132	.004
S24	.266	-.037	.360	.052	.159	.127	-.007	.098	-.028	.026	-.072	.134
S20	.005	.139	-.061	.467	-.084	-.083	.165	.132	-.103	.003	.042	-.023
S03	.221	.026	.192	-.371	.047	.176	.109	-.120	.158	.192	.008	.002
S18	.261	.112	-.245	-.048	.470	.094	.027	.188	-.148	-.081	-.016	.103

S15	.107	.287	-.039	-.233	-.401	-.040	-.125	.068	.068	-.124	-.045	.142
S07	.399	.194	.134	-.211	.180	-.618	-.141	.185	-.020	.227	.012	-.079
S08	.097	.131	-.096	.279	-.220	.379	-.165	.127	.038	.116	.025	.014
S13	.255	.298	-.234	-.135	-.050	-.063	.303	-.155	.038	-.053	.006	-.122
S05	.197	.143	.288	.053	-.091	-.021	-.293	-.072	-.100	.108	.064	.164
S26	.299	.123	-.198	.277	.090	-.198	.070	-.375	-.099	.173	.050	.032
S06	-.074	.216	-.194	.078	.070	.058	.172	-.252	.232	-.033	.088	.180
S19	.224	-.015	.322	.204	-.106	-.182	.154	.073	.062	.048	-.332	-.080

Extraction Method: Principal Axis Factoring.
a 12 factors extracted. 48 iterations required.

Pattern Matrix(a)

	Factor											
	1	2	3	4	5	6	7	8	9	10	11	12
S32	.441	-.155	-.094	.113	-.111	-.061	.301	-.072	.224	.072	.111	-.044
S06	-.387	-.027	.012	.037	.011	.142	.053	-.256	.124	-.033	.174	.096
S23	.327	-.141	.100	.064	.023	-.110	.037	-.174	-.009	.009	.075	.235
S28	-.336	.735	-.089	.014	-.016	-.049	-.101	-.041	.082	.130	-.042	-.057
S29	-.138	-.648	-.063	-.078	-.086	-.099	-.034	-.057	.075	.006	.008	-.091
S30	-.085	.415	.141	.132	.030	-.023	-.007	.040	-.214	-.147	.144	.055
S05	.092	.155	.474	-.050	-.037	-.078	-.099	-.037	.087	.028	-.025	-.039
S16	-.160	-.140	.431	-.026	.041	-.020	.127	-.031	-.033	.023	-.104	.036
S27	-.025	-.244	.304	.233	.013	-.089	.075	-.054	.101	.145	.012	.136
S20	-.023	.018	.008	.525	.059	.039	.025	-.056	-.018	.034	-.097	-.109
S03	-.217	-.151	.124	-.448	.033	-.069	.155	.027	-.065	.088	-.056	-.025
S22	-.142	.044	-.036	.394	-.008	-.176	.105	-.010	.032	.120	.002	.269
S02	-.007	.029	.066	.140	.587	.059	.007	.001	-.075	-.009	-.023	.059
S18	.112	-.170	-.142	.010	.465	-.078	-.040	-.007	.275	.038	.212	-.100
S04	-.048	.116	-.038	-.153	.378	-.105	.069	-.031	.012	.038	-.019	-.021
S07	.093	-.064	.115	.003	.031	-.849	-.148	-.010	.060	-.038	-.121	-.015

S21	.004	-.054	.015	.015	.130	.089	.553	.025	.047	-.059	-.268	.005
S12	.125	.183	.297	-.186	.028	-.059	.417	-.158	.113	-.180	-.013	-.087
S13	-.118	-.061	-.145	.024	.082	-.117	.372	-.277	-.080	.094	.002	.131
S17	.183	-.155	.129	-.049	.015	.017	.302	.136	.070	.147	.044	-.079
S26	-.034	-.105	.118	.154	-.022	-.088	-.032	-.601	.002	-.013	-.032	-.173
S34	-.391	.224	.034	.156	.090	-.243	.078	.422	-.136	-.061	.361	-.098
S14	.036	.158	-.014	-.058	.114	-.009	.065	-.344	.035	.165	.089	.010
S33	-.029	-.017	.084	-.028	.072	-.005	-.141	-.033	.676	.062	-.033	.084
S31	-.055	.003	-.056	.143	-.139	-.088	.264	.031	.617	-.070	-.122	-.114
S24	-.002	-.033	.208	-.094	.184	.030	.002	.147	.225	-.065	-.179	-.151
S10	.018	.023	-.054	-.003	.079	-.072	-.102	-.196	-.003	.574	-.024	-.022
S11	.022	-.010	-.068	-.243	.028	-.147	.196	.041	.142	.487	.100	.185
S08	-.003	.014	.171	.149	-.035	.286	-.060	.082	.040	.471	.014	-.019
S19	-.032	.051	-.013	.119	-.003	-.096	.029	.006	.075	-.043	-.595	.020
S25	.096	-.072	.136	-.089	-.082	-.049	.187	.000	.034	.151	-.373	.013
S15	.051	.120	.219	-.015	-.040	-.050	.130	.084	.009	.132	.022	.501
S09	.027	.056	.195	-.010	-.090	-.056	.106	-.072	.102	.051	.070	-.424
S01	.011	-.047	.065	.136	.070	-.014	.118	.042	-.043	.254	-.069	-.335

Extraction Method: Principal Axis Factoring. Rotation Method: Oblimin with Kaiser Normalization.
a Rotation converged in 51 iterations.

Structure Matrix

	Factor											
	1	2	3	4	5	6	7	8	9	10	11	12
S32	.509	-.335	.038	.065	-.084	-.157	.359	-.184	.378	.206	.015	-.042
S34	-.479	.402	-.055	.136	.134	-.143	-.048	.396	-.291	-.124	.347	-.026
S06	-.380	.018	-.050	.076	.055	.095	.040	-.282	.059	.023	.211	.125
S23	.350	-.202	.105	.050	.011	-.178	.126	-.241	.095	.121	.062	.250
S28	-.448	.767	-.082	.075	.080	-.007	-.196	.014	-.108	.018	.090	-.020
S29	.001	-.653	-.057	-.095	-.095	-.108	.087	-.119	.205	.057	-.072	-.100
S30	-.208	.522	.043	.145	.028	.035	-.137	.104	-.347	-.195	.199	.104

S05	.126	.123	.494	-.058	-.027	-.113	.028	-.024	.159	.085	-.111	-.083
S16	-.098	-.139	.465	-.034	.057	-.093	.270	-.047	.087	.124	-.207	-.002
S27	.052	-.279	.345	.225	.035	-.169	.243	-.159	.228	.292	-.077	.122
S20	-.053	.021	.027	.529	.053	.053	.012	-.077	-.002	.080	-.102	-.100
S03	-.152	-.154	.173	-.450	.081	-.128	.256	.024	.033	.098	-.109	-.037
S22	-.163	.048	-.015	.408	.040	-.202	.132	-.110	.007	.189	.043	.310
S02	-.076	.091	.041	.132	.571	.003	.051	-.032	-.054	.076	.006	.046
S18	.131	-.193	-.127	-.025	.483	-.147	.054	-.126	.334	.151	.187	-.110
S04	-.080	.116	-.003	-.161	.421	-.167	.127	-.062	.049	.084	.005	-.018
S07	.152	-.105	.190	-.049	.091	-.848	.085	-.102	.217	.041	-.176	.002
S21	.035	-.169	.186	-.028	.162	-.047	.593	-.011	.174	.069	-.356	-.048
S12	.152	.064	.410	-.234	.082	-.196	.487	-.163	.246	-.032	-.132	-.118
S13	-.118	-.115	-.073	.035	.167	-.225	.412	-.358	.020	.202	.036	.199
S17	.248	-.251	.243	-.089	.040	-.067	.384	.063	.218	.238	-.082	-.103
S26	.003	-.157	.124	.182	.021	-.147	.079	-.607	.154	.102	-.036	-.128
S14	.018	.101	.015	-.026	.185	-.092	.118	-.381	.098	.232	.139	.058
S33	.080	-.135	.169	-.041	.108	-.108	.037	-.138	.676	.180	-.090	-.021
S31	.055	-.173	.130	.093	-.072	-.188	.354	-.070	.659	.061	-.245	-.199
S24	.053	-.075	.283	-.133	.172	-.019	.110	.148	.286	-.009	-.284	-.252
S10	.039	-.044	.023	.056	.170	-.124	.042	-.279	.118	.587	.034	.030
S11	.080	-.117	.060	-.227	.142	-.261	.338	-.104	.246	.545	.099	.215
S08	.020	-.012	.209	.194	-.015	.265	-.004	.045	.072	.462	-.006	-.032
S19	-.003	-.033	.124	.109	-.009	-.121	.115	.038	.129	-.032	-.599	-.065
S25	.172	-.199	.297	-.102	-.056	-.131	.327	-.014	.194	.205	-.444	-.047
S15	.048	.097	.237	-.006	-.018	-.126	.194	.015	-.005	.197	.036	.495
S09	.074	-.010	.270	-.031	-.039	-.078	.163	-.071	.220	.094	-.050	-.425
S01	.036	-.092	.163	.130	.112	-.031	.184	.013	.094	.280	-.145	-.329

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

Factor Correlation Matrix

Factor	1	2	3	4	5	6	7	8	9	10	11	12
1	1.000	-.176	.077	-.059	-.080	-.038	.030	-.013	.155	.056	-.054	-.031
2	-.176	1.000	.008	.036	.066	.031	-.164	.095	-.206	-.106	.127	.031
3	.077	.008	1.000	-.023	-.008	-.085	.227	.009	.163	.154	-.207	-.079
4	-.059	.036	-.023	1.000	-.027	.052	-.060	-.069	-.043	.079	.002	.034
5	-.080	.066	-.008	-.027	1.000	-.110	.112	-.074	.063	.138	.034	-.027
6	-.038	.031	-.085	.052	-.110	1.000	-.199	.128	-.147	-.078	.036	-.074
7	.030	-.164	.227	-.060	.112	-.199	1.000	-.106	.185	.198	-.138	.020
8	-.013	.095	.009	-.069	-.074	.128	-.106	1.000	-.152	-.147	-.095	-.084
9	.155	-.206	.163	-.043	.063	-.147	.185	-.152	1.000	.172	-.116	-.141
10	.056	-.106	.154	.079	.138	-.078	.198	-.147	.172	1.000	.025	.058
11	-.054	.127	-.207	.002	.034	.036	-.138	-.095	-.116	.025	1.000	.147
12	-.031	.031	-.079	.034	-.027	-.074	.020	-.084	-.141	.058	.147	1.000

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

Factor Score Coefficient Matrix

	Factor											
	1	2	3	4	5	6	7	8	9	10	11	12
S01	-.012	-.005	.046	.064	.049	.026	.055	.044	-.034	.133	-.038	-.194
S02	-.002	.010	.034	.083	.374	.029	.011	-.004	-.032	.008	-.023	.029
S03	-.141	-.060	.059	-.256	.024	-.018	.091	.010	-.029	.043	-.034	-.019
S04	-.016	.033	-.037	-.078	.199	-.033	.030	-.030	.006	.011	-.028	-.015
S05	.064	.049	.262	-.017	-.032	-.013	-.046	.006	.043	.008	-.011	-.038
S06	-.204	-.046	.004	.016	.004	.033	.035	-.160	.056	-.027	.098	.073
S07	.110	-.010	.063	-.018	.028	-.769	-.128	-.019	.019	-.041	-.132	.002

S08	-.004	-.002	.135	.119	-.023	.100	-.042	.070	.019	.259	-.006	-.044
S09	.034	.023	.109	-.006	-.055	-.007	.035	-.031	.039	.040	.043	-.240
S10	.020	-.008	-.030	.021	.060	-.035	-.042	-.108	-.019	.316	-.007	-.032
S11	.000	-.013	-.047	-.179	.030	-.068	.144	.041	.064	.304	.108	.142
S12	.063	.130	.204	-.156	.040	.000	.248	-.097	.040	-.113	.047	-.063
S13	-.131	-.009	-.104	.022	.055	-.120	.193	-.179	-.058	.042	.018	.094
S14	.017	.047	-.012	-.038	.066	-.009	.028	-.164	.010	.062	.062	.016
S15	.035	.062	.122	.003	-.042	-.036	.058	.028	.001	.066	.025	.318
S16	-.098	-.055	.229	-.013	.024	.013	.049	-.017	-.019	.028	-.065	.024
S17	.085	-.045	.073	-.012	.002	.007	.112	.085	.020	.072	.015	-.056
S18	.080	-.058	-.107	-.014	.341	-.015	-.032	-.024	.149	.020	.137	-.074
S19	-.044	.002	-.011	.075	.019	.014	.020	.054	.008	-.026	-.350	.003
S20	.006	.000	.004	.286	.027	.005	.000	-.030	-.015	.038	-.076	-.057
S21	-.027	-.034	-.001	.018	.100	.000	.304	.034	-.008	-.035	-.199	-.004
S22	-.087	-.022	-.020	.230	-.007	-.026	.076	-.012	-.009	.058	.023	.177
S23	.118	-.004	.040	.041	.002	-.020	.021	-.074	-.017	.001	.081	.133
S24	-.028	.012	.116	-.049	.108	.018	-.015	.105	.080	-.022	-.092	-.108
S25	.025	-.005	.082	-.036	-.036	-.009	.080	.037	-.026	.085	-.179	-.007
S26	-.080	-.044	.075	.122	-.007	-.021	.000	-.374	-.011	-.011	.052	-.110
S27	-.040	-.078	.174	.136	-.004	-.017	.028	-.035	.039	.087	.003	.085
S28	-.243	.519	-.088	-.025	-.016	-.067	-.080	-.121	.100	.120	-.065	-.065
S29	-.188	-.281	-.071	-.039	-.072	-.046	-.021	-.037	.040	.014	.005	-.065
S30	.017	.138	.087	.072	.009	-.009	.010	-.013	-.085	-.074	.059	.042
S31	-.069	-.025	-.052	.115	-.127	-.035	.164	.044	.377	-.064	-.079	-.098
S32	.285	.014	-.084	.098	-.091	-.053	.159	-.039	.107	.062	.140	-.042
S33	-.039	.008	.069	-.031	.064	.035	-.126	-.019	.377	.024	.024	.065
S34	-.315	.059	.044	.138	.073	-.161	.151	.338	-.097	-.021	.318	-.097

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

Factor Score Covariance Matrix

Factor	1	2	3	4	5	6	7	8	9	10	11	12
1	.917	-.654	1.683	.121	-.517	1.246	1.027	-.172	-.166	1.440	-.414	1.020
2	-.654	1.054	-.604	-.064	1.523	-.587	-.248	-.055	1.352	-.863	.956	-.175
3	1.683	-.604	2.882	.005	1.223	.955	2.612	-.437	1.432	1.607	-.195	2.281
4	.121	-.064	.005	.709	-.285	1.013	.026	-.151	1.064	.974	-.219	-.023
5	-.517	1.523	1.223	-.285	2.971	-.711	.351	-.504	1.976	-.384	2.086	.260
6	1.246	-.587	.955	1.013	-.711	3.107	-.191	-.305	1.145	1.856	.642	-.360
7	1.027	-.248	2.612	.026	.351	-.191	2.232	-.451	.622	.260	-.361	1.201
8	-.172	-.055	-.437	-.151	-.504	-.305	-.451	.804	-.078	-.463	.556	-.292
9	-.166	1.352	1.432	1.064	1.976	1.145	.622	-.078	4.253	-.104	.055	.607
10	1.440	-.863	1.607	.974	-.384	1.856	.260	-.463	-.104	1.981	-.610	.660
11	-.414	.956	-.195	-.219	2.086	.642	-.361	.556	.055	-.610	3.209	-.166
12	1.020	-.175	2.281	-.023	.260	-.360	1.201	-.292	.607	.660	-.166	2.733

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

Analysis on the Science Domain Dataset Subset to Final Factors Reduction

Notes

Output Created		02-MAY-2008 14:23:17
Comments		
Input	Data	C:\Documents and Settings\dcolbeck.COMPUTING\Desktop\Final Data Collection 280408\Domain Analysis\Science12 ExpAnalysis 020508.sav
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	167
Missing Value Handling	Definition of Missing	MISSING=EXCLUDE: User-defined missing values are treated as missing.
	Cases Used	LISTWISE: Statistics are based on cases with no missing values for any variable used.
Syntax		FACTOR /VARIABLES S01 S02 S03 S04 S05 S06 S07 S08 S09 S10 S11 S12 /MISSING LISTWISE /ANALYSIS S01 S02 S03 S04 S05 S06 S07 S08 S09 S10 S11 S12 /PRINT UNIVARIATE INITIAL CORRELATION SIG DET KMO EXTRACTION ROTATION FSCORE /FORMAT SORT /PLOT EIGEN ROTATION /CRITERIA MINEIGEN(1) ITERATE(250) /EXTRACTION PAF /CRITERIA ITERATE(250) DELTA(0) /ROTATION OBLIMIN /METHOD=CORRELATION .
Resources	Elapsed Time	0:00:00.06
	Maximum Memory Required	18744 (18.305K) bytes

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
S01	2.6006	.58706	167
S02	3.4036	.43213	167
S03	2.0665	.47991	167
S04	2.6204	.56819	167
S05	2.7826	.77156	167
S06	2.4192	.94633	167
S07	2.1132	.45144	167
S08	3.2455	.61042	167
S09	2.1419	.45988	167
S10	2.3174	.64854	167
S11	1.9162	.53956	167
S12	2.3018	.50747	167

Correlation Matrix(a)

		S01	S02	S03	S04	S05	S06	S07	S08	S09	S10	S11	S12
Correlation	S01	1.000	-.180	.159	.084	.055	.121	.276	.110	.155	.220	-.011	.091
	S02	-.180	1.000	-.113	.085	-.035	-.033	-.171	.194	-.136	-.082	-.176	-.045
	S03	.159	-.113	1.000	.130	.030	.210	.285	.108	.265	.188	.281	.290
	S04	.084	.085	.130	1.000	.057	.104	.180	.160	.058	.162	.093	.089
	S05	.055	-.035	.030	.057	1.000	.128	.174	.183	.134	.173	-.049	.013
	S06	.121	-.033	.210	.104	.128	1.000	.160	.129	.215	.071	.240	.134
	S07	.276	-.171	.285	.180	.174	.160	1.000	.103	.245	.212	.287	.257
	S08	.110	.194	.108	.160	.183	.129	.103	1.000	-.027	.133	-.127	.112
	S09	.155	-.136	.265	.058	.134	.215	.245	-.027	1.000	.126	.287	.148
	S10	.220	-.082	.188	.162	.173	.071	.212	.133	.126	1.000	.058	.260
	S11	-.011	-.176	.281	.093	-.049	.240	.287	-.127	.287	.058	1.000	.146
	S12	.091	-.045	.290	.089	.013	.134	.257	.112	.148	.260	.146	1.000
Sig. (1-tailed)	S01		.010	.020	.139	.240	.060	.000	.078	.023	.002	.443	.122
	S02	.010		.072	.137	.326	.335	.013	.006	.040	.145	.012	.283
	S03	.020	.072		.047	.351	.003	.000	.081	.000	.008	.000	.000
	S04	.139	.137	.047		.233	.091	.010	.019	.229	.018	.116	.127
	S05	.240	.326	.351	.233		.050	.012	.009	.043	.013	.264	.431
	S06	.060	.335	.003	.091	.050		.019	.048	.003	.183	.001	.042
	S07	.000	.013	.000	.010	.012	.019		.094	.001	.003	.000	.000
	S08	.078	.006	.081	.019	.009	.048	.094		.364	.043	.050	.075
	S09	.023	.040	.000	.229	.043	.003	.001	.364		.052	.000	.028
	S10	.002	.145	.008	.018	.013	.183	.003	.043	.052		.230	.000
	S11	.443	.012	.000	.116	.264	.001	.000	.050	.000	.230		.030
	S12	.122	.283	.000	.127	.431	.042	.000	.075	.028	.000	.030	

a Determinant = .280

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.707
Bartlett's Test of Sphericity	Approx. Chi-Square	205.107
	df	66
	Sig.	.000

Communalities

	Initial	Extraction
S01	.160	.231
S02	.130	.355
S03	.217	.321
S04	.085	.116
S05	.112	.243
S06	.134	.204
S07	.264	.352
S08	.156	.347
S09	.176	.251
S10	.159	.246
S11	.246	.558
S12	.163	.283

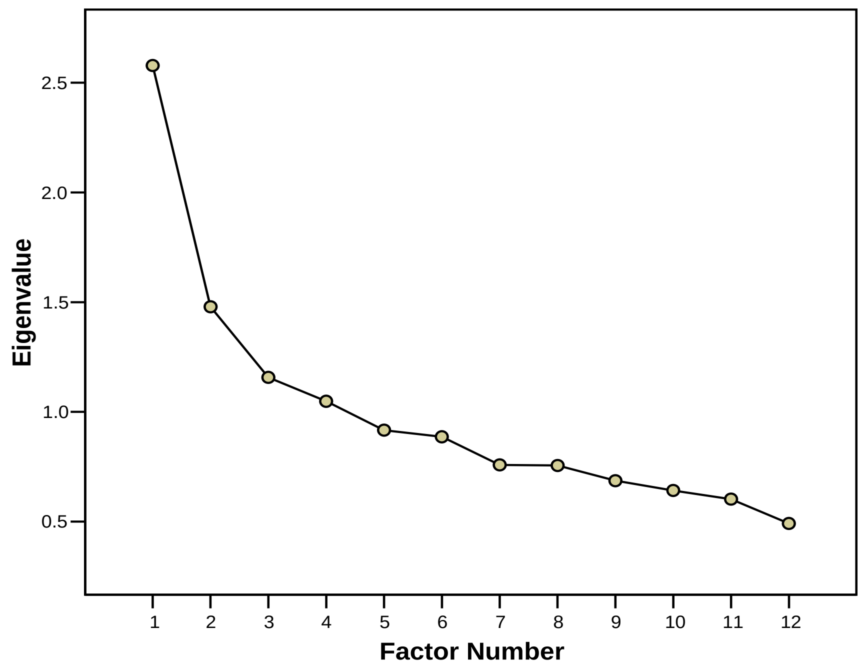
Extraction Method: Principal Axis Factoring.

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings (a)
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	2.579	21.488	21.488	1.889	15.744	15.744	1.455
2	1.479	12.324	33.812	.838	6.983	22.728	.659
3	1.157	9.642	43.454	.478	3.980	26.708	1.498
4	1.048	8.735	52.189	.302	2.516	29.224	.699
5	.916	7.637	59.827				
6	.886	7.387	67.213				
7	.758	6.317	73.530				
8	.755	6.295	79.825				
9	.686	5.719	85.544				
10	.641	5.346	90.890				
11	.602	5.017	95.906				
12	.491	4.094	100.000				

Extraction Method: Principal Axis Factoring.
a When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Scree Plot



Factor Matrix(a)

	Factor			
	1	2	3	4
S07	.586	.029	-.090	.012
S03	.539	-.023	.107	-.134
S11	.494	-.469	.298	.071
S09	.458	-.138	.004	.150
S12	.428	.093	.067	-.295
S10	.394	.225	-.153	-.131
S06	.377	.023	.160	.189
S01	.350	.129	-.301	-.032
S04	.246	.194	.133	-.023
S08	.169	.545	.137	.056
S02	-.255	.341	.416	-.020
S05	.213	.265	-.128	.333

Extraction Method: Principal Axis Factoring.
a 4 factors extracted. 24 iterations required.

Pattern Matrix(a)

	Factor			
	1	2	3	4
S11	.745	-.101	.064	-.176
S09	.408	-.124	-.082	.136
S06	.389	.104	-.004	.172
S02	-.087	.559	.157	-.056
S08	-.087	.434	-.203	.255
S04	.105	.208	-.184	.047
S12	.092	.090	-.507	-.192
S10	-.052	-.003	-.479	.086
S01	-.067	-.179	-.390	.181
S03	.319	.034	-.375	-.096
S07	.269	-.096	-.371	.134
S05	.062	.038	.014	.485

Extraction Method: Principal Axis Factoring. Rotation Method: Oblimin with Kaiser Normalization.
a Rotation converged in 28 iterations.

Structure Matrix

	Factor			
	1	2	3	4
S11	.709	-.148	-.173	-.143
S09	.458	-.126	-.284	.187
S06	.400	.101	-.223	.213
S02	-.178	.549	.179	-.074
S08	-.003	.467	-.276	.345
S07	.433	-.076	-.518	.271
S12	.276	.101	-.487	-.011
S10	.149	.033	-.487	.239
S03	.461	.035	-.474	.056
S01	.113	-.141	-.412	.290
S04	.174	.218	-.253	.131
S05	.094	.070	-.171	.488

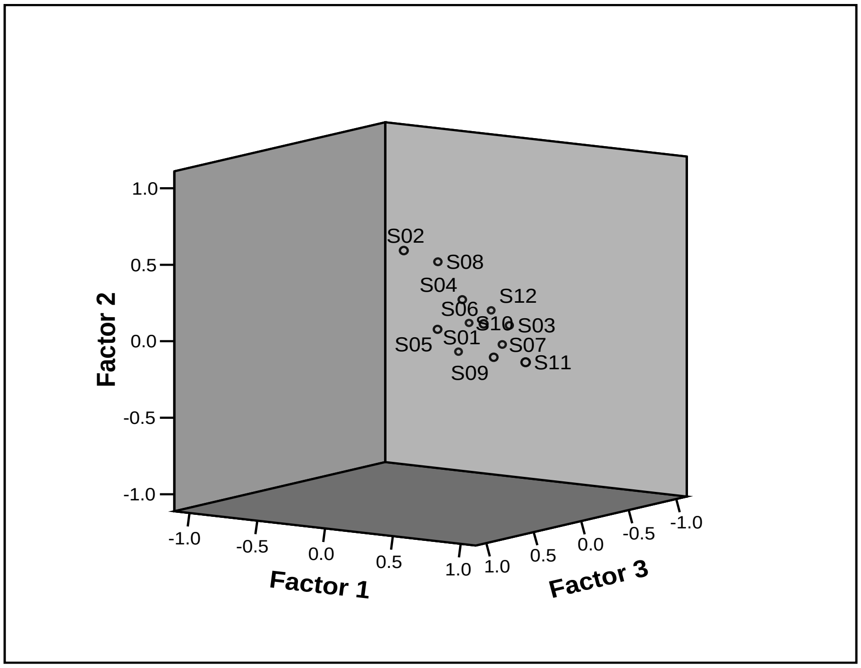
Extraction Method: Principal Axis Factoring. Rotation Method: Oblimin with Kaiser Normalization.

Factor Correlation Matrix

Factor	1	2	3	4
1	1.000	-.041	-.403	.083
2	-.041	1.000	-.057	.073
3	-.403	-.057	1.000	-.328
4	.083	.073	-.328	1.000

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

Factor Plot in Rotated Factor Space



Factor Score Coefficient Matrix

	Factor			
	1	2	3	4
S01	-.006	-.116	-.187	.147
S02	-.016	.439	.080	-.072
S03	.170	.053	-.210	-.047
S04	.048	.128	-.087	.039
S05	.045	.023	-.023	.351
S06	.162	.081	-.030	.131
S07	.134	-.051	-.232	.156
S08	-.004	.340	-.140	.223
S09	.177	-.067	-.062	.120
S10	-.008	.010	-.240	.097
S11	.519	-.053	.029	-.197
S12	.066	.084	-.250	-.119

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

Factor Score Covariance Matrix

Factor	1	2	3	4
1	.725	-.149	1.212	-.677
2	-.149	.526	-.727	-.029
3	1.212	-.727	1.913	-.540
4	-.677	-.029	-.540	.509

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

Correlation Analysis on the Science Domain Dataset

Notes

Output Created		02-MAY-2008 14:24:33
Comments		
Input	Data	C:\Documents and Settings\dcolbeck.COMPUTING\Desktop\Final Data Collection 280408\Domain Analysis\Science12 ExpAnalysis 020508.sav
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	Split File	<none>
	N of Rows in Working Data File	167
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each pair of variables are based on all the cases with valid data for that pair.
Syntax		CORRELATIONS /VARIABLES=S01 S02 S03 S04 S05 S06 S07 S08 S09 S10 S11 S12 /PRINT=TWOTAIL NOSIG /MISSING=PAIRWISE .
Resources	Elapsed Time	0:00:00.02

Correlations

		S01	S02	S03	S04	S05	S06	S07	S08	S09	S10	S11	S12
S01	Pearson Correlation	1	-.180(*)	.159(*)	.084	.055	.121	.276(**)	.110	.155(*)	.220(**)	-.011	.091
	Sig. (2-tailed)		.020	.040	.279	.481	.119	.000	.157	.046	.004	.885	.243
	N	167	167	167	167	167	167	167	167	167	167	167	167
S02	Pearson Correlation	-.180(*)	1	-.113	.085	-.035	-.033	-.171(*)	.194(*)	-.136	-.082	-.176(*)	-.045
	Sig. (2-tailed)	.020		.145	.274	.653	.670	.027	.012	.080	.290	.023	.565
	N	167	167	167	167	167	167	167	167	167	167	167	167
S03	Pearson Correlation	.159(*)	-.113	1	.130	.030	.210(**)	.285(**)	.108	.265(**)	.188(*)	.281(**)	.290(**)
	Sig. (2-tailed)	.040	.145		.094	.702	.006	.000	.163	.001	.015	.000	.000
	N	167	167	167	167	167	167	167	167	167	167	167	167
S04	Pearson Correlation	.084	.085	.130	1	.057	.104	.180(*)	.160(*)	.058	.162(*)	.093	.089
	Sig. (2-tailed)	.279	.274	.094		.466	.181	.020	.039	.458	.036	.232	.255
	N	167	167	167	167	167	167	167	167	167	167	167	167
S05	Pearson Correlation	.055	-.035	.030	.057	1	.128	.174(*)	.183(*)	.134	.173(*)	-.049	.013
	Sig. (2-tailed)	.481	.653	.702	.466		.099	.025	.018	.085	.025	.529	.863
	N	167	167	167	167	167	167	167	167	167	167	167	167
S06	Pearson Correlation	.121	-.033	.210(**)	.104	.128	1	.160(*)	.129	.215(**)	.071	.240(**)	.134
	Sig. (2-tailed)	.119	.670	.006	.181	.099		.038	.095	.005	.365	.002	.085
	N	167	167	167	167	167	167	167	167	167	167	167	167
S07	Pearson Correlation	.276(**)	-.171(*)	.285(**)	.180(*)	.174(*)	.160(*)	1	.103	.245(**)	.212(**)	.287(**)	.257(**)
	Sig. (2-tailed)	.000	.027	.000	.020	.025	.038		.187	.001	.006	.000	.001

	N	167	167	167	167	167	167	167	167	167	167	167	167
S08	Pearson Correlation	.110	.194(*)	.108	.160(*)	.183(*)	.129	.103	1	-.027	.133	-.127	.112
	Sig. (2-tailed)	.157	.012	.163	.039	.018	.095	.187		.729	.086	.101	.149
	N	167	167	167	167	167	167	167	167	167	167	167	167
S09	Pearson Correlation	.155(*)	-.136	.265(**)	.058	.134	.215(**)	.245(**)	-.027	1	.126	.287(**)	.148
	Sig. (2-tailed)	.046	.080	.001	.458	.085	.005	.001	.729		.104	.000	.056
	N	167	167	167	167	167	167	167	167	167	167	167	167
S10	Pearson Correlation	.220(**)	-.082	.188(*)	.162(*)	.173(*)	.071	.212(**)	.133	.126	1	.058	.260(**)
	Sig. (2-tailed)	.004	.290	.015	.036	.025	.365	.006	.086	.104		.460	.001
	N	167	167	167	167	167	167	167	167	167	167	167	167
S11	Pearson Correlation	-.011	-.176(*)	.281(**)	.093	-.049	.240(**)	.287(**)	-.127	.287(**)	.058	1	.146
	Sig. (2-tailed)	.885	.023	.000	.232	.529	.002	.000	.101	.000	.460		.060
	N	167	167	167	167	167	167	167	167	167	167	167	167
S12	Pearson Correlation	.091	-.045	.290(**)	.089	.013	.134	.257(**)	.112	.148	.260(**)	.146	1
	Sig. (2-tailed)	.243	.565	.000	.255	.863	.085	.001	.149	.056	.001	.060	
	N	167	167	167	167	167	167	167	167	167	167	167	167

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

Analysis on the Health Domain Dataset

Statement to Subset Reduction

Notes

Output Created		02-MAY-2008 13:46:01
Comments		
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	Filter	<none>
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	Split File	<none>
	N of Rows in Working Data File	268
Missing Value Handling	Definition of Missing	MISSING=EXCLUDE: User-defined missing values are treated as missing.
	Cases Used	LISTWISE: Statistics are based on cases with no missing values for any variable used.
Syntax		FACTOR /VARIABLES H01 H02 H03 H04 H05 H06 H07 H08 H09 H10 H11 H12 H13 H14 H15 H16 H17 H18 H19 H20 H21 H22 H23 H24 H25 H26 H27 H28 H29 H30 H31 H32 H33 H34 /MISSING LISTWISE /ANALYSIS H01 H02 H03 H04 H05 H06 H07 H08 H09 H10 H11 H12 H13 H14 H15 H16 H17 H18 H19 H20 H21 H22 H23 H24 H25 H26 H27 H28 H29 H30 H31 H32 H33 H34 /PRINT UNIVARIATE INITIAL CORRELATION SIG DET KMO EXTRACTION ROTATION FSCORE /FORMAT SORT /PLOT EIGEN ROTATION /CRITERIA MINEIGEN(1) ITERATE(250) /EXTRACTION PAF /CRITERIA ITERATE(250) DELTA(0) /ROTATION OBLIMIN /METHOD=CORRELATION .
Resources	Elapsed Time	0:00:00.36
	Maximum Memory Required	133672 (130.539K) bytes

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
H01	2.2201	.64189	268
H02	2.5336	1.02898	268
H03	2.1007	.64268	268
H04	2.8134	1.13618	268
H05	2.3060	.66172	268
H06	3.8396	1.00951	268
H07	2.3470	.98818	268
H08	2.0037	.67872	268
H09	2.0224	.68111	268
H10	2.3694	.99517	268
H11	2.3321	.96268	268
H12	2.2052	.68617	268
H13	2.5373	.94933	268
H14	2.8433	1.16345	268
H15	2.7015	1.29262	268
H16	1.8657	.73225	268
H17	1.4963	.60891	268
H18	2.4851	1.08607	268
H19	2.0746	.66622	268
H20	2.6306	1.09549	268
H21	1.9515	.67699	268
H22	2.8134	.94546	268
H23	1.7090	.90214	268
H24	2.3321	.67442	268
H25	1.7836	.66886	268
H26	2.7052	1.09427	268
H27	1.9030	.62853	268
H28	4.1716	.76463	268
H29	2.4440	1.01701	268
H30	3.9776	.88234	268
H31	1.7910	.68777	268
H32	1.7985	.87649	268
H33	1.9104	.70273	268
H34	4.2052	.91125	268

Correlation Matrix(a) see - .spo file

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.701
Bartlett's Test of Sphericity	Approx. Chi-Square	1430.526
	df	561
	Sig.	.000

Communalities

	Initial	Extraction
H01	.111	.163
H02	.183	.314
H03	.251	.386
H04	.196	.278
H05	.198	.239
H06	.193	.250
H07	.134	.166
H08	.191	.360
H09	.214	.319
H10	.283	.467
H11	.334	.455
H12	.236	.368
H13	.336	.400
H14	.296	.337
H15	.269	.430
H16	.251	.314
H17	.247	.233
H18	.247	.597
H19	.189	.229
H20	.231	.736
H21	.232	.287
H22	.297	.414
H23	.347	.359
H24	.185	.254
H25	.298	.495
H26	.251	.358
H27	.251	.495
H28	.345	.463
H29	.200	.367
H30	.266	.388
H31	.316	.362
H32	.338	.501
H33	.233	.295
H34	.334	.485

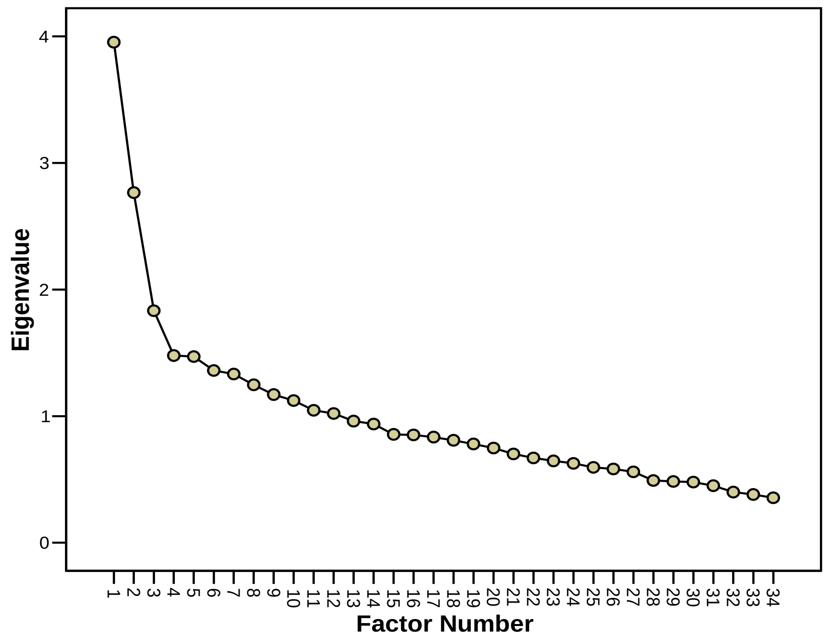
Extraction Method: Principal Axis Factoring.

Total Variance Explained

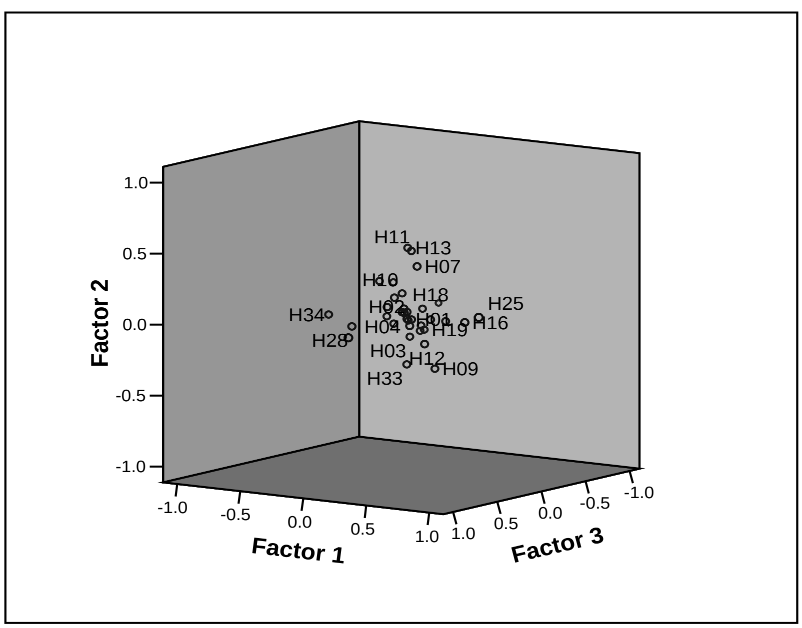
Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings (a)
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	3.954	11.630	11.630	3.340	9.822	9.822	1.993
2	2.766	8.135	19.764	2.147	6.314	16.136	1.519
3	1.833	5.390	25.155	1.233	3.627	19.764	1.377
4	1.479	4.350	29.505	.883	2.598	22.362	1.332
5	1.470	4.324	33.829	.852	2.505	24.867	1.359
6	1.360	4.001	37.829	.816	2.401	27.268	1.219
7	1.333	3.920	41.749	.737	2.168	29.436	.964
8	1.247	3.669	45.418	.670	1.971	31.407	1.141
9	1.171	3.443	48.861	.588	1.730	33.138	1.114
10	1.123	3.303	52.164	.497	1.460	34.598	1.295
11	1.046	3.076	55.240	.403	1.184	35.782	1.420
12	1.021	3.002	58.242	.401	1.179	36.961	1.814
13	.961	2.826	61.068				
14	.938	2.758	63.826				
15	.856	2.517	66.343				
16	.851	2.504	68.847				
17	.835	2.455	71.301				
18	.809	2.380	73.681				
19	.780	2.295	75.975				
20	.748	2.200	78.175				
21	.701	2.062	80.237				
22	.670	1.970	82.207				
23	.647	1.902	84.109				
24	.627	1.844	85.952				
25	.595	1.751	87.703				
26	.583	1.713	89.417				
27	.560	1.647	91.063				
28	.491	1.445	92.508				
29	.483	1.422	93.930				
30	.479	1.409	95.339				
31	.450	1.323	96.662				
32	.400	1.175	97.838				
33	.380	1.119	98.957				
34	.355	1.043	100.000				

Extraction Method: Principal Axis Factoring.
a When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Scree Plot



Factor Plot in Rotated Factor Space



Factor Matrix(a)

	Factor											
	1	2	3	4	5	6	7	8	9	10	11	12
H32	.498	-.132	-.178	-.024	.042	.008	-.274	.231	.123	-.128	-.141	-.149
H31	.478	-.007	.017	.051	.204	.146	-.009	.129	.115	-.062	-.100	-.156
H23	.475	.027	.046	.070	-.071	.042	-.305	.027	-.085	-.018	.099	-.089
H11	.434	.369	-.072	-.157	.094	-.074	-.127	-.054	-.116	.195	-.097	.084
H17	.420	-.177	.007	.022	-.072	-.005	.052	-.070	-.080	-.007	-.028	-.069
H21	.385	-.126	.231	.102	-.087	.026	.170	-.067	.050	.076	-.095	-.007
H16	.372	-.202	.154	-.034	.071	-.055	.063	-.093	-.184	-.193	-.126	-.053
H05	.319	-.196	.131	-.053	.060	.013	.170	-.006	.131	.112	.037	.121
H33	.311	-.220	.060	.146	.233	.204	-.043	.022	.106	-.021	.114	-.043
H04	.276	.073	.142	-.231	.237	.102	.167	-.082	.077	.025	.021	-.121
H13	.302	.485	-.003	-.079	-.028	-.135	.125	-.011	.042	.011	-.176	.008
H22	.244	.444	.057	.183	.114	-.002	.171	-.121	.036	-.209	.087	-.105
H14	.273	.432	.092	-.003	-.157	-.087	-.022	.046	.083	-.016	-.006	-.159
H25	.362	-.380	.147	.151	.075	-.177	.077	-.066	-.262	-.034	-.216	.110
H06	.162	.359	.027	-.049	.099	-.035	.061	.066	-.143	-.051	.218	.043
H09	.131	-.353	.235	-.092	.053	.065	-.028	-.182	-.003	-.098	.193	.161
H26	.275	.316	-.004	.291	.108	-.124	-.073	.110	.095	-.039	.019	.205
H19	.207	-.279	-.133	-.005	.092	.113	.204	.049	.133	.078	-.042	-.003
H07	.187	.205	-.008	-.102	.055	-.194	-.001	-.049	-.078	.077	-.129	.079
H28	-.380	.225	.432	.104	.154	.104	.080	-.068	.137	.017	-.081	.017
H34	-.362	.283	.410	.026	.001	.175	-.085	.094	.192	.093	-.113	-.010
H30	-.358	.030	.371	.113	.130	-.044	-.016	.121	-.202	.101	.038	-.149
H12	.305	-.165	.320	-.041	-.171	-.121	-.075	-.231	-.015	-.047	.163	-.107
H29	.124	.045	-.304	-.239	-.198	.214	.117	-.167	.214	-.106	-.029	.126
H20	.242	.249	-.176	.535	-.259	.397	.140	-.178	-.135	.059	-.007	-.015
H15	.214	.328	.173	-.212	-.418	-.110	.013	-.049	-.004	.029	.082	-.068

H10	.323	.244	-.092	.059	.351	-.216	-.047	-.240	.160	.120	.124	.077
H18	.268	.218	.214	-.218	.042	.474	-.244	.009	-.218	.066	-.054	.209
H01	.100	-.025	.135	-.056	-.014	-.033	.300	.180	.001	-.049	.031	.059
H03	.228	-.263	.239	.046	-.157	-.026	-.291	-.118	.278	.033	-.041	.034
H27	.387	-.070	.084	.215	-.187	-.135	.019	.409	.061	.068	.141	.193
H02	.204	.119	.116	-.241	.006	.154	.144	.264	-.054	-.255	.060	.037
H08	.265	-.106	-.198	-.124	.100	.117	.061	.082	-.093	.364	.148	-.164
H24	.207	-.194	.175	-.054	-.191	-.022	.204	.070	.059	.220	-.057	-.034

Extraction Method: Principal Axis Factoring.
a 12 factors extracted. 61 iterations required.

Pattern Matrix(a)

	Factor											
	1	2	3	4	5	6	7	8	9	10	11	12
H25	.685	.086	.101	.004	.102	.017	-.042	.104	.114	-.034	-.025	.006
H16	.515	.021	.016	-.010	-.073	.038	.100	-.101	-.008	-.054	-.018	-.132
H34	-.383	.024	.277	-.004	.009	.202	-.014	-.089	.254	-.271	-.065	-.029
H17	.296	-.007	-.079	.091	-.131	-.001	-.007	.019	.076	.122	-.017	-.106
H13	-.013	.478	-.090	.113	-.088	.008	.126	-.029	.075	-.085	.118	-.085
H11	.043	.467	-.053	.009	-.041	.271	-.069	.038	-.033	.165	.175	-.052
H07	.118	.372	-.011	-.061	-.011	.053	-.013	.012	.005	.004	.106	.031
H09	.210	-.349	-.080	-.162	-.115	.165	.025	.010	.043	-.045	.153	.152
H33	.062	-.319	.027	.060	.079	.093	.003	.035	.071	.097	.202	-.249
H29	-.130	.002	-.608	.061	-.005	.053	.046	-.109	.040	-.050	-.033	.047
H30	-.015	-.060	.578	-.027	-.010	.018	.036	-.072	.013	.016	-.078	.081
H20	.069	-.102	-.115	.869	.019	.108	-.139	.069	.054	.045	-.071	.083
H22	.018	.043	.017	.338	-.139	-.091	.201	-.108	-.101	-.145	.316	-.102
H15	-.128	.223	-.092	.040	-.532	.045	.101	.037	.060	.002	-.100	.088
H12	.211	-.159	.038	-.048	-.494	.001	-.066	-.016	.075	-.001	.090	.018
H14	-.155	.246	.026	.137	-.320	-.031	.082	.025	.018	-.044	.045	-.196

H18	.004	.061	-.024	.080	.045	.775	.041	-.027	-.015	.033	-.104	9.696E-05
H02	.001	-.031	-.078	-.066	-.033	.167	.498	.015	-.083	-.050	-.101	-.130
H01	.057	.000	.017	-.024	.015	-.061	.347	.080	.149	-.003	-.013	.051
H03	.010	-.144	-.082	-.154	-.236	.083	-.300	.136	.248	-.169	.040	-.180
H06	-.062	.079	.073	.079	-.104	.097	.261	.068	-.208	.087	.204	.076
H27	-.030	-.038	.043	.016	-.056	-.018	.186	.623	.139	.051	.000	-.082
H26	-.039	.141	.023	.149	.086	.035	.028	.343	-.041	-.175	.305	-.103
H04	.016	.033	-.013	-.064	-.061	.091	.186	-.274	.145	.126	.219	-.129
H24	.053	.048	.011	-.014	-.125	-.035	.051	.072	.402	.152	-.120	.031
H21	.228	.009	-.004	.145	-.112	.027	.020	.036	.352	-.005	.033	-.054
H05	.089	-.060	-.097	-.075	.008	.053	.092	.088	.303	.084	.173	.018
H19	.065	-.102	-.167	.006	.186	-.075	.059	-.009	.221	.165	.037	-.107
H08	-.091	.005	.033	.018	.012	.054	-.023	-.021	.072	.600	.035	-.050
H28	-.184	-.037	.298	.051	.071	.096	.031	-.195	.234	-.317	.116	.098
H10	-.030	.161	-.053	-.025	-.007	-.043	-.141	.010	-.027	.072	.636	-.023
H32	.079	.053	-.127	-.123	.004	.006	-.042	.138	-.088	.053	-.082	-.612
H31	.082	-.004	.002	.069	.064	.062	.096	-.032	.091	.062	.097	-.477
H23	.092	-.043	.037	.080	-.258	.187	-.104	.170	-.133	.116	.021	-.265

Extraction Method: Principal Axis Factoring. Rotation Method: Oblimin with Kaiser Normalization.
a Rotation converged in 71 iterations.

Structure Matrix

	Factor											
	1	2	3	4	5	6	7	8	9	10	11	12
H25	.672	-.069	-.006	-.074	-.028	.033	-.023	.225	.239	.126	.081	-.134
H16	.516	-.041	-.076	-.037	-.172	.123	.127	.023	.127	.087	.109	-.231
H34	-.450	.032	.401	.022	.017	.164	.011	-.195	.131	-.423	-.098	.124
H17	.391	-.029	-.194	.070	-.204	.079	.039	.142	.174	.238	.089	-.244
H13	-.049	.548	-.101	.260	-.216	.105	.244	.028	.013	-.040	.255	-.166
H11	.074	.505	-.135	.144	-.200	.342	.063	.109	-.068	.212	.332	-.221

H09	.318	-.376	-.083	-.242	-.130	.185	-.005	.017	.174	.026	.114	.038
H07	.083	.358	-.035	.017	-.101	.087	.054	.048	-.023	.038	.181	-.040
H30	-.130	-.084	.598	-.070	.059	-.021	.011	-.139	-.009	-.166	-.121	.219
H29	-.074	.037	-.559	.073	-.029	.049	.059	-.099	.020	.064	-.028	-.029
H20	.016	.032	-.140	.808	-.046	.099	-.055	.136	.010	.062	.040	-.092
H22	-.024	.228	.022	.435	-.193	.050	.275	-.058	-.097	-.130	.401	-.180
H15	-.084	.324	-.097	.122	-.564	.143	.178	.074	.055	-.027	-.016	.010
H12	.332	-.138	-.025	-.078	-.502	.126	-.030	.077	.198	.036	.128	-.093
H14	-.122	.373	-.004	.270	-.378	.103	.176	.086	-.011	-.055	.163	-.234
H18	.018	.090	-.042	.110	-.134	.757	.127	-.029	-.003	.056	.063	-.157
H02	.035	.044	-.092	.004	-.113	.229	.493	.016	-.001	.017	.004	-.173
H01	.091	.007	.006	-.011	-.026	-.033	.346	.076	.196	.034	.014	.008
H06	-.069	.233	.058	.178	-.149	.165	.298	.054	-.192	.054	.260	-.020
H27	.161	.011	-.038	.077	-.156	.031	.191	.645	.212	.131	.067	-.229
H24	.181	-.026	-.059	-.049	-.167	-.006	.097	.127	.434	.186	-.076	-.042
H21	.332	-.028	-.078	.119	-.217	.106	.097	.137	.415	.092	.133	-.194
H05	.256	-.095	-.153	-.082	-.074	.105	.134	.133	.370	.182	.202	-.126
H03	.188	-.205	-.103	-.174	-.276	.144	-.276	.197	.300	-.088	.048	-.227
H08	.080	.010	-.125	.019	.013	.083	.030	.038	.097	.584	.081	-.157
H28	-.303	-.032	.436	.041	.087	.066	.049	-.294	.139	-.451	.052	.222
H19	.195	-.161	-.237	-.030	.155	-.063	.066	.043	.266	.270	.051	-.173
H10	.064	.251	-.089	.092	-.072	.071	-.048	.055	-.044	.112	.642	-.170
H26	-.011	.248	.025	.270	-.034	.096	.080	.350	-.063	-.120	.370	-.215
H04	.109	.061	-.072	-.014	-.122	.204	.263	-.214	.190	.166	.294	-.203
H32	.246	.036	-.273	-.036	-.091	.119	-.020	.273	-.001	.223	.069	-.645
H31	.219	.018	-.121	.137	-.051	.192	.164	.087	.162	.186	.251	-.552
H23	.226	.030	-.088	.131	-.340	.299	-.048	.278	-.043	.181	.159	-.401
H33	.230	-.295	-.060	.042	.032	.166	.018	.097	.168	.179	.243	-.344

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

Factor Correlation Matrix

Factor	1	2	3	4	5	6	7	8	9	10	11	12
1	1.000	-.166	-.163	-.114	-.147	.066	.014	.196	.228	.249	.149	-.219
2	-.166	1.000	-.015	.212	-.153	.038	.149	.044	-.169	-.008	.167	-.031
3	-.163	-.015	1.000	-.016	.065	-.019	-.009	-.074	-.039	-.268	-.028	.189
4	-.114	.212	-.016	1.000	-.065	.041	.110	.069	-.077	-.023	.143	-.138
5	-.147	-.153	.065	-.065	1.000	-.224	-.091	-.119	-.107	.021	-.104	.130
6	.066	.038	-.019	.041	-.224	1.000	.106	-.006	.037	.033	.185	-.214
7	.014	.149	-.009	.110	-.091	.106	1.000	-.026	.105	.053	.115	-.072
8	.196	.044	-.074	.069	-.119	-.006	-.026	1.000	.064	.106	.041	-.195
9	.228	-.169	-.039	-.077	-.107	.037	.105	.064	1.000	.078	.031	-.095
10	.249	-.008	-.268	-.023	.021	.033	.053	.106	.078	1.000	.063	-.185
11	.149	.167	-.028	.143	-.104	.185	.115	.041	.031	.063	1.000	-.233
12	-.219	-.031	.189	-.138	.130	-.214	-.072	-.195	-.095	-.185	-.233	1.000

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

Factor Score Coefficient Matrix

	Factor											
	1	2	3	4	5	6	7	8	9	10	11	12
H01	.028	.001	.000	.007	.011	-.028	.188	.029	.087	.012	-.003	.026
H02	.000	-.034	-.043	-.011	-.020	.084	.317	-.008	-.032	-.025	-.039	-.053
H03	.011	-.104	-.055	-.086	-.152	.069	-.232	.081	.158	-.128	.030	-.094
H04	.014	-.005	-.013	-.011	-.024	.049	.131	-.168	.102	.084	.115	-.060
H05	.043	-.041	-.054	-.032	.011	.021	.068	.036	.183	.054	.084	.021
H06	-.016	.032	.051	.035	-.051	.046	.154	.033	-.114	.042	.103	.044
H07	.042	.147	.000	-.007	-.004	.018	-.012	.012	.003	-.001	.041	.027
H08	-.047	.000	.021	.004	.021	.024	.000	-.031	.068	.386	.024	-.022
H09	.108	-.194	-.052	-.095	-.075	.108	.016	-.003	.030	-.027	.101	.080
H10	-.009	.072	-.024	.006	.011	.011	-.116	.001	-.024	.050	.428	-.009

H11	.020	.278	-.017	-.014	-.020	.143	-.057	.029	-.033	.112	.104	-.009
H12	.114	-.099	.021	-.036	-.301	.034	-.047	-.013	.047	-.013	.053	.016
H13	-.013	.277	-.040	.052	-.041	-.024	.098	-.034	.045	-.055	.056	-.033
H14	-.066	.126	.031	.080	-.172	-.035	.052	.015	.009	-.038	.001	-.099
H15	-.059	.130	-.050	.015	-.355	.024	.071	.018	.035	-.008	-.085	.069
H16	.221	-.010	.009	.012	-.051	.028	.064	-.064	.005	-.034	.007	-.058
H17	.104	-.007	-.032	.003	-.064	-.006	.016	-.007	.046	.058	-.010	-.042
H18	-.002	.003	-.015	-.008	.005	.619	.040	-.039	-.049	.021	-.035	-.017
H19	.026	-.056	-.084	-.007	.101	-.036	.049	-.024	.145	.094	.022	-.049
H20	.007	-.086	-.071	.713	.024	.026	-.129	.068	.035	.036	-.064	.020
H21	.094	.006	-.002	.025	-.056	.001	.035	.005	.211	.003	.025	-.025
H22	.005	.019	.031	.162	-.082	-.037	.164	-.096	-.081	-.107	.200	-.079
H23	.040	-.033	.038	.026	-.155	.096	-.085	.084	-.107	.051	.012	-.121
H24	.020	.021	-.005	-.018	-.057	-.022	.044	.026	.230	.094	-.061	.023
H25	.394	.053	.079	-.030	.060	.000	-.027	.081	.101	-.033	-.006	.029
H26	-.023	.078	.037	.045	.057	.022	.016	.210	-.049	-.126	.172	-.048
H27	-.023	-.021	.042	.020	-.021	-.024	.146	.492	.117	.030	-.015	-.028
H28	-.081	-.032	.188	.049	.038	.059	.035	-.129	.168	-.222	.092	.037
H29	-.056	-.004	-.351	-.008	.002	.021	.041	-.084	.044	-.028	-.027	.022
H30	.003	-.018	.335	-.006	-.015	.016	.029	-.039	-.010	.018	-.030	.033
H31	.027	-.025	.007	.055	.050	.018	.064	-.057	.066	.036	.059	-.264
H32	.020	.013	-.080	-.047	.015	.027	-.056	.090	-.067	.021	-.069	-.411
H33	.026	-.174	.019	.007	.051	.056	.016	.002	.048	.050	.119	-.130
H34	-.209	.014	.176	.013	.002	.123	-.014	-.051	.185	-.199	-.042	-.054

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

Factor Score Covariance Matrix

Factor	1	2	3	4	5	6	7	8	9	10	11	12
1	1.557	-.382	1.059	-.284	-.750	1.958	.114	.922	-.321	2.288	-.378	.042
2	-.382	.730	-.616	.208	1.155	-.495	.267	-.025	1.934	-.599	.297	-.466
3	1.059	-.616	2.152	-.623	.901	1.270	1.963	.038	-.506	1.264	-.401	2.145
4	-.284	.208	-.623	.845	-.826	.244	-.080	.149	1.203	.683	-.001	-.714
5	-.750	1.155	.901	-.826	2.957	-.524	1.006	-.402	1.637	-1.137	1.552	.387
6	1.958	-.495	1.270	.244	-.524	2.955	-.411	1.098	.374	2.296	.709	-.473
7	.114	.267	1.963	-.080	1.006	-.411	2.332	.046	.432	-.327	-.117	1.069
8	.922	-.025	.038	.149	-.402	1.098	.046	1.126	-.001	.208	.670	-.864
9	-.321	1.934	-.506	1.203	1.637	.374	.432	-.001	4.306	.563	-.207	-.280
10	2.288	-.599	1.264	.683	-1.137	2.296	-.327	.208	.563	2.758	-.139	-.181
11	-.378	.297	-.401	-.001	1.552	.709	-.117	.670	-.207	-.139	2.946	-.728
12	.042	-.466	2.145	-.714	.387	-.473	1.069	-.864	-.280	-.181	-.728	2.732

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

Analysis on the Health Domain Dataset Subset to Final Factors Reduction

Notes

Output Created		02-MAY-2008 14:11:13
Comments		
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	N of Rows in Working Data File	269
Missing Value Handling	Definition of Missing	MISSING=EXCLUDE: User-defined missing values are treated as missing.
	Cases Used	LISTWISE: Statistics are based on cases with no missing values for any variable used.
Syntax		FACTOR /VARIABLES H01 H02 H03 H04 H05 H06 H07 H08 H09 H10 H11 H12 /MISSING LISTWISE /ANALYSIS H01 H02 H03 H04 H05 H06 H07 H08 H09 H10 H11 H12 /PRINT UNIVARIATE INITIAL CORRELATION SIG DET KMO EXTRACTION ROTATION FSCORE /FORMAT SORT /PLOT EIGEN ROTATION /CRITERIA MINEIGEN(1) ITERATE(250) /EXTRACTION PAF /CRITERIA ITERATE(250) DELTA(0) /ROTATION OBLIMIN /METHOD=CORRELATION .
Resources	Elapsed Time	0:00:00.11
	Maximum Memory Required	18744 (18.305K) bytes

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
H01	2.3535	.37610	269
H02	2.2316	.43769	269
H03	3.2100	.54936	269
H04	2.7242	.80894	269
H05	2.5803	.73405	269
H06	2.4796	1.08782	269
H07	2.6929	.44284	269
H08	2.4770	.59305	269
H09	2.1918	.42180	269
H10	3.0855	.46131	269
H11	2.3729	.99493	269
H12	1.7677	.59803	269

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.733
Bartlett's Test of Sphericity	Approx. Chi-Square	303.117
	df	66
	Sig.	.000

Communalities

	Initial	Extraction
H01	.093	.188
H02	.296	.427
H03	.042	.072
H04	.098	.131
H05	.147	.235
H06	.143	.259
H07	.151	.214
H08	.259	.357
H09	.113	.247
H10	.037	.382
H11	.170	.393
H12	.220	.325

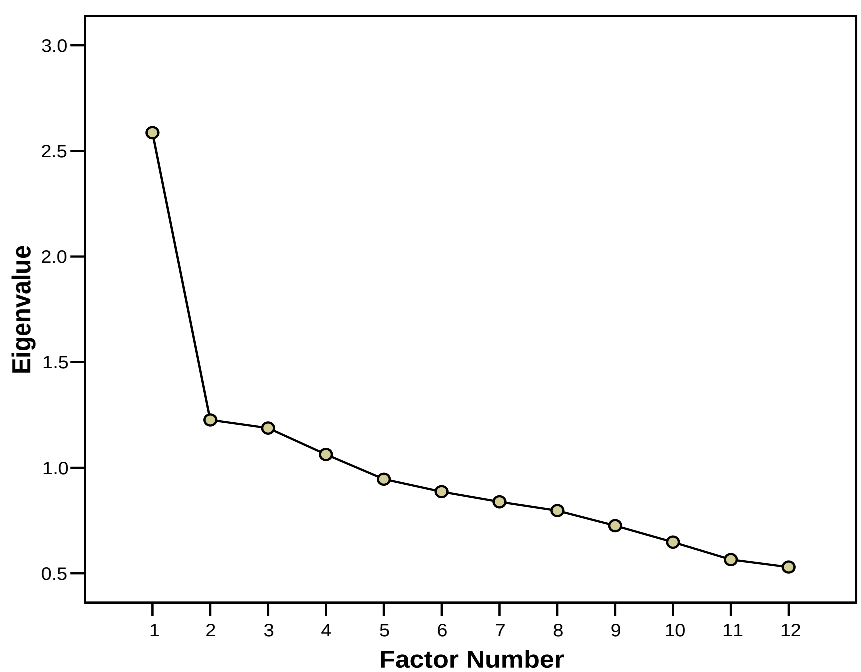
Extraction Method: Principal Axis Factoring.

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings (a)
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	2.586	21.550	21.550	1.897	15.805	15.805	1.297
2	1.226	10.219	31.769	.514	4.281	20.086	1.186
3	1.188	9.898	41.668	.462	3.848	23.934	.484
4	1.063	8.857	50.525	.358	2.986	26.919	1.054
5	.946	7.881	58.406				
6	.887	7.390	65.796				
7	.839	6.988	72.784				
8	.797	6.643	79.427				
9	.726	6.050	85.477				
10	.648	5.397	90.875				
11	.565	4.711	95.586				
12	.530	4.414	100.000				

Extraction Method: Principal Axis Factoring.
a When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Scree Plot



Factor Matrix(a)

	Factor			
	1	2	3	4
H02	.634	-.073	.125	-.069
H08	.577	-.069	.087	.107
H12	.535	.025	-.176	.088
H05	.408	.041	-.039	-.256
H07	.392	.211	-.056	-.111
H04	.312	-.058	.112	-.134
H01	.265	.239	-.182	.168
H11	.397	-.448	.179	.046
H06	.327	.338	.097	-.168
H03	-.143	.145	.135	-.110
H10	-.025	.236	.518	.238
H09	.320	.069	-.170	.333

Extraction Method: Principal Axis Factoring.
a 4 factors extracted. 78 iterations required.

Pattern Matrix(a)

	Factor			
	1	2	3	4
H06	.488	.087	.118	.040
H05	.435	-.110	-.146	-.031
H07	.405	.025	-.029	.144
H04	.245	-.235	.005	-.060
H11	-.050	-.643	.007	-.019
H02	.361	-.412	.038	.109
H08	.197	-.384	.092	.254
H10	-.045	-.089	.633	.032
H09	-.053	-.049	.038	.502
H01	.133	.138	.010	.395
H12	.225	-.154	-.103	.367
H03	.090	.128	.114	-.166

Extraction Method: Principal Axis Factoring. Rotation Method: Oblimin with Kaiser Normalization.
a Rotation converged in 21 iterations.

Structure Matrix

	Factor			
	1	2	3	4
H06	.485	-.022	.154	.149
H05	.445	-.235	-.138	.144
H07	.440	-.114	-.022	.262
H04	.285	-.279	-.015	.068
H11	.102	-.624	-.105	.120
H02	.497	-.521	-.029	.311
H08	.371	-.477	.002	.393
H10	.019	.025	.611	-.042
H09	.110	-.150	-.038	.493
H12	.367	-.315	-.165	.484
H01	.216	.012	-.010	.400
H03	.015	.166	.163	-.185

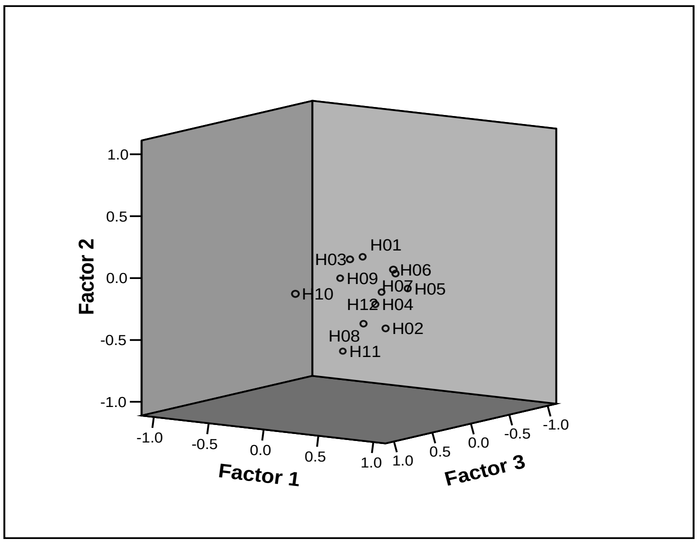
Extraction Method: Principal Axis Factoring. Rotation Method: Oblimin with Kaiser Normalization.

Factor Correlation Matrix

Factor	1	2	3	4
1	1.000	-.246	.052	.296
2	-.246	1.000	.175	-.240
3	.052	.175	1.000	-.129
4	.296	-.240	-.129	1.000

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

Factor Plot in Rotated Factor Space



Factor Score Coefficient Matrix

	Factor			
	1	2	3	4
H01	.070	.081	.006	.238
H02	.245	-.264	.011	.079
H03	.055	.065	.094	-.091
H04	.112	-.102	.002	-.043
H05	.227	-.057	-.092	-.017
H06	.284	.083	.129	.012
H07	.213	.029	-.002	.084
H08	.118	-.224	.037	.177
H09	-.039	-.018	-.010	.323
H10	.013	.009	.573	-.022
H11	-.071	-.429	-.069	-.025
H12	.120	-.090	-.113	.268

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

Factor Score Covariance Matrix

Factor	1	2	3	4
1	.933	-.605	1.283	.274
2	-.605	.843	-.505	.124
3	1.283	-.505	1.765	.698
4	.274	.124	.698	.687

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

Correlation Analysis on the Health Domain Dataset

Notes

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Comments		
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	Split File	<none>
	N of Rows in Working Data File	269
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each pair of variables are based on all the cases with valid data for that pair.
Syntax		CORRELATIONS /VARIABLES=H01 H02 H03 H04 H05 H06 H07 H08 H09 H10 H11 H12 /PRINT=TWOTAIL NOSIG /MISSING=PAIRWISE .
Resources	Elapsed Time	0:00:00.02

Correlations

		H01	H02	H03	H04	H05	H06	H07	H08	H09	H10	H11	H12
H01	Pearson Correlation	1	.114	-.036	.013	.092	.154(*)	.124(*)	.094	.208(**)	-.004	.005	.209(**)
	Sig. (2-tailed)		.063	.560	.828	.134	.011	.042	.125	.001	.949	.930	.001
	N	269	269	269	269	269	269	269	269	269	269	269	269
H02	Pearson Correlation	.114	1	-.085	.189(**)	.288(**)	.254(**)	.210(**)	.339(**)	.179(**)	.013	.338(**)	.300(**)
	Sig. (2-tailed)	.063		.164	.002	.000	.000	.001	.000	.003	.827	.000	.000
	N	269	269	269	269	269	269	269	269	269	269	269	269
H03	Pearson Correlation	-.036	-.085	1	.020	-.036	.028	-.004	-.088	-.070	.072	-.103	-.153(*)
	Sig. (2-tailed)	.560	.164		.749	.562	.653	.950	.152	.254	.236	.092	.012
	N	269	269	269	269	269	269	269	269	269	269	269	269
H04	Pearson Correlation	.013	.189(**)	.020	1	.206(**)	.101	.074	.220(**)	.041	.009	.149(*)	.159(**)
	Sig. (2-tailed)	.828	.002	.749		.001	.099	.226	.000	.499	.878	.015	.009
	N	269	269	269	269	269	269	269	269	269	269	269	269
H05	Pearson Correlation	.092	.288(**)	-.036	.206(**)	1	.139(*)	.234(**)	.182(**)	.074	-.076	.107	.169(**)
	Sig. (2-tailed)	.134	.000	.562	.001		.022	.000	.003	.224	.214	.080	.005
	N	269	269	269	269	269	269	269	269	269	269	269	269
H06	Pearson Correlation	.154(*)	.254(**)	.028	.101	.139(*)	1	.205(**)	.118	.000	.085	-.008	.199(**)
	Sig. (2-tailed)	.011	.000	.653	.099	.022		.001	.054	.995	.163	.893	.001
	N	269	269	269	269	269	269	269	269	269	269	269	269
H07	Pearson Correlation	.124(*)	.210(**)	-.004	.074	.234(**)	.205(**)	1	.277(**)	.122(*)	-.024	.030	.181(**)
	Sig. (2-	.042	.001	.950	.226	.000	.001		.000	.046	.690	.629	.003

	tailed)												
	N	269	269	269	269	269	269	269	269	269	269	269	269
H08	Pearson Correlation	.094	.339(**)	-.088	.220(**)	.182(**)	.118	.277(**)	1	.217(**)	.049	.275(**)	.316(**)
	Sig. (2-tailed)	.125	.000	.152	.000	.003	.054	.000		.000	.425	.000	.000
	N	269	269	269	269	269	269	269	269	269	269	269	269
H09	Pearson Correlation	.208(**)	.179(**)	-.070	.041	.074	.000	.122(*)	.217(**)	1	.003	.056	.208(**)
	Sig. (2-tailed)	.001	.003	.254	.499	.224	.995	.046	.000		.966	.359	.001
	N	269	269	269	269	269	269	269	269	269	269	269	269
H10	Pearson Correlation	-.004	.013	.072	.009	-.076	.085	-.024	.049	.003	1	-.018	-.088
	Sig. (2-tailed)	.949	.827	.236	.878	.214	.163	.690	.425	.966		.768	.150
	N	269	269	269	269	269	269	269	269	269	269	269	269
H11	Pearson Correlation	.005	.338(**)	-.103	.149(*)	.107	-.008	.030	.275(**)	.056	-.018	1	.170(**)
	Sig. (2-tailed)	.930	.000	.092	.015	.080	.893	.629	.000	.359	.768		.005
	N	269	269	269	269	269	269	269	269	269	269	269	269
H12	Pearson Correlation	.209(**)	.300(**)	-.153(*)	.159(**)	.169(**)	.199(**)	.181(**)	.316(**)	.208(**)	-.088	.170(**)	1
	Sig. (2-tailed)	.001	.000	.012	.009	.005	.001	.003	.000	.001	.150	.005	
	N	269	269	269	269	269	269	269	269	269	269	269	269

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

Appendix H: Nationality Based Analysis SPSS Data

Analysis on the Australian Nationality Based Dataset

The Australian dataset analysis used in conjunction with this section of the research in order to obtain a direct comparison with the U.S. and the P.R.C. datasets can be seen in Appendix E, as such will not be repeated here.

Analysis of the U.S.A. Nationality Based Dataset

Statement to Subset Reduction

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	Split File	<none>
	N of Rows in Working Data File	58
Missing Value Handling	Definition of Missing	MISSING=EXCLUDE: User-defined missing values are treated as missing.
	Cases Used	LISTWISE: Statistics are based on cases with no missing values for any variable used.
Syntax		FACTOR /VARIABLES USA1 USA2 USA3 USA4 USA5 USA6 USA7 USA8 USA9 USA10 USA11 USA12 USA13 USA14 USA15 USA16 USA17 USA18 USA19 USA20 USA21 USA22 USA23 USA24 USA25 USA26 USA27 USA28 USA29 USA30 USA31 USA32 USA33 USA34 /MISSING LISTWISE /ANALYSIS USA1 USA2 USA3 USA4 USA5 USA6 USA7 USA8 USA9 USA10 USA11 USA12 USA13 USA14 USA15 USA16 USA17 USA18 USA19 USA20 USA21 USA22 USA23 USA24 USA25 USA26 USA27 USA28 USA29 USA30 USA31 USA32 USA33 USA34 /PRINT UNIVARIATE INITIAL CORRELATION SIG DET KMO EXTRACTION ROTATION FSCORE /FORMAT SORT /PLOT EIGEN ROTATION /CRITERIA MINEIGEN(1) ITERATE(250) /EXTRACTION PAF /CRITERIA ITERATE(250) DELTA(0) /ROTATION OBLIMIN /METHOD=CORRELATION .
Resources	Elapsed Time	0:00:02.10
	Maximum Memory Required	133672 (130.539K) bytes

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
USA1	1.9655	.64795	58
USA2	1.8103	.99924	58
USA3	2.1552	.55573	58
USA4	2.3103	.95893	58
USA5	2.4310	.62442	58
USA6	2.8621	1.05045	58
USA7	1.6034	.67381	58
USA8	2.0517	.54362	58
USA9	2.1207	.53238	58
USA10	1.8966	.91171	58
USA11	1.5862	.67628	58
USA12	1.8793	.59464	58
USA13	1.8103	.75989	58
USA14	2.0517	.92570	58
USA15	2.0345	1.22783	58
USA16	2.0517	.78186	58
USA17	1.2241	.46048	58
USA18	2.0172	.78341	58
USA19	2.1724	.50045	58
USA20	2.6379	.94958	58
USA21	1.7069	.59260	58
USA22	2.5000	.84293	58
USA23	1.7241	.93270	58
USA24	2.3103	.50287	58
USA25	1.8103	.68715	58
USA26	2.4828	1.01292	58
USA27	1.7069	.53010	58
USA28	3.8621	.88750	58
USA29	2.2931	.95529	58
USA30	3.8103	.82626	58
USA31	1.7586	.53999	58
USA32	1.5862	.62223	58
USA33	1.9828	.63499	58
USA34	4.0517	.71137	58

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.439
Bartlett's Test of Sphericity	Approx. Chi-Square	869.145
	df	561
	Sig.	.000

Communalities

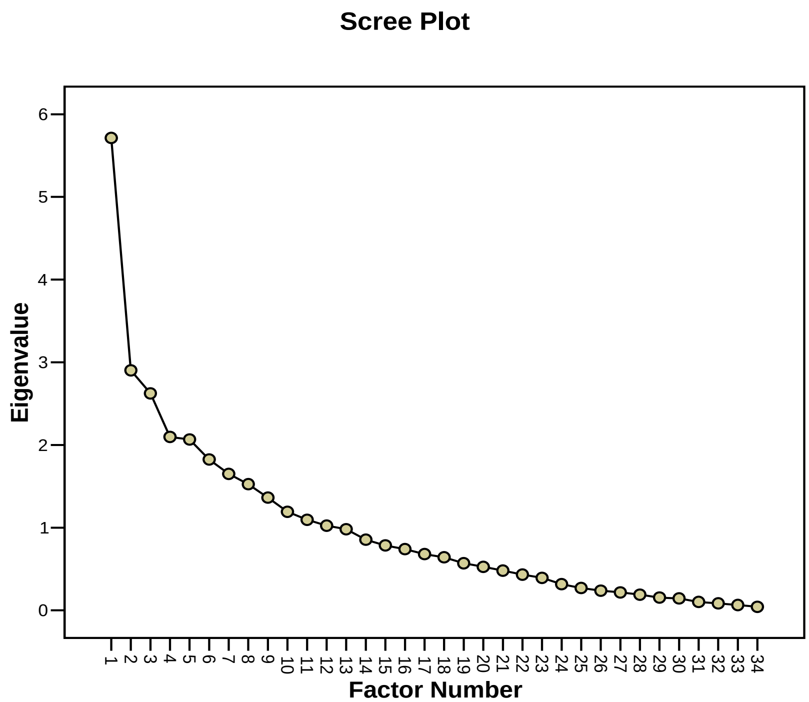
	Initial	Extraction
USA1	.716	.665
USA2	.562	.446
USA3	.558	.390
USA4	.785	.783
USA5	.645	.732
USA6	.717	.579
USA7	.780	.693
USA8	.638	.494
USA9	.719	.487
USA10	.715	.357
USA11	.767	.754
USA12	.611	.435
USA13	.735	.617
USA14	.742	.783
USA15	.707	.612
USA16	.764	.740
USA17	.691	.600
USA18	.729	.653
USA19	.544	.249
USA20	.577	.674
USA21	.797	.751
USA22	.569	.391
USA23	.599	.525
USA24	.580	.425
USA25	.775	.628
USA26	.634	.533
USA27	.801	.757
USA28	.651	.459
USA29	.845	.860
USA30	.553	.471
USA31	.736	.642
USA32	.792	.782
USA33	.614	.649
USA34	.831	.815

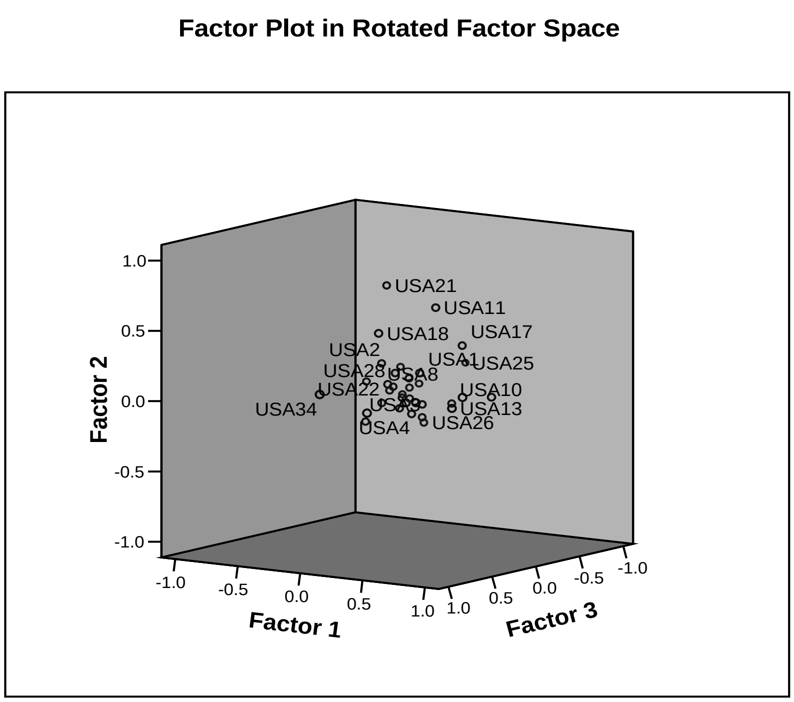
Extraction Method: Principal Axis Factoring.

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings (a)
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	5.713	16.802	16.802	5.368	15.789	15.789	3.266
2	2.903	8.539	25.340	2.542	7.477	23.266	2.358
3	2.624	7.718	33.059	2.297	6.756	30.022	2.019
4	2.097	6.169	39.227	1.701	5.003	35.024	2.203
5	2.067	6.080	45.307	1.681	4.943	39.968	1.709
6	1.824	5.366	50.673	1.434	4.217	44.185	1.826
7	1.651	4.855	55.528	1.181	3.472	47.657	1.878
8	1.526	4.489	60.017	1.161	3.416	51.073	1.918
9	1.364	4.011	64.028	.908	2.672	53.744	1.383
10	1.193	3.507	67.536	.848	2.493	56.238	1.970
11	1.096	3.223	70.759	.705	2.074	58.312	3.100
12	1.024	3.012	73.771	.606	1.782	60.094	1.705
13	.982	2.888	76.660				
14	.855	2.513	79.173				
15	.786	2.312	81.485				
16	.741	2.179	83.663				
17	.681	2.002	85.666				
18	.642	1.889	87.554				
19	.570	1.677	89.231				
20	.526	1.549	90.779				
21	.481	1.413	92.193				
22	.432	1.271	93.464				
23	.394	1.159	94.623				
24	.317	.932	95.554				
25	.270	.795	96.350				
26	.239	.702	97.052				
27	.218	.641	97.692				
28	.190	.560	98.252				
29	.155	.456	98.709				
30	.144	.425	99.133				
31	.102	.299	99.432				
32	.085	.250	99.682				
33	.065	.193	99.874				
34	.043	.126	100.000				

Extraction Method: Principal Axis Factoring.
a When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.


Scree Plot
Eigenvalue
Factor Number


Factor Plot in Rotated Factor Space
Factor 2
Factor 1
Factor 3
USA21
USA11
USA18
USA17
USA2
USA1
USA25
USA28
USA22
USA10
USA34
USA13
USA26
USA4

Factor Matrix(a)

	Factor											
	1	2	3	4	5	6	7	8	9	10	11	12
USA32	.726	-.048	-.012	-.073	.031	.115	-.098	.368	.033	-.185	-.225	-.027
USA27	.640	.003	.341	-.343	.022	-.130	.110	-.076	-.048	.031	-.025	.272
USA4	.605	-.328	.106	.085	-.199	-.217	.238	-.099	.326	.047	.158	-.057
USA13	.602	-.081	.033	-.113	.187	-.163	.091	.312	-.100	.075	-.211	.083
USA31	.589	.043	-.074	-.201	.015	.006	-.170	.088	-.156	-.050	.345	-.252
USA11	.574	.337	-.026	.141	-.260	.178	-.111	-.277	.088	-.005	-.280	-.125
USA7	.565	.262	.284	.084	-.118	-.142	.167	.183	.232	-.070	.250	.039
USA29	.541	-.528	-.350	.292	.022	-.163	.079	.085	-.152	-.024	-.085	.103
USA17	.522	.441	.004	-.119	.147	.145	-.101	-.070	.181	-.083	-.139	.036
USA33	.458	.089	.255	.165	-.056	.356	-.029	-.241	-.135	-.140	.252	.222
USA26	.436	-.297	-.065	-.277	.047	.324	.115	-.065	-.017	.021	.220	-.020
USA30	-.414	.191	.130	.103	-.323	-.138	.170	.168	-.052	.051	-.045	.218
USA6	.390	-.082	.364	-.011	-.323	.072	-.139	.338	-.140	.117	.104	-.032
USA23	.383	.152	-.069	-.313	.128	.153	.087	.159	.285	.273	-.153	-.036
USA10	.347	-.213	-.318	-.157	-.113	.004	.151	.039	.093	.038	-.063	-.122
USA16	.047	.553	-.148	.205	.355	.023	-.130	.214	.018	-.326	.114	.243
USA21	.454	.471	-.035	.142	.096	-.193	-.232	-.286	-.271	.091	-.031	-.191
USA1	.264	.468	-.151	-.329	-.339	-.026	.014	.117	-.216	.239	.036	.106
USA9	-.289	.383	.027	-.260	.099	-.028	.295	-.020	-.083	.262	.044	.114
USA28	-.354	.364	.248	.122	-.007	.135	.043	.225	.049	.148	-.058	-.159
USA34	-.139	-.118	.823	-.098	-.034	-.020	-.215	.080	-.126	.059	-.048	-.137
USA25	.179	.384	-.550	-.021	.183	.237	.154	-.016	.004	.057	.109	-.130
USA18	.359	.371	.392	.207	-.034	-.272	.196	-.145	-.077	-.132	-.137	-.112
USA15	.226	-.161	-.084	.573	.012	.135	-.227	.313	.040	.161	-.028	-.062
USA14	.273	.113	-.389	.401	-.160	-.399	-.121	-.050	-.009	.386	.095	.150
USA5	-.151	-.091	.220	.005	.713	.025	-.045	.054	.003	.352	.113	-.053
USA12	.318	-.018	.107	.184	.456	.041	.071	-.057	-.223	.071	-.087	.089

USA20	.086	-.116	.164	.267	-.246	.568	.165	-.256	-.058	.230	-.126	.085
USA19	-.071	.232	-.019	.208	-.143	.244	.100	.082	.157	.051	.134	-.065
USA8	.172	-.064	.119	.110	.261	-.195	.522	-.158	-.011	-.080	-.052	-.145
USA2	.266	-.148	.048	-.177	.020	-.266	-.357	-.314	.069	.116	.067	.006
USA3	.226	-.225	.108	-.023	.211	.208	-.247	-.150	.214	.079	-.069	.221
USA24	.011	.164	.327	.303	.137	-.123	-.006	-.015	.387	.073	.101	.008
USA22	.263	-.128	.113	.273	.086	.183	.276	.079	-.293	.013	.081	-.052

Extraction Method: Principal Axis Factoring.
a 12 factors extracted. 18 iterations required.

Pattern Matrix(a)

	Factor											
	1	2	3	4	5	6	7	8	9	10	11	12
USA23	.670	.030	-.122	-.047	.121	.015	-.068	.018	.132	.167	.058	-.119
USA32	.636	.066	.161	-.026	-.170	-.041	.022	.046	-.111	-.326	.152	.221
USA13	.579	-.012	.201	.194	.080	-.114	.222	-.068	-.156	-.011	.026	.124
USA17	.412	.366	-.155	-.154	-.061	.065	-.042	-.117	.138	.023	.052	.262
USA10	.298	-.063	-.198	.097	-.172	-.025	.102	-.004	-.088	-.084	.168	-.234
USA21	-.097	.762	-.018	.209	.101	-.033	.068	-.041	-.068	.068	.166	.082
USA11	.243	.628	-.093	.010	-.307	.319	-.012	-.008	.065	-.130	-.050	-.055
USA34	-.071	.105	.784	-.317	.205	.008	-.034	.009	.073	-.023	-.005	-.143
USA25	.127	.151	-.600	.059	.066	.031	-.022	.253	-.052	.146	.259	.117
USA6	.177	-.029	.597	.128	-.100	.115	-.134	.129	.037	-.007	.284	-.017
USA14	-.083	.165	-.156	.859	.006	-.040	-.080	-.103	.122	.093	-.075	-.039
USA29	.146	-.159	-.077	.514	-.075	.061	.268	-.144	-.259	-.381	.044	.008
USA5	.043	-.089	.035	-.017	.847	-.072	.043	-.006	.101	.067	.068	-.012
USA12	.103	.127	.013	.103	.386	.171	.275	-.084	-.138	-.045	-.020	.217
USA20	-.021	.055	.017	.002	-.021	.814	-.009	.087	-.027	.008	-.147	-.196
USA33	-.186	.086	.087	-.041	-.088	.544	.030	-.211	.094	.014	.291	.336
USA8	.011	.032	-.124	-.061	.085	-.019	.702	.029	.079	.011	-.026	-.077

USA18	.007	.467	.222	-.022	-.153	-.007	.480	.034	.180	.052	-.101	.112
USA22	-.048	-.050	.108	.107	.120	.299	.332	.226	-.123	-.061	.178	.083
USA2	-.068	.226	.081	.119	.079	-.112	-.126	-.504	.069	-.036	.154	-.180
USA27	.354	.019	.290	-.007	-.069	.120	.227	-.475	.025	.288	.124	.120
USA28	.034	.098	.157	-.138	.152	-.009	-.103	.466	.176	.135	-.163	-.009
USA3	.191	-.054	-.014	-.041	.201	.249	-.185	-.391	.096	-.182	-.061	.049
USA19	-.041	-.020	-.118	.008	-.070	.175	-.089	.312	.256	.031	.051	.034
USA24	-.019	.035	.059	.051	.155	-.032	.088	-.009	.578	-.080	-.122	.069
USA7	.198	-.013	.182	.113	-.205	-.040	.221	.006	.497	.089	.274	.227
USA4	.144	-.119	.041	.235	-.219	.061	.368	-.231	.407	-.146	.239	-.261
USA9	.032	-.040	-.097	-.040	.179	-.001	.051	.069	.003	.638	-.102	-.003
USA1	.230	.185	.071	.210	-.219	.023	-.215	.048	-.147	.573	.161	.038
USA15	.110	.002	.100	.423	.163	.132	-.164	.302	.087	-.463	-.019	.062
USA31	.038	.167	.077	.035	.006	-.144	-.038	.010	-.026	-.035	.742	.051
USA26	.149	-.199	-.092	-.115	.035	.263	.046	-.153	-.070	.011	.502	-.090
USA30	-.118	-.177	.193	.130	-.217	.003	-.031	.158	.050	.303	-.367	.067
USA16	.009	.044	-.237	-.004	.036	-.185	-.099	.076	.105	-.020	-.025	.780

Extraction Method: Principal Axis Factoring. Rotation Method: Oblimin with Kaiser Normalization.
a Rotation converged in 66 iterations.

Structure Matrix

	Factor											
	1	2	3	4	5	6	7	8	9	10	11	12
USA32	.736	.185	.163	.191	-.189	.136	.156	-.124	-.084	-.345	.466	.286
USA23	.656	.128	-.134	.001	.055	.075	-.016	-.067	.131	.136	.249	-.030
USA13	.640	.103	.200	.303	.033	-.007	.348	-.196	-.144	-.103	.315	.190
USA17	.514	.514	-.128	-.036	-.069	.144	.023	-.163	.210	.052	.270	.374
USA10	.371	-.057	-.203	.203	-.224	.033	.129	-.113	-.156	-.131	.321	-.226
USA21	.113	.806	-.013	.292	.026	.007	.124	-.109	.030	.079	.268	.280
USA11	.379	.668	-.061	.168	-.343	.383	.032	-.080	.173	-.100	.225	.110

USA18	.100	.528	.289	.073	-.146	.056	.491	-.009	.288	.103	.022	.273
USA34	-.140	.031	.784	-.360	.226	.032	-.008	-.050	.161	.002	-.116	-.098
USA25	.223	.217	-.621	.117	.006	.050	-.039	.240	-.073	.168	.278	.197
USA6	.277	.049	.587	.198	-.184	.221	-.017	.036	.078	-.068	.362	.045
USA14	.030	.254	-.157	.819	-.110	-.057	-.017	-.057	.101	-.018	.048	.021
USA29	.298	-.130	-.056	.641	-.107	.147	.381	-.252	-.333	-.543	.312	-.015
USA5	-.004	-.098	.028	-.136	.838	-.070	.073	-.042	.082	-.005	-.061	.044
USA12	.194	.177	.042	.134	.390	.211	.356	-.134	-.097	-.140	.116	.300
USA20	.003	.006	.049	-.007	-.034	.776	.007	.115	.042	-.082	-.036	-.140
USA33	.073	.230	.158	.037	-.092	.600	.135	-.193	.149	-.087	.386	.377
USA8	.063	.026	-.057	-.002	.113	.021	.673	-.039	.062	-.010	.027	-.004
USA4	.341	-.017	.127	.354	-.273	.185	.445	-.348	.327	-.267	.413	-.218
USA22	.072	-.031	.135	.174	.095	.364	.385	.161	-.106	-.144	.229	.154
USA2	.069	.241	.094	.126	.040	-.103	-.058	-.558	.044	-.111	.215	-.172
USA27	.514	.195	.340	.062	-.104	.175	.358	-.529	.055	.156	.387	.157
USA28	-.135	.061	.130	-.215	.152	-.030	-.171	.509	.253	.251	-.312	.073
USA3	.228	-.005	.016	-.041	.227	.269	-.100	-.403	.092	-.281	.078	.024
USA19	-.048	.015	-.108	.002	-.089	.190	-.121	.354	.271	.074	-.019	.079
USA24	-.037	.113	.122	.014	.177	.013	.089	.020	.595	-.062	-.161	.135
USA7	.371	.216	.253	.219	-.254	.102	.306	-.039	.507	.062	.383	.321
USA9	-.068	-.007	-.121	-.181	.147	-.113	-.011	.178	.028	.646	-.196	.019
USA1	.301	.305	.019	.210	-.345	-.007	-.172	.078	-.094	.553	.265	.104
USA15	.136	.016	.094	.475	.123	.232	-.081	.237	.097	-.511	.067	.130
USA31	.331	.273	.070	.190	-.099	.002	.070	-.154	-.060	-.079	.762	.137
USA26	.348	-.135	-.074	-.020	-.017	.339	.130	-.261	-.140	-.117	.585	-.097
USA30	-.292	-.178	.179	.005	-.201	-.097	-.098	.314	.092	.349	-.445	.013
USA16	.035	.224	-.225	.019	.094	-.147	-.078	.176	.150	.061	-.032	.781

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

Factor Correlation Matrix

Factor	1	2	3	4	5	6	7	8	9	10	11	12
1	1.000	.144	-.011	.143	-.060	.128	.118	-.153	.014	-.055	.383	.094
2	.144	1.000	.007	.104	-.048	.035	.022	-.075	.153	.093	.132	.239
3	-.011	.007	1.000	-.007	-.016	.058	.094	-.056	.093	-.033	.005	.033
4	.143	.104	-.007	1.000	-.136	.030	.111	.000	-.035	-.166	.179	.053
5	-.060	-.048	-.016	-.136	1.000	-.015	.033	-.035	-.001	-.080	-.130	.069
6	.128	.035	.058	.030	-.015	1.000	.073	.026	.072	-.147	.170	.062
7	.118	.022	.094	.111	.033	.073	1.000	-.100	-.013	-.059	.127	.083
8	-.153	-.075	-.056	.000	-.035	.026	-.100	1.000	.051	.154	-.189	.104
9	.014	.153	.093	-.035	-.001	.072	-.013	.051	1.000	.044	-.080	.086
10	-.055	.093	-.033	-.166	-.080	-.147	-.059	.154	.044	1.000	-.100	.026
11	.383	.132	.005	.179	-.130	.170	.127	-.189	-.080	-.100	1.000	.070
12	.094	.239	.033	.053	.069	.062	.083	.104	.086	.026	.070	1.000

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

Factor Score Coefficient Matrix

	Factor											
	1	2	3	4	5	6	7	8	9	10	11	12
USA1	.198	-.022	.114	.122	-.069	.078	-.188	.057	-.132	.294	.069	.035
USA2	.068	.016	-.008	.021	.033	-.006	-.074	-.225	.020	-.139	.008	-.054
USA3	-.031	.093	-.003	-.042	.119	-.011	-.114	-.206	.053	.024	-.065	.017
USA4	.187	-.241	-.102	.106	-.173	.075	.269	-.090	.358	-.297	.152	-.287
USA5	.133	-.033	.043	.048	.619	.010	.095	-.046	.079	-.064	.009	.022
USA6	.074	-.088	.221	.148	-.053	.044	-.081	.156	-.013	-.105	.063	.000
USA7	-.065	.014	.099	.035	-.067	-.009	.087	.064	.415	.217	.155	.157
USA8	.019	-.008	.005	-.031	.047	.037	.219	.072	-.037	.035	-.043	-.001

USA9	.177	-.153	-.138	.050	-.073	.048	.116	.121	-.002	.033	.016	-.156
USA10	-.084	.146	.032	-.064	.098	-.133	.006	-.087	.019	.250	-.020	.037
USA11	.213	.279	-.062	.009	-.185	.256	-.046	.042	.004	-.274	-.050	-.149
USA12	-.021	.042	-.034	.005	.078	.117	.070	.043	.004	.037	.037	.021
USA13	.148	.003	-.026	.050	-.062	-.067	.089	.070	-.097	.048	.015	-.027
USA14	-.058	.113	.097	.561	.035	-.081	-.203	.044	.137	.111	-.123	-.069
USA15	-.027	.026	.045	.064	.121	.069	-.135	.117	.134	-.048	-.015	.134
USA16	-.029	-.022	.008	-.003	.140	-.054	-.031	-.031	.098	-.026	-.153	.679
USA17	.233	.033	-.091	-.023	-.020	.048	-.039	-.026	.065	-.153	-.007	.017
USA18	-.098	.252	.096	-.032	.002	-.148	.322	.078	.134	.070	-.165	.103
USA19	-.061	.084	.035	-.025	.089	-.046	.011	.023	.097	.089	-.041	.080
USA20	-.007	-.044	-.038	-.012	.005	.495	-.034	.132	.083	.066	-.075	-.052
USA21	-.298	.561	-.010	.010	.207	-.165	.113	-.205	-.104	.246	.081	.142
USA22	-.026	-.009	.050	.003	.090	.043	.146	.065	-.137	.041	.019	.105
USA23	.159	.058	-.094	-.074	.137	-.024	-.059	-.036	.077	.176	-.025	-.027
USA24	.064	-.047	-.052	.034	-.043	.040	-.060	.032	.179	-.093	-.016	-.052
USA25	.203	-.038	-.129	.119	.038	.107	.021	.202	-.084	-.137	.121	-.034
USA26	-.045	-.035	-.002	-.029	.091	.102	.006	-.055	-.038	.067	.152	.037
USA27	.019	.087	.222	-.102	.097	-.014	.122	-.497	-.072	.441	-.048	.284
USA28	.055	.014	-.001	.018	-.016	.085	.031	.185	.034	-.018	.021	-.048
USA29	.198	-.243	.042	.464	.016	.159	.352	-.116	-.455	-.561	.029	.003
USA30	-.076	-.023	.089	.080	-.072	-.001	.060	.030	-.046	.131	-.103	.059
USA31	-.094	.065	-.095	-.038	-.141	-.086	-.071	.123	-.024	.028	.496	-.135
USA32	.514	-.097	.098	.009	-.145	-.010	-.059	.159	-.112	-.362	.057	.013
USA33	-.087	-.034	-.017	-.002	-.086	.347	-.005	-.076	-.007	-.079	.211	.141
USA34	.065	.057	.651	.026	.223	.040	-.062	.015	-.039	-.187	-.090	-.038

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

Factor Score Covariance Matrix

Factor	1	2	3	4	5	6	7	8	9	10	11	12
1	1.438	.760	2.118	.319	.421	2.203	1.557	-.021	.868	1.969	.334	1.088
2	.760	1.315	.653	.048	1.856	1.043	.597	.027	2.295	.371	.972	.463
3	2.118	.653	2.926	.420	1.219	2.005	3.224	.050	1.065	1.876	-.071	2.650
4	.319	.048	.420	1.065	-.024	.925	.656	-.288	1.911	.890	-.200	.404
5	.421	1.856	1.219	-.024	3.494	1.144	.799	-.002	2.676	-.246	2.290	.584
6	2.203	1.043	2.005	.925	1.144	3.644	1.059	.322	1.431	2.835	1.498	.570
7	1.557	.597	3.224	.656	.799	1.059	2.960	-.521	.127	.136	.129	1.891
8	-.021	.027	.050	-.288	-.002	.322	-.521	1.064	.031	.640	1.190	.171
9	.868	2.295	1.065	1.911	2.676	1.431	.127	.031	5.355	.364	.321	.987
10	1.969	.371	1.876	.890	-.246	2.835	.136	.640	.364	3.070	1.382	.467
11	.334	.972	-.071	-.200	2.290	1.498	.129	1.190	.321	1.382	3.724	.495
12	1.088	.463	2.650	.404	.584	.570	1.891	.171	.987	.467	.495	3.520

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

Analysis of the U.S.A. Nationality Based Dataset Subset to Final Factors Reduction

Notes

Output Created		29-APR-2008 11:23:47
Comments		
Input	Data	C:\Documents and Settings\dcolbeck.COMPUTING\Desktop\Final Data Collection 280408\Cultural Analysis\USA\CA_USA12_280408.sav
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	N of Rows in Working Data File	58
Missing Value Handling	Definition of Missing	MISSING=EXCLUDE: User-defined missing values are treated as missing.
	Cases Used	LISTWISE: Statistics are based on cases with no missing values for any variable used.
Syntax		FACTOR /VARIABLES USA1 USA2 USA3 USA4 USA5 USA6 USA7 USA8 USA9 USA10 USA11 USA12 /MISSING LISTWISE /ANALYSIS USA1 USA2 USA3 USA4 USA5 USA6 USA7 USA8 USA9 USA10 USA11 USA12 /PRINT UNIVARIATE INITIAL CORRELATION SIG DET KMO EXTRACTION ROTATION FSCORE /FORMAT SORT /PLOT EIGEN ROTATION /CRITERIA MINEIGEN(1) ITERATE(250) /EXTRACTION PAF /CRITERIA ITERATE(250) DELTA(0) /ROTATION OBLIMIN /METHOD=CORRELATION .
Resources	Elapsed Time	0:00:00.05
	Maximum Memory Required	18744 (18.305K) bytes

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
USA1	1.6483	.49745	58
USA2	1.6466	.55416	58
USA3	2.9103	.41282	58
USA4	2.1724	.78109	58
USA5	2.1552	.48853	58
USA6	2.3103	.65446	58
USA7	2.1897	.49760	58
USA8	2.3414	.30667	58
USA9	2.0810	.53883	58
USA10	2.0414	.44210	58
USA11	2.6862	.41526	58
USA12	2.0517	.78186	58

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.560
Bartlett's Test of Sphericity	Approx. Chi-Square	102.660
	df	66
	Sig.	.003

Communalities

	Initial	Extraction
USA1	.307	.307
USA2	.319	.320
USA3	.378	.783
USA4	.368	.556
USA5	.167	.155
USA6	.198	.161
USA7	.310	.412
USA8	.177	.134
USA9	.369	.495
USA10	.287	.510
USA11	.172	.194
USA12	.144	.199

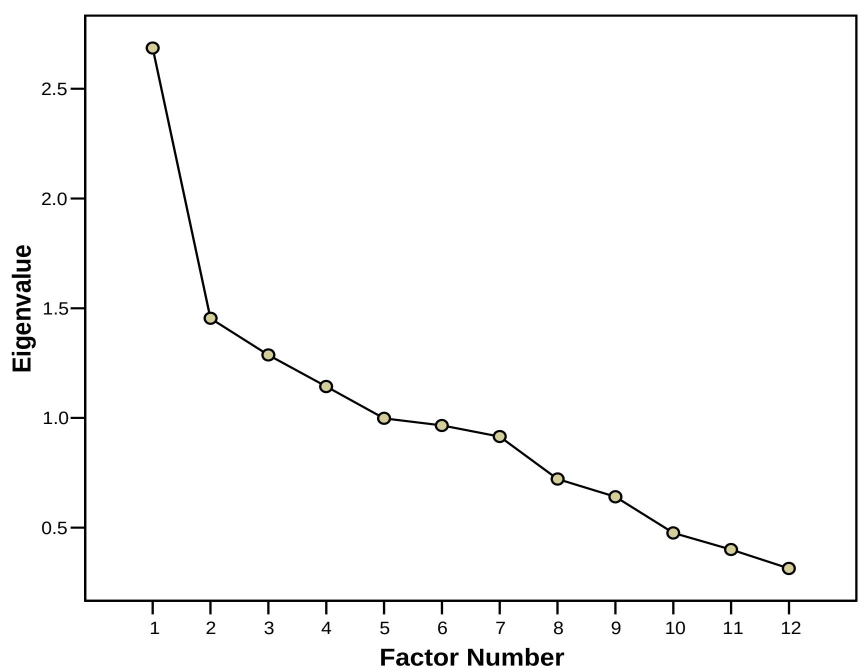
Extraction Method: Principal Axis Factoring.

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings (a)
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	2.686	22.384	22.384	2.108	17.564	17.564	1.773
2	1.454	12.118	34.501	.968	8.070	25.634	1.237
3	1.287	10.724	45.226	.648	5.396	31.031	1.275
4	1.143	9.527	54.752	.502	4.186	35.217	.541
5	.998	8.316	63.068				
6	.965	8.045	71.113				
7	.915	7.626	78.739				
8	.721	6.011	84.750				
9	.641	5.338	90.088				
10	.476	3.965	94.052				
11	.400	3.333	97.385				
12	.314	2.615	100.000				

Extraction Method: Principal Axis Factoring.
a When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Scree Plot



Factor Matrix(a)

	Factor			
	1	2	3	4
USA9	.611	.073	-.297	-.170
USA1	.539	.112	.043	-.045
USA2	.526	.126	.022	.162
USA7	.477	.076	-.396	.147
USA6	.352	-.172	-.088	.003
USA11	.305	-.106	.017	-.298
USA8	.266	-.202	-.082	.126
USA3	.565	-.643	.224	.027
USA4	.387	.604	.102	-.177
USA10	.415	.153	.553	.093
USA12	.013	.212	.067	.387
USA5	.107	.022	-.121	.359

Extraction Method: Principal Axis Factoring.
a 4 factors extracted. 31 iterations required.

Pattern Matrix(a)

	Factor			
	1	2	3	4
USA9	.688	-.018	-.012	-.153
USA7	.627	-.050	-.136	.169
USA1	.371	-.051	.292	-.047
USA2	.351	-.091	.287	.159
USA3	-.047	-.821	.284	-.164
USA4	.430	.488	.398	-.061
USA8	.144	-.294	-.006	.070
USA6	.236	-.255	.024	-.046
USA10	-.113	-.097	.734	.060
USA12	-.026	.072	.151	.418
USA5	.115	-.097	-.034	.358
USA11	.196	-.108	.094	-.330

Extraction Method: Principal Axis Factoring. Rotation Method: Oblimin with Kaiser Normalization.
a Rotation converged in 14 iterations.

Structure Matrix

	Factor			
	1	2	3	4
USA9	.686	-.217	.204	-.142
USA7	.602	-.217	.055	.181
USA1	.475	-.168	.409	-.051
USA2	.468	-.196	.394	.154
USA3	.270	-.824	.305	-.199
USA8	.226	-.332	.048	.063
USA6	.314	-.324	.107	-.051
USA10	.141	-.092	.702	.036
USA4	.414	.349	.514	-.048

USA12	.007	.088	.129	.416
USA5	.138	-.117	-.004	.357
USA11	.250	-.178	.167	-.332

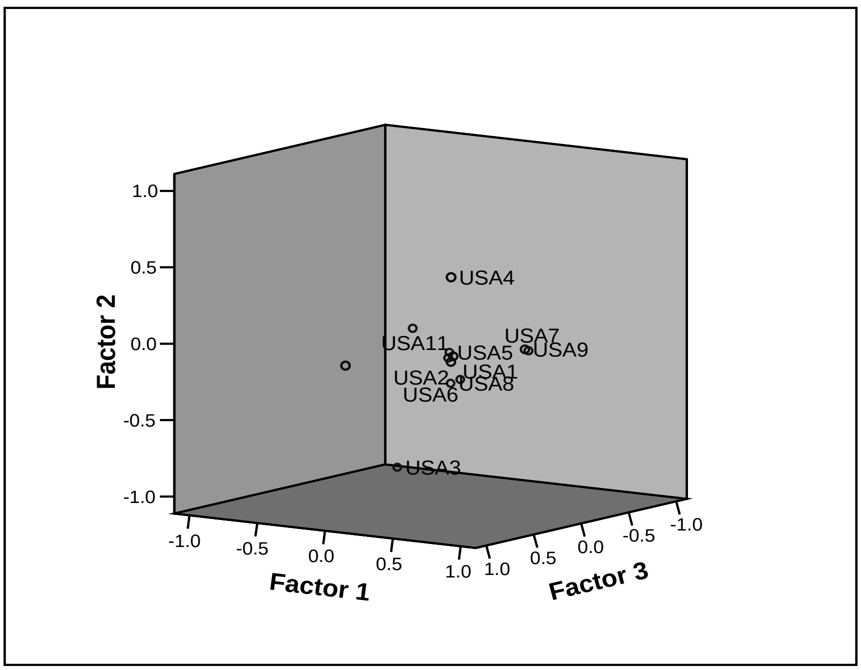
Extraction Method: Principal Axis Factoring. Rotation Method: Oblimin with Kaiser Normalization.

Factor Correlation Matrix

Factor	1	2	3	4
1	1.000	-.283	.308	.016
2	-.283	1.000	-.038	.033
3	.308	-.038	1.000	-.026
4	.016	.033	-.026	1.000

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

Factor Plot in Rotated Factor Space



Factor Score Coefficient Matrix

	Factor			
	1	2	3	4
USA1	.142	-.004	.133	-.009
USA2	.151	-.042	.131	.151
USA3	.069	-.718	.202	-.213
USA4	.212	.245	.346	-.127
USA5	.052	-.055	-.033	.253
USA6	.094	-.095	-.011	-.023
USA7	.300	-.087	-.088	.206
USA8	.061	-.096	-.019	.085
USA9	.358	-.031	-.024	-.136
USA10	-.067	.061	.464	.091
USA11	.066	-.012	.035	-.229
USA12	.004	-.009	.084	.284

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

Factor Score Covariance Matrix

Factor	1	2	3	4
1	1.312	-.764	1.628	.655
2	-.764	.980	-.153	-.354
3	1.628	-.153	2.668	.517
4	.655	-.354	.517	.803

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

Correlation Analysis of the U.S.A. Nationality Based Dataset

Notes

Output Created		29-APR-2008 11:31:10
Comments		
Input	Data	C:\Documents and Settings\dcolbeck.COMPUTING\Desktop\Final Data Collection 280408\Cultural Analysis\USA\CA_USA12_280408.sav
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	Split File	<none>
	N of Rows in Working Data File	58
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each pair of variables are based on all the cases with valid data for that pair.
Syntax		CORRELATIONS /VARIABLES=USA1 USA2 USA3 USA4 USA5 USA6 USA7 USA8 USA9 USA10 USA11 USA12 /PRINT=TWOTAIL NOSIG /MISSING=PAIRWISE .
Resources	Elapsed Time	0:00:00.02

Correlations

		USA1	USA2	USA3	USA4	USA5	USA6	USA7	USA8	USA9	USA10	USA11	USA12
USA1	Pearson Correlation	1	.337(**)	.250	.290(*)	.084	.045	.174	.166	.362(**)	.213	.255	.057
	Sig. (2-tailed)		.010	.058	.027	.530	.739	.193	.213	.005	.109	.054	.673
	N	58	58	58	58	58	58	58	58	58	58	58	58
USA2	Pearson Correlation	.337(**)	1	.216	.245	-.037	.271(*)	.292(*)	.144	.268(*)	.243	.024	.164
	Sig. (2-tailed)	.010		.104	.064	.783	.039	.026	.280	.042	.066	.857	.217
	N	58	58	58	58	58	58	58	58	58	58	58	58
USA3	Pearson Correlation	.250	.216	1	-.166	.048	.257	.144	.257	.244	.281(*)	.221	-.132
	Sig. (2-tailed)	.058	.104		.213	.718	.051	.281	.051	.065	.032	.096	.323
	N	58	58	58	58	58	58	58	58	58	58	58	58
USA4	Pearson Correlation	.290(*)	.245	-.166	1	.032	.031	.160	-.045	.289(*)	.327(*)	.059	-.015
	Sig. (2-tailed)	.027	.064	.213		.811	.819	.229	.738	.028	.012	.661	.912
	N	58	58	58	58	58	58	58	58	58	58	58	58
USA5	Pearson Correlation	.084	-.037	.048	.032	1	.025	.238	.155	-.019	.035	-.080	.139
	Sig. (2-tailed)	.530	.783	.718	.811		.852	.072	.244	.890	.796	.550	.297
	N	58	58	58	58	58	58	58	58	58	58	58	58
USA6	Pearson Correlation	.045	.271(*)	.257	.031	.025	1	.250	.180	.156	.100	.184	-.100
	Sig. (2-tailed)	.739	.039	.051	.819	.852		.059	.177	.241	.454	.167	.453
	N	58	58	58	58	58	58	58	58	58	58	58	58
USA7	Pearson Correlation	.174	.292(*)	.144	.160	.238	.250	1	.033	.406(**)	.025	.122	.028
	Sig. (2-tailed)	.193	.026	.281	.229	.072	.059		.807	.002	.852	.360	.832
	N	58	58	58	58	58	58	58	58	58	58	58	58
USA8	Pearson Correlation	.166	.144	.257	-.045	.155	.180	.033	1	.222	.021	-.026	-.046
	Sig. (2-tailed)	.213	.280	.051	.738	.244	.177	.807		.093	.877	.848	.734

	N	58	58	58	58	58	58	58	58	58	58	58	58
USA9	Pearson Correlation	.362(**)	.268(*)	.244	.289(*)	-.019	.156	.406(**)	.222	1	.067	.216	-.018
	Sig. (2-tailed)	.005	.042	.065	.028	.890	.241	.002	.093		.615	.103	.891
	N	58	58	58	58	58	58	58	58	58	58	58	58
USA10	Pearson Correlation	.213	.243	.281(*)	.327(*)	.035	.100	.025	.021	.067	1	.117	.121
	Sig. (2-tailed)	.109	.066	.032	.012	.796	.454	.852	.877	.615		.382	.367
	N	58	58	58	58	58	58	58	58	58	58	58	58
USA11	Pearson Correlation	.255	.024	.221	.059	-.080	.184	.122	-.026	.216	.117	1	-.106
	Sig. (2-tailed)	.054	.857	.096	.661	.550	.167	.360	.848	.103	.382		.429
	N	58	58	58	58	58	58	58	58	58	58	58	58
USA12	Pearson Correlation	.057	.164	-.132	-.015	.139	-.100	.028	-.046	-.018	.121	-.106	1
	Sig. (2-tailed)	.673	.217	.323	.912	.297	.453	.832	.734	.891	.367	.429	
	N	58	58	58	58	58	58	58	58	58	58	58	58

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Analysis of the P.R.C. Nationality Based Dataset

Statement to Subset Reduction

Notes

Output Created		29-APR-2008 14:08:43
Comments		
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	Split File	<none>
	N of Rows in Working Data File	104
Missing Value Handling	Definition of Missing	MISSING=EXCLUDE: User-defined missing values are treated as missing.
	Cases Used	LISTWISE: Statistics are based on cases with no missing values for any variable used.
Syntax		FACTOR /VARIABLES PRC1 PRC2 PRC3 PRC4 PRC5 PRC6 PRC7 PRC8 PRC9 PRC10 PRC11 PRC12 PRC13 PRC14 PRC15 PRC16 PRC17 PRC18 PRC19 PRC20 PRC21 PRC22 PRC23 PRC24 PRC25 PRC26 PRC27 PRC28 PRC29 PRC30 PRC31 PRC32 PRC33 PRC34 /MISSING LISTWISE /ANALYSIS PRC1 PRC2 PRC3 PRC4 PRC5 PRC6 PRC7 PRC8 PRC9 PRC10 PRC11 PRC12 PRC13 PRC14 PRC15 PRC16 PRC17 PRC18 PRC19 PRC20 PRC21 PRC22 PRC23 PRC24 PRC25 PRC26 PRC27 PRC28 PRC29 PRC30 PRC31 PRC32 PRC33 PRC34 /PRINT UNIVARIATE INITIAL CORRELATION SIG DET KMO EXTRACTION ROTATION FSCORE /FORMAT SORT /PLOT EIGEN ROTATION /CRITERIA MINEIGEN(1) ITERATE(50) /EXTRACTION PAF /CRITERIA ITERATE(50) DELTA(0) /ROTATION OBLIMIN /METHOD=CORRELATION .
Resources	Elapsed Time	0:00:00.35
	Maximum Memory Required	133672 (130.539K) bytes

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
PRC1	1.9135	.57641	104
PRC2	3.2981	1.16486	104
PRC3	1.9615	.63740	104
PRC4	3.1538	1.22885	104
PRC5	2.0769	.63387	104
PRC6	3.9519	.98906	104
PRC7	3.0865	.87145	104
PRC8	1.8269	.63003	104
PRC9	1.8558	.58157	104
PRC10	2.5962	1.17017	104
PRC11	2.5000	1.16586	104
PRC12	2.2885	.60215	104
PRC13	3.6346	1.18287	104
PRC14	2.6635	1.27417	104
PRC15	2.4519	1.25319	104
PRC16	1.8558	.70254	104
PRC17	1.7500	.72071	104
PRC18	2.3077	.99588	104
PRC19	2.0769	.64901	104
PRC20	3.2885	1.07643	104
PRC21	1.9712	.63025	104
PRC22	3.0288	.90797	104
PRC23	2.3654	1.07086	104
PRC24	2.0288	.47166	104
PRC25	1.6346	.62408	104
PRC26	3.0385	1.13995	104
PRC27	2.1058	.57316	104
PRC28	3.7788	.97500	104
PRC29	2.5481	.97423	104
PRC30	3.3077	1.05275	104
PRC31	2.0577	.51815	104
PRC32	3.3462	.91130	104
PRC33	2.1058	.57316	104
PRC34	4.1058	1.14839	104

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.564
Bartlett's Test of Sphericity	Approx. Chi-Square	797.076
	df	561
	Sig.	.000

Communalities

	Initial	Extraction
PRC1	.326	.403
PRC2	.387	.473
PRC3	.319	.286
PRC4	.389	.531
PRC5	.395	.437
PRC6	.509	.497
PRC7	.332	.502
PRC8	.336	.329
PRC9	.435	.971
PRC10	.344	.502
PRC11	.421	.560
PRC12	.371	.344
PRC13	.330	.259
PRC14	.366	.499
PRC15	.405	.608
PRC16	.389	.337
PRC17	.406	.447
PRC18	.326	.323
PRC19	.371	.269
PRC20	.301	.301
PRC21	.355	.378
PRC22	.443	.570
PRC23	.342	.392
PRC24	.355	.911
PRC25	.368	.389
PRC26	.346	.616
PRC27	.405	.617
PRC28	.515	.522
PRC29	.372	.423
PRC30	.440	.654
PRC31	.392	.420
PRC32	.309	.343
PRC33	.421	.591
PRC34	.658	.734

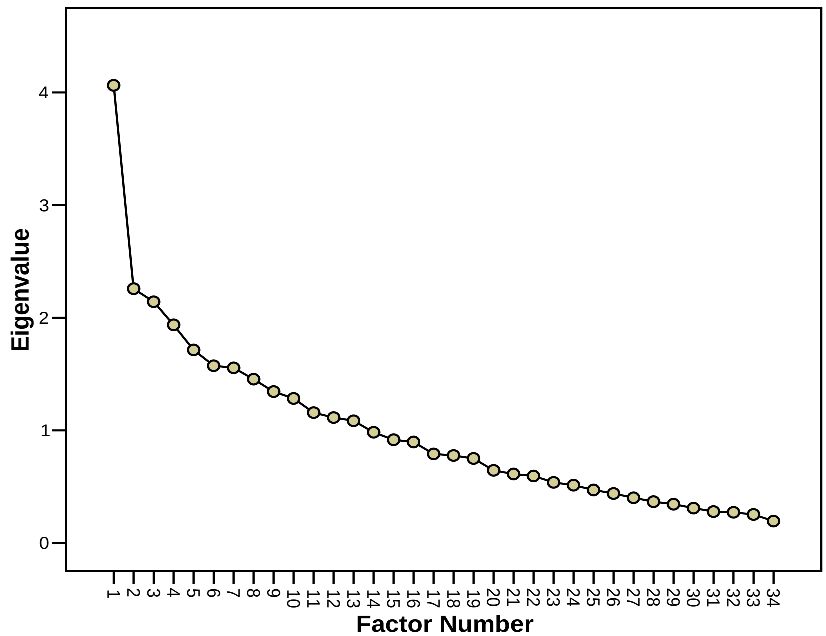
Extraction Method: Principal Axis Factoring.

Total Variance Explained

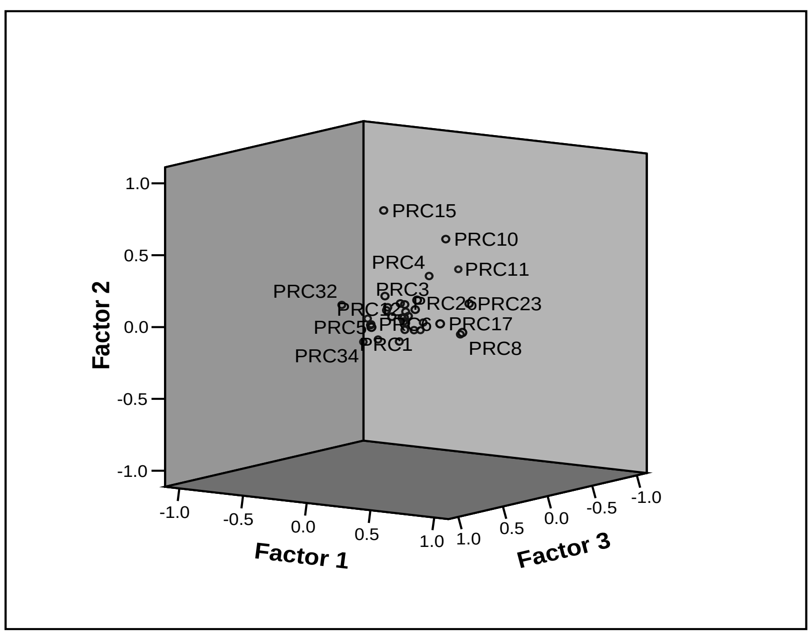
Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings (a)
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	4.063	11.949	11.949	3.563	10.479	10.479	2.128
2	2.257	6.638	18.588	1.746	5.134	15.613	1.712
3	2.142	6.299	24.887	1.712	5.036	20.648	1.376
4	1.936	5.694	30.581	1.431	4.210	24.859	1.470
5	1.714	5.040	35.621	1.229	3.613	28.472	1.863
6	1.573	4.626	40.247	1.220	3.587	32.059	1.096
7	1.555	4.572	44.820	1.041	3.063	35.122	1.284
8	1.454	4.276	49.095	.956	2.811	37.934	1.271
9	1.344	3.952	53.048	.817	2.402	40.336	1.195
10	1.283	3.773	56.821	.780	2.295	42.631	1.129
11	1.157	3.402	60.222	.711	2.091	44.723	1.350
12	1.113	3.273	63.495	.639	1.879	46.602	1.757
13	1.085	3.190	66.685	.593	1.745	48.347	1.617
14	.982	2.889	69.574				
15	.916	2.695	72.269				
16	.896	2.636	74.905				
17	.790	2.324	77.229				
18	.776	2.282	79.511				
19	.750	2.205	81.716				
20	.644	1.894	83.610				
21	.612	1.800	85.410				
22	.594	1.746	87.157				
23	.537	1.579	88.736				
24	.512	1.506	90.241				
25	.469	1.381	91.622				
26	.438	1.289	92.911				
27	.400	1.177	94.088				
28	.366	1.075	95.163				
29	.343	1.009	96.171				
30	.308	.906	97.077				
31	.278	.817	97.894				
32	.271	.798	98.692				
33	.252	.741	99.433				
34	.193	.567	100.000				

Extraction Method: Principal Axis Factoring.
a When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Scree Plot



Factor Plot in Rotated Factor Space



Factor Matrix(a)

	Factor												
	1	2	3	4	5	6	7	8	9	10	11	12	13
PRC34	-.737	.264	.222	-.067	3.397E-05	-.153	.150	-.077	.075	.040	.025	-.060	.072
PRC28	-.662	.238	.050	-.027	.077	-.030	.007	.060	.005	-.112	.029	.012	-.011
PRC6	-.621	.068	-.095	.095	.155	.027	.086	-.088	.115	-.080	.093	.146	.010
PRC17	.456	.263	.074	-.071	.257	.019	.137	-.135	-.088	.013	-.088	-.193	.047
PRC32	-.376	.073	.167	.058	.005	-.107	-.066	.220	-.127	-.105	-.114	.163	.185
PRC5	.375	-.001	.343	.018	.046	.230	.065	-.130	.034	.062	-.174	.227	.124
PRC31	.356	-.044	-.051	.200	-.047	.283	.329	-.110	-.077	-.098	-.125	-.043	-.113
PRC19	.338	.188	.037	-.056	.194	.047	-.111	.068	.111	.151	-.072	.089	.099
PRC23	.333	-.117	-.159	.137	-.211	-.067	.267	-.153	-.057	-.164	.121	-.155	.103
PRC20	-.322	-.022	-.104	.094	.134	.214	-.195	.007	.238	.031	-.118	.038	-.049
PRC13	-.283	.252	.005	-.043	.172	-.099	.163	.063	-.147	.014	-.110	-.098	.005
PRC16	.273	.239	.252	-.102	-.054	-.268	-.097	.095	-.068	-.043	.078	.106	-.122
PRC22	-.255	.501	.074	.279	-.078	.185	-.017	-.093	-.002	-.084	-.134	-.236	.200
PRC15	.272	.424	-.197	-.086	-.159	.034	-.309	.048	-.101	-.298	.101	.241	.127
PRC25	.324	.386	.062	-.193	.035	-.007	.016	-.238	-.051	-.101	-.132	-.073	-.020
PRC4	-.059	.379	-.256	-.228	-.244	.062	.311	.151	.213	-.136	.041	.082	-.107
PRC21	.299	.361	.056	.079	.085	-.004	.083	.111	-.130	-.038	-.160	.100	-.261
PRC24	-.045	.129	.602	.066	-.020	.465	-.052	.191	-.244	-.033	.425	-.091	-.142
PRC11	.083	.200	-.558	.127	-.083	.095	-.107	.285	.108	.138	.194	-.091	.005
PRC33	.251	.006	.458	.274	-.217	-.211	-.043	-.023	.288	.080	.167	.046	.173
PRC10	.299	.213	-.351	-.135	-.207	.028	.141	-.016	-.173	.076	.235	.099	.246
PRC27	.214	.099	-.087	.516	-.095	.085	-.242	.333	.140	-.041	-.211	-.158	-.102
PRC12	.136	.025	.140	.482	.083	-.114	.091	.093	.058	-.012	.167	.025	.062
PRC26	-.106	-.071	-.198	.376	.108	.347	.368	.043	-.029	.098	-.057	.363	.074
PRC8	.183	.119	-.155	.256	.083	-.126	.077	-.167	.013	.240	.179	-.157	-.142
PRC9	.376	.026	-.079	-.064	.835	-.031	.000	.047	.170	-.166	.240	.037	.053

PRC2	-.234	.026	-.187	.117	.131	-.449	.204	.216	-.208	.067	.018	-.004	-.120
PRC29	.270	.125	.209	.193	.040	-.296	.154	.284	-.153	-.014	-.154	.055	.096
PRC1	-.160	.180	.099	-.188	.082	.223	.251	.204	.220	-.010	-.001	-.232	.191
PRC30	-.244	.410	-.021	.357	.004	-.142	-.091	-.457	-.020	.197	.084	.120	-.025
PRC14	.120	.149	.274	-.218	-.184	-.032	.288	.088	.322	.174	.044	.137	-.244
PRC3	.198	.271	-.087	.014	-.010	-.097	-.136	-.127	.290	-.132	-.049	.029	-.131
PRC7	-.058	.264	-.069	-.189	.076	.225	-.186	.068	-.191	.503	-.042	.026	-.022
PRC18	.281	-.004	.027	-.154	-.032	-.169	.040	.151	.128	.287	-.068	-.052	.243

Extraction Method: Principal Axis Factoring.
a Attempted to extract 13 factors. More than 50 iterations required. (Convergence=.004). Extraction was terminated.

Pattern Matrix(a)

	Factor												
	1	2	3	4	5	6	7	8	9	10	11	12	13
PRC31	.545	-.010	.146	.126	-.010	.006	.250	.052	.067	-.081	.033	.003	-.109
PRC23	.433	.145	-.090	-.066	-.066	.008	.021	-.023	-.062	-.357	-.033	.006	.091
PRC32	-.407	.084	.137	.020	-.126	-.245	.078	.081	-.124	-.028	.031	-.135	-.013
PRC17	.390	.039	.172	-.012	.317	-.105	-.142	-.067	-.039	.085	.007	-.177	.096
PRC28	-.353	-.036	-.075	-.106	-.071	-.115	.005	-.079	.023	.023	.020	-.325	-.277
PRC6	-.323	-.071	-.073	-.188	.041	.023	.250	-.179	.014	-.073	-.086	-.190	-.274
PRC25	.264	.202	.251	-.036	.110	-.015	-.250	-.105	.082	.082	-.087	-.142	-.049
PRC20	-.235	-.162	-.023	.189	.045	.235	.134	-.021	-.028	.120	-.125	-.093	-.143
PRC15	-.163	.749	.016	.100	.071	.050	-.100	.009	-.030	.002	.008	.048	-.119
PRC10	.179	.554	-.191	-.234	-.024	-.006	.134	-.050	.007	.061	-.008	.013	.219
PRC11	.001	.270	-.586	.273	.051	.064	.116	-.015	.024	.148	-.053	-.038	.092
PRC5	.096	.036	.523	.010	.089	.124	.186	-.005	.077	.044	.095	.058	.172
PRC27	.037	-.033	-.141	.793	-.075	-.041	.010	.028	-.065	-.035	.016	-.027	.035
PRC9	-.078	-.001	-.066	-.131	1.039	-.019	.043	.064	-.111	-.112	.018	-.006	-.069
PRC19	-.055	.101	.126	.114	.281	.033	.011	-.024	.050	.180	-.028	.000	.226

PRC2	-.082	-.119	-.280	-.061	-.001	-.568	.040	-.062	-.010	-.022	-.131	.077	-.035
PRC29	-.004	.045	.151	.187	.036	-.495	.018	.045	.011	-.116	.045	.002	.234
PRC13	-.014	-.071	-.008	-.077	.018	-.314	-.016	-.044	-.023	.123	-.054	-.284	-.087
PRC21	.168	.110	.135	.234	.102	-.308	.005	-.033	.216	.157	.048	.060	-.164
PRC26	.050	.036	.090	.008	.032	-.050	.795	-.065	.040	.030	-.023	.022	-.055
PRC16	-.106	.169	.084	.022	.060	-.216	-.278	-.050	.198	-.013	.155	.160	.025
PRC30	-.093	.071	.085	-.069	-.097	.009	.065	-.775	-.032	.084	-.068	-.030	-.099
PRC8	.257	-.108	-.243	.036	.111	-.045	-.009	-.401	.022	.036	.018	.076	.062
PRC14	-.012	-.142	.056	-.069	-.072	.006	.003	-.005	.682	.012	.084	.021	.117
PRC4	.040	.282	-.203	-.034	-.093	-.035	.095	.108	.508	-.041	-.141	-.236	-.116
PRC3	-.022	.118	.030	.190	.136	.123	-.171	-.163	.208	-.098	-.203	-.001	-.088
PRC7	-.044	.045	-.060	-.017	-.058	.016	.031	-.108	-.010	.696	.104	.000	.138
PRC12	-.039	-.032	-.053	.182	.149	-.142	.171	-.227	-.035	-.279	.203	.005	.101
PRC24	.001	.025	-.027	-.010	.018	.100	-.050	.052	.046	.123	.954	-.126	-.253
PRC22	.053	.127	.090	.239	-.170	.025	-.019	-.277	-.144	.016	.054	-.594	-.058
PRC1	.009	-.080	-.078	-.036	.106	.068	.034	.206	.145	.000	.085	-.567	.133
PRC34	-.325	-.182	.013	-.263	-.191	-.121	-.052	-.244	.110	-.017	.000	-.444	-.085
PRC18	-.021	-.013	-.005	-.001	.032	-.047	-.063	.062	.066	.075	-.115	-.036	.545
PRC33	-.173	-.031	.148	.116	-.057	.107	-.086	-.273	.152	-.356	.222	.027	.395

Extraction Method: Principal Axis Factoring. Rotation Method: Oblimin with Kaiser Normalization.
a Rotation converged in 49 iterations.

Structure Matrix

	Factor												
	1	2	3	4	5	6	7	8	9	10	11	12	13
PRC31	.548	.086	.152	.178	.093	.029	.241	.034	.086	-.111	.076	.074	.005
PRC28	-.490	-.159	-.125	-.192	-.238	-.141	.061	-.096	-.044	.089	-.054	-.470	-.431
PRC23	.467	.188	-.087	-.013	-.012	.004	.033	-.024	-.024	-.374	-.014	.138	.172
PRC17	.447	.185	.246	.087	.437	-.127	-.201	-.095	.103	.118	.045	-.067	.196

PRC32	-.447	-.042	.096	-.033	-.220	-.253	.081	.058	-.153	-.014	.059	-.213	-.123
PRC20	-.292	-.205	-.080	.129	-.028	.248	.186	-.023	-.094	.149	-.155	-.165	-.244
PRC15	.001	.736	.059	.209	.128	.026	-.193	-.041	.087	.068	-.049	.046	-.051
PRC10	.305	.556	-.197	-.132	.039	-.018	.061	-.028	.088	.080	-.065	.055	.251
PRC11	.069	.304	-.569	.271	.081	.076	.158	-.058	.033	.166	-.172	-.027	.076
PRC5	.197	.084	.547	.123	.196	.117	.072	.020	.141	.018	.226	.112	.250
PRC27	.062	.071	-.075	.760	.048	-.023	.077	-.082	-.048	-.079	.061	.046	.072
PRC9	.097	.030	.017	.034	.949	-.036	-.028	.024	-.016	-.010	-.020	.076	.067
PRC19	.076	.181	.176	.203	.374	.023	-.076	-.037	.140	.199	.016	.047	.272
PRC2	-.132	-.138	-.320	-.117	-.061	-.555	.066	-.097	-.072	-.041	-.158	.006	-.081
PRC29	.072	.104	.204	.228	.124	-.502	-.043	-.017	.071	-.151	.160	.062	.290
PRC21	.223	.237	.204	.295	.232	-.306	-.071	-.102	.275	.152	.074	.037	-.048
PRC26	.066	-.040	-.023	.061	-.016	-.022	.767	-.052	-.051	.004	.002	-.050	-.097
PRC16	-.006	.232	.192	.091	.145	-.245	-.367	-.082	.269	-.023	.185	.166	.137
PRC25	.308	.326	.298	.043	.233	-.043	-.329	-.125	.213	.136	-.067	-.096	.023
PRC30	-.125	.053	.022	.015	-.094	-.053	.042	-.762	-.049	.076	-.074	-.128	-.193
PRC8	.273	-.014	-.213	.101	.175	-.066	.004	-.409	.031	.000	-.006	.111	.107
PRC14	.031	-.046	.120	-.051	.011	-.007	-.085	.017	.664	.004	.129	-.010	.176
PRC4	.055	.322	-.212	-.050	-.077	-.037	.056	.084	.509	.041	-.212	-.294	-.128
PRC3	.052	.215	.058	.244	.210	.104	-.218	-.200	.259	-.048	-.199	.017	-.042
PRC7	-.050	.078	-.050	-.023	.013	.021	.003	-.077	.016	.674	.047	-.088	.082
PRC12	.023	-.035	-.002	.264	.147	-.173	.172	-.272	-.037	-.318	.258	.064	.149
PRC24	-.045	-.038	.169	.031	-.030	.052	-.011	.033	.058	.084	.886	-.148	-.130
PRC22	-.053	.128	.084	.223	-.161	-.028	.041	-.333	-.088	.069	.054	-.590	-.180
PRC34	-.500	-.293	-.051	-.354	-.346	-.171	-.004	-.225	.041	.040	-.027	-.575	-.291
PRC1	-.046	-.076	-.047	-.083	.055	.049	.068	.193	.180	.082	.066	-.530	.058
PRC13	-.108	-.078	-.034	-.125	-.029	-.325	.004	-.071	-.020	.163	-.076	-.346	-.170
PRC18	.076	.060	.019	.018	.131	-.049	-.120	.083	.134	.063	-.040	.059	.531
PRC33	-.066	-.010	.236	.210	.012	.047	-.137	-.270	.186	-.408	.355	.134	.440
PRC6	-.423	-.219	-.178	-.228	-.156	.007	.293	-.165	-.093	-.015	-.153	-.333	-.425

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

Factor Correlation Matrix

Factor	1	2	3	4	5	6	7	8	9	10	11	12	13
1	1.000	.210	.046	.072	.200	.022	.002	-.004	.095	-.039	.013	.165	.182
2	.210	1.000	.036	.155	.106	-.029	-.131	-.043	.159	.070	-.058	.027	.084
3	.046	.036	1.000	.094	.109	-.016	-.146	.014	.088	-.006	.210	.018	.056
4	.072	.155	.094	1.000	.182	.016	.032	-.138	.046	-.040	.079	.079	.075
5	.200	.106	.109	.182	1.000	-.020	-.099	-.049	.126	.090	-.011	.095	.160
6	.022	-.029	-.016	.016	-.020	1.000	.041	.086	-.016	.030	-.053	.054	-.017
7	.002	-.131	-.146	.032	-.099	.041	1.000	.026	-.136	-.036	.016	-.079	-.083
8	-.004	-.043	.014	-.138	-.049	.086	.026	1.000	-.006	.030	-.012	.044	.046
9	.095	.159	.088	.046	.126	-.016	-.136	-.006	1.000	.034	.020	-.058	.105
10	-.039	.070	-.006	-.040	.090	.030	-.036	.030	.034	1.000	-.090	-.143	-.065
11	.013	-.058	.210	.079	-.011	-.053	.016	-.012	.020	-.090	1.000	.037	.151
12	.165	.027	.018	.079	.095	.054	-.079	.044	-.058	-.143	.037	1.000	.201
13	.182	.084	.056	.075	.160	-.017	-.083	.046	.105	-.065	.151	.201	1.000

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

Factor Score Coefficient Matrix

	Factor												
	1	2	3	4	5	6	7	8	9	10	11	12	13
PRC1	.020	-.024	-.028	-.015	.002	.047	.023	.100	.059	.010	-.004	-.257	.109
PRC2	.016	-.049	-.159	-.051	-.053	-.365	.000	-.038	-.022	-.013	.063	.080	-.027
PRC3	-.007	.027	.020	.085	-.003	.073	-.072	-.063	.117	-.026	-.024	.004	-.069
PRC4	.050	.147	-.114	-.014	.043	-.014	.037	.084	.361	-.027	-.088	-.152	-.087
PRC5	-.010	.031	.280	.027	.087	.068	.092	.015	.055	.038	-.012	-.017	.085

PRC6	-.107	-.027	-.042	-.072	-.083	.033	.138	-.058	-.006	-.045	.043	-.050	-.149
PRC7	-.030	-.016	-.022	-.018	.032	-.015	.030	-.043	-.014	.463	-.004	-.022	.123
PRC8	.112	-.052	-.137	.005	.035	-.015	-.027	-.164	.029	.019	-.014	.034	.023
PRC9	-.092	-.059	-.065	-.029	.943	-.005	.020	-.042	-.026	-.066	-.068	-.080	-.021
PRC10	.102	.264	-.127	-.159	-.012	-.018	.082	-.027	-.016	.009	.034	-.010	.168
PRC11	-.021	.110	-.385	.129	.048	.079	.087	-.044	.033	.080	.001	-.043	.088
PRC12	-.008	-.002	-.020	.069	-.022	-.088	.074	-.075	-.021	-.143	.063	.013	.042
PRC13	.003	-.005	.005	-.020	.008	-.135	-.005	.008	-.007	.049	.005	-.098	-.021
PRC14	-.002	-.050	.031	.004	.061	.013	-.027	-.026	.449	.015	-.010	.034	.056
PRC15	-.139	.494	.085	.072	-.039	.021	-.104	.020	.000	-.006	-.036	.044	-.122
PRC16	-.066	.056	.050	.015	.061	-.131	-.106	-.006	.097	.006	.003	.051	.010
PRC17	.203	.011	.095	.003	.068	-.082	-.072	-.056	.006	.084	.033	-.113	.052
PRC18	-.015	.004	-.014	-.032	-.022	-.010	-.012	.050	.018	.061	.046	-.031	.253
PRC19	-.028	.044	.078	.047	-.007	-.003	-.023	-.011	.040	.117	.003	-.004	.092
PRC20	-.073	-.047	.010	.094	-.022	.147	.043	.020	.005	.066	.008	-.005	-.080
PRC21	.061	.045	.088	.117	.048	-.174	-.011	-.064	.129	.076	.022	.052	-.086
PRC22	.083	.080	.073	.157	.047	.016	-.014	-.136	-.120	.004	-.038	-.347	-.026
PRC23	.183	.060	-.067	-.074	-.040	-.019	.020	-.037	-.045	-.205	.022	-.027	.032
PRC24	.040	.021	-.027	-.022	-.060	.041	-.003	.037	.023	.073	.893	-.029	-.168
PRC25	.129	.090	.138	-.013	.003	-.012	-.125	-.020	.061	.046	-.014	-.073	-.048
PRC26	.016	-.001	.060	.029	-.002	-.033	.594	-.009	.014	.009	.017	-.004	-.003
PRC27	-.050	-.057	-.065	.524	.071	-.026	.035	-.017	-.016	-.033	-.041	-.058	.006
PRC28	-.147	.001	-.012	-.031	-.055	-.077	.005	.023	-.003	.018	-.098	-.141	-.149
PRC29	-.010	.054	.098	.082	-.037	-.313	-.001	.012	.002	-.044	.072	.004	.111
PRC30	-.001	.060	.042	.003	.046	.018	-.008	-.585	-.021	.057	-.021	.070	-.088
PRC31	.246	-.016	.066	.015	-.034	-.009	.118	.036	.019	-.042	.005	-.038	-.100
PRC32	-.162	.046	.080	.018	.023	-.129	.043	.076	-.075	-.024	.030	-.053	.023
PRC33	-.125	-.031	.055	.074	.008	.080	-.010	-.194	.102	-.291	.203	.047	.329
PRC34	-.233	-.143	-.016	-.176	-.015	-.108	-.031	-.113	.084	-.035	-.073	-.354	-.008

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

Factor Score Covariance Matrix

Factor	1	2	3	4	5	6	7	8	9	10	11	12	13
1	1.274	.810	1.946	.444	1.212	1.834	1.021	.536	1.136	1.749	1.196	1.434	1.394
2	.810	1.293	1.019	.470	2.056	.822	.380	.322	2.176	.953	1.397	.659	.636
3	1.946	1.019	2.615	.646	1.673	2.001	2.325	.924	1.645	1.895	1.497	2.970	1.626
4	.444	.470	.646	1.034	1.072	1.132	.381	.401	2.227	.879	.889	.509	.338
5	1.212	2.056	1.673	1.072	3.618	.663	.420	.368	3.091	.682	2.911	.856	.534
6	1.834	.822	2.001	1.132	.663	3.102	.603	.494	1.243	2.401	1.191	.902	2.593
7	1.021	.380	2.325	.381	.420	.603	2.317	.554	.729	.413	.335	1.700	.625
8	.536	.322	.924	.401	.368	.494	.554	1.068	1.227	.657	1.119	.794	.394
9	1.136	2.176	1.645	2.227	3.091	1.243	.729	1.227	5.103	.812	.815	1.194	1.087
10	1.749	.953	1.895	.879	.682	2.401	.413	.657	.812	2.571	.722	.555	1.081
11	1.196	1.397	1.497	.889	2.911	1.191	.335	1.119	.815	.722	3.351	1.306	.449
12	1.434	.659	2.970	.509	.856	.902	1.700	.794	1.194	.555	1.306	3.891	1.333
13	1.394	.636	1.626	.338	.534	2.593	.625	.394	1.087	1.081	.449	1.333	3.535

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

Analysis of the P.R.C. Nationality Based Dataset Subset to Final Factors Reduction

Notes

Output Created		29-APR-2008 14:26:35
Comments		
Input	Data	C:\Documents and Settings\dcolbeck.COMPUTING\Desktop\Final Data Collection 280408\Cultural Analysis\China\CA_China13_290408.sav
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	104
Missing Value Handling	Definition of Missing	MISSING=EXCLUDE: User-defined missing values are treated as missing.
	Cases Used	LISTWISE: Statistics are based on cases with no missing values for any variable used.
Syntax		FACTOR /VARIABLES PRC1 PRC2 PRC3 PRC4 PRC5 PRC6 PRC7 PRC8 PRC9 PRC10 PRC11 PRC12 PRC13 /MISSING LISTWISE /ANALYSIS PRC1 PRC2 PRC3 PRC4 PRC5 PRC6 PRC7 PRC8 PRC9 PRC10 PRC11 PRC12 PRC13 /PRINT UNIVARIATE INITIAL CORRELATION SIG DET KMO EXTRACTION ROTATION FSCORE /FORMAT SORT /PLOT EIGEN ROTATION /CRITERIA MINEIGEN(1) ITERATE(25) /EXTRACTION PAF /CRITERIA ITERATE(25) DELTA(0) /ROTATION OBLIMIN /METHOD=CORRELATION .
Resources	Elapsed Time	0:00:00.06
	Maximum Memory Required	21700 (21.191K) bytes

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
PRC1	2.7846	.30712	104
PRC2	2.5240	.98380	104
PRC3	2.2885	.59403	104
PRC4	2.1058	.57316	104
PRC5	1.9663	.49397	104
PRC6	2.8837	.59007	104
PRC7	2.4471	.58674	104
PRC8	2.5673	.67571	104
PRC9	2.5933	.72303	104
PRC10	2.6875	.49848	104
PRC11	2.0288	.47166	104
PRC12	3.0154	.64789	104
PRC13	2.2067	.61774	104

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.482
Bartlett's Test of Sphericity	Approx. Chi-Square	105.872
	df	78
	Sig.	.020

Communalities

	Initial	Extraction
PRC1	.171	.214
PRC2	.134	.169
PRC3	.282	.917
PRC4	.126	.112
PRC5	.124	.142
PRC6	.119	.175
PRC7	.095	.304
PRC8	.108	.168
PRC9	.106	.335
PRC10	.178	.263
PRC11	.130	.663
PRC12	.286	.799
PRC13	.123	.526

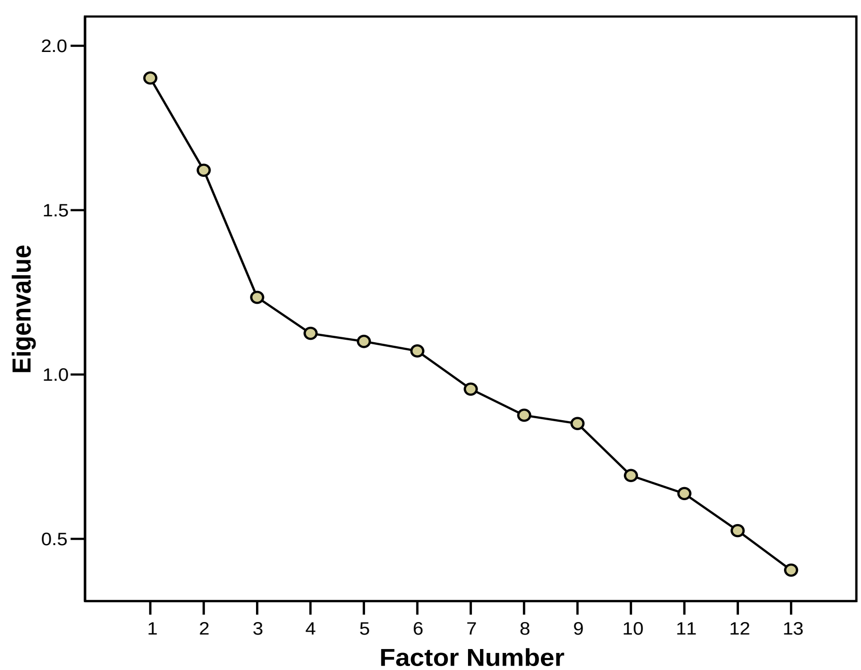
Extraction Method: Principal Axis Factoring.

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings (a)
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	1.902	14.629	14.629	1.473	11.331	11.331	1.253
2	1.622	12.473	27.102	1.078	8.294	19.625	1.189
3	1.235	9.499	36.600	.721	5.548	25.173	.755
4	1.125	8.656	45.257	.602	4.633	29.806	.620
5	1.101	8.467	53.724	.494	3.797	33.603	.654
6	1.072	8.244	61.968	.417	3.206	36.809	.596
7	.956	7.352	69.320				
8	.876	6.739	76.060				
9	.851	6.546	82.606				
10	.693	5.329	87.935				
11	.638	4.908	92.843				
12	.525	4.040	96.883				
13	.405	3.117	100.000				

Extraction Method: Principal Axis Factoring.
a When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Scree Plot



Factor Matrix(a)

	Factor					
	1	2	3	4	5	6
PRC3	.759	.484	-.032	-.159	-.255	-.120
PRC12	-.620	.576	-.126	.204	-.141	-.074
PRC2	.333	.123	-.084	.015	-.085	.167
PRC5	.325	-.012	.037	.071	.153	.080
PRC4	.243	.121	.059	.017	.094	-.158
PRC10	.189	.317	.194	.098	.198	-.199
PRC1	-.259	.311	-.173	-.124	-.008	-.071
PRC8	-.046	.289	-.098	.015	.258	-.080
PRC11	-.172	.222	.743	.084	-.095	.128
PRC13	.274	-.142	-.028	.645	.052	-.105
PRC6	-.063	.194	-.131	.050	.332	.063
PRC9	.079	.195	-.210	.257	-.205	.372
PRC7	.128	.236	.041	-.116	.317	.342

Extraction Method: Principal Axis Factoring.
a Attempted to extract 6 factors. More than 25 iterations required. (Convergence=.011). Extraction was terminated.

Pattern Matrix(a)

	Factor					
	1	2	3	4	5	6
PRC3	.946	.022	-.052	-.154	-.188	.235
PRC10	.350	.072	.180	.139	.156	-.132
PRC4	.289	-.043	.003	.072	.036	-.094
PRC12	-.068	.866	.170	.086	.060	.182
PRC1	.057	.406	-.068	-.150	.092	.001
PRC5	.124	-.268	-.005	.088	.144	.052
PRC11	-.007	.045	.812	-.039	-.067	.000
PRC13	.007	-.121	-.032	.691	-.043	.143
PRC7	.003	-.172	.112	-.189	.478	.137
PRC6	-.061	.068	-.064	.048	.407	-.008
PRC8	.103	.185	-.045	.033	.304	-.070
PRC9	-.033	.122	.000	.107	.037	.578
PRC2	.227	-.105	-.047	-.030	.013	.274

Extraction Method: Principal Axis Factoring. Rotation Method: Oblimin with Kaiser Normalization.
a Rotation converged in 17 iterations.

Structure Matrix

	Factor					
	1	2	3	4	5	6
PRC3	.893	-.189	-.044	-.053	.049	.318
PRC10	.390	.034	.212	.194	.263	-.130
PRC4	.308	-.085	.023	.120	.104	-.068
PRC12	-.176	.856	.163	-.008	.167	.049
PRC1	-.015	.420	-.062	-.178	.148	-.032
PRC5	.224	-.287	.001	.133	.145	.096
PRC11	-.006	.048	.809	-.035	-.032	-.067
PRC13	.119	-.212	-.034	.693	-.027	.125
PRC7	.145	-.111	.117	-.158	.457	.171
PRC6	.032	.127	-.048	.049	.400	-.010
PRC8	.142	.210	-.021	.044	.351	-.077
PRC9	.016	.048	-.041	.063	.061	.555
PRC2	.267	-.177	-.059	-.005	.059	.312

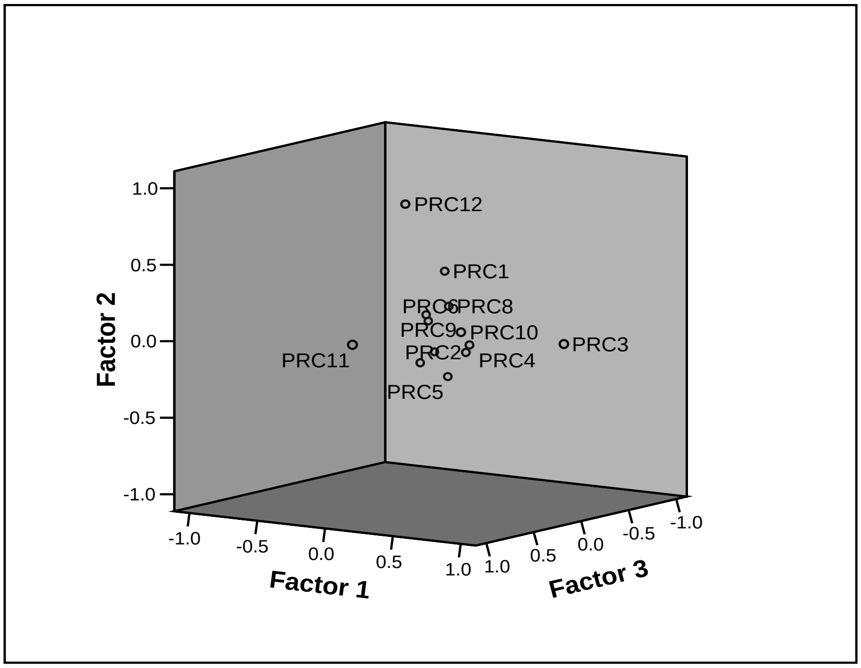
Extraction Method: Principal Axis Factoring. Rotation Method: Oblimin with Kaiser Normalization.

Factor Correlation Matrix

Factor	1	2	3	4	5	6
1	1.000	-.181	.038	.130	.251	.083
2	-.181	1.000	.007	-.094	.127	-.128
3	.038	.007	1.000	.016	.040	-.075
4	.130	-.094	.016	1.000	.041	-.051
5	.251	.127	.040	.041	1.000	.022
6	.083	-.128	-.075	-.051	.022	1.000

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

Factor Plot in Rotated Factor Space



Factor Score Coefficient Matrix

	Factor					
	1	2	3	4	5	6
PRC1	.032	.102	-.053	-.084	.060	-.037
PRC2	-.003	-.036	-.010	-.012	.036	.160
PRC3	.858	-.056	-.013	-.116	-.076	.277
PRC4	.031	.036	.001	.070	.073	-.107
PRC5	.010	-.060	.011	.058	.117	.029
PRC6	.082	-.006	-.006	.040	.253	-.007
PRC7	.014	-.077	.064	-.112	.377	.127
PRC8	.103	.047	-.007	.037	.206	-.076
PRC9	-.094	-.022	-.022	.013	.022	.446
PRC10	.115	.052	.084	.153	.193	-.180
PRC11	.058	-.102	.778	-.023	-.080	-.019
PRC12	-.069	.793	.056	.069	.119	.100
PRC13	.100	-.119	.016	.647	-.014	.089

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

Factor Score Covariance Matrix

Factor	1	2	3	4	5	6
1	1.136	-.588	1.705	.187	-.293	1.710
2	-.588	1.021	-.362	.012	1.563	-.279
3	1.705	-.362	2.310	.269	.728	1.643
4	.187	.012	.269	.584	.175	1.028
5	-.293	1.563	.728	.175	2.652	.480
6	1.710	-.279	1.643	1.028	.480	2.803

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

Correlation Analysis on the P.R.C. Nationality Based Dataset

Notes

Output Created		29-APR-2008 14:31:02
Comments		
Input	Data	C:\Documents and Settings\dcolbeck.COMPUTING\Desktop\Final Data Collection 280408\Cultural Analysis\China\CA_China13_290408.sav
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	104
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics for each pair of variables are based on all the cases with valid data for that pair.
Syntax		CORRELATIONS /VARIABLES=PRC1 PRC2 PRC3 PRC4 PRC5 PRC6 PRC7 PRC8 PRC9 PRC10 PRC11 PRC12 PRC13 /PRINT=TWOTAIL NOSIG /MISSING=PAIRWISE .
Resources	Elapsed Time	0:00:00.01

Correlations

		PRC1	PRC2	PRC3	PRC4	PRC5	PRC6	PRC7	PRC8	PRC9	PRC10	PRC11	PRC12	PRC13
PRC1	Pearson Correlation	1	-.042	-.021	.020	-.077	.068	.017	.134	.021	-.013	-.030	.354(**)	-.190
	Sig. (2-tailed)		.671	.835	.837	.437	.491	.864	.176	.836	.898	.759	.000	.053
	N	104	104	104	104	104	104	104	104	104	104	104	104	104
PRC2	Pearson Correlation	-.042	1	.308(**)	.013	.117	-.031	.082	.030	.167	.070	-.064	-.137	.056
	Sig. (2-tailed)	.671		.001	.898	.239	.754	.407	.759	.089	.481	.517	.166	.575
	N	104	104	104	104	104	104	104	104	104	104	104	104	104
PRC3	Pearson Correlation	-.021	.308(**)	1	.266(**)	.199(*)	-.068	.121	.024	.130	.258(**)	-.065	-.155	.028
	Sig. (2-tailed)	.835	.001		.006	.043	.492	.222	.811	.188	.008	.514	.115	.780
	N	104	104	104	104	104	104	104	104	104	104	104	104	104
PRC4	Pearson Correlation	.020	.013	.266(**)	1	.047	.068	.046	.044	-.045	.100	.025	-.117	.116
	Sig. (2-tailed)	.837	.898	.006		.636	.491	.645	.657	.649	.313	.805	.237	.241
	N	104	104	104	104	104	104	104	104	104	104	104	104	104
PRC5	Pearson Correlation	-.077	.117	.199(*)	.047	1	.051	.119	.000	-.005	.055	-.017	-.227(*)	.166
	Sig. (2-tailed)	.437	.239	.043	.636		.604	.227	.997	.962	.576	.867	.020	.092
	N	104	104	104	104	104	104	104	104	104	104	104	104	104
PRC6	Pearson Correlation	.068	-.031	-.068	.068	.051	1	.153	.090	.062	.133	-.086	.141	-.031
	Sig. (2-tailed)	.491	.754	.492	.491	.604		.121	.361	.530	.179	.388	.155	.758
	N	104	104	104	104	104	104	104	104	104	104	104	104	104
PRC7	Pearson Correlation	.017	.082	.121	.046	.119	.153	1	.138	.069	.043	.076	-.036	-.083
	Sig. (2-tailed)	.864	.407	.222	.645	.227	.121		.164	.487	.668	.445	.716	.400

	N	104	104	104	104	104	104	104	104	104	104	104	104	104
PRC8	Pearson Correlation	.134	.030	.024	.044	.000	.090	.138	1	-.012	.178	-.052	.183	-.016
	Sig. (2-tailed)	.176	.759	.811	.657	.997	.361	.164		.904	.070	.601	.063	.870
	N	104	104	104	104	104	104	104	104	104	104	104	104	104
PRC9	Pearson Correlation	.021	.167	.130	-.045	-.005	.062	.069	-.012	1	-.050	-.031	.130	.118
	Sig. (2-tailed)	.836	.089	.188	.649	.962	.530	.487	.904		.612	.757	.190	.231
	N	104	104	104	104	104	104	104	104	104	104	104	104	104
PRC10	Pearson Correlation	-.013	.070	.258(**)	.100	.055	.133	.043	.178	-.050	1	.163	.027	.086
	Sig. (2-tailed)	.898	.481	.008	.313	.576	.179	.668	.070	.612		.099	.785	.387
	N	104	104	104	104	104	104	104	104	104	104	104	104	104
PRC11	Pearson Correlation	-.030	-.064	-.065	.025	-.017	-.086	.076	-.052	-.031	.163	1	.170	-.071
	Sig. (2-tailed)	.759	.517	.514	.805	.867	.388	.445	.601	.757	.099		.084	.476
	N	104	104	104	104	104	104	104	104	104	104	104	104	104
PRC12	Pearson Correlation	.354(**)	-.137	-.155	-.117	-.227(*)	.141	-.036	.183	.130	.027	.170	1	-.099
	Sig. (2-tailed)	.000	.166	.115	.237	.020	.155	.716	.063	.190	.785	.084		.317
	N	104	104	104	104	104	104	104	104	104	104	104	104	104
PRC13	Pearson Correlation	-.190	.056	.028	.116	.166	-.031	-.083	-.016	.118	.086	-.071	-.099	1
	Sig. (2-tailed)	.053	.575	.780	.241	.092	.758	.400	.870	.231	.387	.476	.317	
	N	104	104	104	104	104	104	104	104	104	104	104	104	104

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).