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Developing A Doctoral Research Methodology

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Abstract:

Choosing a research “methodology” with which to conduct research can be one of the most daunting tasks to confront each doctoral student. Yet, it is a journey all aspiring researchers must take. The chances are, PhD and doctoral candidates will never again have to agonise over, write about, and justify their research methodology to the same extent as in their dissertation. The chances are also, that the journey of learning and conceptual development involved in the research methodology phases of PhD research is similar for all candidates, irrespective of the research field in which the thesis will be submitted.

This paper documents the development of a PhD research methodology, and presents a novel contextual model “Contextual Constructs Model” (CCM) for developing a robust research methodology suitable for dissertation quality research.

Keywords

Research Methodology, Research Philosophy, Research Design

Introduction

“All research is based on assumptions about how the world is perceived and how we can best come to understand it” (Trochim, 2002).

The assumptions of any research are determined by its associated entities, such as the research discipline (Trauth, 2001), the phenomenon being investigated (Remenyi *et al.*, 1998) and, to a varying degree, the personality and presuppositions of the researcher (Fielden, 2003). These entities serve to build a *context* for any research, that guides its development from conception, to philosophy, to methodology, and finally to design and implementation.

This paper is the result of the journey the author embarked on in developing a methodology for the PhD dissertation titled “*The impact of user perceptions of information quality on World Wide Web information retrieval behaviour*”. Like most inexperienced researchers, the initial exploration of research methodology found the author somewhat over-whelmed and baffled with the complexity of methodological discussions, and the terminologies used, to examine the research’s constructs. The author’s attempt to make sense of the process being undertaken resulted in the development of the framework discussed in this paper, a contextual model of the basic constructs that makes up all research.

The Context Of Research

Identifying the context of any research is an important fundamental step in determining which

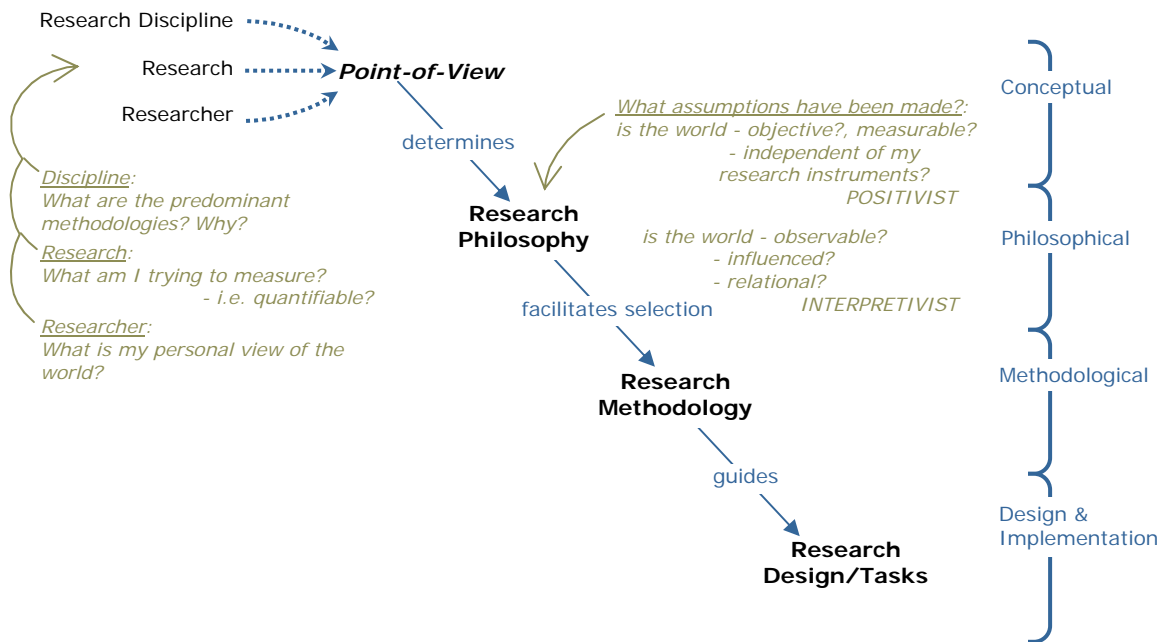
methodologies are best suited. A clear understanding of the context - or Big Picture - of the research will ensure that;

- 1.) The research philosophy fits-in with the constructs of the research discipline and the actual research project being undertaken;
- 2.) The methodology chosen is sound and appropriate in the context of the general research philosophy; and
- 3.) The research design; that is; how the component parts of the research fit together; is consistent with the research methodology.

Figure 1 illustrates a high-level contextual picture of a research project. It breaks down the planning of a research project into four evolving phases; (1) conceptual, (2) philosophical, (3) methodological and (4) design. During these stages, the researcher must consider such things as:

- 1.) The **Point-of-view** of the research;
- 2.) The **Research philosophy**;
- 3.) The **Research methodology**;
- 4.) The **Research design**.

Figure 1. The Contextual Constructs Model (Knight, 2007)



1. Conceptual Phase: *The Research Point-of-view*

Determining the point-of-view of any research is largely a *conceptual* process. It is the starting point of the journey. It involves identifying exactly what it is the researcher wishes to learn, and the *context* in which they wish to learn it.

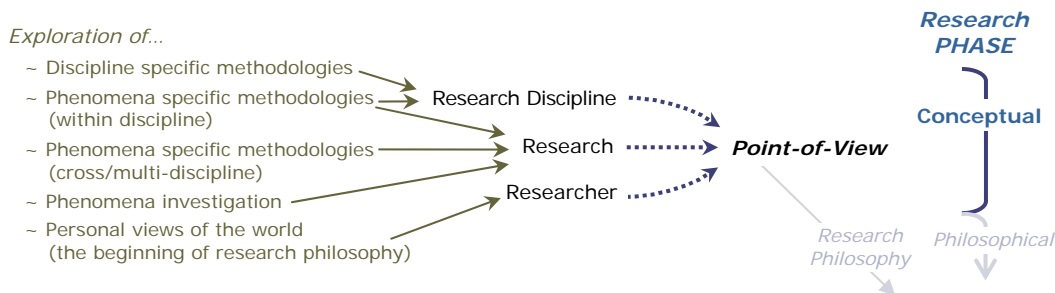
Remenyi *et al.*, (1998) state that the primary drivers of research approaches are (1) the *topic to be researched*, and (2) the *specific research question(s)*. Further to this however, in recognising Walsham's (1995) assertion that a researcher's knowledge of reality is itself a social construction, Trauth (2001) contends that "*objective, value-free data simply cannot be obtained*". A third primary driver of research approach then, is (3) the *researcher* themselves.

1.1 Research Discipline Context

A sound basis of any attempt to understand the “new” is an understanding of what is already known (Trauth, 2001). This involves identifying the research discipline context of the research so that literature and theory produced before the current research can be examined (Webster & Watson, 2002) and used to provide a strong theoretical foundation for how to investigate the phenomenon¹.

The examination of theory as it relates to a discipline context is multi-level. The researcher is required to conceptualise the phenomenon (or phenomena) to be explored during the course of the research project, and identify the research discipline and sub-discipline context of the investigation. The researcher also explores general research methodologies associated with their discipline, as well as a more focused exploration of the methodological approaches used previously to investigate the identified phenomena. Figure 2 illustrates the researcher considerations at this foundational phase of any research.

Figure 2 Contextual Constructs of Research Detail: (Point-of-View)



It should be noted, that the list of exploration areas presented in figure 2 do not necessarily occur in a specific order, although usually phenomena-driven review of the literature will occur first. An important characteristic of research is that, although its ultimate outcome is founded on logic, and can therefore be considered relatively “linear”, as an entity, it is a *process* involving personal cognition. And cognition is anything but linear (Leonard *et al.*, 1999; White, 2007).

The process of a researcher discovering the point-of-view of the research is one of the most complex undertakings of a dissertation, and does not lend itself to a linear approach. In essence, this means that although – for the sake of clarity and non-repetitive writing – the process described herein is written in what amounts to a linear description, each identified part of the process does not necessarily take place in a specified order. Moreover, as the researcher, and research, develop and grow in sophistication, some parts of the research process are iteratively revisited.

In the current research: The purpose of identifying the research discipline context was twofold;

- 1.) It helped identify key areas of research for the essential literature review (Webster & Watson, 2002);
- 2.) It provided a methodological context for the research – where the researcher was able to identify key methodologies commonly used for similar types of research.

¹ The word phenomenon (singular) and phenomena (plural) is used broadly here to describe “*that which the researcher will be exploring as the focus of their PhD/research*”. The term is not used here to suggest the researcher engages “phenomenology” per-se, although this could be an appropriate strategy, depending on the focus of the research.

The research areas of study and their associated disciplines determined to be relevant to the current investigation included:

- Information Retrieval (IR)
Field: Information Systems
PhD Context: specifically contextualised as information retrieval (as a user-behaviour) from the World Wide Web, and associated issues pertaining to IR in an electronic environment devoid of enforceable information quality standards.
- Information Quality (IQ)
Field: Information Systems
Field: Behavioural And Cognitive Sciences – *Psychology*
PhD Context: perceptions of IQ examined from the user of the information’s view-point, in the context of value-judgements during Web IR. Also included investigation of cognitive issues relating to user characteristics such as *dissonance*, *attribution*, and *expectancy*, theories.
- Human-Computer Interaction
Field: Information Systems
Field: Human-Computer Interaction
PhD Context: the human-computer interaction research falls into two main categories, how the cognitive processes of individual users are manifest in Web information retrieval behaviours, and how interaction with a search engine crawler facilitates (or hinders) those cognitive processes.
- Technology Acceptance Model (TAM)
Field: Information Systems
Field: Behavioural and Cognitive Sciences
PhD Context: user-perceptions regarding usefulness and ease of use examined in the context of users’ ongoing adoption of specific on-line information retrieval behaviours.
- Information Seeking Behaviour (ISB)
Field: Behavioural and Cognitive Sciences
Field: Library Science
PhD Context: exploration of specific ISB impacts on user results to TAM and IQ-related self-perceptions of user-group search engine interaction.

1.2 The Phenomena of the Research

“what one wants to learn determines how one should go about learning it”
(Trauth, 2001).

Determining the key characteristics of the phenomena being investigated is one of the first steps towards developing a sound framework to guide the process of how the research will be approached.

The Characteristics of the Phenomena

A key task in identifying the boundaries of the investigation is a development of what amounts to a schema of the phenomena of the research. Such an activity involves identifying whether the major research “object” is:

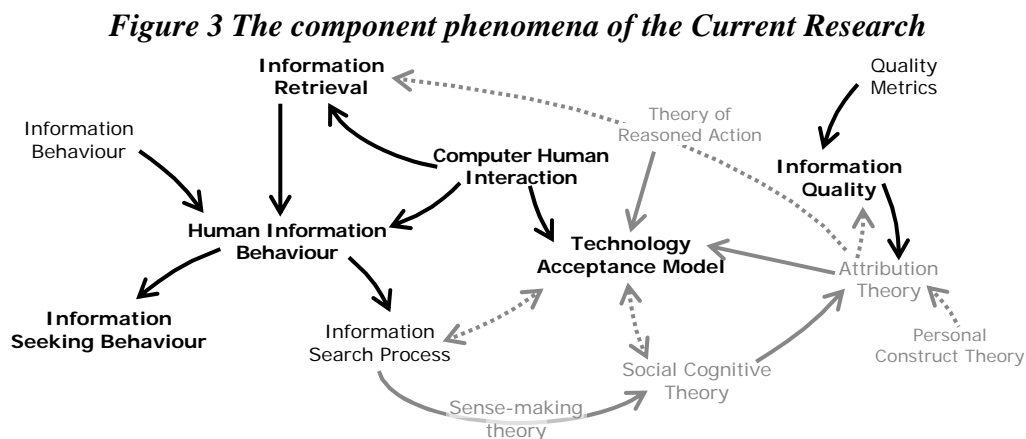
- 1.) One phenomenon possessing a range of characteristics;
- 2.) A set of phenomena possessing convergent characteristics; *or*

3.) A set of phenomena possessing divergent characteristics

In the current research: In simple terms, the current research was a broad investigation of high-end user IQ perceptions of Web-based content, and how those perceptions impact user information seeking behaviour. Developing a schema of the phenomena involved in the investigation revealed the “object” to be far more complex. In real terms, the phenomenon of “IQ perceptions” is manifest through the characteristics of several co-existing phenomena, including;

- Human-computer interaction (also, computer-human interaction).
- Information seeking behaviour (ISB) – inc; human information behaviour (HIB); information retrieval (IR); and information search process (ISP)
- Technology acceptance / technology adoption (TAM)
- Information quality perceptions; inc; quality metrics
- Social cognitive theories, inc; attribute theory, personal construct theory

Figure 3 illustrates a schematic representation of the various phenomena identified early in the current research. The complexity of the phenomena and the multiple relationships between the parts of the whole were found to be highly complex, and found to require a multi-discipline approach in regards to theory research and literature review.



Once the phenomena being investigated are identified, basic conceptual questions of them must be asked. Can a phenomenon be observed? Can it be quantified? Can it be defined? Can it be contextualised? The answers to these questions form the basis of the research problem to be investigated in the research, and help shape the actual *research questions* developed for the research project.

The growing understanding of the phenomena then, does two things:

- 1.) It *indirectly drives* the intangibles of the research, such as the research philosophy, as the researcher makes conceptual decisions about the nature of the phenomena, the nature of themselves, and the nature of the world.
- 2.) It *directly drives* the tangibles of the research, such as What is being measured? What type of data collection will reveal more about it?

The Research Questions

Conceptualising and articulating the research questions helps *focus the scope of the research* (Eisenhardt, 1989; Heinström, 2003; Kari, 2004), thereby helping the researcher to:

- 1.) Determine the key characteristics of the phenomenon to be investigated

- 2.) Identify key areas of academic literature needed to fully investigate the research problem;
- 3.) Identify discipline (or disciplines) context of the research, as well as areas of synergy across multiple disciplines;
- 4.) Determine a target user-population (where applicable);
- 5.) Identify the type of data to be collected.

In the current research: Determining the key characteristics of the phenomena to be investigated meant establishing the two contexts of enquiry. Firstly, given that unless a user knows the specific URL of target information, Web information retrieval (IR) most often occurs through search engine interaction, the *information context* was determined to be how users exhibit information quality (IQ) perceptions in their initial information search process during search engine interaction. The *behavioural context* then, was user information seeking behaviour (ISB) – or, more specifically, the information search process (ISP) component of ISB. Accordingly, questions such as “*what is information quality*” needed to be framed in the context of how users make decisions regarding the results to their search engine queries. Importantly, the emphasis of the inquiry was not search engine interaction per se, but information interaction in a search engine context.

The research questions of the current research are presented below. Like most over-arching research questions, each question both assumes certain truths and implies a number of sub-questions. All of these need to be recognised and examined in order for the research questions to be fully investigated.

RQ.1 – How do individual users apply common perceptions of information quality to make judgments about the information they retrieve from the World Wide Web?

RQ.1 assumes that:

- users have pre-existing perceptions of what constitutes information quality;
- users – either consciously or unconsciously – use their perceptions to make value judgments about the usefulness of information they wish to retrieve from the Web.

RQ.1 implies that;

- users can find quality information in a variety of information environments, but for various reasons have chosen the Web to apply their craft.

The sub-questions examined in order to fully investigate RQ.1 included:

RQ.1 (a): What is information quality?

RQ.1 (b): How do individual differences between users act as antecedents in the process of user determinations of information that is “fit-for-use”?

RQ.2 – How do “individual differences” impact on high-end users’ attitudes and perceptions regarding search engine effectiveness to retrieve high quality information?

RQ.2 assumes that:

- the target user-group will have a relatively sophisticated awareness of the cognitive processes involved with their information tasks and search engine interactions.
- there is a strong likelihood that at least some individual differences between users have an impact on the PU & PEoU constructs of the TAM.

The sub-questions of RQ.2 included:

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RQ.2 (a): *how do individual differences act as antecedents on user perceptions of their search and retrieval of information on the Web?*

RQ.2 (b): *how effective are the TAM's PU and PEOU constructs at "telling the story" of on-going search engine usage?*

Finally, a third research question addressing the exploratory nature of the investigation was posed.

RQ.3 – Can a framework be developed to model the processes of IQ perceptions in the context of IR, providing a more accurate lens through which to examine end-users individual difference?

1.3 The Researcher: Positioning the "self" – first considerations of philosophy

Trauth (2001) contends that the five major influencing factors on one's approach to any research include;

- 1.) The research problem;
- 2.) The researcher's theoretical lens;
- 3.) The characteristics of the phenomena;
- 4.) The researcher's skills;
- 5.) Academic politics.

Within the Contextual Constructs Methodology (CCM) framework, the research problem and characteristics of the phenomena are addressed in the "research" construct, and academic politics relate closely with the "research discipline". The factors which relate to the researcher as a "self" driven cognitive entity in their own right are what Trauth calls a researcher's "*theoretical lens*" and "*skills*". These are seen as having the final guiding influence on a research project's Point-of-View.

Fielden (2003) describes the involvement of a researcher's own influencing point-of-view as "inevitable". Inevitable because a researcher's own individual mind-set, biases, skills and knowledge become an intrinsic part of the research process (Janesick, 2000). To the "positivist" researcher, such a stance is unpalatable, given their pre-research supposition that a researcher must always remain neutral in the process of research collection, observation and analysis. A more robust discussion relating to positivist versus non-positivist epistemological² view-points is provided in the following section of this paper, suffice to state, that the argument here is not for or against a specific philosophical or methodological view of research. The point is simply that, as part of the "researchers' lens" and skill-set, these pre-suppositions are expected to influence the research point-of-view.

In relation to interpretivist research, which epistemologically recognises researcher bias, Krieger (1991) contends that the realisation of the "self" is, in fact, "*fundamental to qualitative research*". Olesen concurs, that the realisation of the self provides an additional resource upon which research results can be viewed or interpreted (Olesen, 2000).

The recognition that the researcher plays a significant role in the research process is not only a paradigm of the interpretivist school of thought. Pather & Remenyi (2004) observe that critical

² In simple terms, a researcher's epistemology is related to their perceptions of the world and the phenomenon they are studying. Epistemology will be addressed in greater detail in the *Research Philosophy* (section 2) of this paper.

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researchers too, “often conduct their research in the context of Marxism, feminism, corporate power structures anti-racism and anti-colonialism” (2004, p144), idealistic, constructed truths, that influence a researcher’s view of the world. Importantly, both critical realism and interpretivist views have originated out of a need to address and overcome some of the limitations associated with positivism (Hjørland, 1998; Wallace, 1998; Pather & Remenyi, 2004), recognising that information systems research problems often exist in a *social* context that numbers and rigorous statistical tests may not necessarily be able to measure effectively (Pather & Remenyi, 2004).

From a purely pragmatic point-of-view, critical and interpretivist researchers recognise that the researcher is part of the world being studied (Schostak, 2002), and that the act of the research investigation has the capacity to affect what is being researched, which, in turn, has the capacity to influence perceptions of the phenomena and therefore interpretation of results. On the other hand, the positivist attempts to remove their “self” from the study, and in so doing, makes a claim to a more “objective” research approach.

Trauth’s (2001) list of influencing identifies two affective researcher-driven qualities; (1) the researcher’s theoretical lens; and (2) the researcher’s skill. Schostak (2002) further states that the very act of researching can and does have an effect on these two qualities. As a researcher envelopes themselves in the theory and academic literature associated with their discipline and phenomena being studied, they can expect to become more knowledgeable and therefore continually adapt and refine their theoretical lens. The same can be said of a researcher’s skill. The act of researching; controlling research boundaries, developing data collection tools, collecting data, analysing the data, recognising limitations, and formulating conclusions have the accumulative affect of improving a researcher’s skill. *No researcher would expect to be in the same cognitive-space at the end of a research project than at the beginning.*

2. Philosophical Phase: *The Research Philosophy*

*“The alternative to philosophy is not no philosophy, but bad philosophy.
The ‘unphilosophical’ person has an unconscious philosophy, which they apply in
their practice - whether of science or politics or daily life” (Collier, 1994: p17).*

The way a researcher perceives the world, to a great extent, determines their philosophical assumptions about that world, which in turn are intrinsically connected to any underlying research epistemology (Myers, 1997). Epistemology refers to the assumptions one makes about one’s knowledge of reality and how one obtains and/or understands that knowledge. As researchers then, it is important to know what these assumptions are (Cecez-Kecmanovic, 2001; Stahl, 2005).

Collier’s (1994) contention that “no philosophy” is actually “bad philosophy” serves to remind the researcher that not being aware of their philosophical assumptions does not mean those assumptions do not exist. In the same way, an awareness of one’s philosophical assumptions does not give a researcher the licence to produce known-bias in their research. Instead, an awareness of underlying assumptions about the world should provide researchers with the tools by which they can recognise particular bias in the research, and therefore limit its influence on the validity of the research as a whole (Dey, 2002).

Research Purpose in Research Philosophy

Galliers (1992) proposes that choosing a research approach involves determining which approach

best suits either; (1) the “object” or phenomena to be studied; or (2) the goal of the research; that is; theory testing, theory building or theory extension. Dobson (2002) pushes this idea further however, suggesting it is two-dimensional to take an either/or view of research. Rather, determining a philosophy involves understanding *both* the object *and* the research purpose, and any relationship between them. The researcher would argue that the object, understood in the context of the research purpose, is in fact, a clear understanding of the phenomena to be studied. That is, the object/phenomena is understood to be a contextual entity, and the context provides at least part of the researcher’s understanding of their investigation. Figure 4 illustrates the traditional relationship between research purpose, underlying epistemology and the resultant methodologies.

Figure 4. Determining a the Purpose & Philosophy of the Research

Research Purpose	Underlying Epistemology	Resultant Methodologies			
Theory testing	Deductive reasoning	generalised ideas		→	specific observations
		Theory → Hypothesis	→	Observation → Confirmation	
Theory building	Inductive reasoning	specific observations		→	generalised ideas
		Observation → Pattern	→	Tentative hypothesis → Theory	

It should be stated however, that the categorising of the research purpose in terms of *theory testing* versus *theory building*, while extremely useful in helping a researcher identify their epistemological position, is considered by some authors (Kaplan & Duchon, 1988; Sonnenwald & Iivonen, 1999; Thurmond, 2001; Dooley, 2002; Onwuegbuzie & Leech, 2005; Krauss, 2005; Williamson, 2006; Presbury & Fitzgerald, 2006) to be limiting in that it locks the researcher into relying on only one research paradigm, or view of reality.

Deductive versus Inductive, or a combination of both?

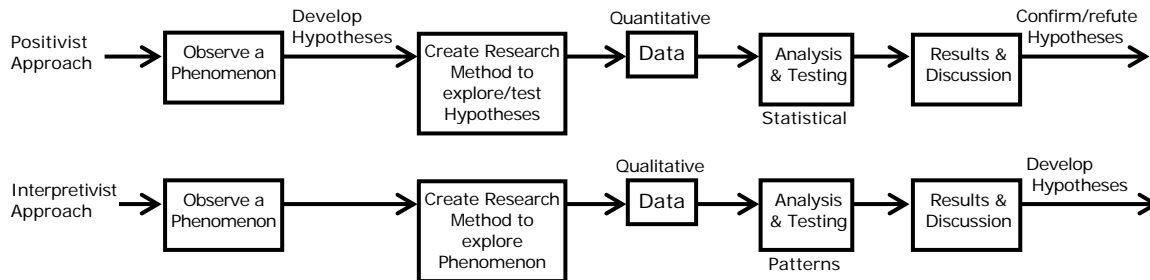
At an epistemological level, deductive (or positivist) researchers generally assume that reality is objective and can be described or measured using methods that are independent of the researcher (Myers, 1997). Alternatively, inductive (or interpretivist) research adopts the position that a researcher’s knowledge of reality is socially constructed and, since the enquirer uses their own preconceptions in order to guide the process of inquiry, the result is that value-free data actually cannot be obtained (Walsham, 1995). As stated previously, however, it is not always helpful to polarise the two approaches to such an extent (Onwuegbuzie & Teddlie, 2003).

Trochim contends “*all quantitative data is based upon qualitative judgments; and all qualitative data can be described and manipulated numerically*” (Trochim, 2002), a notion that has been embraced philosophically by *pluralism*, and methodologically by *triangulation*. Triangulation is the act of combining various methodologies from both positivist and interpretivist epistemologies (Amaratunga *et al.*, 2002; Modell, 2005). It was developed by researchers who believe that deductive and inductive research are not actually opposed, but rather simply focus on the different dimensions of the same phenomenon (Das, 1983; Mathison, 1998; Onwuegbuzie & Leech, 2005).

Using this frame of reference, Lee (1991) suggests that positivist and interpretivist approaches are neither opposed, nor irreconcilable. Figure 5 illustrates that at the most basic fundamental level, both approaches are driven by a need to scientifically understand or explain observed phenomena, which motivates a scientific enquiry of that phenomena. A positivist approach to research is said to begin with a hypothesis, that is; a possible explanation for the observed

phenomena; which leads to the researcher adopting a methodology designed to test if the hypothesis is true. An interpretivist approach, by comparison, begins with the researcher adopting a methodology designed to more closely observe and analyse the phenomena and develop possible explanations regarding its characteristics. So, *Methodological pluralism* embraces both quantitative/deductive and qualitative/inductive research approaches by supposing that both approaches have degrees of the other inherent within them (Amaratunga *et al.*, 2002).

Figure 5. The fundamental elements of Research



The argument for mixing research approaches however is countered by writers such as Orlikowski and Baroudi (2005), who believe that triangulation of methodologies is simply not possible. For the interpretivist researcher: “*There is no sense in which the interpretive perspective can accommodate positivistic beliefs. Interpretive research is seen to be based on philosophical assumptions which are essentially different from those of the positivist perspective*” (Orlikowski & Baroudi, 1991 p.16). And, for the positivist researcher: there remains what Hume (cited in Rosenberg, 1993) called “*the problem with induction*”, described in terms of a research assumption of the “uniformity of nature”. That is; an assumption that “the future will be like the past” (Wood, 2000). Given that inductive research epistemologically accepts the view that the world is not necessarily uniform, there remains – at least in the view of the positivist – an irreconcilable chasm between interpretivist research and the process of inductive scientific inquiry, which assumes basic uniformities within the natural world.

Critical Realism

As a growing paradigm within the IS field of research, critical realism, like triangulation, embraces the concept of methodological pluralism (Landry & Banville, 1992), but it does so at a philosophical level by drawing its epistemology from such schools of thought as positivism, interpretivism and critical research.

Critical researchers believe that bias is an inherent characteristic of humans, and – given that research is conducted by humans – that all research is to some degree biased (Pather & Remenyi, 2004). In this respect, it could be argued that critical realism is an interpretive approach to research, except that for the realist, reality itself is not just a social construct (as an interpretivist would believe) since it is able to pre-exist the social analysis of it (Dobson, 2002). Therefore, for the critical realist, only the knowledge of reality is inherently subjective, reality itself remains relatively objective and unchanging. This belief – that there exists a natural uniformity to ‘reality’ outside of the researcher’s contextual interpretation of it – allows the critical researcher to better address Hume’s “*problem with induction*” by assuming a degree of scientific predictability in the phenomena being investigated. In this way, critical realism, as a research philosophy, more or less requires a pluralistic approach to its adopted methodology in that it embraces both the absolutes of positivism and the recognised bias of interpretivism.

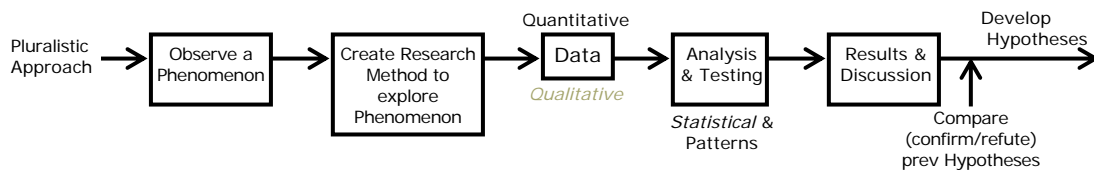
In the current research: The broad phenomenon being investigated was user perceptions of information quality in the context of their web information retrieval behaviours. Using a critical realist framework allowed the researcher to realise that understanding the phenomenon actually involved measuring three phenomena, two of which were assumed to exist. The phenomenon of user IQ perceptions assumes that;

- 1.) Users who are looking for information on the Web already have a pre-conceived perception of information quality; and
- 2.) Users utilise their perceptions of IQ to find and retrieve relevant information.

In this way, it was recognised that it was being assumed that the phenomenon of IQ perceptions were manifest in users' information seeking and retrieval behaviours, and that the relationship between the perceptions and behaviours was relatively stable.

Figure 6 illustrates how the current research, in engaging a critical realist philosophy, adopted a pluralistic approach to investigating user perceptions of information quality in the context of information retrieval. The complex, multi-dimensional nature of the phenomena was studied using a multi-dimensional investigation that engaged analytical methods commonly associated with qualitative research to explore quantitative, statistical data.

Figure 6. Critical Realism (Pluralistic) approach for the Current Research



The current researcher perceived that critical realism, and in-turn the use of a pluralistic approach made available to the research a rich tapestry of research methods and tools that may otherwise not be available if the researcher took an absolute positivist or absolute interpretivist approach. Where a positivist could aim for replicability and generalisability, and the interpretivist could enhance the in-depth understanding of a phenomenon, the mixed approach of the current research provided methods for the researcher to achieve both outcomes (Mingers, 2001a; 2001b).

How research philosophy facilitates research methodology

Research philosophy encompasses the epistemological assumptions of the research and the researcher. It differs from actual methodology in that it provides the foundation for the methods or strategies by which a researcher will investigate phenomena. The literature investigating research approaches and methodologies in the field of information systems can, at times, cause a degree of confusion, given the various uses of value-laden words to describe such elements as “approach”, “methods”, and “strategies”. For the purpose of clarity, the current research describes *research approach* as a high-level function that encompasses the epistemology and philosophy. The *methodology* then, is the actual strategies employed to develop the tools for data collection, the practical workings of which are governed by the *research design*. The research design, seen as the blueprint for the delivery of data collection tools and interaction with the user-group, will be discussed in detail in the following section.

The ultimate role of the research philosophy then, is to;

- 1.) Establish the researcher's epistemological stance, and

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- 2.) Provide a foundation for the choice of which established research methodologies within the research field can be used for data collection and analysis.

Strictly speaking, epistemology and philosophy are also different entities, in that the philosophical view point drives the epistemological justification for the methods of investigation (methodology) to be chosen. A pluralistic epistemology, for example, can technically be the result of either an interpretivist or critical realist philosophy, which then facilitates the use of either/or/both quantitative and qualitative methods of data collection and analysis. To add to the complexity of the language of research methodology, a quantitative or qualitative “approach” is not the same as a quantitative or qualitative “method”. The approach merely establishes the research parameters within which associated methods can be used. For example, a qualitative approach can use both quantitative and qualitative methods of data collection. The analysis of the data however, will most likely be *inductive* or *critical* in its epistemology, hence why it is called a qualitative investigation.

In simple language then, determining the philosophical approach helps the researcher further develop their “theoretical lens”, and facilitates the choosing of appropriate methodologies with which to investigate the research phenomena.

3. Methodological Phase: *The Research Methodology*

At an operational level, a research methodology refers to the procedural framework within which the research is conducted (Remenyi *et al.*, 1998). It is the use of specific methods to:

- 1.) Gather adequate and representative evidence of phenomena (Buckley *et al.*, 1976);
- 2.) Develop appropriate ways to analyse collected data (Fielden, 2003); and
- 3.) Demonstrate the validity or reasonableness of any findings or conclusions (Amaratunga *et al.*, 2002).

Methodology & Validity

The concept, and necessity, of validity is central to all research. It is the quality by which research can be judged as valid, reliable, and – where appropriate – generalisable. There are four possible levels of validity that a researcher may wish to establish (Pandit, 1996; Dooley, 2002; Rowley, 2002):

- 1.) *Construct validity* – is established through the correct design and use of data collection tools for the specific concepts being studied. This is particularly important when a researcher chooses to construct additional or secondary data from the primary data (Slater & Atuahene-Gima, 2004), such as clustered results to create new data-sets as part of their analysis.
- 2.) *Internal validity* – is required if the researcher wishes to demonstrate any relationships between parts of the phenomena
- 3.) *External validity* – is required if a researcher wishes to establish a level of generalisability regarding the findings of their research.
- 4.) *Reliability* – is established by using a credible and consistent line of enquiry and data collection. That is; that the use of the same data-collection would produce the same results in a similar setting.

Generally speaking, validity is established through the use of correct research methodology, and is intrinsically linked to *research design*. Data collection, as well as the analytical methods used

to examine the data collected, must be delivered in such a way that the results do not exhibit inconsistencies because of design limitations or variables.

It should be noted, that not all levels of validity are achievable, or necessary, for all research. For example, research that is not trying to establish a relationship between any of the phenomena being studied does not necessarily require internal validity. In the same way, a highly interpretive case study that is seen by the researcher as a “one-off” – and therefore not requiring of the findings to be generalisable – does not necessarily require external validity. Construct validity however, is essential to all research, if the findings are to be considered valid and reliable, even within their own unique context.

Methodologies for Data Collection, Collation & Analysis

There is an abundance of data collection, collation and analysis methodologies and strategies available to researchers. Some suit specific philosophical approaches better than others, but many can be used, albeit in a different way, with any research purpose. Moreover, some approaches allow, or even require, multiple methodologies to be applied. The guiding principle should always be to ensure that the research data retains its expressed validity to the research project (Rowley, 2002).

Table 1 presents a list of some of the common research methodologies which a researcher might consider when undertaking a scientific study. Included also is a description of the method, the types of data analysis strategies often associated with the method, and the typical research purpose and philosophical approach.

Table 1. Common Research Methodologies in the Informing Sciences

Method/Strategy	Description	Associated data analysis strategies	Type of research Q's addressed	Disciplines (commonly found, but not limited to)	Typical Philosophical approach	Typical Research Purpose
Action Research	Research that involves a reflective process, usually leading up to problem solving. Most often involves the researcher intimately in the research data collection and analysis.	<ul style="list-style-type: none"> • Constructivism • Observation • Contextual Analysis 		<ul style="list-style-type: none"> • Social Sciences • Business • Health Sciences 	Inductive	Theory building
Archival Analysis	Research which uses existing records and data	<ul style="list-style-type: none"> • Exploratory • Data Analysis • Content Analysis 	Who, what , where, how many, how much*	<ul style="list-style-type: none"> • Business studies • Information Sciences/Systems • Library Science 	Deductive or Inductive	Theory testing or building
Case Study (type 1)	Research usually involving a single phenomenon, or single context	<ul style="list-style-type: none"> • Interviews • Structural Equation Modeling 	How, Why*	<ul style="list-style-type: none"> • Social Sciences • Business studies • Information Sciences/Systems 	Deductive	Theory testing
Case Study (type 2)	In depth, contextually driven research, involving a single phenomenon, or single context.	<ul style="list-style-type: none"> • Interviews • Field notes 	How, Why*	<ul style="list-style-type: none"> • Social Sciences • Business studies • Information Sciences/Systems 	Inductive	Theory building
Case Studies (Multiple)	In depth, contextually driven research, involving comparisons of single phenomena.	<ul style="list-style-type: none"> • Interviews • Surveys 	How, Why*	<ul style="list-style-type: none"> • Social Sciences • Business studies • Information Sciences/Systems 	Inductive	Theory building
Conceptual Analysis	method in which phenomena are systematically examined & grouped or classified into existing or constructed categories	<ul style="list-style-type: none"> • Data Analysis • Systemics • Concept modeling 	What, how	<ul style="list-style-type: none"> • Comp. Sciences • Information Sciences/Systems • Business studies 	Inductive	Theory building

Table 1. Common Research Methodologies in the Informing Sciences (cont...)

Method/Strategy	Description	Associated data collection & analysis strategies	Type of research Q's addressed	Disciplines (commonly found, but not limited to)	Typical Philosophical approach	Typical Research Purpose
Content Analysis	method in which content of communication is studied, and used to make inferences about the antecedents and/or effects of communication	<ul style="list-style-type: none"> • Hermeneutics • Semiotics • Grounded Theory 	What to whom; to what extent, with what effect *-*	<ul style="list-style-type: none"> • Social sciences • Cognitive sciences • Communication studies 	Inductive	Theory building
Data Analysis	process of examining and summarising data with the intent to extract useful information & develop conclusions	<ul style="list-style-type: none"> • Data mining • Analytics 		<ul style="list-style-type: none"> • Business Studies • Computer Science 	Deductive or Inductive	Theory testing or building
Discourse Analysis	analysing written, spoken or signed language use	<ul style="list-style-type: none"> • Systemics • Semiotics • Hermeneutics 		<ul style="list-style-type: none"> • linguistics • Communication & Cultural studies • Anthropology • Social sciences 	Inductive	Theory building
Ethnography	Research method designed to help understand phenomena in the social and cultural contexts in which it exists.	<ul style="list-style-type: none"> • Constructivism • Relativism • Grounded Theory 	What, how, why	<ul style="list-style-type: none"> • Cultural & Social anthropology • Cultural studies 	Inductive	Theory building
Experiment	Research in simulated environment that manipulates controls, variables & subjects	<ul style="list-style-type: none"> • Transcript Analysis • Factor Analysis 	How, Why*		Deductive	Theory testing
Exploratory Research	Research which can be used when a research problem has not yet been clearly defined	<ul style="list-style-type: none"> • Constructivism • Grounded Theory 		<ul style="list-style-type: none"> • Social Sciences • Business Studies 	Inductive	Theory building
Field Study	non-experimental studies investigating processes or phenomenon in natural systems	<ul style="list-style-type: none"> • Surveys • Clinical Trial • Interview 		<ul style="list-style-type: none"> • Natural Sciences 	Inductive	Theory building
Literature Review/analysis	Research which critiques, analyses & extends existing literature to build new frameworks/models	<ul style="list-style-type: none"> • Discourse analysis • 		<ul style="list-style-type: none"> • All disciplines • 	Inductive	Theory building
Meta-analysis	Research which statistically combines the results of several studies which address a set of related research hypotheses	<ul style="list-style-type: none"> • Statistical Analysis • 		<ul style="list-style-type: none"> • All disciplines 	Deductive	Theory testing
Observation	Research involving the systematic (usually first-hand) study of phenomena.	<ul style="list-style-type: none"> • Field notes • • 		<ul style="list-style-type: none"> • All disciplines 	Deductive or Inductive	Theory testing or building
Participant (self) Observation	Research involving the users' first-hand perceptions and/or accounts of phenomena	<ul style="list-style-type: none"> • Surveys • 		<ul style="list-style-type: none"> • Social Sciences • Business Studies • Marketing 	Inductive	Theory building
Protocol Analysis	Research involving the study of user verbal reports of thought sequences	<ul style="list-style-type: none"> • Behavior analysis • User Surveys • Interviews • Usability Testing 		<ul style="list-style-type: none"> • Cognitive Science & psychology • Educational psychology 	Inductive	Theory building
Survey/ Questionnaire	Research which uses predefined or structured questionnaires to obtain consistent data from many users	<ul style="list-style-type: none"> • Surveys • • 	Who, what, where, how many, how much*	<ul style="list-style-type: none"> • Social science • Marketing 	Deductive	Theory testing

Types of Research Q's addressed * (Rowley, 2002) *-* (Holsti, 1969)

The Current Research: Data Collection ~ indirect observation

“When one’s concern is the experience of people, the way that they think, feel and act, the most truthful, reliable, complete and simple way of getting information is to share their experience” (Waddington, 1994)

The phenomena being investigated were determined to be interactive human behaviours, encompassing both social and cognitive processes. For this reason, the principles inherent in

observation research methods (Baker, 2006) were seen as an important tool in understanding the user-group's information behaviour.

There is much evidence within the field of library information science to suggest the best way to understand a behaviour is to observe it (Bailey *et al.*, 1998; Anderson, 2001; Lin, 2001; Huang, 2003; Strang, 2007; Xu & Liu, 2007). This presented the current research with two dilemmas. Firstly, the phenomena being investigated, IQ perceptions, cannot be directly observed in its own right, it is merely implied by the information behaviour of the user. Essentially, perceptions of IQ are a cognitive process that motivate and facilitate specific information retrieval behaviours in the user. To overcome this problem, the research became survey based, with users being asked to describe their perceptions as well as their various information retrieval strategies and behaviours in considered contexts. While this opened the research to a potentially larger user-group representation, it also led to the second dilemma of the research, that no direct physical observation of the user behaviour could take place. Instead, it would need to be *indirect* observation through users' own self-evaluation.

Self-evaluation was chosen over transaction-log analysis (TLA) as the method of indirect observation for the simple reason that while TLA generates large amounts of information regarding the pathways of user behaviours, it is rarely able to facilitate the researcher developing an understanding of *why* the user chose specific query results over another. Why did the user refine their search? Why did the user change from a *keyword* search to a *phrase* search? Was it to confirm, refine, or change their query? Was it an indication that the user recognised their original keywords were ineffective, or did the results to their initial query trigger a thought regarding a different way to find the target information?

Web (self-serve) Surveys: Given that the target user-group were high-end³ users who engage Web search engines to retrieve high-quality information, it was decided that an appropriate mode of delivery for the surveys and questionnaires was the Web itself. A domain name was registered (www.informationqualityonline.com) and used as the delivery space for interaction with the user-group.

Survey Typology: Users were required to register to participate, with the registration form containing questions relating to the demographic make up of each applicant. If an applicant met the criteria for user-group inclusion, they were considered a participant and sent the URL for the first survey. A total of 140 questions were asked of each participant, distributed across one registration and four survey forms. Questions fell into four avenues of enquiry;

- 1.) Demographic data (registration form) – 23 questions
- 2.) TAM-type perceptions of
 - Information retrieval using Web-based search engines – 12 questions
 - Retrieving high quality information from the World Wide Web – 12 questions
- 3.) Information Seeking Behaviours (ISB) and search engine IR strategies – 16 questions
- 4.) Perceptions of information quality (IQ) – 77 questions

Participants had to complete all four surveys for their data to be considered usable. A total of 80 participants completed all four surveys, resulting in 11,200 pieces of data to analyse.

³ The term “high-end” is used to describe the typical *informatic* behaviour of the user-group, with the target group being on-staff academics (lecturers and researchers) and post-graduate (PhD and Masters) level students who regularly engage the Web to search for and retrieve high-quality information

The Current Research: Data Analysis

The data-collection strategies discussed in the previous section could easily fit into a deductive research project, however a significant shift in methods took place in the data-analysis phase of the research. It was at this stage that the research became inductive in focus, adopting strategies most often associated with explorative (Onwuegbuzie & Leech, 2005), multiple case-study (Zach, 2006), and constructivist research. An Inductive approach to data analysis was chosen specifically because it would provide a framework by which the user results could be explored in new and innovative ways.

Strategies associated with Glaser & Strauss (1967) and Strauss & Corbin's (1994) *Grounded Theory*; McClintock *et al. Case Cluster Method* (1979); Eisenhardt's *Theory Building* (1989); Charmaz's *Constructivist Grounded Theory* (2000); Yin's *Multiple Case Studies* (1981); and Denzin's *Triangulation* (1970, 1978) methods were examined for commonalities and appropriateness of application to the current research.

The purpose of examining the body of inductive methods was not to find a single methodology with which to guide the data analysis phase of the current research, but to provide a theoretical backdrop by which the researcher could develop a novel, yet theoretically robust, framework for data analysis.

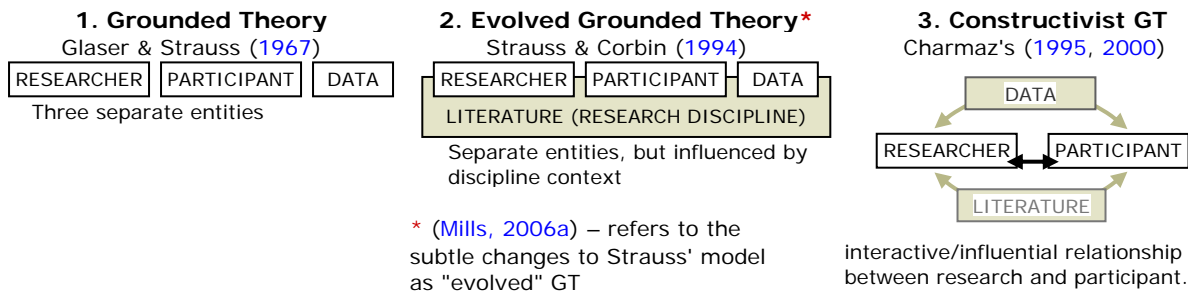
Grounded Theory (GT): The three basic constructs of Grounded Theory (GT) are (1) concepts; (2) categories; and (3) propositions (Pandit, 1996). Strategically, a researcher adopting this methodology is required to name (or label) and categorise the various concepts encountered during the GT-driven investigation, which is divided into five phases; (1) Research design; (2) Data collection; (3) Data ordering; (4) Data analysis; and (5) Literature comparison. The process of naming and categorising data into concepts, which takes place largely in phases three and four, is said to aid the researcher to develop novel ways of looking at the data, and thus facilitate theory building. Mills *et al.* (2006a; 2006b) describe the associated strategies of data handling in GT research in terms of a "constant comparison" methodology.

The paradox of GT lies in its rejection of the positivist and critical researcher view of a "pre-existing reality/truth", yet it embraces the idea that the GT researcher can design data-collection and analyse data results from an absolutely objective non-biased viewpoint – and in fact, must do so. These two positions seem to contradict each other, particularly in light of the fact that the GT researcher must conceptualise the research data into logical categories of research exploration. An act that immediately imposes onto the data, the researcher's (subjective) perceptions of the concepts buried in the data. This paradox is addressed by Charmaz's (2000) introduction of *constructivism* to the GT paradigm.

Constructivism: Constructivism is concerned with the ways in which people construct meaning (Williamson, 2006). As an applied methodology, it is less formalised than GT in the sense that there is no one set mode of operation per se. What the constructivist researcher does recognise however, is that whichever methods are used to conceptualise, group, name or categorise sets of research data, are *imposed constructs*, birthed from within the researcher's own perceptions and cognitive engagement with the world. Given that the goal of both the constructivist and GT researcher is to generate meaning from data, a merging of the strategies involved in the two research frameworks is not all together surprising. The major differences however, lies in their principal philosophical view regarding how people (including researchers) find and construct meaning.

Constructivist Grounded Theory: Where GT postulated that a researcher could (and, in fact, should) approach data with a clean slate, free from any cognitive pre-conceptions, constructivist-GT proposes that pre-conceptions need to be acknowledged, and even embraced. Concerning the relatively recent fusion of constructivism into the GT paradigm, Mills *et al.* (2006a) contend that although Charmaz has “emerged as a leading proponent of constructivist grounded theory” (2006a, p6) the progress of constructivist typology within GT has been an evolutionary one – with writers like Strauss and Corbin (1994) increasingly recognising the iterative role of a GT researcher’s pre-conceptions, most often influenced by their associated discipline’s thinking. The evolution of GT from the ridged model of Glaser & Strauss (1967), through to Charmaz’s (1995, 2000) blend of constructivist and GT thinking is illustrated in figure 7.

Figure 7 Evolution of Grounded Theory



Because of the acknowledged influences on the researcher’s conceptual lens, constructivist-GT is able to do what GT could not do, that is; interact at a far deeper level with the source of the data to be analysed. In so doing, constructivist-GT “overtly reshapes the interactive relationship between researcher and participants in the research process” (Mills, 2006b) and emphasises a co-construction in the development of meaning through data analysis. Far from being a way to avoid confronting researcher bias, *constructivism serves to build a reciprocal relationship between the researcher and participant* with the goal of developing a stronger contextual view of the data, rather than the GT researcher’s own view.

The over-arching problem with this approach however, is that it assumes the “participant point-of-view”, or the “participant/researcher relationship” are the best and most appropriate view-point from which to examine user results. Where GT may expect too much of the “data” – the emphasis of constant-comparison being data versus data with some suggesting a researcher need not have understood the bulk of associated literature at the time of analysis; constructivist GT may expect too much of the research/participant relationship. The current researcher holds the view that ultimately, participants are as prone to bias as any researcher, and a too-close relationship between the researcher and participant has the potential to skew user results.

A Multi-method Contextual Construct Approach:

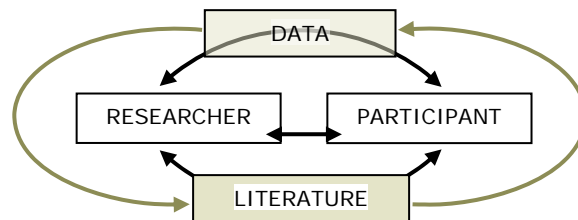
The researcher proposes a multi-method approach that utilises the *constant-comparison* strategies of GT and constructivist GT, identifying and comparing data and data patterns, without becoming bogged down in only one epistemology or view of the world and how people find and construct meaning. The value in such an approach is that it allows the research to develop data analysis strategies that recognise and utilise:

- 1.) Data versus data (constant comparison) analysis (GT);

- 2.) The social context of the researcher, participant and phenomenon being investigated. This is particularly important given that;
- i. the researcher is affiliated with the “target” user-group
 - ii. perceptions of IQ have a strong “contextual” value
 - iii. information behaviour is often described as a “social” phenomenon.
- 3.) The existent literature and theory already developed regarding the phenomenon being investigated.

The third point, regarding the role of existent theory associated with the phenomenon (in this case information quality and human information behaviour), is particularly important given that it is not emphasised in either GT or constructivist GT as part of an evolving research lens, through which the researcher builds their growing understanding of the phenomenon. Figure 8 illustrates this multi-methods contextual approach to data analysis, showing the relationship between the literature and data somewhat neglected in the previous models.

Figure 8. A (Multi-method) Contextual Construct Method for Data Analysis



The Contextual Construct Method for data analysis was used to develop the design of the data classification structures of some 11,200 pieces of user data.

4. Design/Implementation Phase: *The Research Design*

The previous section introduced the contextual construct method used in the current research to help the researcher develop a valid and rigorous approach to the methodology-related aspects of the research project. Methodologies relevant to survey-driven data collection and inductive data-collation and analysis were presented and discussed in the context of how they applied to the current research.

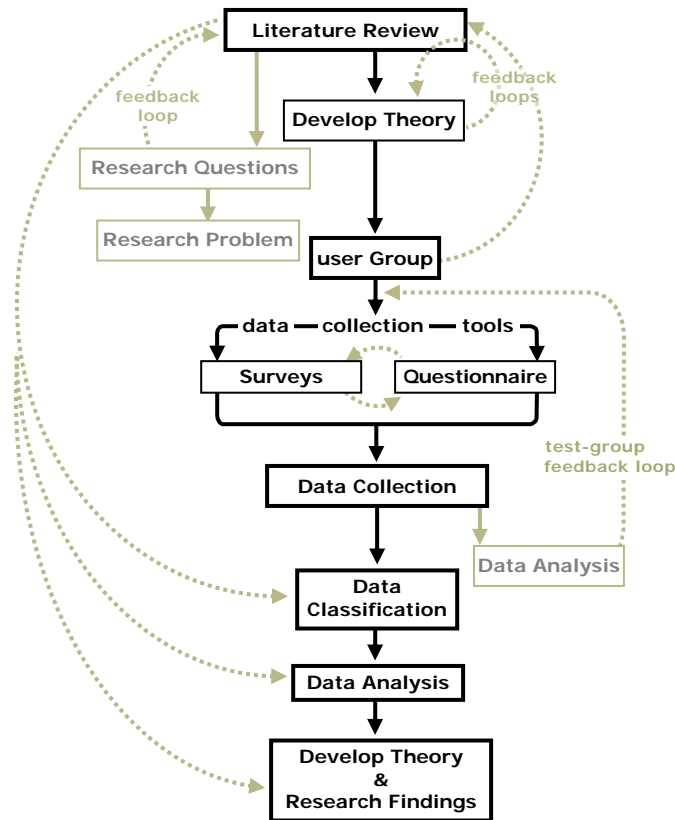
The general development of the research design, as with much of the research, was seen as a contextually-driven, iterative process. The first step was to identify the various research tasks involved in the research, and to develop a blue-print of how they would happen. This was done by mapping out each task in the context of their relationship to other tasks. Figure 9 illustrates how this worked.

It should be stated first and foremost, that the research design was seen as an iterative/cyclical process. For example, the initial literature review led to two things. Firstly, it led to the researcher beginning the process of thinking about the driving paradigms and theories associated with the research, that is; the researcher began to develop a theoretical lens through which to examine the research. Secondly, it led to the identification and development of the research questions. Both the growing theoretical lens and research questions facilitated feedback loops back to the literature review task(s), because their development broadened or focused the review in specific ways. The greater theoretical understanding gained through this process then led to

further refinement of the research questions and developing theory.

The process of task completion then, occurred in both a linear and cyclical fashion. For example, the data collection task could not logically occur before data collection tools (i.e.; surveys and/or questionnaires) were in place. The researcher was careful however, to map out into the design framework any opportunity for an iterative feedback look, that would allow tasks to be revisited and constructs to be improved. Importantly, as figure 9 demonstrates, literature review became the central revisited task in all stages of the research's lifecycle, reinforcing the inclusion of "literature" in the contextual constructs method (figure 8).

Figure 9. A Holistic (Cyclical) Approach to Research Tasks, demonstrating the contextual construct methods (fig 8) of the Contextual Constructs Model (fig 1)



Contribution & Limitations

Contribution

A first for Information Science/Systems

The Contextual Constructs Model (figure 1) and its associated contextual construct method (figure 8) represent one of the first pragmatic research methodologies to emerge from the field of information systems/science. That it is a deviation from the more common deductive-driven research associated with the discipline may cause some researchers' concern, as will its mixing of methodological approaches. This, however, should not deter IS researchers from pushing the discipline, methodologically speaking, into new uncharted waters.

At a time when the information systems discipline is going through what its leading authors'

have described as an “*identity crisis*” (Benbasat & Zmud, 2003) there has never been a greater need for IS researchers to consider their methodological options. Benbasat & Zmud contend the ever increasingly “eclectic” nature of both the practice and study of IS calls for multiple paradigms and approaches when researching IS.

Innovative in “Systemics” Application

As emergent interdisciplinary fields such as systemics and cybernetics, and significant new developments in the epistemological framing (Olsson, 2004) of systems theory begin to filter through to IS related disciplines, the CCM offers a systems-driven approach to developing research methodology and design.

Limitations

The researcher acknowledges that the Contextual Constructs Model is still relatively young in its research life. The result is that its self-justifying argument is still comparatively unsophisticated and requires more thought and application in order to build itself into a cohesive, theoretically sustainable research methodology.

Secondly, the researcher acknowledges that much of the detail of the CCM in the context of the current research, such as specific data analysis strategies and such have not been discussed. The purpose of the paper however – given the space limitations – is to, at the very least, introduce the over-riding Contextual Constructs Model and its associated contextual constructs method.

Conclusion

The purpose of this paper was to present the beginnings of a novel framework/model developed for the PhD dissertation “*The impact of user perceptions of information quality on World Wide Web information retrieval behaviour*”. Presented is the core elements of the model which allows a researcher to consider such elements as their research; (1) Point-of-view; (2) Philosophy; (3) Methodology; and (4) Design.

The discussion of the model has been facilitated with some narrative driven examples of how the model specifically worked in the current research. The specific version of the model presented is an example of inductive (or interpretivist) analysis of positivist-type data, however the researcher contends that the framework – which exists as a guiding framework for developing philosophy and methodology – can be applied to research of any epistemological persuasion.

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