UNIVERSITY OF SOUTHERN QUEENSLAND

ASSESSING THE EFFECTIVENESS OF THE DIFFERENT LEVELS OF INSTRUCTIONAL STRATEGIES (DLISt7) FOR ONLINE LEARNING BY UNDERGRADUATE STUDENTS FROM THE UNIVERSITY OF SOUTHERN QUEENSLAND (USQ), AUSTRALIA

A Dissertation submitted by

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ABSTRACT

Based on Chickering and Gamson's (1987) Seven Principles for Good Practice, the purpose of this research project was to attempt to revitalize the principles by amalgamating them with Merrill's (2006) Different Levels of Instructional Strategy. The primary aim was to develop an instrument for DLISt7 and obtain data that could facilitate its validation and standardization using a pretest-posttest Internet quasi-experimental research design. The proposed measure could then be put forward for use either as a rubric for facilitating the extrinsic implementation of DLISt7, or as a set of unobtrusive diagnostic indicators for assessing the quality of learning intrinsically experienced by students in blended and online courses. The study was conducted across five faculties at a regional Australian multi-campus university. The intent was to contribute to new knowledge by utilizing the data collected to generate awareness about the likelihood of thrusting into practice varying levels of instructional strategies for communicating expectations and relaying information in view of improving the instructional design of future online courses. The idea was to produce a tool that could create more opportunities for more of the principles to be put to good use as an effectiveness multiplier. The critical insight that can be extended to educational administrators, teaching staff and instructional designers is the importance of making good use of whatever was made available, while remaining autonomously eclectic when deciding the discretionary balance between utilizing asynchronous or synchronous communication technology and online resources for blended and online courses.

CERTIFICATION OF DISSERTATION

The work submitted in this dissertation is original, except as acknowledged in the text. The material herein has not been submitted, either in whole or in part, for any other award at this or any other university except where acknowledged.

________________________________	12th July 2013
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INTRODUCTION

1.1 Introducing the Research

Over the past century, the world that we live in has changed dramatically and rapidly. In the same way discoveries and inventions fuelled the Industrial Revolution mechanizing human society, technology has been credited as the catalyst for modernizing the way we do things. That is to say, the invention of the microprocessor that is used in today's personal computer (PC) was reasoned to be the protagonist (Gates, Myhrvold & Rinearson, 1995). Naisbitt (1984) had earlier anticipated that innovative directions and applications would in due course be developed from the technology itself. Take for example, the way in which the Internet as a means of access to computer mediated engagement and interaction has over the years interwoven itself into the fabric of modern society enabling the multiplicative threads of its many users to be seen, heard and saved (Covey, 2004).

The growth, development and subsequent maturation of computers in the field of education began in earnest sometime during the 1960's when computers took up entire floors of buildings and were astronomically expensive (Skinner, 1968). But by the summer of 1972 when Intel announced the release of its 8008 microprocessor chip, which was closely followed by the release of the 8080 chip in the spring of 1974, the microprocessor revolution had inadvertently been triggered (Gates et al., 1995). Roughly three decades after the introduction of the first pocket calculator, desktop computers, laptops, palmtops, smart phones and tablets like the iPad, or the

Galaxy Tab, have become much more affordable. Such tools have also become resources utilized on a daily basis by the modern "Information/Knowledge Worker" (Covey, 2004, p. 6).

In 1969, ARPANET (Advanced Research Project Agency Network) was developed by military research institutions and universities because of the need to exchange computerized research data (Gates et al., 1995). By the 1980's, the National Science Foundation had connected its five supercomputing centres using a specially created network called NSFNET (National Science Foundation Network). This network is the foundation for what was to later become the Internet (Tretter, 1995). Nevertheless, during the early 1990's only a few hundred computers were connected to the Internet because of the not so friendly nature of early web browsers that were complicated and overly reliant on text-menu interfaces (Tretter, 1995). However by 1993, when Marc Andreessen and Eric J. Bina at the National Centre for Supercomputing Applications (NCSA) released MOSAIC, recognized as the first popular point-and-click web browser with a graphical user interface (GUI) that made it trouble-free and osmotic to surf the World Wide Web (WWW), nothing would ever be the same again (McCain & Jukes, 2001).

The impact of the PC, and more importantly the connectivity afforded by the Internet on our daily lives, has been without a doubt significant. The bold claim made by the American Institute for Higher Education Policy that not since the invention of the printing press, ostensibly by Johann Gutenberg in the 15th century, has an invention had the potential to dramatically change how people share information, communicate and interact with one another is to a certain extent substantiated (Bullen, 2001). Although for the record, in a Discovery Channel program it was pointed out that the first printing press was actually invented by the

Chinese in the 8th century whereas Gutenberg's printing press only arrived some 700 years later (What the Ancients Knew, 2006). It was around 1450 when Gutenberg, "a goldsmith from Mainz, Germany, invented movable type and introduced the first printing press to Europe (China and Korea already had presses)" (Gates et al., 1995, p. 8).

The reality of the situation is, the PC and Internet are tools that have the potential to become Information Age learning and teaching resources analogous to how the invention of paper and the subsequent arrival of books became the medium of choice that improved the way humans were able to store and impart knowledge (see e.g., Lever-Duffy, McDonald & Mizell, 2003; Shneiderman, 1998). Take for example this excerpt from a letter written by a father to his son dated 1800 B.C. which was discovered intact in the dry sands of Egypt. In his letter, the father had asked his son to "go to school, stand before your teacher, recite your assignment, open your schoolbag, write your tablet, let the teacher's assistant write your new lesson for you....Don't stand about in the public square....Be humble and show fear before your superiors" (Dworetzky, 1987, p. 4).

Who could have imagined that from an economy based on agriculture, the future of modern society would be that of "an economy built on information" (Naisbitt, 1984, p. 1)? The swing, from being an agricultural to industrial, and most recently an information society, has caused centralized structures such as education, to become decentralized resulting in the need to adjust so as to become a more balanced and diverse society (Naisbitt, 1984, p. 103).

The point is, despite the prevailing trend of blended and online learning in higher education, research efforts into web-based learning and teaching methodology have often revealed diffused and contradictory results that have "failed to break much new pedagogical ground" (Hannafin & Kim, 2003, p. 347). In actuality, it has been quite a while since predictions were first made about the possibility of paradigm shifts in the way educators would conceptualize and deliver education to learners. This is because, as the world's population continues to grow, "a far greater part of them want an education" for which "the demand cannot be met simply by building more schools and training more teachers" (Skinner, 1968, p. 29).

Instead, "education must become more efficient. To this end curricula must be revised and simplified, and text-books and classroom techniques improved" upon using the latest available technology (Skinner, 1968, p. 29). Thus, it is proposed that in order for "the science of learning and the art teaching" (Skinner, 1968, p. 22) to be more effective in blended or online environments, the eclectic selection of appropriate pedagogy should consider the systematic use of conscientious and contextual engagement. Teachers for instance, can help students "in every way short of teaching them" by communicating new approaches about the acquisition of knowledge not to mention the relaying of information about the "methods and techniques of thinking, taken from logic, statistics, scientific methods, psychology, and mathematics. That's all the 'college education' they need. They [can] get the rest by themselves in our libraries and laboratories" (Skinner, 1962, p. 121).

However, simply having access does not guarantee being able to successfully leverage what the PC and Internet have to offer (Chickering & Ehrmann, 1996), henceforth referred to as instructional technology, so as to include the use of instructional media such as communication technology and online resources for the process of instruction (Morrison, Ross & Kemp, 2001; Reiser, 2012). For example, attempting to use instructional technology to support a wide range of pedagogical approaches borrowed from the conventional classroom (Albion & Redmond, 2006) is already a difficult undertaking, and becomes even more intricate when having to make it all work in an "effective, efficient and engaging" manner (Merrill, 2006, p. 1). The complex nature of online instructional design suggests the need for practical guidelines designed to enable the effective integration of instructional technology with good pedagogy regardless of form, delivery system or instructional architecture (see e.g., Merrill, 2008; Merrill, 2009).

As expressed by Grant and Thornton (2007), "a common mistake online course developers or instructors make is trying to emulate the traditional classroom with technology mediated interactions without the benefit of good pedagogy" (p. 347). In keeping with the ideas of Haughton and Romero (2009), because of the lack of visual cues that teaching staff traditionally associate and normally rely upon to develop confidence, engagement and trust, "traditional teaching methods do not translate seamlessly to the online environment" (p. 571). Instead, "faculty with traditional teaching experience and online instructors with minimal or no teaching experience….usually rely on trial and error process, until they learn to manage the new environment to teach effectively" (Haughton & Romero, 2009, p. 571).

1.2 Integrating Instructional Technology with Good Pedagogy

Despite some early success, the applicability of instructional technology in the field of education appears to have ebbed into a state of paradigm paralysis. Time and again educators have been left perplexed by the myriad of answers to the simple question of how to balance the use of instructional technology in online courses to improve the quality of learning experienced in terms of effectiveness, efficiency and engagement. Hence, what use is there of knowing what instructional technology has to offer when educators themselves are hesitant about when, where and how to best use instructional technology to support learners and the teaching process? Clearly, there is a need for "a guiding philosophy that they [teaching staff] can adapt to their personal style, course contents, student population, and available technology" instead of the holeshot approach that was the pioneering spirit of the dot.com generation (Shneiderman, 1998, p. 26).

For this reason, youthful educators who would like to carve a niche for themselves in the field of educational research would endeavour to explore and experiment with alternative methods for facilitating learners that effectively integrate and situate instructional technology with good pedagogy. According to Garrison, Cleveland-Innes & Fung (2010b), "the challenge is to systematically explore the integration of pedagogical ideals and new communications technology that will advance the evolution of higher education as opposed to reinforcing existing practices" (p. 31). This is of particular concern when there seems to be a missing link in the synergy of events between cognitive presences, social presences, teaching presences and concrete strategies or tactics for online learning and teaching that confound the situation (Kehrwald, Reushle, Redmond, Cleary, Albion & Maroulis, 2005). For example, a recommendation was recently made on the back of findings from a number of research projects about the widely-accepted *Community of Inquiry (CoI)* framework that learning presence should be integrated as a new conceptual element (Shea, Hayes, Smith, Vickers, Bidjerano, Pickett, Gozza-Cohen, Wilde & Jian, 2012).

As it stands, pedagogy is defined as "the actual function of teaching, or what teachers do when implementing their craft to assist their students' learning" (Lever-Duffy et al., 2005, p. 48). Hence, would it not be a logical aim by any standards to improve upon the efficiency of how online learning is designed, developed, implemented and evaluated, so as to better support the process of knowledge construction and possibly the transfer of skills using sound educational theory and practice (Lever-Duffy et al., 2005)?

"As a mere reinforcing mechanism" the teacher might one day become antiquated, but "if the teacher is to take advantage of recent advances in the study of learning, she must have the help of mechanical devices" (Skinner, 1968, p. 22). Back then, it was probably just science fiction that one day mechanical and electrical devices in the form of modern one-to-one or one-to-many communication, in concert with "robust supporting technologies" (Anderson & Dron, 2012, p. 7) could skilfully be used to progress through a series of "shaping or successive approximations" (Case & Bereiter, 1984, p. 141) that shortened the window of opportunity between "contingencies of reinforcement" (Skinner, 1954, p. 86). After all, "the human organism is, if anything, more sensitive to precise [and detailed] contingencies" (Skinner, 1954, p. 94).

What is not desired is for online learning and teaching methodology to be permeated with negative or "poisonous pedagogy," a phrase initially coined as *schwarze padagogik* by Katharina Rutschky (1977), that supposedly mirrors the real world because its antagonistic use by overzealous teaching staff "can have disastrous consequences for learners" in terms of emotional and psychological development (Lebow, 1995, p. 177). Although based on past experiences, there are times when the anthropomorphic use of black pedagogy, either by means of negative or positive reconditioning as "periodic reinforcement" for stimuli (Skinner, 1938, p. 151), would be an example of how to respond when engaging with apathetic, obdurate and recalcitrant learners.

On the one hand, there is the law of conditioning that states "if the occurrence of an operant is followed by the presentation of a reinforcing stimulus, the strength is increased" but on the other hand, the law of extinction states that "if the occurrence of an operant already strengthened through conditioning is not followed by the reinforcing stimulus, the strength is decreased" (Skinner, 1938, p. 21). Thus, there are two basic types of reinforcing stimuli, positive and negative, in which "the cessation of a positive reinforcement acts as a negative [and] the cessation of a negative as a positive" (Skinner, 1938, p. 66).

In précis, this is the essence of what online pedagogy is in its most rudimentary form. The fundamental idea is that of a light switch. Teaching staff can in principle flick the light on when required, and keep it switched on for his or her students to facilitate their journey through the pathways of knowledge. But if and when it is appropriate, teaching staff can opt to flip it off, and keep it switched off for as long as necessary to get students to work hard at finding their own answers (Syaril Izwann, 2012b). Anderson and Dron (2011) have so far summed it up best when they said that quality online learning experiences exploit all "three generations of cognitive-behaviourist, social constructivist and connectivist pedagogy" to encapsulate what distance education has evolved into (p. 1).

Consequently, it would probably be of contemporary interest to innovative educational researchers keen on exploring and experimenting with theories about online pedagogy to look at potentially engaging methods for supporting learners to learn using instructional technology;

> ...which means identifying ways to help learners construct knowledge....Instruction is not instruction if it does not foster construction. Furthermore, if construction is what the *learner* does,

> then we need a different term for what a *teacher* (or other agent) does to foster construction, and 'instruction' has commonly been used more than any other term to convey that meaning. Therefore, *we define instruction as anything that is done purposely to facilitate learning*. It includes constructive methods and self-instruction, as well as more traditional views of instruction, such as lecture and direct instruction (Reigeluth & Carr-Chellman, 2009, p. 6).

Subsequently, contemporary educators might want to pause, and ask themselves what is their existing paradigm about online learning and teaching, and how does such a bridging process manifest itself in an observable manner indicative of an acceptable and adequate personal standard that is measurable (Byrne, 2010). For example, in an Australian Department of Education, Science and Technology (DEST) funded Evaluation and Investigations Program (EIP) entitled; *Online Teaching and Learning in Higher Education: A Case Study,* the adoption and subsequent manifestation of flexible learning and online teaching in higher education was researched at the University of Southern Queensland (USQ), Toowoomba Campus (Postle, Sturman, Cronk, Mangubhai, Carmichael, McDonald, Reushle, Richardson & Vickery, 2003).

The report revealed that at USQ, research focusing on what constitutes a pedagogical framework of principles for online learning and teaching was "still in its formative years" though "there is a belief amongst some at USQ that an online pedagogy, supported by appropriate online instructional design exists, but to date has not been articulated in any recognised, formal way" (Reushle, 2003, p. 9). "It remains, to those who believed that such a pedagogy exists…an elusive, but cherished prize that might solve [some of] the dilemmas and contradictions of online education" (Postle et al., 2003, p. 17).

Within the Faculty of Education (FOE) at USQ, further investigation into what constitutes online pedagogy and transformative learning was conducted by Kehrwald et al., (2005) and was subsequently published as a working paper. Instead of concentrating on the transmission of content or the delegation of tasks, online pedagogy was defined as what learners were actually doing and how their own actions contributed towards personal learning and meaning making. Authentic, practical and goal-directed activities that were achieved via collaboration or individual effort placed the learner at the centre of learning tasks.

Even though technology often takes centre stage, it is actually awareness about the connections made with humans that drive online learning systems. Thus, the fundamental issue that once again arose was of "how to marry the power of networked connectivity with established pedagogical principles to produce better learning outcomes" (Kehrwald et al., 2005, p. 1). This is because, as a field, online learning had to undergo its own rite of passage in order to continue to grow and in due course reach maturity. After which it should became apparent that the characteristics of learning and teaching have not really changed, "good teaching is [still] good teaching" (Albion & Redmond, 2006), but "what has changed is how education providers and teachers facilitate learning" (Kehrwald et al., 2005, p. 1). The management of key considerations such as learner support, mediated interaction, situativity, learner centredness, in addition to balancing flexibility with structure "is what differentiates online teaching and learning from similar activities in other educational contexts" (Kehrwald et al., 2005, p. 4).

1.3 The Digitization of Education

In light of the fact that “transitioning from teaching in the traditional classroom to the online environment is not a simple task for most faculty, particularly veteran faculty who have taught in the traditional mode for eons” there exists the need for a set of principles, conceptual framework, pedagogy, paradigm or philosophy that can be used as practical guidelines to improve the whole experience while at the same time make it common sense to continue the practice of good teaching while integrating with instructional technology (Grant & Thornton, 2007, p. 352). Consequently, instead of standing still, continuous effort has to be made to find out how the learning and teaching experience has been, and will continue to be altered, by the use of computer mediated engagement and interaction. The target audience should involve consumers of instructional technology ranging from the learner, to the instructional designer looking for new ways to improve the design of future online courses, to teaching staff with limited or no online teaching experience, to veteran faculty who have been asked to conduct a familiar course in an unfamiliar environment.

Perhaps the time has also come for a re-evaluation of the current paradigm concerning what online pedagogy is, or in simpler terms, the mind-set about how the online learning and teaching experience has so far been characterized, to why it had to be allowed to continue the passage of growth, modernization, and the rite to maturity. As once remarked by Thomas Kuhn (1970), scientific advancement is not an evolutionary journey, but is more like a “series of peaceful interludes punctuated by intellectually violent revolutions” in which one’s “conceptual world view is replaced by another” or simply improved upon (p. 6).

A paradigm according to the interpretation of McCain & Jukes (2001) is an accepted model, perspective, value system, frame of reference, or worldview that influences our beliefs and subsequent deeds. However, when in a state of paradigm paralysis it is often the case that the unaware are caught unprepared and do not pause to contemplate the changes that are happening around them. Their instinctive reaction is almost always to hang on to what is customary and secure, since it is human nature to do so. If change were to be forced, then most of them would choose the easy way-out, that is the path of least resistance (McCain & Jukes, 2001). To the unwary change is uncomfortable and disorientating. Shying away from change and going back to their tried and tested ways is the preferred option. This is rather unfortunate because "Change, after all, is only another word for growth, another synonym for learning. We can all do it, and enjoy it, if we want to," says British futurist Professor Charles Handy (as cited in Rose & Nicholl, 1997, p. 4).

It had been envisioned long ago that over the coming years the requirement for society's modern workforce to be properly trained and sufficiently prepared would steadily increase. This is reinforced by the fact that modern societies are becoming more and more reliant on complex technological infrastructure to create, process and distribute information. The prediction then was for approximately sixty-five percent of the worthwhile professional and clerical jobs that will be sought after are those that deal with information and its diffusion, for example accountants, bankers, bureaucrats, clerks, engineers, insurance people, lawyers, managers, programmers, secretaries, stock brokers, technicians, teachers and many others (Naisbitt, 1984). It was projected that the workplace revolution brought about by the microprocessor would continue to materialize over the course of "the next two or three decades, which is fast by historical standards" (Gates et al., 1995, p. 252).

It is this future that the founding fathers of my country, who won our independence from the British in 1957 after 446 years of colonialism and exploitation, had foreseen. These sought after jobs, are now the present day occupation of many from my generation as we collectively endeavour to build upon the legacy left behind by our forefathers. Launched as a national archetype in 1991 by the former Prime Minister of Malaysia, Tun Dr. Mahathir Mohamad, the rationale of Wawasan (Vision) 2020 is for its people to become a developed and self-sufficient industrialized nation by the year 2020.

The function of the education sector will be of grooming the next generation and meeting the nation's need for highly competent information workers (Mahathir, 1992b). It will be the responsibility of the education sector to carve and shape a Malaysian society that is scientific, progressive, innovative, forward-looking and "one that is not only a consumer of technology but also a contributor to the scientific and technological civilisation of the future" (Mahathir, 1992a, para. 12). The vision that we as a nation are pursuing is of our children being agile on their feet and "able to quickly adapt to [the] changing patterns of supply, demand and competition" (Mahathir, 1992a, para. 36).

By having an education system that is one of best in the Third World, the next generation of Malaysians need to be moulded so as to be capable of setting new standards, achieve pioneering results, and possibly be a match for the best in the world (Mahathir, 1992a). Our children need not grow up being bullied and intimidated by prejudice based upon disingenuous differences that western colonialists have in the past uncouthly coerced upon my forefathers like a glass ceiling. Instead they should look up to the likes of Nicole Ann David and Lee Chong

Wei; the former the highest ranked women's squash player in the world, and the latter the number one ranked men's badminton player, as good role models.

Therein, lays the dilemma. In view of the education sector being an indispensable pillar of modern Malaysian society in terms of supplying well-trained, skilled and competent knowledge workers, how do you find a way to improve current educational policies by promoting the utilization of instructional technology in an effective, efficient and engaging manner? Is it merely a set of circumstances that requires the incessant purchase, installation and upgrading of computer related infrastructure and paraphernalia? Where does the path begin, and when will the journey end (Syaril Izwann, 2012a). In his book, *The Road Ahead*, Bill Gates said that;

> In a changing world, education is the best preparation for being able to adapt. As the economy shifts, people and societies who are appropriately educated will tend to do the best. The premium that society pays for skills is going to climb, so my advice is to get a good formal education and then keep on learning. Acquire new interests and skills throughout your life (Gates et al., 1995, p. 254).

Furthermore, issues regarding the shift from an industrial to a high-tech/high touch society had been foreseen and foretold by John Naisbitt in his book *Megatrends; Ten New Directions Transforming Our Lives* (1984), and Everett Rogers in his *Theory of Diffusion and Adoption* (1983). The Naisbitt Group used an intelligence gathering technique employed during World War II to monitor public behavior and social change. By utilizing the technique of content analysis to gather data, they were able to synthesize what was happening in society and forecast what might be future trends or single out pointless fads.

Consequently, Naisbitt was able to identify and correctly anticipate that computers would firstly, “offer a cost effective albeit capital-intensive way of individualizing education,” secondly, “computers simplified the extensive recordkeeping required for individualized instruction,” and thirdly, “familiarity with computers is now considered a strong vocational advantage, [or in other words] a [saleable] skill” (Naisbitt, 1984, p. 28).

In addition, Naisbitt proposed *The Three Stages of Technological Development*. Firstly, new technology or innovations would follow the route of least resistance. Basically, this meant that technology would be applied in ways that did not intimidate people or threaten their jobs. Secondly, technology would be used to improve previous technologies. For example, how the film camera and typewriter have been improved upon by the digital camera and word processor, or how the pocket calculator has been assimilated into personal digital assistants (PDAs), smart phones, desktops, laptops, net books and tablets. Lastly, there is the discovery of innovative directions or applications that are developed from the technology itself, which according to Naisbitt has yet to occur. Nevertheless, when considered in the context of current literature is probably happening as you read this, case in point, Google, Wikipedia, Facebook, Web 2.0 and semantic web technology such as Twitter (Anderson & Dron, 2011).

Meanwhile, Roger’s Theory of Diffusion and Adoption suggests that there are many reasons to explain why an innovation may or may not be accepted. For example, there are factors such as the advantages of the innovation, the compatibility of values, needs and experiences, innovation complexity, ability to try the innovation, communicating information about the innovation as well as the social system; the influence of networks and relationships (Morrison, et al., 2001).

However, within the context of this research it is thought that issues associated with innovation complexity and obscurity of results best explain why lingering doubts about the effectiveness, efficiency and engagement of online learning still exist.

In other words, was instructional technology integrated using good pedagogy and did it manifest itself in a familiar manner that enabled seasoned educators to anticipate what to do next, when to do it, how to do so and where to look for tell-tale signs of whether they are failing or succeeding? Or did the whole process of implementation make them feel lost and vulnerable? As similarly reasoned by Reushle and McDonald (2004), "the adoption of online technologies has meant that teachers are experiencing change in terms of their teaching philosophies, their relationships with learners and their work patterns and activities" (p. 6).

Additionally, Rogers also classified those who adopt technology into five categories. Firstly, there are the first adopters who rush out to adopt an innovation as soon as possible, sometimes even going after prototypes or test versions. Secondly, there are the early adopters who adopt an innovation as soon as a commercial version is available. Thirdly, there are the early majority adopters who comprise the first fifty percent to adopt an innovation. Fourthly, there are the late majority adopters who adopt an innovation only after it seems safe. And lastly, there are the laggards who are the last to adopt an innovation or sometimes completely fail to do so (Morrison et al., 2001). The reasons listed above are included because they will later be useful in making it easier to connect and subsequently come to terms with the findings of the research project.

1.4 Theoretical Rationale

Many educators and learners alike initially thought that online instruction, generally referred to in Malaysia as online learning, would be a simple task of going through prescribed content followed by an automated evaluation of learning based on set responses. This is very much behaviorism and could possibly be a textbook example of operant conditioning, i.e. stimulus and response, where the instructional emphasis remains rooted in the tradition of drill and practice, and has the tendency to encourage rote learning that results in "the demonstration of learning success being ... [the] accumulation and retention of facts" (Hanafi, Ahmad Hanizar, Kim Guan & Rozhan, 2003, p. 357). Such a notion does not come as a surprise because when the "behavioral psychology movement began to influence educational technology" it did take the form of programmed instruction which later "formed the foundation for instructional systems technology (Wager, 1995, p. 6-7).

Later, "newer information-processing theories" such as constructivism were successfully assimilated into the foundation "for thinking about instructional design" (Wager, 1995, p. 7). Constructivists describe learning as an active process that does not happen in a vacuum and is unique because of how each of us constructs understanding (Lever-Duffy et al., 2003). Cognitive-constructivism as espoused by Robert Gagne, advocates that "learning is the result of an individual's cognitive efforts to construct his or her personal knowledge" (Lever-Duffy et al., 2005, p. 16). Active learning, contextual learning, inquiry learning, learning contracts, mastery learning and meaningful learning are all terms used to describe the various learning activities encouraged by cognitive-constructivists.

When used in conjunction with the term effectiveness and efficiency, it is important to understand how engagement can lead to an increase in learner interaction, interest and subsequently satisfaction (see e.g. Merrill, 2008; Merrill 2009). According to Bangert (2008a), “a recommended instructional practice for higher education faculty is to engage in valued and meaningful inquiry-based, learning activities” that are “designed to create knowledge structures that can be retrieved when necessary to solve problems encountered in real-world contexts” (p. 36). Very simply, engagement can be defined as the quality of effort, in terms of time and energy, learners invest and devote towards purposeful interactive involvement in educational activities and conditions that are likely to contribute directly to the construction of understanding (see e.g., Coates, 2006; Kuh & Hu, 2001). For example, observing a demonstration early in the instructional process about the value of a new skill to be acquired can be practical in terms of motivating learners to engage in a complex real-world task that they could not managed before, so that a related or similarly complex problem might later be tackled successfully (Merrill, 2009).

Hence, in modern online courses learners should be taking full responsibility for their own learning, either as individuals or as participants in a community of inquiry. On the one hand, the aim has always been to harness the potential afforded by communication and Internet technologies via “asynchronous interaction design options” that would enable participants to “maintain engagement in a community of learners when and where they choose” (Garrison & Cleveland-Innes, 2005, p. 133). On the other hand, the goal has also been to “structure the educational experience to achieve defined learning outcomes” using interaction that is structured, systematic, critical and reflective (Garrison & Cleveland-Innes, 2005, p. 134).

However, interaction alone is no guarantee and neither is it enough to facilitate cognitive presence in online learning environments although it is seen as central to “an educational experience, whether it is online, face-to-face or a blending of both” (Garrison & Cleveland-Innes, 2005, p. 134). Even if high levels of interaction may perhaps be reflective of group cohesion, “it does not directly create cognitive development or facilitate meaningful learning and understanding” (Garrison & Cleveland-Innes, 2005, p. 135).

The underlying reason for this is that learners must attempt to learn by participating in the learning process, also known as engagement theory (Kearsley & Shneiderman, 1999). The fundamental idea is that students must not be silent sleeping partners. Instead they “must be meaningfully engaged in learning activities through interaction with others and worthwhile tasks” (Kearsley & Shneiderman, 1999, p. 1). In an attempted to challenge and stimulate the minds of students with new perspectives so that they can continue to construct and scaffold schema, the use of “authentic projects provides a higher level of satisfaction [for] students than working on artificial problems since they can see the outcomes/impact of their work on people and organizations” (Kearsley & Shneiderman, 1999, p. 4).

For example, consider how the use of email, asynchronous web conference boards and course-specific portfolios (Wuensch et al, 2009) can “significantly increase the extent and ease of interaction amongst all participants, as well as access to information” to facilitate an engaging learning and teaching experience in a distributed learning environment which is as cost-effective as it is in emphasizing the “positive role that technology can play in human interaction and evolution” (Kearsley & Shneiderman, 1999, p. 5). Quite simply technology creates an “electronic learning [milieu] that fosters the kind of creativity and communication needed to nourish engagement" (Kearsley & Shneiderman, 1999, p. 5). Hence, this makes the distinction by Reigeluth and Carr-Chellman (2009) differentiating instruction and construction all the more compelling due to its "implication that instruction is necessarily done *to* learners (i.e., learners are passive), whereas construction is done *by* learners (i.e., learners are active)" requiring active manipulation of the material learnt which "cannot occur passively" (p. 6).

Analyzed closely, these are also the achievable learning and teaching outcomes that Chickering and Gamson's *Seven Principles for Good Practice in Undergraduate Education (Seven Principles)*, and Merrill's *Different Levels of Instructional Strategy (DLIS)* want to harness. Used for example as a preorganizer, such principles could be useful in letting "learners know what knowledge they are responsible for acquiring. Useful preorganizers....helps them to cognitively arrange and organize the knowledge before it is introduced" (Lever-Duffy et al., 2003, p. 50).

To encourage even deeper learning, learners can later be presented with authentic tasks and learning materials that match, or better yet, somewhat exceed their proficiency level. In phases, they can be stimulated with challenging perspectives that might hook them to the learning process. The end goal is to encourage learners to construct their own understanding, or as stated by Scardamalia and Bereiter (2006) "All understandings are inventions; inventions are [thus] emergents" (p. 15). Succinctly, this was what the newly proposed Different Levels of Instructional Strategies (DLISt7) for Online Learning was designed to function as, "a set of workable principles that could guide pedagogy in a variety of contexts" (Scardamalia & Bereiter, 2006, p. 24).

All of this might be hard to fathom for some, but so was the thought of being able to carry a tablet computer around campus some forty odd years ago when computers were the size of whole floors of buildings. But the truth of the matter is what stands in the way of education being cajoled out of the stone-age and into the digital age, are just a few steps that learners and educators alike must be made aware of in terms of what constitutes good pedagogy when engaging in online learning and teaching. With a bit of luck, once these steps have been disseminated, then lingering doubt about the effectiveness, efficiency and engagement of online learning, particularly in terms of innovation complexity and obscurity of results, should become less perceptible. Instead, the new paradigm of how to continue good pedagogy while integrating with instructional technology will be in our thoughts influencing beliefs and deeds (Robertson, Grant & Jackson, 2004).

1.5 Statement of the Problem

Based on Chickering and Gamson's (1987) Seven Principles for Good Practice, the purpose of this research project was to attempt to revitalize the principles by amalgamating them with Merrill's (2006) Different Levels of Instructional Strategy. The basic idea was to determine whether the Seven Principles could be revitalised by amalgamating them with DLIS. The primary aim was to obtain data that could facilitate the development and validation of a standardized measure for assessing the effectiveness of the newly proposed DLISt7. The measure intended for standardization could then be put forward for use either as a rubric for facilitating the extrinsic implementation of DLISt7, or as unobtrusive diagnostic "process indicators" (Kuh, Pace & Vesper, 1997, p. 436) for assessing the quality of learning intrinsically experienced by students in blended and online courses.

The intent was to contribute to new knowledge by utilizing the data collected to generate awareness about the likelihood of thrusting into practice varying levels of instructional strategies for communicating expectations and relaying information in view of improving the instructional design of future online courses. The idea was to produce a tool that could create more opportunities for more of the principles to be put to good use as an effectiveness multiplier for efficient and engaging online learning.

The critical insight that can be extended to educational administrators, teaching staff, and instructional designers is the importance of making good use of whatever was made available, while remaining autonomously eclectic when deciding the discretionary balance between utilizing asynchronous or synchronous communication technology and online resources. In other words, when DLIS is used as a rubric either for teaching, treatment, or torture purposes to prompt and stimulate conditional response from students, which explains the *t* in DLISt7 three-ways, favourable online learning experiences that are in union with the Seven Principles would manifest themselves in ways that are familiar and unobscure paving the way for the instructional design of future online courses to be improved upon.

The central problem that was at the core of this research was determining the validity of amalgamating DLIS with the Seven Principles to form DLISt7. A sub-problem that was also investigated was whether the items used to define the construct of DLISt7 would actually measure the appropriate constructs, and were thus reliably tapping into what was supposed to be measured. A final sub-problem that was also assessed was the perceived effectiveness of DLISt7 by undergraduate students from USQ.

1.6 Focus of the Research

The focus of the research project was to seek out and explore innovative ways for improving the quality of learning experienced by students in an effort to improve the design of future online courses. Hence, this exploratory study wanted to determine whether the Seven Principles could be revitalised by way of merging it with the Different Levels of Instructional Strategy. A principle, as defined in the context of this study, is “a relationship that is always true under appropriate conditions regardless of the methods or models which implement this principle,” and whose underlying function is “to promote more effective, efficient or engaging learning” (Merrill, 2009, p. 43).

In their original form, the Seven Principles were designed to be robust so as to always be true under appropriate conditions with each principle having the capacity to “stand alone on its own, but when all are present their effects multiply” (Chickering & Gamson, 1987, p. 2). Upon being updated, the term “instructional strategy” was integrated so as to accentuate the utility of the Seven Principles in promoting effective, efficient and engaging learning in conjunction with “new communication and information technologies that had become major resources for teaching and learning in higher education” (Chickering & Ehrmann, 1996, p. 1).

Despite the simplicity and practicality of its design, there had been a tendency for the Seven Principles in its various reincarnations to not be fully utilized (see e.g., Bangert, 2004; Bangert 2008b; Batts, 2008; Chickering & Gamson, 1999; Cobbett, 2007; Wuensch, Shahnaz, Ozan, Kishore & Tabrizi, 2009). A review of the above literature suggests a penchant for the Seven Principles to be implemented and subsequently assessed in their stand alone form instead of as a whole. Perhaps the

Seven Principles could be resuscitated by being analysed from a different perspective. To echo the words of Merrill, "we need to back up and find out if there's a set of principles we can agree to and then build on these principles. Let's build on what's there instead of starting over and reinventing the wheel every single time" (in Spector, Ohradza, Van Schaack & Wiley, 2005, p. 318).

Accordingly, when compared to the *Three Critical Conditions for Excellence* by the Study Group on the Conditions of Excellence in American Higher Education (1984), the *Nine Strategies for Improving Student Learning* by the Oxford Centre for Staff Development, England (1992), the *Twelve Attributes of Good Practice* by the Education Commission of the States (1996) (Cross, 2005, p. 3), and the *Seven Calibrated Scales of Student Engagement* by the Centre for the Study of Higher Education, University of Melbourne (Coates, 2006), "the best known, and certainly most widely distributed" (Cross, 2005, p. 3) framework or "widely distributed set of process indicators" (Kuh, et al., 1997, p. 436) is the Seven Principles.

Hence, in an attempt to make full use of what is already there and not reinvent the wheel, this researcher attached DLIS as the component that introduces the function of utilizing instructional strategies to enable the learning experienced by students to be systematically scalable to different levels of complexity culminating in the ability to traverse and satisfactorily complete complex tasks. The rationale was to move away from "information-only presentations" towards a more task-centred approach that increases in level of complexity to promote more effective, efficient and engaging learning (Merril, 2006, p. 16). This was for all intents and purposes, an attempt at creating more opportunities for more of the principles to be put to good use and thus increase the probability of multiplying the effectiveness of DLISt7 as a set of guiding principles.

This shift in approach was somewhat similar to what had been earlier suggested in the literature by Hanafi et al., (2003) and Reushle and McDonald, (2004). A good example of a recent study from a similar genre was the attempt by Swan, Matthews, Bogle, Boles and Day (2012) to link the design of online courses with utilitarian functionality in conjunction with instructional objectives. In view of the need to link the implementation of online learning outcomes to course design, Swan et al., (2012) recommends starting "with a QM (Quality Matters) review and revision and then use scores on the CoI survey to incrementally 'tweak' [the] course design and implementation" because the findings from the study "suggest that, taken together, QM and CoI revisions can be linked to improved outcomes, but unfortunately not to each other" (p. 86). This is because the two instruments were separate and uncorrelated, but with DLISt7 the research instrument was by design meant to be utilized two-ways; firstly as a rubric and secondly as diagnostic indicators of process.

1.7 Research Objectives

The objective of this research project was to obtain data that would facilitate the development, validation and standardization of a measure for assessing the effectiveness of DLISt7. In attempting to ground the development, validation, and standardization of this measure in psychometric theory, this research attempted to realize Nunnally and Bernstein's criteria for standardization. As a rule, a measure is said to be standardized when; (a) its rules of measurement are clear, (b) it is practical to apply, (c) it is not demanding of the administrator or respondent, and (d) its results do not depend upon the administrator (see e.g., Netemeyer, Bearden & Sharma, 2003; Nunnally & Bernstein, 1994). Consequently, a measure that successfully fulfils all the right criteria would yield "similar results across applications (i.e., the measure is reliable), and offer scores that can be easily interpreted as low, medium [or] high" (Netemeyer et al., 2003, p. 2).

The resultant standardized measure had also been designed to perform two functions: firstly as a rubric for facilitating the extrinsic implementation of DLISt7, and secondly as unobtrusive diagnostic indicators of process for assessing the quality of learning intrinsically experienced by students. This standardized measure has the potential to be used by others in the future to either implement DLISt7, or improve the instructional design of online courses.

In order to be able to categorically achieve the aim of the research, the ensuing research objectives were utilized to systematically measure students' Awareness of DLISt7 and their perception of its effectiveness. The following table was used as a quick guide to check the alignment of the research objectives with the null (H_0) and alternative (H_A) hypotheses, along with the types of statistical tests that would be used for analysis of data.

Table 1.1
A Summary of the Research Objectives, Research Hypotheses & Statistical Tests that would be used for Analysis of Data

Research Objectives	Refer to the following H_0 & H_A	Types of Statistical Tests
a. To categorically measure students' Awareness of the Different Levels of Instructional Strategies (DLISt7) for Online Learning at the pre and posttest stage.		Frequency Distributions
i. To determine if students' Awareness of DLISt7 was independent of or related to being in the No Treatment-Treatment group.	H_{O1} & H_{A1} $H_{O1.1}$ & $H_{A1.1}$	Cross-tabulation Chi-square test for Independence or Relatedness

ii. To determine if students' Awareness of DLISt7 was independent of or related to the attribute independent variable of gender.	H_{O2} & H_{A2} $H_{O2.1}$ & $H_{A2.1}$	Cross-tabulation Chi-square test for Independence or Relatedness
iii. To determine if students' Awareness of DLISt7 was independent of or related to the attribute independent variable of nationality.	H_{O3} & H_{A3} $H_{O3.1}$ & $H_{A3.1}$	Cross-tabulation Chi-square test for Independence or Relatedness
iv. To determine if students' Awareness of DLISt7 was independent of or related to the attribute independent variable of academic progress at USQ, i.e., type of degree and academic year.	H_{O4} & H_{A4} $H_{O4.1}$ & $H_{A4.1}$ H_{O5} & H_{A5} $H_{O5.1}$ & $H_{A5.1}$	Cross-tabulation Chi-square test for Independence or Relatedness
v. To determine if students' Awareness of DLISt7 was independent of or related to the attribute independent variable of faculty affiliation.	H_{O6} & H_{A6} $H_{O6.1}$ & $H_{A6.1}$	Cross-tabulation Chi-square test for Independence or Relatedness
vi. To determine if students' Awareness of DLISt7 was independent of or related to the utilization of communication technology and online resources by teaching staff to convey instructional strategies for online learning.	H_{O7} & H_{A7} $H_{O7.1}$ & $H_{A7.1}$	Cross-tabulation Chi-square test for Independence or Relatedness
b. To analyze students' perception towards the effectiveness of DLISt7 at the pre and posttest stage.		
i. To determine if there was a significant difference in the gain score of participants.	H_{O8} & H_{A8}	Paired sample *t*-test
ii. To determine if there was a significant difference in the mean scores of participants who answered 'Yes' or 'No' about Awareness of DLISt7.	H_{O9} & H_{A9} $H_{O9.1}$ & $H_{A9.1}$	Independent-samples *t*-test
iii. To determine if there was a significant difference in the	H_{O10} & H_{A10} $H_{O10.1}$ & $H_{A10.1}$	Independent-samples *t*-test

	mean scores of participants who were in the No Treatment-Treatment group.		
iv.	To determine if there was a significant difference in the mean scores of Female participants compared to Male participants.	H_{O11} & H_{A11} $H_{O11.1}$ & $H_{A11.1}$	Independent-samples *t*-test
v.	To determine if there was a significant difference in the mean scores of Local participants compared to International participants.	H_{O12}& H_{A12} $H_{O12.1}$ & $H_{A12.1}$	Independent-samples *t*-test
vi.	To determine if there was a significant difference in the mean scores of First Year and Head Start participants compared to Second, Third and Later Year participants.	H_{O13} & H_{A13} $H_{O13.1}$ & $H_{A13.1}$	Independent-samples *t*-test
vii.	To determine if there was a significant difference in the posttest scores of participants who answered 'Yes' compared to those who answered 'No', after controlling for scores on the Awareness of DLISt7 pretest administered prior to the intervention.	H_{O14} & H_{A14}	One-way between-groups Analysis of Covariance (ANCOVA)
viii.	To determine if there was a significant interaction between the posttest scores for Awareness of DLISt7, No Treatment-Treatment group, and Gender.	H_{O15} & H_{A15}	Three-way between-groups Analysis of Variance (ANOVA)
ix.	To determine how well the pre and posttest scores could be used to predict students' perception towards the effectiveness of DLISt7.	H_{O16} & H_{A16}	Simple Linear Regression
c.	To determine the validity of DLISt7 as a conceptual framework and the reliability of the items utilized.		Exploratory Factor Analysis (EFA)

d.	To determine the expected (saturated) and observed (default) fit of DLISt7 as a measurement model.	H_{O17} & H_{A17}	Confirmatory Factor Analysis (CFA)

1.8 Research Hypotheses

Based on the problems and objectives that had been identified, the null hypotheses and their respective alternative hypotheses are listed in Appendix A.

1.9 Assumptions and Limitations of the Research

Before any theory can be "interpreted with confidence" and "become an established part of science," the experiment demonstrating the theory needs to be successfully replicated and cross-validated under different conditions (Campbell & Stanley, 1963, p. 3). Since this research intends to develop and validate a standardized measure for assessing the effectiveness of DLISt7, a quasi-experimental pretest-posttest non-equivalent control group design was identified as being realistically achievable. Although, the research project could have also been designated as an ex post facto study for the reason that "the effects of a naturalistically occurring treatment" was being examining (Tuckman, 1999, p. 181), it was decided that a pretest-posttest designation would be preferred because of how DLISt7 was designed to function, firstly as a rubric, and secondly as an unobtrusive diagnostic indicator of process.

Due to ethical considerations, although it is possible by design to manipulate DLISt7 to prompt and stimulate conditional responses from research participants, this is not yet doable. This is because efforts had to first be made to establish the psychometrical properties of DLISt7 in terms of construct validity and internal consistency (Vandewaetere & Desmet, 2009). For this reason, although teaching staff working with the Treatment groups were provided copies of DLISt7, they were only invited but not obligated to refer to it during the course of the semester as they managed their interaction with students. Hence, for the time being it is assumed that DLISt7 as a "treatment is included by selection rather than manipulation" (Tuckman, 1999, p. 181). Subsequently, further replication of the research project and the utilization of the research instrument by others in the future to cross-validate DLISt7 would hopefully unlock its Rubik's cube like potential (Syaril Izwann, 2012b).

It was also assumed that the quasi-experimental pretest-posttest non-equivalent control group design "while not true experiments, [would] provide reasonable control over most sources of invalidity" (McMillan & Schumacher, 2009, p. 278). According to Stanley and Campbell (1963) if the eight classes of different extraneous variables, which are relevant to internal validity, are not controlled then they "might produce effects confounded with the effect of the experimental stimulus" (p. 5). To be specific, extraneous variables such as "history, maturation, testing, instrumentation, statistical regression, selection bias, experimental mortality [and] selection-maturation interaction" would be reasonably controlled (Campbell & Stanley, 1963, p. 5). Again, it must be emphasized that although not true experiments, quasi-experimentation does "provide substantially better control of the threats to validity than do pre-experimental designs," and are suitable for complicated situations in which complete experimental control cannot be feasibly achieved because of practical limitations (Tuckman, 1999, p. 168).

For example, this research will still be threatened by the extraneous variable of selection bias. The recommended approach for controlling the threat of selection bias is to “randomly assign groups to true experiments” (Vockell & Asher, 1995, p. 242). However, “the real world that confronts an educational researcher is fraught with practical limitations upon opportunities to select or assign Ss and manipulate conditions” (Tuckman, 1999, p. 168). Similar to the manner in which teaching staff can only be invited but are not obligated to refer to the research instrument while managing their interaction with students, random assignment is just as difficult to achieve when utilising intact classes. Consequently, “experts recommend a strategy called purposive sampling for heterogeneity” which in the context of this research was done in three-stages (Vockell & Asher, 1995, p. 274).

Even when random assignment of large intact groups such as classrooms to control or treatment conditions is a possibility, a researcher still has to prove that the groups are about the same in most characteristics and that selection differences would probably not have an effect on the results (McMillan & Schumacher, 2009). Consequently, although researchers often times “feel tempted” to randomly assign intact classes to either control or treatment groups, it is actually better to “treat them as non-random groups and proceed with specific designs for use with intact groups” such as the pretest-posttest non-equivalent control group design (Tuckman, 1999, p. 142). “Initial selection differences” can be ruled-out “as a threat to internal validity” via a comparison of “the pre-test scores of the two groups” to determine if they had performed “comparably before the treatment but differently afterwards” (Vockell & Asher, 1995, p. 274). In case there is a “big difference at the pretest” a researcher can still statistically adjust “the posttest scores for any pretest differences” (Johnson & Christensen, 2008, p. 334).

1.10 Outcome and Significance of the Research

It was the intent of the researcher that from the outcome of this research project, a successful assessment of the validity and reliability of the proposed conceptual framework could prove to be beneficial in terms of contributing to existing bodies of knowledge relating to the field of Assessment and Measurement in Instructional Technology and Flexible Learning. This would be by way of creating a context for promoting the utilization of DLISt7 as a whole instead of as standalone principles. This is for all intents and purposes to create more opportunities for more of the principles to be put to good use, thus increasing the probability of multiplying its effectiveness. In other words, when DLIS is used as a rubric, either for teaching, treatment, or torture purposes to prompt and stimulate conditional response from students, favourable online learning experiences that are in union with the Seven Principles would manifest themselves in ways that are familiar and unobscure.

A successful assessment of the validity of DLISt7 could conceivably pave the way for teaching staff to have the flexibility of being eclectic in their choice of pedagogy for providing students with directed facilitation (Shea, Li & Pickett, 2006) to work their way through the pathways of knowledge to find their own answers. Successively less facilitated guidance, also known as guided instruction (Kirschner, Sweller & Clark, 2006) should be provided with each scaffolded task until students are functioning autonomously, or in other words completing tasks on their own. Metacognitive comprehension about DLISt7 could potentially be beneficial for students in terms of generating conscientious and contextual awareness about the difference between planned instances of instructional strategies as opposed to random acts when engaging and interacting with teaching staff.

The researcher was also optimistic that by developing a correlated measuring procedure that is not only psychometrically reliable in terms of development, validation and standardization (Cronbach, 1990; Netemeyer et al., 2003; Nunnally & Bernstein, 1994), but configured so as to be usable either as a rubric or as unobtrusive diagnostic indicators of process, this research project would be able to make a significant contribution in terms of refuting the criticisms that had been levelled at other studies from a similar vein. This was because, during the course of conducting a review of literature for both the Seven Principles and the Different Levels of Instructional Strategy, three major criticisms were identified.

Firstly, Bangert (2008b) argues that a major limitation of studies related to the discovery of principles involved in instructional strategies, and their subsequent use to invent instructional design procedures and tools to promote learning, was their "failure to use or develop psychometrically sound instruments" (p. 27). Similarly Vandewaetere and Desmet (2009), also argued that a "great majority of questionnaires measuring non-observable constructs such as attitude towards CALL [Computer Aided Language Learning] are often developed from a specific point of view and were seldom followed by psychometrical validation" (p. 349). That was why the "psychometrical properties of the questionnaire, such as construct validity and reliability" are often left unanswered (Vandewaetere & Desmet, 2009, p. 349). Secondly, Scardamalia and Bereiter (2006) contend that principles are often "framed as goals, rules, beliefs, design parameters, or diagnostic questions" that are "too abstract" to be of any use (p. 24). Last but not least, Achtemeier, Morris and Finnegan (2003) are of the opinion that principles and inventories seem to include whatever someone decides is appropriate to ask at that point in time.

Finally, it should be realised that both DLIS and the Seven Principles “tell us the things that most (good) instructors already know” (Hutchins, 2003, p. 8). The mistake that should not be repeated is to interpret either of them or DLISt7 “as a grand meta-principle” (Cross, 2005, p. 1). Students will still need to work their way through the pathways of knowledge to find their own answers. The sharing of metacognition about “what the experts know is not likely to result in the kind of deeper learning that we want to encourage” but what is important is to generate Awareness about DLISt7 so that others in the not too distant future will “know what to look for” in terms of the difference between planned instances of instructional strategies as opposed to random acts (Cross, 2005, p. 1).

1.11 Operational Definitions

For a list of the terms and definitions that were contextualized for use in this research project refer to Appendix P.

1.12 Summary

The proliferation of the PC and Internet has been without a doubt an important influence on our daily lives. All that one has to do is look around to see how much our lives have changed because of them. Yet, their success as an information age learning and teaching resource remains partial. Why is this? What is holding back the field of education? For how long have we been hearing about predictions concerning paradigm shifts in the way educators would conceptualize and deliver education? If it was just about issues pertaining to the practicality and acceptance of instructional technology, then all that has to be done is read up John Naisbitt's *Megatrends; Ten New Directions Transforming Our Lives* and Everett Roger's *Theory of Diffusion and Adoption*. Then again that was never really the issue. Perhaps, the real problem lies with having access to instructional technology but struggling to understand how to manage and make it all work.

Many of the guiding principles for integrating instructional technology with good pedagogy are convoluted (Scardamalia & Bereiter, 2006). Despite looking good on paper, these guiding principles are often protracted to the extent that their effectiveness and real-world utility are difficult to assess. Forthrightly, this was the logic of the research project, i.e., propose DLISt7 as a conceptual framework, put it to the test, assess its psychometrical properties, and if successful, refine it so as to be able to suggest the simplest explanation possible. This was in an effort to harmonize DLISt7 with the law of parsimony which states that;

> …a theory should be stated in the simplest form that adequately explains the phenomena. This does not mean that all theories should be simple statements; rather, they should be stated succintly and precisely, avoiding ambiguities and unnecessary complexity. Important factors must not be overlooked, and the comprehensiveness of the theory must be adequate for its purpose (Wiersma & Jurs, 2009, p. 21).

Potentially, this could provide the substantiation needed to justify why learners and educators alike should be mutually aware or better yet acknowledge and acquire as conceptual prerequisites, frameworks such as the Seven Principles for Good Practice in Undergraduate Education, the Different Levels of Instructional Strategy and the Communities of Inquiry model. However, without amalgamating the above mentioned conceptual frameworks into something that is simple, clear, practical, not demanding and standardized, as is the case with DLISt7, it would probably remain a chore to conveniently integrate instructional technology with good pedagogy. This in reality is a task that is not as simple as it sounds by any length of the imagination.

Hopefully, awareness and acceptance of DLISt7 would enable students and teaching staff alike to extricate themselves from the bind of having to integrate instructional technology with good pedagogy. Students should now be better equipped to interpret the execution of instructional strategies by teaching staff, understand why existing instructional events were scaffolded in such a manner, and value the construction of stable learning environments that improved the quality of learning they experienced. Intuitively they would also be better able to appreciate when, where and which technology was used, and most importantly, the quality of effort that had to be expended (Syaril Izwann, 2012b).

CHAPTER 2

REVIEW OF LITERATURE

2.1 Introduction

In attempting to trace and chronicle the history of how machines were hypothesized to be used to facilitate human learning, a review of literature from a chronological perspective was conducted. The aim of this review was to narrow down how the field of instructional design has evolved from its humble beginnings as part of educational technology, to possibly becoming the bridge that connects the field of education as it used to be, with the field of education as it needs to be in the 21st century.

The purpose of this review was to justify how the merging of two conceptual frameworks to form an improved framework could perhaps result in a rubric that is practical and can be used to integrate instructional technology with good pedagogy. The guidelines outlined by this rubric have the potential to be applied as instructional strategies, which if wielded skilfully, can not only mimic the meaningful interactions characteristic of face to face classrooms, but also enhance the effectiveness, efficiency and engagement of online learning. Lastly, this review of literature uses periodicals that are from a similar genre in terms of theoretical rationale to keep up to speed with recent developments and trends that have occurred in the field.

2.2 How Machines were Hypothesized to Facilitate Human Learning

The use of teaching machines to conduct programmed instruction to engineer human behaviour was originally proposed in 1938 by Burrhus Frederic Skinner in his book *The Behavior of Organisms: An Experimental Analysis*. In 1968, Skinner again advocated the significance of using teaching machines, specifically those that he had invented, in his book *The Technology of Teaching* (Lever-Duffy et al., 2003). At roughly the same period in time, psychologists began to look for ways to apply the principles of cybernetics. The analogy made famous by this generation of psychologists was of humans and machines being feedback systems that self regulate (Joyce, Weil & Showers, 1972). Also in 1968, the first course that taught the systematic design of instruction was conducted at Florida State University (Gagné & Briggs, 1979).

In 1972, Skinner published his controversial book *Beyond Freedom and Dignity* in which he hypothesized that it is with behavioural engineering and not individual freedom, that the key to the survival of the human race lies (Lever-Duffy et al., 2003). By 1978 when the first edition of Dick and Carey's book *The Systematic Design of Instruction* was published, issues relating to performance technology, constructivism and computers were incorporated in order to keep abreast with developments that had occurred in the field of learning theories and teaching methodology (Dick & Carey, 1996).

2.3 The Systematic Design of Instruction

Sometime during 1978, while in Tallahasse, Florida, Robert M. Gagné & Leslie J. Briggs wrote that in order for instruction to be effective it must be planned. By their definition, instruction is the purposeful undertaking of helping people to learn. Despite the fact that even without instruction learning might still occur, the benefits and effects of instruction are easily observed (Gagné & Briggs, 1979). The main purpose of their book was to describe the necessary characteristics, or common thread, that instruction must have so as to be effective in helping learners learn. They were quick to point out that instruction is a set of events (also known as instructional events), which affects learners and facilitates learning (Gagné & Briggs, 1979). Additionally, they also pointed out that some of the events that serve as a framework for instruction may partly be internal. This is especially true when learning is composed of activities called 'self-instruction' (Gagné & Briggs, 1979). Contemporary examples of such internal processes would be activities related to cognitive-behaviourism, social constructivism, and connectivism (Anderson & Dron, 2011).

This then led them to suggest that the word 'instruction' would be a more suitable choice compared to the word 'teaching' in describing the types of events that may directly or indirectly affect the process of learning, and not just those set in motion by a teacher (Gagné & Briggs, 1979). Needless to say, the presentation of information or arrangement of learning activities may still be the prerogative of instructors, though they can now choose when and where to step back and just facilitate the learning process.

Teaching, without any loss in stature due to its ability to withstand the test of time is thus proposed to be only one form of instruction. Hence, good teaching is still good instruction, regardless of the instructional architecture or delivery system that is used. What has changed over the past three decades, and will probably continue to evolve is how educational institutions, administrators, and teaching staff plan to promote engagement and interaction with learners using either directed facilitation or facilitated guidance.

2.4 The Seven Principles for Good Practice in Undergraduate Education

During the latter half of fifth century B.C., also known as the pre-Socratic-Promethean period, Greek educators known as the Elder Sophists were already aware of the issues associated with evaluation, individual differences, motivation, perception, and behaviour. They recognized that different instructional strategies achieved different results (Saettler, 2004). Likewise, this notion of using instructional strategies to improve the quality of learning experienced by students is a persistent theme that can be found to reverberate in the literature by Merrill. In his eloquent definition of the term Instructional Science, the relationship between Instructional Strategies, Instructional Design, and Instructional Science was made clear. By definition, "instructional science is concerned with the discovery of the principles involved in instructional strategies; and instructional design is the use of these scientific principles to invent instructional design procedures and tools that will promote student learning" (Merrill, Drake, Lacy, Pratt, & the ID_2 Research Group, 1996, p. 1).

The Seven Principles by Chickering and Gamson (1987) were first issued in an *American Association for Higher Education* (AAHE) bulletin. Prior to this, the authors were involved with the Council on Adult and Experiential Learning (CAEL) and were part of a movement that was looking at various approaches to improving American higher education in response to criticisms such as “apathetic students, illiterate graduates, incompetent teaching and impersonal campuses” (Chickering & Gamson, 1987, p. 1). It was while with the council that they were acquainted with the principles of good practice in experiential learning, and decided to fashion something similar for undergraduate education. With the help of colleagues from the higher education sector, AAHE members, the Education Commission of the States, along with support from the Johnson Foundation, the authors “distilled findings from decades of research on the undergraduate experience” and formulated the Seven Principles (Chickering & Ehrmann, 1996, p. 1). Listed below is an abbreviated version of the Seven Principles. For a complete listing see Appendix B.

1. *Encouraging Contact Between Students and Teaching Staff*
2. *Developing Reciprocity and Cooperation Among Students*
3. *Encouraging Active Learning*
4. *Giving Prompt Feedback*
5. *Emphasizing Time on Task*
6. *Communicating High Expectations*
7. *Respecting Diverse Talents and Ways of Learning*

According to Chickering and Gamson (1987), these principles are not the “ten commandments” that have to be adhered to religiously (p. 2). Instead they are just guidelines that should be applied using good old fashioned common sense by administrators, teaching staff and learners alike;

> ...These principles seem like good common sense, and they are – because many teachers and students have experienced them and because research supports them. They rest on 50 years of research on

> the way teachers teach and students learn, how students work and play with one another, and how students and faculty talk to each other. While each practice can stand on its own, when all are present their effects multiply. (Chickering & Gamson, 1987, p. 2)

Anyone of us, who has had the opportunity to study with a good teacher, would have most probably either knowingly or unknowingly experienced these principles first hand. Thus, the deep-rooted issue that sparked this research project was to investigate whether it would make any difference if such principles were to be made known in advance, and what would the reaction be after the fact.

2.5 Further Development of the Seven Principles

By 1996, the Seven Principles had been updated to include the term "instructional strategy" so as to accentuate its utility in promoting effective, efficient, and engaging learning in conjunction with "new communication and information technologies that had become major resources for learning and teaching in higher education" (Chickering & Ehrmann, 1996, p. 1). To put it briefly, technology was identified as a major resource for learning and teaching. It was emphasized that in order for the potential of new technologies to be fully realized they must be utilized in ways consistent with the Seven Principles. The key to unlocking this potential was the notion of having an instructional strategy being supported by different types of technology, or having a range of technologies supporting various instructional strategies.

In 1999, Chickering and Gamson looked back upon and discussed the utilization and "applications of the Seven Principles since their initial release"

(Hutchins, 2003, p. 6). The authors stated that “the Seven Principles for Good Practice in Undergraduate Education were a huge success when they were first issued in the mid-1980s, and they have continued to be refined and used in a variety of ways since then” (Chickering & Gamson, 1999, p. 75). The principles and their inventories have gone on to be incorporated, adapted, or used as a launch pad for quite a few assessments and research instruments.

Among the notable examples are, the *Seven Principles for Good Practice in Student Affairs* by the American College Personnel Association (ACPA) and the National Association of Student Personnel Administrators (NASPA), the *College Student Experiences Questionnaire (CSEQ)* by George Kuh from the Higher Education Program, Indiana University, the *Learning Process Inventory and Assessment (LPIA)* by Richard Webster from the Fisher College of Business, Ohio State University, the *National Survey of Student Engagement (NSSE)* by Peter Ewell from the National Centre for Higher Education Management Systems (NCHEMS), the *Seven Calibrated Scales of Student Engagement* by Hamish Coates from the Centre for the Study of Higher Education (CSHE), University of Melbourne, and the *Flashlight Program* by Chickering and Ehrmann from the Teaching, Learning and Technology (TLT) Group (see e.g., Chickering & Gamson, 1999; Coates, 2006).

It was acknowledged by the authors and later substantiated by others, that there was a tendency for only five of the principles to be frequently utilized i.e., (1) encouraging contact between students and teaching staff, (2) developing reciprocity and cooperation among students, (3) encouraging active learning, (4) giving prompt feedback, and (5) communicating high expectations (see e.g., Bangert, 2004; Bangert 2008b; Batts, 2008; Chickering & Gamson, 1999; Cobbett, 2007; Wuensch, Shahnaz, Ozan, Kishore & Tabrizi, 2009). The two frequently unused principles were (i) emphasizing time on task, and (ii) respecting diverse talents and ways of learning. Nevertheless, the authors were "pleased that the seven principles have inspired such research and encourage others to make use of both the principles and the inventories in carrying out studies of teaching practices, student learning, faculty discipline, and institutions" (Chickering & Gamson, 1999, p. 80).

2.6 Adaptations of the Seven Principles

2.6.1 The 1990s

In a 1997 study by George Kuh, Robert Pace and Nick Vesper entitled; *The Development of Process Indicators to Estimate Student Gains Associated with Good Practices in Undergraduate Education,* the process of developing psychometrically reliable process indicators for student performance was described. A case was made for selected CSEQ items to be used as measures for three good practices; (1) faculty-student contact, (2) cooperation among students and (3) active learning (Kuh et al., 1997). The aim was to aid institutions in determining whether activities and opportunities for learning were plentiful, and whether the learning resources available were being fully utilized. The objective was to help students and teaching staff focus on tasks and activities that were linked to desirable learning outcomes.

Process indicators were selected because they are generally less difficult and expensive to develop and administer. One such set of process indicators is the extensively distributed Seven Principles. However, few attempts have been made to determine whether student behaviour was consistent with these principles. Consequently, the purpose of the study was two-fold; firstly, to document the procedure for developing "psychometrically sound process indicators of student behaviours" and secondly, to test for "the utility of process indicators" (Kuh et al., 1997, p. 437).

Hence, an exploratory study was conducted to investigate the relationship between exposure to good practices and the academic gains of male and female undergraduate students from different institutions. Data was in the form of gain scores and student self-reports on CSEQ activities. The sample utilized was of single, first and second year students, who were not more than 22 years old, and were attending university full-time while living in residential halls, fraternities or sororities. Responses to the questionnaire were provided by respondents either in late 1993 or early 1994. Respondents were randomly selected from a population (*N) of* 12, 459 with six groups having a sample (*S) of* 911 which was derived from the number of students in the smallest group. This was in an effort to avoid complications related to unequal sample sizes (Kuh et al., 1997).

The findings of the study revealed that active learning and cooperation among students were the best predictors of gains for both male and female students. The perception of students towards their institutional environment also influenced gains. For instance, students who perceived that their institutions valued scholarship, aesthetic interest and critical thinking were more inclined to demonstrate gains. Correspondingly, students who perceived the quality of relationships to be good amongst administrators, teaching staff and peers also reported higher gains (Kuh et al., 1997). Taken as a whole, the results of the study suggest that exposure to good practices had a positive relationship with gains. While this does not come as a surprise, additional evidence would be appreciated to corroborate the claim that some practices are better than others.

2.6.2 The First Half of the New Millennium

In the year 2001, Charles Graham, Kursat Cagiltay, Byung-Ro Lim, Joni Craner and Thomas M. Duffy, online course evaluators from *Indiana University's Centre for Research on Learning & Technology* published a study entitled; *Seven Principles of Effective Teaching: A Practical Lens for Evaluating Online Courses*. Having learnt from previous evaluations of other online courses, the researchers took "the perspective of a student enrolled in the course" and began "identifying examples of each of Chickering and Gamson's seven principles" to learn about recognizing strategies for interacting with teaching staff (Graham et al., 2001, p. 1). For example, instructors should clarify to students the types of interaction permissible and the appropriate timeframe for responding to them. Questions regarding technical support or references to grades should not be posed, while responses to emails and messages should be within two working days or during specified timeslots.

With regards to encouraging cooperation among students, it was suggested that students should be more conscious of the design of discussion assignments to smooth the progress of meaningful cooperation (Graham et al., 2001). To do this, discussion groups should be kept small, focused on tasks, and be output oriented. Teaching staff should initially post expectations for discussions, and subsequently create tasks that would engage students in either a meaningful or contextual manner. Students should also be provided with feedback about their discussions, and be evaluated based on the quality of their postings. Most importantly, it was emphasized that portions of students' grades should be dependent on their participation in online activities.

As for encouraging active learning, the recommendation was that “students should present course projects” when completed (Graham et al., 2001, p. 2). Blogs, class websites, forums or web portfolios should be utilized to create opportunities for comments and constructive criticism to be passed-on in an asynchronous manner. Once uploaded, other students and teaching staff are free to comment and review constructively. Upon evaluating the comments, students can then revise and update their work. By the end of the course, teaching staff should compile reactions towards the presentations, identify concerns, highlight overlooked issues and convey them to students.

With regards to receiving prompt feedback, it was proposed that students can either receive information or acknowledgement feedback. Information feedback serves the function of providing some kind of assessment, while acknowledgement feedback serves the function of confirming the occurrence of an event that is of significance. Acknowledgement feedback has often been overlooked in online environments because it requires a certain amount of effort as opposed to face-to-face environments, in which it can be unspoken (Graham et al., 2001). For example, making eye contact, a nod of the head, or handing in assignments by hand. Additionally, because students and teaching staff alike are having to deal with increasingly hectic schedules as the semester progresses, a decrease in response frequency and an increase in response time often occurs late in the semester. This in turn results in a shift in approach from teaching staff having to address individual students, to having to respond to the whole class instead (Graham et al., 2001).

As for emphasizing time on task, the need for deadlines was emphasized. There is just no substitute for repeatedly-disseminated deadlines that push students to spend time on task, help those with busy schedules avert procrastination and provide a context for frequent contact with teaching staff. Given that there was also a need to communicate high expectations, students must be willing to accept challenges that test their limits, utilize authentic real life situations and not expect to be heaped with praises (Graham et al., 2001). Students should not be obsessed with what they have achieved for achievements can be surpassed. More importantly, they must come to realize that the key to long term success is the journey that they embark on, persist with, and live to tell the tale.

Bearing in mind that diverse talents and ways of learning must be respected, it was suggested that students ought to be allowed to choose project topics that incorporated diverse views (Graham et al., 2001). Students should expect only the bare minimum of guidance from teaching staff. They should be aware that teaching staff often utilise instructional strategies to extract the maximum amount of effort from students. Additionally, teaching staff would also want to safeguard themselves from students and discourage the practice of spoon feeding. If and when students require additional guidance, then they should be brave enough to ask for it and be prepared to pay the price, presumably in effort or some similar currency.

In 2001, George Kuh published another study but this time with Shouping Hu entitled; *The Effects of Student-Faculty Interaction in the 1990s*. It was argued that frequent and meaningful interaction between students and teaching staff was believed to be important for learning and personal development. It was assumed that the more contact made, either inside or outside of the classroom, the greater student development and satisfaction would be. However, Kuh and Hu (2001) reported that there were also studies about the influence of student-faculty interaction that indicated otherwise (see e.g., Kuh, Hu & Vesper, 2000; Olsen, Kuh, Schilling, Schilling, Connolly, Simmons & Vesper, 1998). The consensus garnered from these studies was that a lot of changes had occurred in higher education over the past several decades including the characteristics of students, patterns of attendance, learning and teaching approaches, instructional technology, and student accommodation which had an effect on student-faculty interaction (Kuh & Hu, 2001).

Consequently, it was proposed that the characteristics of student-faculty interaction and its impact on student learning and personal development be examined. Three research questions were utilized to establish the focus of the study (Kuh & Hu, 2001). Firstly, what is the nature of undergraduate student-faculty interaction beginning from First Year through to Senior Year? Secondly, what is the contribution of student-faculty interaction to student satisfaction? Thirdly, what are the contributions of different forms of contact between students and teaching staff on student learning and satisfaction?

Data was obtained via responses to the third edition of CSEQ. The instrument focused on the experiences of students in three areas: (a) the amount of time and energy, or in other words, effort expended, (b) the perception of students towards important dimensions of the institution's environment, and (c) estimates of how much progress had been made towards favourable outcomes (Kuh & Hu, 2001).

The sample *(S)* for the study was 5,409, and was randomly selected from 126 colleges and universities as per the classification provided by the Carnegie Foundation for the Advancement of Teaching (1994). This included 33 general liberal arts colleges (GLA), 15 selective liberal arts colleges (SLA), 44 comprehensive colleges and universities (CCU), 14 doctoral universities (DU), and 20 research universities (RU). This sample was supposed to be a ten percent representation for a population (*N)* of 54,488 full-time enrolled undergraduates who completed the CSEQ between 1990 and 1997 (Kuh & Hu, 2001).

A principal component factor analysis with oblique rotation produced three factors: (a) Substantive Academic or Career-Related Interactions, (b) Out-of Class Personal or Social Contact, and (c) Writing Improvements (Kuh & Hu, 2001). Multiple regressions were also performed, and Pascarella's (1985) General Causal Model of Environmental Influences on Student Learning and Personal Development was used to determine how student and institutional characteristics, plus other student experiences would link with overall student-faculty interaction. This was then looped back to the three interaction factors mentioned earlier.

Kuh and Hu (2001) recognized that the third edition of CSEQ may be limited in terms of its sensitivity to changes that have influenced student-faculty interaction over time. The fourth edition of CSEQ is noted to include technology related interaction items such as the frequency with which students use e-mail, and the degree to which electronic media was used for academic purposes. Nevertheless, the authors were rather confident that the third edition of CSEQ would still tap students' behaviours regarding desirable learning and personal development outcomes because the items had been designed to ask students to reflect on what they had put into and are getting out of their university experience.

The findings of the study revealed four conclusions. Firstly, contact between students and teaching staff increased during the four years of university. Secondly, "the positive effects of student-faculty contact on satisfaction and gains [were] mediated [by] the effort that students expend on other activities" (Kuh & Hu, 2001, p. 326). What this meant was that student-faculty contact does not directly affect satisfaction, but the sum of effort expended on other activities does. Thirdly, institutional type had limited influence on how student-faculty interaction affected student satisfaction and gains. Fourthly, the effects of student-faculty interaction were found to be conditional. Students who devoted more effort to their studies and were academically better prepared had the tendency to interact more frequently with teaching staff.

It was suggested that institutions of higher learning should develop a sustainable environment that is welcoming, supportive and affirming. When appropriate, teaching staff should always attempt to steer out-of-class conversations towards substantive matters. When working on the writing of students, teaching staff should be sensitive to how they approach and explain the importance of improving writing related competencies and skills. Often times, first and second year students may mistake critical criticism for negative criticism, and take things personally. This is perhaps because they cannot yet see the long term benefits or transferability of such skills to other aspects of their lives such as future employment and marketability (Kuh & Hu, 2001).

Social contact between students and teaching staff was also said to have limited effect on satisfaction and gains. It was suggested that policies which supported such informal interactions be reviewed. The results from the study indicated that for most students, more is better in terms of interacting with teaching staff, except for when it is outside of the classroom. Out-of-class contact was identified to influence students' perception about the environment found on campus. It was established that positive student-faculty interaction would encourage students to devote greater effort to educationally purposeful activities (Kuh & Hu, 2001).

In 2004, Arthur Bangert came out with the study entitled; *The Seven Principles of Good Practice: A framework for evaluating on-line teaching.* It was contended that Internet-based instruction was becoming a common method for delivering coursework to students. The design and delivery of online courses was supposed to be guided by constructivist learning models which endorsed a learner-centred curriculum for encouraging active learning and collaboration via the use of authentic instructional activities and interactive communities (Bangert, 2004).

Student evaluations of teaching are commonly used to gather feedback about the quality of instruction experienced. However, the validity of such an evaluation is dependent on the technical adequacy and content validity of the items written to define the construct of teaching effectiveness. A limited number of questions that formed the Student's Evaluation of Educational Quality (SEEQ) or Course/Instructor Evaluation Questionnaire (CIEQ) captured "constructivist-compatible teaching practices" (Bangert, 2004, p. 219).

One of the better known summaries of instructional practices is the widely disseminated Seven Principles framework. The instructional practices that comprise the Seven Principles are thought to be focused on constructivist-based teaching practices and can be used as a platform for guiding the design and delivery of quality online instruction (Bangert, 2004).

The study utilized a sample of 24 graduate students enrolled in EDCI 402: Educational Statistics I at Montana State University (Bangert, 2004). The questionnaire used for the study was designed to consist of items that were in line with the Seven Principles and are thus compatible with constructivist learning principles. Items were carefully worded to reflect the main idea and contextualized for use within online learning environments. Cronbach's alpha (α) for the 35-item questionnaire was 0.94.

The results of the study indicated that most students felt teaching staff used constructivist-based teaching practices, as per the Seven Principles. Although many of the students expressed satisfaction with the course, activities such as the use of discussion and study groups were identified as areas for improvement. The conclusion drawn by Bangert (2004) was that constructivist-based teaching practices, as per the Seven Principles, were being used to promote learning by way of making available valuable learning experiences for students.

2.6.3. The Second Half of the Millennium

In 2007, Shelley Cobbett presented her study entitled; *A Re-Conceptualized Model of Good Online Pedagogical Practices* at the World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education. It was claimed that several authors had tried to apply the Seven Principles for use in distance education. For example, an evaluation of online courses by Graham, Cagiltay, Lim, Craner and Duffy (2001) presented a detailed application of the Seven Principles for online learning. In turn, Cobbett (2007) attempted to address gaps in the learning and teaching process for online courses by focusing her study on instructor behaviour. This was in an effort to broaden the knowledge base "to include the faculty perspective of good online pedagogical practice" by better understanding the process of learning and teaching online (Cobbett, 2007, p. 2411). Cobbett's aim was to synthesize her findings into a working model that could be applied to online environments.

Cobbett (2007) used a triangulation method that began with a survey which included open ended questions followed by in-depth focus group interviews. The study utilized a sample of 92 nursing instructors from across Canada who taught nursing education online. The survey used was an adapted version of Chickering, Gamson and Barsi's (1989) Faculty Inventory. In adapting the research instrument, items that were not suitable for online environments were removed. Cronbach's alpha for the whole Inventory was 0.92, while the individual alphas for each principle ranged from 0.85 to 0.69 (Cobbett, 2007).

An exploratory factor analysis was conducted to identify the underlying dimensions for the 62 items that defined the construct of good online pedagogical practice. Results from the Principal Component Analysis (PCA) with Varimax rotation and Kaiser Normalization revealed that 70% of the variance was accounted for by seven factors using an item loading > 0.5. There was one main factor and six smaller factors (Cobbett, 2007).

Consequently, the findings of the study did not confirm Chickering and Gamson's original principle groupings. Instead, a different set of five constructs emerged from the analysis with only 40 of the 62 activities in the Faculty Inventory being represented by the groupings (Cobbett, 2007). This was interpreted as support for the argument that in terms of the focus of activities, differences exist between teaching in online environments compared to face-to-face environments.

Cobbett (2007) proposed a model to best explain the findings of the study. It was proposed that communicative learning be at the centre of the model as its main process and outcome. The four components that surrounded communicative learning were; (1) student, (2) teacher, (3) informed confidence and (4) knowing and sharing. The use of the label student was meant to include activities that are student centred and driven whereas the label teacher was meant to include activities that are teacher centred and driven such as "stating clear expectations, offering immediate feedback, and using diverse teaching strategies" (Cobbett, 2007, p. 2413). The label informed confidence, was inclusive of activities which were meant to encourage "independent completion of projects, high standards, detailed evaluation, and the setting of challenging goals" (Cobbett, 2007, p. 2413). The label, knowing and sharing, was meant to include activities that necessitated students to be responsible for their own learning.

The proposed model, 'Putting the Pieces Together: A Re-Conceptualized Model of Good Online Teaching and Learning Practices' was based on a reduced set of items that can be used by students and teaching staff alike to evaluate online learning and teaching practices (Cobbett, 2007). The two groups can choose either as individuals or in juxtaposition with one another, to use the items identified to research about online learning and teaching from both perspectives. Apparently, there are differences in the "emphasis that are placed on pedagogical practices in the online environment versus the face-to-face environment" (Cobbett, 2007, p. 2411). Or in other words, "there are differences in the focus of the activities when the teacher is teaching in the online learning environment versus the face-to-face learning environment" (Cobbett, 2007, p. 2411). Thus, the conclusion that was made by the study was that not all of the activities included in the research instrument were indicative of the Seven Principles. The items that were successfully grouped as communicative learning, student collaboration, teacher, informed confidence, knowing and sharing, were deemed as appropriate measures of good online pedagogical practice.

Also in 2007, Mary Rose Grant and Heather Thornton published their study entitled; *Best Practices in Undergraduate Adult-Centred Online Learning: Mechanisms for Course Design and Delivery*. It was reasoned that an increasing number of higher education adult programs were offering online courses as a means of providing students with convenient access to learning opportunities and to tap future markets (Grant & Thornton, 2007). This shift from traditional face-to-face to the more contemporary online environment necessitated a closer look at the quality of instruction and instructional design being offered.

The instructional practices of teaching staff, the instructional design of courses and opportunities for faculty-student interactions within online environments were seen as predictors of student learning and satisfaction. A common fault among online course developers and subsequently teaching staff was to try to replicate traditional classroom interactions using instructional technology without having good pedagogy as a guide. Grant and Thornton (2007) stated in their study that good online teaching practices should fundamentally be the same as good traditional teaching practices and the factors which influence good instruction should in general be applicable across different conditions and cultures. This builds upon Cobbett's (2007) rationalisation that gaps and differences in the learning and teaching process exist between the online environment and the traditional classroom because of the different emphasis on pedagogical practices in terms of focus of activities.

Hence, the study attempted to examine the Seven Principles in terms of their "effectiveness and applicability in online courses for adult learners" (Grant & Thornton, 2007, p. 347). The stated purpose was the investigation of best practices for the design, implementation and evaluation of online instruction, not to mention the identification of practices that make the most of what online instruction has to offer and promote learning experiences that are positive. Adult and constructivist learning theories provided the yardstick for assessing these practices.

Data was obtained from 12 questionnaires distributed to 14 online instructors from the School for Adult and Continuing Education at an undisclosed university. Ten of the participants were part-time instructors while two were full-time. The sample was supposed to reflect the ratio of part-time to full time instructors in the school (98:7). Responses from a sample of 150 students were also part of the data collected. By utilizing the research instrument, personal and focus group interviews, the study attempted to investigate the different features of online course design and delivery. Data collected from teaching staff responses to the survey, individual, and focus group interviews were also analyzed for common patterns and emergent themes associated with learning, teaching and student engagement (Grant & Thornton, 2007).

The research instrument itself was an eight-item survey adapted from the TLT Group (2005) which used Chickering and Ehrmann's (1996) article as the benchmark for integrating the use of technology with the Seven Principles. Survey questions were left open-ended to allow for descriptive responses and were modified to include phrasing that was appropriate for online courses. Seven of the items in the research instrument referred to each of the original principles with an additional eighth meant as a means for teaching staff to recommend an additional best practice based on their experience (Grant & Thornton, 2007).

Personal interviews with all teaching staff and two focus group sessions were conducted to cross validate what lessons had been learnt. All responses by teaching staff were analyzed for patterns, similarities, and themes in accord with grounded theory methodology. End of course evaluations were comparatively examined so as to verify that teaching staff best practices were also viewed as effective by students. The response of students and teaching staff to seven open-ended questions, which were on both the end of course evaluation and survey, were also recorded and analyzed (Grant & Thornton, 2007).

Findings from the study revealed three distinct themes; (1) course design, (2) instructional effectiveness and (3) connectivity. With regards to best practices, the traditional practices associated with the Seven Principles were deemed adaptable and were supported by the three themes that had emerged. These themes were proposed as pathways to bridging the digital divide between face to face and online learning and teaching practices. Additionally, the best practices identified were also deemed efficient by students in their end of course evaluations (Grant & Thornton, 2007). Based on further reading by the researcher, such a result is in stride with the theories of constructivism and engagement that had been put forward by Kearsley and Schneiderman (1999).

Potentially, the results from this study can be used as a point of reference for future development and implementation of online courses, not to mention its practical implications with regards to teaching staff development and policy decisions. The transition from teaching in a traditional classroom to that of an online one is not easy, especially for senior staff members who have been teaching in the traditional mode for a long time, and thus have seen it all. It may or may not be, depending on the individual, an intimidating transitional experience that requires the thoughtful interpretation of familiar good learning and teaching practices that utilizes constructivist approaches. Institutions that make an effort to assist teaching staff in transitioning and attempting to discover possible methods for implementing good online learning and teaching practices will compete favourably for adult students compared to those who do not (Grant & Thornton, 2007).

In 2008, Arthur Bangert published a study entitled; *The Development and Validation of the Student Evaluation of Online Teaching Effectiveness*. In this follow up study it was argued that there was concern among educators that in rushing to offer online courses in order to sustain and increase enrolments, quality assurance procedures for guiding the design and delivery of online courses had been largely ignored (Bangert, 2008b).

Originally developed in 2004, the Student Evaluation of Online Teaching Effectiveness (SEOTE) was meant "to assess constructivist-compatible online teaching practices" as per the Seven Principles (Bangert, 2008b, p. 29). Student responses were extracted using a six-point Likert scale with an open-ended question to enable students to express their perception about the effectiveness and quality of online instruction. The development of SEOTE had been documented in earlier pilot studies (Bangert, 2004, 2005a) and subsequent validation studies involving exploratory (Bangert, 2005b) and confirmatory factor analyses (Bangert, 2006).

The subsequent validation study of SEOTE involved a sample of 498 undergraduate and graduate students enrolled in blended and online courses for the 2004 semester at Montana State University (Bangert, 2008b). Results from the pilot studies, followed by a content experts review identified 26 out of 35 items as being appropriate for exploratory factor analysis to determine if the instrument actually measured the seven distinct instructional constructs defined by the Seven Principles. A range of courses were sampled from the disciplines of agriculture, arts, business, computer science, education, English, medical health, music, nursing, philosophy, psychology, science (biology, chemistry, & physics) and social science.

The results from the factor analysis revealed multiple instances of cross-loading which resulted in the items written to assess Chickering and Gamson's framework failing to emerge as seven unique factors. The conclusion that was drawn then was that the underlying characteristics of effective face-to-face classroom settings manifested themselves differently in online environments (Bangert, 2008b).

A second validation study was conducted using a sample of 807. The data was initially tested for skewness and kurtosis, and was found to depart significantly from normal. A visual inspection revealed that the distribution for each of the 26 SEOTE items was negatively skewed. However, factor analytic procedures that employed maximum likelihood extraction methods are not adversely affected when skewness is < 2.00 and kurtosis is ≤ 7.00. Opportunely, none of the variables analyzed exceeded these critical thresholds (Bangert, 2008b).

Exploratory factor analysis was again conducted using a randomly divided subsample of 404 with four factors being extracted. Factor one was interpreted as Student-Faculty Interactions, factor two was Cooperation among Students, factor three was Active Learning, and factor four was Time on Task. Again there were many instances of cross loading which resulted in only 23 of the 26 items from the first validation study being retained (Bangert, 2008b).

A confirmatory factor analysis using LISREL 8.72 was then conducted using a second subsample of 403 to test for the stability and replicability of the latent model that had been earlier identified. Results from this analysis revealed that the independence of the model that hypothesized all variables to be uncorrelated was rejected. The hypothesized four-factor model identified by the exploratory factor analysis was found to be a better fit (Bangert, 2008b).

Model fit was evaluated using a root mean square error of approximation (RMSEA) value < 0.05 in combination with a comparative fit index (CFI) and non-normed fit index (NNFI) with values > 0.90. The hypothesized four-factor model yielded a RMSEA of 0.042 with CFI and NNFI values both being 0.99. Cronbach's alpha for all four SEOTE factors were as follows: Student-Faculty Interactions (α = 0.94), Cooperation among Students (α = 0.86), Time on Task (α = 0.82) and Active Learning (α = 0.85) (Bangert, 2008b).

The explanation offered for why four rather than seven factors emerged is that the dimensions of effective teaching originally described for face to face settings have different causal relationships when applied to online environments. It was proposed that SEOTE be used to provide online instructors with valuable diagnostic and summative feedback about their teaching effectiveness. Further research should also be attempted to study the validity of the four factor structure at other institutions that engage in online instruction (Bangert, 2008b).

Also in 2008, David Batts published his study entitled; *Comparison of Student and Instructor Perceptions of Best Practices in Online Technology Courses*. Although initially designed for face-to-face instruction, it was maintained that the Seven Principles were intended to be applicable, practical and sensible to suit a variety of learning contexts (Batts, 2008). With the increase in attention to online learning in higher education, there had been a number of notable attempts to retool the implementation of the Seven Principles for online instruction. In a 2002 report by the Ohio Learning Network (OLN) Task Force it was noted that the Seven Principles remained a valid pedagogical option.

To a lesser extent this was the aim of the research project, formerly to replicate Guidera's (2003) doctoral research project at the masters level (2004-2007), and latter to amalgamate DLIS with the Seven Principles to form DLISt7 at the postgraduate level (2009-2013). For example, the writer can still remember that rooting winter's morning in 1980 of attending First Grade class at East Elementary

School, Athens, Ohio. Of particular significance was Mrs. N's (selectively removed to preserve anonymity) use of the film projector that was out in the hallway. As a seven year old, the writer vividly remembers raising his hand and volunteering to bring the projector into class. He then attentively watched her clumsily fumble with the operating levers, gates, sprockets, rollers, drums and selector switches of what was then a modern piece of instructional equipment, although perhaps forlornly antiquated by today's standards.

According to Batts (2008), there have also been other studies both in undergraduate and graduate courses that utilized the Seven Principles as indicators of quality instruction (see e.g., Batts, Colaric & McFadden, 2006; Braxton, Olsen & Simmons, 1998; Buckley, 2003; Taylor, 2002). Taylor (2002) for example, used the Seven Principles to evaluate the quality of instruction across multiple disciplines in completely online undergraduate courses. The survey instrument that he developed allowed instructors to critique their own course. It contained eight categories, one for each of the seven principles, and one for general information.

Taylor (2002) concluded that although teaching staff were self-reporting the supposed use of these principles in their courses, not all seven were being fully utilized. In light of the study being completed only by teaching staff with no student input, there was the likelihood that responses were biased because they were in fact statements of opinion by teaching staff about what they had or had not done during the course. As a result, the need arose for a study that compared teaching staff responses with student responses. Hence, Batts et al., (2006) modified Taylor's (2002) research instrument and surveyed both teaching staff and their students.

The survey used a sample of 548 students with 31 instructors from two small public universities. Batts et al., (2006) then compared the mean from teaching staff to the mean from students for each principle to determine if there was agreement and consistency in the perceived use of the Seven Principles. The findings of the study revealed that both teaching staff and students were in agreement with regards to the perceived use of the principles in online undergraduate courses.

Batts (2008) then went on to examine the perceptions of teaching staff and students about the use of the Seven Principles to mimic face-to-face interactions in online courses. The participants of the study were teaching staff and students from online undergraduate courses at a large south eastern public university. The survey utilized a sample of 461 students with 22 instructors. The Online Teaching Practices (OTP) survey, originally developed by Taylor (2002) and subsequently modified by Batts et al., (2006) was used to identify the extent to which teaching staff included the Seven Principles in their courses. OTP had 49 items grouped into eight categories.

The findings of the study revealed that the following principles were evident in the online courses surveyed; (a) student-faculty contact, (b) prompt feedback, and (c) high expectation (Batts, 2008). The study also identified three implications which are discussed in the following. Firstly, although these principles have come to be accepted as indicators of quality instructional strategies, only three of the seven principles had perceived means of medium to high. In an earlier study (Batts, et al., 2006) six of the seven principles had means of medium to high.

Secondly, teaching staff may find it useful to use the findings of the study to begin the search for ways to improve the four principles which had low perceptions of use, namely; (1) time on task, (2) active learning, (3) cooperation among students, and (4) diverse talents and ways of learning. Lastly, there were also three instances where teaching staff did not see any evidence of the principles during the course.

Consequently, the recommendation made by Batts (2008) was for administrators who provided teaching staff with training about online instruction, to consider including the Seven Principles.

This in turn, was the reason why it was felt that the merging of the DLIS with the Seven Principles would be a way forward in terms of creating a context that promotes the utilization of DLISt7 as a whole instead of as standalone principles. After all, Chickering and Gamson (1987) did emphasize that “while each practice can stand on its own, when all are present their effects multiply” (p. 2). This was for all intents and purposes, an attempt at creating more opportunities for more of the principles to be put to good use, and thus increase the probability of multiplying the effectiveness of DLISt7 as “a set of workable principles that could guide pedagogy in a variety of contexts” (Scardamalia & Bereiter, 2006, p. 24).

In 2009, Karl Wuensch, Shahnaz Aziz, Erol Ozan, Msao Kishore and M. H. N. Tabrizi published their study entitled; *Technology and Pedagogy: The Association between Student’s Perceptions of the Quality of Online Courses and the Technologies Employed.* It was reasoned that online teaching staff must not only know how to apply good teaching practices, such as the Seven Principles, but must also be able to determine which technologies would be most appropriate for use in conjunction with teaching techniques that are pedagogically sound (Wuensch et al., 2009). It had been noted that technology was only as effective as the extent to which it enabled the integration of good teaching practices.

Studies have revealed that student perception about online learning and satisfaction was related to the amount of interaction that occurs between students, their peers and teaching staff. While satisfactory interaction is possible using technologies that support asynchronous communication, the additional use of technologies that support synchronous communication may enhance the degree of interaction among participants in online courses. Thus, it is up to individual teaching staff to decide in what proportions asynchronous or synchronous communication should be used. This issue of balance was of little concern in traditional (face-to-face) classrooms (Wuensch et al., 2009).

Although there has been a lot of research on the effectiveness of various types of technologies used for online learning, email has somehow been overlooked and belittled as an educational technology afterthought in terms of its effectiveness. However, the likes of Kearsley and Shneiderman (1999) would argue otherwise because email is seen as one of the more “important collaborative tools and it usually serves as the communication backbone for all activities” (p. 2). Nevertheless, faculty members have been known to grumble that it takes a lot of time and effort to keep pace with email and that sometimes students can become inappropriately aggressive.

Much of what transpires during face-to-face communication, such as body language, tone of voice and intonation, goes missing in email. As a result, miscommunication and consequently low social presences tends to occur. Furthermore, the utilization of Learning Management Systems (LMS) that generally included functions which enabled the use of discussion boards and the administration of quizzes and examinations was also included. Apparently the availability and appropriate use of such functions can also influence student learning and satisfaction with online courses (Wuensch et al., 2009).

Correspondingly, a survey instrument was designed and developed by a team of faculty from a south eastern university to measure student attitudes towards various pedagogical characteristics of online courses. In total the instrument had eighty-six items with eleven being about students’ perception towards the pedagogical characteristics of the most recent online course they had completed. Additional items were about how frequently each of the twenty-one educational technologies listed in the survey had been utilized. A convenience sample that included elements of cluster sampling and snowball sampling of students from 46 universities and colleges across 26 different states in the U.S. was utilized. A sample of 4,789 respondents completed the survey (Wuensch et al., 2009).

Results from the study revealed “that [email] was the most frequently used technology – everybody has it and knows how to use it” (Wuensch et al., 2009, p. 257). The study also identified seven of the most regularly used technologies as being of the asynchronous type. Perhaps this was because they were common in LMSs, for instance online digital drop box, asynchronous discussion, slide presentations, course-specific web page, unproctored testing and asynchronous online lecture.

Although half of the students reported having experienced synchronous chat, technologies that supported synchronous communication were generally less frequently used in online courses. For example, telephone with instructor, proctored online testing, synchronous online lecture, lecture with video and audio, electronic white board and remote/virtual lab. The least used technologies were those that involved the use of two-way audio and video exchanges.

The frequency of use for each of the twenty-one technologies was found to be positively correlated with students’ perceptions of course quality. Nevertheless, there were also six types of technologies that had associations which were so small the technologies fell short of statistical significance. These were; lecture with audio only, instant messaging, student synchronous presentation, student has audio and video input, student has only audio input, and lastly 3-D virtual classrooms (Wuensch et al., 2009).

The frequency of e-mail utilization was the most significant finding made by the study in relation to course quality. Although e-mail may not be as effective as face-to-face communication in establishing social presence and teacher immediacy, experienced users of e-mail may realize that missing nonverbal and vocal cues can be expressed in other ways. Furthermore, it was also determined from the findings of the study that a course was perceived as more difficult the more frequently a technology was utilized (Wuensch et al., 2009). Apparently, when course materials became more difficult, or instructors more demanding, technology was utilized more frequently because both students and teaching staff alike had come to appreciate its usefulness in bridging the digital divide to solve the problem at hand in an effective, efficient and engaging manner.

2.7 The Different Levels of Instructional Strategy

Meanwhile, Merrill has been suggesting for a number years that the principles of teaching and learning, which constitute the foundation of instructional science, have not really changed that much, but what has changed are the tools at our disposal. Learners today are not significantly different from those of a decade ago, a generation ago, or a century ago. The basic learning mechanisms by which learners acquire knowledge and skill have remained constant amid societal change. While far less understood, the science of instruction is just as stable as the science of biology, physics, or chemistry (Merrill et al., 1996, p. 2).

Subsequently, he goes on to propose that in most instructional design theories and models, a basic set of interrelated prescriptive principles, which he prefers to call the First Principles of Instruction, can be abstracted (Merrill, 2002). This claim is said to be based on his analysis of instructional design practices such as the Vanderbilt Learning Technology Centre's *Star Legacy Program*, Howard Gardner's *Multiple Approaches to Understanding*, Jeroen van Merrienboer's *4-Component ID Model* and David Jonassen's *Descriptions of Constructivist Learning Environments* (Romiszowski, 2006). Briefly listed below are Merrill's First Principles of Instruction. For a complete listing see Appendix C;

Demonstration principle

- *Learning is promoted when learners observe a demonstration*
- *Demonstrations are enhanced when learners receive guidance*
- *Demonstrations are enhanced when learners observe media*

Application principle

- *Learning is promoted when learners engage in applying their newly acquired knowledge or skill*
- *Application is effective only when learners receive intrinsic or corrective feedback*
- *Application is enhanced when learners are coached and when this coaching is gradually withdrawn*

Task-centred approach

- *Learning is promoted when learners are engaged in a task-centred approach*
- *A task-centred approach is enhanced when learners undertake a progression of whole tasks*

Activation principle

- *Learning is promoted when learners activate relevant cognitive structures*
- *Activation is enhanced when learners recall or acquire a structure for organizing the new knowledge*

Integration principle

- *Learning is promoted when learners integrate their new knowledge into their everyday life*
- *Integration is enhanced when learners create, invent, or extrapolate personal ways to use their new knowledge or skill*
- *Integration is enhanced when learners publicly demonstrate their new knowledge or skill*

However, what was of greater value was the proposition that "performance on complex real-world tasks will be incremented when an instructional strategy implements each of the first principles in turn" (Merrill, 2006, p. 9). Therefore, when these instructional strategies are used to implement each of the first principles sequentially, the learning experienced by students can be made to be systematically scalable to different levels of complexity culminating in the ability to satisfactorily complete complex tasks (Merrill, 2006). Most importantly, the Different Levels of Instructional Strategy have been proposed in a functional form that can be utilized straight away. Briefly listed below are Merrill's Different Levels of Instructional Strategy. For a complete listing see Appendix D;

Level 0 – Information Only

- *Information is presented with or without accompanying recall questions*

Level 1 – Information Only Plus Demonstration

- *Consistent demonstration is added to information only strategy*
- *Guidance in conjunction with demonstration promotes an additional increment in performance*
- *The inclusion of relevant media in demonstrations promotes an additional increment in learning efficiency, effectiveness and engagement*

Level 2 – Information Only Plus Demonstration Plus Application

- *Consistent application along with corrective feedback is added to Level 1 instructional strategy*
- *Gradually diminishing coaching is added to consistent application*

Level 3 – Task-Centred with Demonstration and Application

- *Consists of a task-centred approach that includes consistent demonstration and application of component skills*

Merrill himself has commented that “problem-centred instruction was an idea that [he] had not addressed in Component Display Theory and Gagne had not addressed in his Conditions of Learning” (Spector et al., 2005, p. 317). As he continued to study the literature available, it became clear to him that “building instruction centred around real-world problems was a key to effective content organization and contrasted with the usual topic-oriented approach (Spector et al., 2005, p. 317). He then goes on to make the distinction that problem-centred instruction is not as efficient as task-centred instruction, and nor is it as effective because learners are expected to acquire the necessary skills by researching for solutions and struggling with the problem (Merrill, 2009).

According to Kirschner et al., (2006) “un-guided or minimally guided instructional approaches” are normally less effective and efficient during constructivist, discovery, experiential, inquiry-based or problem-based teaching with novice to intermediate learners (p. 84). This is because evidence indicates that they are susceptible to acquiring “misconceptions or incomplete or disorganized knowledge” unless they have accrued a considerable amount of prior knowledge that would enable them to intrinsically have the critical insight required to complete a complex task and later solve a related or similarly complex problem (Kirschner et al., 2006, p. 84).

Consequently, Merrill has indicated preference for a task-centred instructional strategy because it "is a form of direct[ed] instruction but in the context of authentic, real-world problems or tasks" (Merrill, 2009, p. 49). He has hypothesized that "performance on complex, real-world tasks will be incremented (successively improved) when an instructional strategy implements each of the first principles in turn" (Merrill, 2009, p. 55). Briefly listed below are Merrill's proposed Options for Task Progression meant for Task-Centred Instructional Strategies. For a complete listing see Appendix E;

Activation Enhancement

- *Providing or recalling relevant experiences with any of the above instructional strategies*

Structure Enhancement

- *Adding an activation structure to any of the above instructional strategies*

Reflection Enhancement

- *Adding reflective integration to any of the above instructional strategies*

Extrapolation Enhancement

- *Adding extrapolation-integration to any of the above instructional strategies*

Going Public Enhancement

- *Adding go public-integration to any of the above instructional strategies*

2.8 Adaptations of the Different Levels of Instructional Strategy

In 2007, Theodore W. Frick, Rajat Chadha, Carol Watson, Ying Wang and Pamela Green, from the Department of Instructional Systems Technology, School of Education, Indiana University, Bloomington, published their study entitled; *Theory-Based Course Evaluation: Nine Scales for Measuring Teaching and Learning*

Quality. What is significant about this group is that they constructed a survey instrument using items from Indiana University's Bureau for Evaluative Studies and Testing (BEST) course evaluation item bank, and proceeded to amalgamate it with Merrill's First Principles of Instruction to form what is now known as the Teaching and Learning Quality Scales (TALQ).

According to Frick et al., (2007) back then, the relationship between student achievement and traditional course evaluation practices in higher education contained few items that were strongly correlated. Consequently, the findings from their study revealed that the relationship between student evaluations of teaching effectiveness and measures of student learning gains were weak. It was also reported that the relationship between learning achievement and student grades were moderate.

Initially, factor analysis was not performed because the "scales were formed *a priori* based on what we were trying to measure" i.e., academic learning time, activation, application, authentic problems, demonstration, global course rating, integration, learner satisfaction and student achievement (Frick et al., 2007, p. 16). However, because of concerns about the possibility of what is called the 'halo effect' i.e., "if a student is happy with an instructor or course, then he or she tends to rate everything perceived as positive about the course very highly, and vice versa," factor analysis was performed using the image factoring extraction method with varimax rotation (Frick et al., 2007, p. 28). "Given that only a single factor was extracted, this means that all of these scales are strongly associated with a single construct" labelled as 'Instructional Quality' (Frick et al., 2007, p. 29). The sample utilized was of 140 undergraduate and graduate students from different courses who were attending 89 different universities. Cronbach's alpha for the scales ranged from 0.74 to 0.97, with correlations among scales averaging 0.63 (Frick et al., 2007, p. 33).

In 2008, Frick, Chadha, Watson and Emilija Zlatkovska published a study entitled; *Improving Course Evaluations to Improve Instruction and Complex Learning in Higher Education.* This study attempted to address two limitations of the earlier study. Firstly, the participation of "whole classes to address concerns about representativeness of student ratings" and secondly, in an effort to circumvent problems related to the issue of self-reporting, "an independent assessment of student mastery of course objectives" was obtained from course instructors (Frick et al., 2008, p. 5). A sample of 464 students from 12 courses was surveyed. Findings from the study revealed that if students indicated they had "experienced academic learning time (ALT) and that their instructors used the First Principles of Instruction," then they were "nearly 4 times more likely [to] achieve high levels of mastery of course objectives" (Frick et al., 2008, p. 2).

In 2009, Frick, Chadha, Watson, Wang and Green published their study entitled; *College student perceptions of teaching and learning quality.* In this study, improvements were made to TALQ using "items targeting academic learning time (ALT), Merrill's First Principles, and Kirkpatrick's level of evaluation (1 & 2), in addition to global ones...which indicated overall ratings of the course and instructor" (Frick et al., 2009, p. 707). This time around, the group wanted to investigate the likelihood that students would learn more, master course objectives, or feel satisfied with the instruction received, if and when Academic Learning Time and the First Principles had occurred.

The findings from the study, indicated that "students were three to five times more likely to agree or strongly agree that they learned a lot and were satisfied with courses" when the First Principles took place, and students were engaged frequently and successfully during ALT (Frick et al., 2009, p. 713). It was recommended by the research group that "learners be assessed both before and after instruction with respect to their mastery of instructional objectives" (Frick et al., 2009, p. 716). This was for the purpose of enabling course designers to identify what parts of the instruction could be improved and whether ample learning opportunities had been provided.

In 2010, Frick, Chadha, Watson and Zlatkovska published their study entitled; *New Measures for Course Evaluation in Higher Education and their Relationships with Student Learning.* TALQ was used to survey a sample of 464 students from 12 courses. The findings from the study revealed that when students were in agreement with their instructors about the usage of the First Principles of Instruction and of having experienced ALT, i.e., the repetitive engagement in successful learning activities that are relevant to curriculum goals, the tendency was for them to be roughly 5 times more likely to achieve high levels of mastery of course objectives compared to being 26 times less likely to achieve low levels of mastery (Frick, et al., 2010).

As of 2011, the latest paper to be released by this group of researchers was by Chadha and Frick entitled; *Dependability of College Student Ratings of Teaching and Learning Quality.* It appears that the first author has moved on having been appointed to the Australian Council for Educational Research. The findings from an administration of the TALQ survey instrument "near the end of the semester to 464 students in 12 classes taught by 8 professors at a large Midwestern university" was reported (Chadha & Frick, 2010, p. 2). Findings from the study revealed that three First Principles of Instruction i.e., activation, application and integration, could dependably be used by students to rate learning progress, satisfaction and course/instructor quality. Authentic problems, instructor demonstration and ALT are the First principles that were found to be less dependable. Hence, the suggestion put forth was for future validation studies that examined the use of the modified scales in postsecondary education, be conducted for reasons related to improving the quality of teaching (Chadha & Frick, 2010).

Although what has been done by Frick et al., (2007–2011) is to a certain extent similar to what this research project attempted, it is slightly different in terms of the theoretical constructs that were chosen as the building blocks. It must be reiterate, that within the context of this research project, the merging of DLIS with the Seven Principles would be a way forward in terms of creating a context that promotes the utilization of DLISt7 as a whole. This is for all intents and purposes to create more opportunities for more of the principles to be put to good use, and thus increase the probability of multiplying the effectiveness of DLISt7 as a set of guiding principles.

This is because, when DLISt is used as a rubric to prompt and stimulate conditional response from students, favourable online learning experiences that are in union with the Seven Principles would manifest themselves in ways that are unobscure and familiar. Only then would a move away from issues related to the quagmire known as quality teaching be likely, and instead the focus shift towards finding new ideas for improving the instructional design of future online courses by effectively integrating technology with good pedagogy regardless of form, delivery system or instructional architecture (see e.g., Merrill, 2008; Merrill, 2009).

The same mistake that instructors and online course developers made when “trying to emulate the traditional classroom with technology mediated interactions without the benefit of good pedagogy" should not be repeated (Grant & Thornton, 2007, p. 347). Consequently, the proportionate use and management of key considerations such as learner support, mediated interaction, situativity, learner centredness, in addition to balancing flexibility with structure, "is what differentiates online teaching and learning from similar activities in other educational contexts" (Kehrwald et al., 2005, p. 4). This is because, as of a few years ago, issues of balance were of little concern in traditional face-to-face classrooms (Wuensch et al., 2009). Perhaps, after all these years there is a real chance that a new paradigm concerning the stimulation of awareness about how to continue good pedagogy while integrating with instructional technology is now on the horizon (Robertson, Grant & Jackson, 2004).

2.9 Related Developments in the Field

In the original doctoral study on which this research project was based upon entitled; *Perceptions of the Effectiveness of Online Instruction in terms of the Seven Principles of Effective Undergraduate Education* by Stan G. Guidera (2003), the effectiveness of online instructional delivery was assessed by teaching staff experienced in teaching both online and traditional environments. The research question investigated was: do teaching staff perceive online instructional delivery to be as effective as traditional face-to-face instruction in meeting the instructional objectives outlined in the Seven Principles? Guidera utilized the Faculty Inventory from the TLT group's Flashlight Program for his study.

The findings of the study rejected the null hypothesis for the research question. Overall, it was concluded that teaching staff perceived online instruction to be somewhat effective at meeting certain objectives. However, the perceived level of effectiveness was not consistent across all Seven Principles. For example, online instruction was found to be less effective for promoting student-teaching staff interactions and cooperation among students. On the other hand, online instruction was found to be effective in providing prompt feedback and communicating high expectations (Guidera, 2003).

Within the Malaysian context, Hanafi Atan, Ahmad Hanizar, Saw Kim Guan and Rozhan Idrus (2003) assessed a science interactive teaching and learning courseware in their study entitled; *Science Educational Software in Malaysian Smart Schools: An Evaluation of Pedagogical and Communicative Dimensions*. A case was made for the Smart Schools concept which was a government initiative that attempted to formally expose students, teachers, administrators and parents to information technology (IT). The pilot project ran from 1999 until 2002 with ninety schools being selected to be part of the programme (Hanafi et al., 2003). This was in an attempt to shift the education system towards a paradigm that emphasized critical thinking and knowledge creation instead of continuing to be rooted in the traditions of rote learning.

The pilot project was meant to be the testing ground for the Smart School Integrated Solution (SSIS). Its most important component was the learning and teaching courseware which was supposed to be the bridge between curriculum, pedagogy, and assessment. Designed for use on a browser-based platform, the courseware was intended to make lesson deliveries more effective, efficient and meaningful. The goal was to encourage students to take responsibility for their own learning so as to be better able to realise their potential (Hanafi et al., 2003).

Web-based learning was thought to have the necessary characteristics to support the accepted constructivist learning theory of knowledge construction in which learning is student-centred and interactive rather than teacher-centred and didactic. The role of the teacher shifts from that of content expert to facilitator of knowledge construction. Students should no longer be passive listeners but active participants who search for knowledge instead of waiting for it to come to them. Instructional emphasis would be on critical thinking and not rote learning with the demonstration of learning success no longer being retention but assimilation. The transformation of facts and ideas constitutes the process of knowledge construction instead of the accrual and memorization of facts. Teaching processes were supposed to be collaborative and interactive rather than traditional drill and practice. The Smart Schools project generated high expectations among Malaysian educators and was expected to incorporate design features that would utilise various forms of communicative technology to support collaborative learning and constructivist educational strategies (Hanafi et al., 2003).

The science educational software that was reviewed by this study was meant for use with Form One students (13 year olds) in Malaysian Smart Schools. The topics that were reviewed were; (1) The Physical Quantities and Their Measurements, (2) The Cell as a Unit of Life, (3) Living Things and Their Classification, (4) Matter, (5) Resources on Earth, (6) The Air Around Us, (7) Sources of Energy and (8) Heat.

The study utilized an approach that was adapted from the taxonomy of Web-Based Learning Environments (WBLE) developed by Nachimas, Mioduser, Oren and Lahav (1999). It entailed identifying and sorting the courseware according to its learning and instructional objectives. A total of ten pedagogical objectives were selected and each page of the courseware was carefully reviewed in terms of its pedagogical dimensions. The ten pedagogical objectives were: (1) Instructional Configuration, (2) Instructional Model, (3) Instructional Means, (4) Interactive Types of Teaching, (5) Cognitive Processes, (6) Loci of Controls, (7) Feedback, (8) Help Function, (9) Learning Resources and (10) Evaluation (Hanafi et al., 2003).

The findings of the study revealed that there were gaps and discrepancies in the design of the learning and teaching courseware in terms of expectation and implementation. Its design was for the most part information based which would result in a form of instructional delivery that remained directed. The cognitive processes that students were being asked to use were still information retrieval and memorisation. Links to external learning resources were limited with online collaboration with peers and experts being nonexistent. Interactivity was for the most part limited to interaction with the courseware's database.

In light of the study's findings, it was recommended by Hanafi et al., (2003) that the design of future learning and teaching courseware for Malaysian Smart Schools take advantage of the unique features made available by the Web. The courseware created must contain pedagogical and communicative dimensions that harness the Web's potential and versatility so as to be able to capitalize on current educational strategies.

In 2004, Janna S. Robertson, Michael M. Grant and Lorrie Jackson published their study entitled, *Is Online Instruction Perceived as Effective as Campus Instruction by Graduate Students in Education?* It was contended that there was a need to investigate the use of technology in online classrooms to determine if it was possible to replicate the meaningful interactions of face-to-face classrooms. This was deemed necessary to be able to answer the question of how to continue the practice of good teaching while integrating technology with online or web-based instruction (Robertson et al., 2004). The research question investigated was; is online or web-based instruction perceived as effective as face-to-face instruction by graduate students in teacher education? Subsequently, Robertson et al., collected their data using an online survey adapted from a study by Nguyen, Cripps and Draude (2002), which in turn was adapted from Chickering & Erhmann's (1996) study wherein the Seven Principles were updated for online instruction.

The findings of the study did not reveal any significant differences between the effectiveness of online instruction compared to conventional face-to-face instruction. However, it did indicate that in terms of the interactions that occurred between students and teaching staff, online instruction may be equivalent to conventional instruction. Although students of online classes rated the amount of learning they experienced in class to be higher than of those who took conventional courses, their scores were not significantly different. Thus, the results were attributed more to chance rather than a meaningful difference in scores (Robertson et al., 2004).

Additionally, the ratings received for student collaboration and active learning were slightly higher for conventional classes than for online ones. Yet again, the scores were not significantly different and the results were attributed more to chance rather than a meaningful difference in scores. Consequently, Robertson et al., (2004) stressed that their findings should not be used as evidence to differentiate between the effectiveness of online and conventional campus instruction.

Besides their findings Robertson et al., (2004) also compiled a list of criticisms categorized according to each of the Seven Principles to add to existing bodies of knowledge. These criticisms were from various other studies that had utilized the Seven Principles as their theoretical rationale. The following is a collective review of the criticism amassed by Robertson et al., (2004).

With regards to encouraging contact between students and teaching staff, a number of studies have indicated that a lack of personal contact with teaching staff continues to concern students in online courses, (see e.g., Knipe & Lee, 2002; Peters, 2001; Solloway & Harris, 1999; Valenta, Therriault, Dieter & Mrtek, 2001). Devoid of before and after class informal social dialogue, students in online courses felt restricted in the amount of time they had to ask questions and obtain support (Knipe & Lee, 2002).

Additionally, there were suggestions that students' skill and interest level in socializing online affected their perception of teaching staff effectiveness while interacting online to deliver instruction (Peters, 2001). In other words, if students were more proficient and motivated than teaching staff, then most likely their perception of teaching staff effectiveness would be different.

Furthermore, there have also been criticisms that some students are not ready to deal with their own learning, and feel discouraged or perplexed when teaching staff deliberately withhold support in online environments (Solloway & Harris, 1999). Basically, this was a reference to students and the instructional strategies used by hardnosed teaching staff when having to deal with the attitude, behaviour and conduct of a select few. However, during the course of completing his postgraduate researcher project the writer has read and consequently become aware that in order to enable "learners to be members of a facilitated, interactive, safe learning community" the concept of "human-ness has been identified...as critical to a successful online learning environment" (Reushle & McDonald, 2004, p. 3). For instance, sometime in 2010 an associate (again selectively removed to preserve anonymity) came back from an academic visit to the University of Hertfordshire in the United Kingdom, and gave the writer a coffee mug that had the Seven Principles tactfully printed across it.

Last but not least, it was also identified that students with low proficiency writing skills may find the medium even more intimidating than communicating in class. This is because students are obliged to possess advanced understanding of English as a language, which is unfortunately beyond the capability of some (Peters, 2001). To put it briefly, if technology is the teaching tool of the Information Age, then the English Language is its *lingua franca,* regardless of racial, religious or cultural differences.

In view of developing reciprocity and cooperation, students felt that they actually learnt less because they had to bring something to the discussion table, particularly when teaching staff limited their input (see e.g., O'Malley & McGraw, 1999; Solloway & Harris, 1999). They reported this as a concern in relation to poor collaboration and wished for more allowances to be made until their confidence grew (Solloway & Harris, 1999). Additionally, students felt that the benefits of shared experiences, camaraderie and social interactions outweigh the advantages of working conveniently from remote locations (Valenta et al., 2001).

Bearing in mind the need to encourage active learning, studies have indicated that online instruction is still limited to lower order cognitive functions (Knipe & Lee, 2002). Students still perceive online instruction as yet another exercise for learning by memorization, acquiring new terms and practicing contemporary skills. Furthermore, there have also been reports that online instruction lacks critical thinking skills that are common in conventional courses (Robertson et al., 2004).

Taking into consideration the requirement of giving prompt feedback, studies have indicated that students are not receiving the feedback they require. This was simply because of inadequate teaching staff know-how with regards to interest level, preparation, teaching strategies and technology skills that amount to minimal feedback and interaction in online classrooms (see e.g., Hill, 2002; Knipe & Lee, 2002; Peters, 2001; Solloway & Harris, 1999). Given that time on task requires emphasizing, studies have revealed that the smaller the amount of time spent online, the lesser the amount of confidence students have that an online tool can facilitate academic improvement (Peh & Foo, 2001). In addition, studies have also revealed that students who have the advantage of time, resources and easy access to technology stand to gain the most when compared to those who are at a disadvantage (Valenta et al., 2001). There have also been reports that students are tempted to register for additional online courses but sense that they learnt less online as compared to conventional courses (O'Malley & McGraw, 1999).

With regards to communicating high expectations, a number of studies have been conducted about the impact of online instruction on perceptions of high expectations (Robertson et al., 2004). More often than not, the term workload was associated with high expectations. Thus, there have been complaints of a heavier workload online compared to conventional courses (see e.g., Peh & Foo, 2001; Tamashiro, 2004; Valenta et al., 2001).

Taking into consideration the need to respect diverse talents and ways of learning, studies have not found any differences between the perception of either multimodal or singular learners, and the utilization of web-based strategies (Frey, Faul & Yankelov, 2003). Similarly, no difference was found when conscious effort was made to address learner preference in terms of respecting their diverse talents and ways of learning (Sanders & Morrison-Shetland, 2001).

The findings also suggested that when students with limited technology skills were compared to those with more robust skills, the former group of students tend to perceive online instruction as less effective or dissatisfying (Robertson et al., 2004). However, certain groups of learners with a particular preference are inclined to do better in online environments (Valenta et al., 2001). It was suggested that online instruction appears to yield returns for students who like to learn electronically, but does not apply to the entire student population (Tamashiro, 2004). Perhaps the younger students, who are techno savvy, possess the aptitude and capacity to assimilate and keep up with the frantic pace of technological development, are more suitable for online learning compared to those who are from a different generation.

Subsequent criticism towards the Seven Principles as a whole was also mentioned in the study by Robertson et al., (2004). Among the more notable criticisms that were directed at the Seven Principles were, in order for the in-depth interaction between students and teaching staff to occur, the small class sizes required would not be cost effective for most institutions (Heterick, 2002). Additionally, only students with a specific skill set and learning style would be affected by the Seven Principles (Fitzsimmons, 2001). Furthermore, it was established that when it comes to dealing with online course content, technologies and tasks, independent learners would stand to gain more satisfaction when compared to learners who are dependent on child-like models of learning (Fitzsimmons, 2001). Moreover, it was the opinion of Robertson et al., (2004), that the Seven Principles might not be suitable for graduate students. This is because, graduate classes are smaller, have more face-to-face time, and required an independent style of learning. Consequently, when compared to undergraduate populations, the graduate setting may lack some of the challenges that Chickering and Ehrmann (1996) wanted to address.

The most pejorative criticism levelled at the Seven Principles was the lack of options to the precise methodologies that were being advocated (Robertson et al., 2004). Perhaps somewhere along the way Chickering and Gamson's (1987) reminder that the principles are not a set of ten commandments that have to be adhered to religiously had been forgotten. Instead they are just guidelines that ought to be used as rules of thumb.

Also in 2004, Shirley Reushle and Jaquelin McDonald published their paper entitled: *Online Learning: Transcending the physical.* It was claimed that the Internet had increased opportunities for flexible approaches to learning. While some educators are enthusiastic about its use to support interactions that would make for learning to be more effective, research has suggested that much of online education has remained focused on the distribution of materials therefore maintaining the 'delivery' mode of teaching (Reushle & McDonald, 2004). The authors of the paper contend that online learning should be used to create a dynamic learner centred environment where knowledge is constructed via collaborative interactions with motivated learners.

The authors were teaching staff who taught online at an Australian institution for tertiary education (the University of Southern Queensland). Data was formally obtained from the course; *Instructional Design for Flexible Learning,* collected at the end of Semester 1, 2004, using an online evaluation form. Prior to this in 2002, the authors were involved in a DEST funded EIP research project entitled: *Online Teaching and Learning in Higher Education: A Case Study* (Postle et al., 2003).

DEST has since been renamed the Department of Education, Employment and Workplace Relations by the Australian government. The study explored the emergence of online learning and teaching in higher education, and traced the acceptance of flexible learning approaches at USQ (Reushle & McDonald, 2004).

The findings from the case study revealed that online approaches to learning and teaching had a number of advantages over traditional distance education. One of the more significant points discussed was the increased opportunities for interaction between teaching staff and student, and between student and student. The quality of instruction, student support and level of interaction available from online teaching staff, have been indicated by students enquiring about online education at USQ as being important factors when choosing between universities (Reushle & McDonald, 2004). Consequently, the use of synchronous and asynchronous tools such as discussion groups, email and virtual chats would enable the conception of environments suitable for collaborative group learning. Hence, learners are encouraged to take advantage of such online communities for the purpose of exchanging ideas in an attempt to construct their own understanding.

As a result, the pedagogical principles that underpin the design of the courses discussed in this paper include; (1) the development of a supportive and productive learning community, (2) a focus on situated learning, (3) interactive and collaborative learning, and (4) the use of reflective practices. At that point in time, the literature available suggested that the concept of 'human-ness' was critical for online learning environments to be successful. The human touch, which was a reference to social presence, was a notion that had to be created and maintained throughout the learning experience. This was for the purpose of enabling learners to become members of a learning community that was facilitated, interactive, and safe

(Reushle & McDonald, 2004). Which back in the day, was also what the Seven Principles were about in terms of improving American higher education in response to criticisms such as “apathetic students, illiterate graduates, incompetent teaching and impersonal campuses” (Chickering & Gamson, 1987, p. 1).

Such an approach to online pedagogy was advocated by the authors in an attempt to shift from passive to active learning, from environments that are teacher-centred to more learner-centred environments, and from decontextualised tasks to authentic, meaningful, and structured experiences (Reushle & McDonald, 2004). In educational literature, it is a common argument that learning within a constructivist environment encourages meaningful learner engagement, and the nurturing of critical, creative and complex thinkers (see e.g., Bates, 1999; Jonassen, 2000).

During the course, *Teaching online: Strategies and Tactics*, one of the interactive strategies employed was the use of synchronous chat. Chat has often been thought of as an excellent means of enabling ‘real time’ engagement. However, much debate has transpired about its actual worth in online learning environments. Nevertheless, chat can still be used to provide reinforcement and immediate feedback when face-to-face meetings are not possible. Reushle and McDonald (2004) advised that it would be handy but not essential to have a pre-determined agenda before engaging in synchronous chat.

From the findings of the study, it was suggested that the acceptance of online technologies has resulted in teaching staff having to experience change in their teaching philosophies, relationships with learners and work patterns (Reushle & McDonald, 2004). The conclusion that was drawn was that the promised e-learning boom did not materialize as expected because it took off before people really knew how to properly utilize the technology available. Nevertheless, with thoughtful design, such a dream is still a possibility though students and teaching staff alike will need time to acclimatize to the changes that had to happen.

2.10 Related Trends in the Field

In 2006, J. Ben Arbaugh and Alvin Hwang published their study entitled; *Does "teaching presence" exist in online MBA courses?* A case was made for them to focus on teaching presence because it was the least explored and conceptually established of the three types of presence originally proposed by Garrison, Anderson and Archer (2000) as part of their Community of Inquiry (CoI) Model in their study; *Critical inquiry in a text-based environment: Computer conferencing in higher education.* Garrison et al., had originally proposed this conceptual order as a tool for use during "computer mediated communication (CMC) and computer conferencing" in support of the educational experience (2000, p. 87).

According to Arbaugh and Hwang (2006) it had been suggested earlier that effective online learning was the function of three types of presence. Firstly, social presence was described as the ability of learners to project themselves socially and emotionally, thereby representing themselves as real people. Secondly, cognitive presence was defined as the extent to which learners were able to construct and confirm meaning through sustained reflection and discourse. Lastly, teaching presence was described as the design, facilitation and direction of cognitive social processes for the purpose of realizing meaningful and worthwhile educational learning outcomes. It was maintained that "this model has roots in learning frameworks such as" Chickering and Gamson's Seven Principles (1987) and studies by the National Research Council's Commission on Behavioural and Social Sciences and Education (CBASSE) about *How People Learn* (Arbaugh & Hwang, 2006, p. 9).

As understood by Arbaugh and Hwang, teaching presence is composed of three components; (1) Instructional Design and Organization, (2) Facilitating Discourse and (3) Direct Instruction. For that reason, the research question that was being investigated was; are Course Design and Organization, Facilitating Discourse and Direct Instruction empirically distinct dimensions of teaching presence? This was for all intents and purposes to verify the validity of the constructs that define the dimensions for teaching presence. Arbaugh and Hwang (2006) conducted a confirmatory factor analysis that tested for the significance of item loadings on each factor, relationships between the factors, and fit of the data to the hypothesized factor model.

The findings from the study revealed that the three components of teaching presence could be empirically validated. Moreover, the test results provided a comprehensive multi-prong platform for testing the discriminant validity of the underlying factors in the teaching presence framework, the significance of the items that define these factors and their relationships. Consequently, this enabled Arbaugh and Hwang (2006) to ground their concept for advocating effective online learning using empirical data.

As for the Instructional Design and Organization component, Arbaugh and Hwang (2006) emphasized the need for instructors to communicate goals, provide clear instructions on participation behaviour, set deadlines and time frames for activities, not to mention guidelines and boundaries to facilitate effective student interactions. With the Facilitating Discourse component, it was emphasized that there was a need for ongoing process interventions and interactions by teaching staff to promote discovery and understanding, acknowledge and encourage student participation, create channels for effective dialogue, keep students from straying, monitor their interactions, and provide guidance instead of letting students work in isolation. Such collaboration in an online environment was said to stem from Chickering and Gamson's (1987) principle of encouraging contact between students and teaching staff.

Lastly with the Direct Instruction component, it was suggested that it is still possible for teaching staff to continue to shoulder the role of providing intellectual and scholarly leadership, if they choose to do so, as was the scenario in the traditional classroom and so it will continue to be in contemporary online environments (Arbaugh & Hwang, 2006). However, a lot of ground still remains to be covered before it is truly understood how educational experiences that are worthwhile can be designed and delivered optimally in text-based environments that successfully mediate critical discourse and reflection for the purpose of creating an educational CoI (Garrison et al., 2000).

In 2008, Kerri-Lee Krause and Hamish Coates published their study entitled: *Students' Engagement in First-year University*. To sum up, the paper was about campus based Australian students' engagement during their First Year of university. Data obtained from a national study was used to define the seven dimensions of student engagement (Krause & Coates, 2008). Based on the work of Astin (1985, 1993), Pace (1995) and Chickering and Gamson (1987) the study focused on how students were engaging in activities that earlier research had linked to quality learning outcomes. This notion correlates with the call made earlier by Arbaugh and Hwang (2006) about understanding how worthwhile educational experiences should be designed and delivered in an optimal manner so as to promote effective, efficient and engaging critical discourse and reflection.

Studies pertaining to student engagement were primarily based on the constructivist view that tertiary education is fundamentally about the construction of knowledge by students. The establishment of learning environments that are conducive and the provision of ample learning opportunities are the responsibility of institutions. However, the final responsibility for learning rests squarely on the shoulders of students. How students make good use of the resources at their disposal is up to them (Krause & Coates, 2008).

In the last few years a substantial amount of research has focused on student engagement. For example in the US there is the work by Kuh (2001), Fredericks, Blumenfeld and Paris (2004), while in the United Kingdom there is the work of Mann (2001), and in Australia there is the work of Krause, Hartley, James and McInnis (2005), and Coates, Tilbrook, Guthrie and Bryant (in press).

In an attempt to monitor the quality of university education in Australia, the First Year experience study was initially initiated by McInnis and James (1994). McInnis, James and Hartley (1999) then modified the questionnaire and replicated the earlier study using a sample obtained from the original seven universities. Krause, Hartley, James and McInnis (2004) later replicated the study yet again but this time with a larger sample that could be used to establish a norm for the nation. New questions about the use of Information and Communication Technologies (ICT) were incorporated into the modified questionnaire in an effort to remain in touch with international research trends (Krause & Coates, 2008).

The sampling for the 2004 study was of commencing First Year undergraduate students from eleven broadly defined educational fields selected from thirteen participating public universities in Australia. This was intended to be a twenty-five percent stratified sample representative of the student population. Indigenous and international students who were enrolled full-time were also included. However, students in non-award and enabling programs were excluded. The first mailing of questionnaires occurred in July 2004 and a second mailing occurred in August. The return rate was thirty-three percent, which was a total of 3542 useable responses (Krause & Coates, 2008).

The engagement scales were analyzed using exploratory factor and thematic analyses for the purpose of categorizing the First Year Experience Questionnaire (FYEQ) into significant items groupings. Face validity for the item groupings was established via consultation with experts in the field which subsequently led to labels being ascribed for each scale (Krause & Coates, 2008). Internal consistency reliability for each scale was calculated and factor analysis was used to establish construct validity. A maximum likelihood extraction using varimax rotation was used for factor extraction.

The FYEQ had items that functioned both as latent indicators of student learning processes and as elements of a calibrated engagement scale. Cronbach's alpha for most of the scales were above 0.70 (Krause & Coates, 2008). The items were then grouped into the following scales: (1) Transition Engagement Scale (TES), (2) Academic Engagement Scale (AES), (3) Peer Engagement Scale (PES), (4) Student-staff Engagement Scale (SES), (5) Intellectual Engagement Scale (IES), (6) Beyond-class Engagement Scale (BES) and (7) Online Engagement Scale (OES). It must be noted that for the purpose of this paper, although student engagement with ICT was proposed to represent an independent scale, this does not mean that it might not correlate with and influence a range of other attitudes, behaviours and learning experiences (Krause & Coates, 2008). Nevertheless, because the mean for the OES scale behaved in a different way compared to the rest suggests that more work was required to better understand how students were engaging online and its effect on their learning experiences.

The findings of the study provided evidence about the multifaceted nature of student engagement. Thanks to the work of Kuh and colleagues the concept of student engagement has gained international recognition in promoting student learning and demonstration of institutional effectiveness. These scales are not meant to replace the NSSE by NCHEMS, but instead represent an Australian perspective on engagement that was focused on the First Year experience (Krause & Coates, 2008).

Also in 2008, Arthur Bangert published a study entitled; *The Influence of Social Presence and Teaching Presence on the Quality of Online Critical Inquiry.* In this study, Bangert (2008a) wanted to investigate the influence of social and teaching presence on the quality of critical inquiry experienced by online learners using Garrison et al., (2000) version of Dewey's (1933) practical inquiry model. A sample of 33 students registered for "an online version of a graduate-level, educational statistics course were randomly assigned to either a control, social presence, or social presence combined with teaching presence experimental discussion group" (Bangert, 2008a, p. 34).

CMC was seen as important for promoting interactions that are reflective and meaningful in online learning environments. Consequently, the practice of engaging students in contextually meaningful inquiry-based learning activities that were designed to create knowledge structures, which are retrievable when necessary, to solve authentic problems encountered in the real-world, is a valued and recommended instructional practice for teaching staff in institutions of higher education. Critical thinking is supposedly promoted in CMC activities when the CoI Model is used to interpret written discourse. Social presence is characterized as how a person is perceived during CMC, or in other words, a student's sense of being and belonging in an online course (Picciano, 2003). The methods that are utilized to design quality instructional experiences which support and sustain productive communities of inquiry by teaching staff represents teaching presence. By borrowing Dewey's (1933) practical inquiry model, the construct of cognitive presence can be operationalized to explain how online learners are able to confirm and construct meaning through sustained discourse and reflection within a CoI that is supported by CMC (Bangert, 2008a).

Although the CoI model proposed by Garrison et al., (2000) has been widely cited and is highly recommended for "guiding the design and delivery of online instruction," few studies have looked at how the "core elements of the model interact simultaneously during CMC" (Bangert, 2008a, p. 44). The findings of the study revealed that students who were involved in a CoI that had elements of social and teaching presence, produced more messages that could be coded at the highest levels of cognitive presence. This was interpreted as conditions that are suitable for "nurturing and sustaining deep levels of critical inquiry" (Bangert, 2008a, p. 53). Thus, the notion that cognitive presence is dependent on both presences, either of the teaching or social variety, was supported by the results from the study. Hence, large scale multiple regression studies would be the recommended next step to confirm this outcome (Bangert, 2008a).

In 2010, J. Ben Arbaugh, Arthur Bangert and Martha Cleveland-Innes published their study entitled; *Subject matter effects and the Community of Inquiry (CoI) framework: An exploratory study*. In this study, Arbaugh et al., (2010) wanted to investigate if online learning and teaching was effected by subject matter, and at the same time, explore the dimensions of the CoI framework in a graduate level, multi-institution, multi-disciplinary setting. In other words, this study wanted to determine to what extent perceptions of cognitive, social and teaching presence varied across disciplines.

The CoI model considers community as a function of the relationship between cognitive, social and teaching presence that emerges in support of online learning. Cognitive presence is defined as "the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse," whereas social presence is described as "the degree to which learners feel socially and emotionally connected with others in an online environment" (Arbaugh et al., 2010, p. 38). Teaching presence, which is the "design, facilitation and most importantly, the direction of cognitive and social processes for the realization of personally meaningful and educationally worthwhile learning outcomes" is the central organizing element (Arbaugh et al., 2010, p. 38).

Group cohesion, open communication and affective expression are the categories of social presence. Teaching presence, as defined by Anderson, Rourke, Garrison and Archer (2001) has three components: (1) instructional design and organization, (2) facilitating discourse (i.e. building understanding) and (3) direct instruction (Arbaugh et al., 2010). Although the findings from a study by Shea (2006) found only two components for teaching presence, and contradicts the findings from the study by Arbaugh and Hwang (2006) that found three components, the three component conceptualization of teaching presence remains grounded in earlier research (see e.g., Coppola, Hiltz & Rotter, 2002; LaPointe & Gunawardena, 2004; Stein, Wanstreet, Calvin, Overtoom & Wheaton, 2005).

From his reading of periodicals related to the issue, the writer was able to gather that recent results from an “exploratory factor analysis identified a four rather than three factor solution for the current version of the CoI survey” (Bangert, 2009, p. 110). The loadings from factor analysis are consistent with the findings from other recent studies that “suggest a two-dimensional orientation of items used to measure teaching presence” since the “eigenvalues indicate a potential fourth factor, while the scree plot yields inconclusive results” (Arbaugh, Cleveleand-Innes, Diaz, Garrison, Ice, Richardson & Swan, 2008, p. 135).

The explanation offered was that such findings “may merely reflect the reality of the online environment rather than a flawed conceptualization....[which] might suggest a modified CoI model based on sequence of activities” (Arbaugh, 2007, p. 81). The two factors extracted are “referred to as [1] Instructional Design and Organization and ‘[2] Directed Facilitation’ (the latter refers to a combination of facilitation of discourse and direct instruction)” (Shea, Li & Pickett, 2006, p. 181). This is very much in line with what was suggested by Cobbett (2007) when she said that there are apparent differences in the emphasis placed on pedagogical practices in terms of the focus of activities for online instruction compared to the traditional environment.

Cognitive presence is defined as the “four phases of the Practical Inquiry Model” which are: (1) the triggering event, (2) exploration through critical reflection and discourse, (3) integration by means of meaning construction and finally (4) resolution by way of application (Garrison et al., 2010a, p. 6). Earlier studies conducted using transcript analysis (see e.g., Garrison et al., 2001) revealed that students were not progressing to the integration and resolution phases but were lingering at the exploration phase. Perhaps, this is where a better understanding of how students were engaging online (Krause & Coates, 2008) and the effect of engagement on interaction while experiencing learning should come into play.

The reason suggested was that the design of the educational experience probably did not have clear expectations which required facilitation and direction in order for students to be able move to forward (see e.g., Garrison et al., 2010a; Swan, Richardson, Ice, Garrison, Cleveland-Innes & Arbaugh, 2008). The nature and level of the course content had also been identified as another factor that may predict the likelihood of higher order learning (Arbaugh et al., 2010). Coincidentally, this is in line with the notion that despite a lot of ground having been covered over the past thirteen years (Garrison et al., 2000), it remains to be fully understood how educational experiences that are worthwhile can be designed, developed, implemented and evaluated in CMC based environments for the purpose of mediating effective, efficient and engaging critical discourse and reflection.

In view of course content being treated as constants by practitioners and researchers of online learning, there have been calls to study online learning approaches that are applicable across various disciplines (see e.g., Davis & Wong, 2007; Gorski & Caspi, 2005; Hornik, Sanders, Li, Moskal & Dziuban, 2008). In view of increasing interest in the integration of content with pedagogical knowledge, research on how the outcomes of online learning and teaching are influenced by subject matter are beginning to appear (Arbaugh et al., 2010).

Data for this study was collected from two institutions in America at the start of Fall 2007 until the end of Fall 2008. The 34-item CoI survey instrument was used to operationalize the CoI framework together with the emotional presence construct. Participants from School A were graduate and undergraduate students (n = 1173) from a mid-sized western university enrolled in blended (43%) and fully online

(57%) courses offered using WebCT for the Spring 2008 semester. The sample size utilised provided a ratio of approximately 35:1 for each of the 34 variables. Results for Kaiser-Meyer-Olkin measure of sampling adequacy (0.97) and Bartlett's Test of Sphericity (X^2_{561} = 34, 170.68, $p < 0.001$) indicated that the data was appropriate for factor analysis (Arbaugh et al., 2010).

Principal component extraction with oblique direct oblimin rotation was performed and a four-factor solution was identified. However, Kaiser's criterion, Cattell's (1966) Scree test and the pattern matrix revealed a more parsimonious three-factor solution. Cronbach's alpha for internal consistency was 0.95 for cognitive presence, 0.91 for social presence, and 0.96 for teaching presence (Arbaugh et al., 2010).

Respondents from School A were grouped into eight academic disciplines: Education (n=378), Nursing (n=302), Business (n=110), Allied Health/Technical (n=85), Engineering (n=81), Science/Math (n=80), Social Sciences (n=56), and 'Other' courses from various disciplines (n=82). To determine if there were significant differences across course discipline and between delivery mode (i.e. blended versus online) for each of the CoI factors, a two-way factorial ANOVA was conducted. For the cognitive and social presence factors, significant main effects were found for both course discipline and delivery mode. For the teaching presence factor, there was a significant main effect for course discipline only. Moreover, for the respondents enrolled in fully online courses, their perception of cognitive and social presence was found to be significantly higher than that of students enrolled in blended courses.

Post hoc analysis revealed that respondents from the Allied Health/Technical courses had the tendency to rate cognitive, social and teaching presence to be significantly higher than that of respondents from other courses. However, the means scores for teaching presence were found to not differ significantly between respondents from the Allied Health/Technical and the Science/Math discipline. In any case, no matter what the CoI factor was, respondents from Education courses had higher mean scores compared to respondents from Engineering courses (Arbaugh et al., 2010).

Participants from School B were from 35 online MBA courses at a mid-western university beginning September 2007 until December 2008. A response rate of 53.5% (409 out of 764) provided useable responses with the mean age for students being 32.9. 59% of the respondents were male. Results from the factor analysis yielded a five factor solution, except that the fifth factor loaded on a single item. Further analyses of the four and three factor solution revealed that a three factor solution best corresponds with the findings. Cronbach's alpha for internal consistency was 0.94 for cognitive presence, 0.87 for social presence, and 0.96 for teaching presence (Arbaugh et al., 2010).

Respondents from School B were grouped into six traditional subject areas for business schools: (i) Macro-management (Strategy and International Business), (ii) Operations (MIS, Project Management & Decision Analysis), (iii) Micro-management (Organizational Behavior & Human Resources), (iv) Quantitative (Accounting & Finance), (v) Marketing, and (vi) Other (courses in Business Law, Ethics, and Business Literature). The findings from the study revealed that the most significant difference between disciplines was for teaching presence, with Marketing and 'Other' also posting high scores. All categories scored significantly higher for cognitive presence and there were only minimal differences for social presence (Arbaugh et al., 2010).

The probable explanation provided was that academic disciplines can be categorized conceptually as being two dimensional i.e., ‘hard’ for those that have a dominant paradigm, or ‘soft’ for those that have competing paradigms (Arbaugh et al., 2010). Furthermore, depending on the type of emphasis with regards to application that is required, a discipline can either be ‘pure’ when the results are related to discovery/explanation or understanding/interpretation, and ‘applied’ when the results are related to products/techniques or protocols/procedures (see e.g. Becher, 1994; Biglan, 1973; Neumann, 2001; Neumann, Parry & Becher, 2002). In the one hand, students who are exposed to the pure and hard approaches are required to accrue, apply and integrate mastery of techniques so as to be able to become deductive linear thinkers. On the other hand, students who are exposed to the applied soft approach are encouraged to construct their own knowledge and free-range using reiterative cognitive processes that are inductive because of the expectation to become lateral thinkers (Arbaugh et al., 2010).

According to the authors, these categorizations provide some degree of justification about the findings of the study particularly in relation to cognitive presence. However, “reasons for differences in teaching and social presence do not lend themselves to explanation as readily” (Arbaugh et al., 2010, p. 42). Even with the use of the hard versus soft applied paradigm, it may not be visible to the naked eye the differences in teaching presence because of the characteristics of its sub-elements such as facilitated discourse, directed instruction and knowledge construction. Hence, by utilising what has been elucidated in this study, future researchers would have an abundance of opportunity to extend upon these findings. Despite the apparent limitations of this study, this paper does make the contribution that the "CoI framework may be more applicable to applied disciplines than pure disciplines" (Arbaugh et al., 2010, p. 43).

2.11 Summary

From the review of literature presented in the above, the writer was able to go over the main points and rationalised that a lot of research had already been conducted to investigate the relationship between exposure to good practices and academic gain. However, the investigations were mostly about whether online instructional delivery was perceived as effective as traditional face-to-face instruction. In higher education, a lot of changes have occurred over the past several decades, but in rushing to be the first or an early adopter, quality assurance procedures for guiding the design and delivery of online courses were sometimes ignored. The need to take a closer look at the quality of instructional design being offered was the purpose for examining the nature of student-faculty interaction and its impact on student learning, personal development and satisfaction. This was because the instructional practices of teaching staff, the design of courses and the opportunities for faculty-student interactions within online environments were seen as predictors of student learning and satisfaction.

In précis, good online teaching practices should fundamentally be the same as good traditional teaching practices, and the factors which influence good instruction should in general be ecologically applicable across different settings (Johnson & Christensen, 2012). Thus, the commitment is to making the most out of what online instruction has to offer by pinpointing best practices for the design, development, implementation and evaluation of online courses. Transitioning from teaching in the traditional classroom to that of an online one is not as easy as it seems. It can be an intimidating experience that requires the thoughtful interpretation of familiar principles about good learning and teaching practices.

A list of possible best practices was synthesized from the review of literature conducted and is presented in the following. Firstly, repetitive engagement in successful academic learning activities between students and teaching staff is supposed to increase. Secondly, student-faculty contact does not directly affect satisfaction, but the sum of effort expended is supposed to. Thirdly, students who devoted more effort i.e., time and energy to their studies and were academically better prepared, are the ones who have the tendency to interact more frequently with teaching staff.

The use of noteworthy principles to mimic face-to-face interactions in online courses was found to be only as effective as the extent technology was enabling the integration of good teaching practices. It is the prerogative of teaching staff to decide in what proportions asynchronous or synchronous communication should be used. This issue of balance was of little concern in traditional classrooms. Apparently, the appropriate use of LMSs that included functions which enabled the use of CMC, together with email as the communication backbone for most activities, was identified to influence student learning and satisfaction. Technologies that supported synchronous communication were generally used less frequently unless it was for providing reinforcement and immediate feedback in the absence of face to face meetings.

The most important lesson learnt from the review of literature was that teaching staff perceived online instruction to be somewhat effective at meeting certain objectives, particularly in terms of mediating effective, efficient, and engaging critical discourse and reflection. The suggestion that most struck a chord with the writer was that it would still be possible for teaching staff to continue to be accountable for facilitating intellectual and scholarly leadership, either via directed facilitation or facilitated guidance. However, the establishment of learning environments that are conducive and the provision of ample learning opportunities have, and will continue to be institution dependent. All the same, the final responsibility for learning rests squarely on the shoulders of the individual. How a student makes good use of the resources at their disposal is up to them.

This may perhaps be analogous of the assumption that was made about how the promised e-learning boom did not materialize as expected because it took off before people really knew how to properly utilize the technology available. Thus, the process of knowledge construction is not just about addressing “gaps in knowledge by investigating an area of research that fills a void in existing information,” but can also be about learning through replication which can sometimes result in the serendipitous expansion of knowledge (Creswell, 2002, p. 4). Perhaps there is still value in the wise saying that a good workman never blames his or her tools.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

Each and every aspect of research should not be left to chance but needs to be well thought-out and purposeful (Cohen, Manion & Morrison, 2005). Without a research design that is sensible and achievable, relevant data about hypothesized relationships would be hard to come by. Consequently, the importance of careful planning, the methodical development of instrumentation, the selection of an appropriate sample, the identification of suitable windows of opportunity to implement the research, limitations of the design, and a thorough analysis of the data are fundamental (Cohen, et al., 2005).

In this chapter the research design, its variables, instrumentation, sampling frame, procedure for administration of treatment, data collection and analysis of data will be described in detail. The purpose is to demonstrate procedural rigor in order to establish that the research was conducted in an objective, valid and reliable manner. As made clear by Tuckman (1999), internal validity can be established by demonstrating that the findings of the study were the "function of the program or approach being tested rather than the result of other causes not systematically dealt with," and that the study would have external validity if the findings "obtained would apply in the real world to other similar programs and approaches" (p. 6). The following Diagram 3.1 maps out the thought process that is essence of this research project so as to provide a lucid visualization of the process flow.

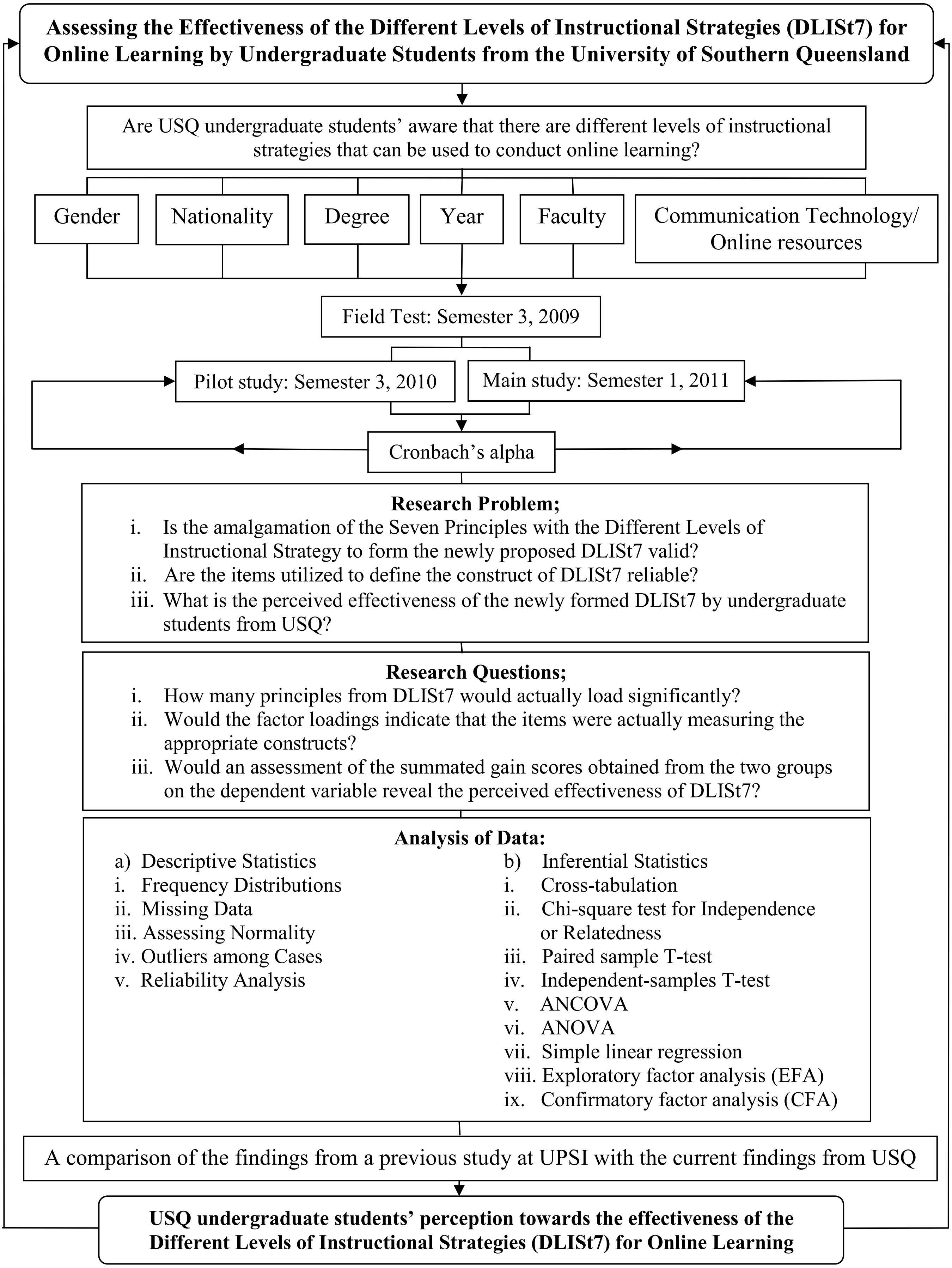

Diagram 3.1: Process Map

3.2 Research Design

The central problem that was at the heart of this research was determining the validity of amalgamating the Different Levels of Instructional Strategy with the Seven Principles to form DLISt7. A sub-problem that was also investigated was the reliability of the items utilized to define the construct of DLISt7 in order to verify whether they were actually measuring what they were supposed to measure. A final sub-problem that was assessed was the perceived effectiveness of DLISt7 by undergraduate students from USQ.

Consequently, this research project attempted to determine the validity of DLISt7 as a conceptual framework and the reliability of the items utilized by conducting an EFA and CFA. This was in an effort to systematically find answers for the following research questions. Firstly, how many principles from DLISt7 would actually load significantly? Secondly, would the factor loadings indicate that the items were actually measuring the appropriate constructs, and were thus reliably tapping into what was supposed to be measured? Lastly, would an assessment of the summated "gain scores (that is, posttest minus pretest)" obtained from the "two groups on the dependent variable" reveal the perceived effectiveness of DLISt7 (Tuckman, 1999, p. 174)?

In line with the researcher's inclination towards a post-positivist paradigm, the design of this research was that of a pretest-posttest non-equivalent control group Internet quasi-experiment. The pretest-posttest stability of "the correlation between the same person's score on the same set of items at two points in time" is in relation to the temporal stability of the responses provided by respondents over time (Netemeyer et al., 2003, p. 10).

The sampling frame used was of students in intact clusters who were enrolled in certain courses to be accessed by the researcher (Johnson & Christensen, 2008). In an effort to avoid sampling the same student twice, intact groups such as First Year and Head Start, who are Year 11 or 12 high school students, were assigned to the Treatment group. Second, Third and Later Year students were assigned to the No Treatment control group. This was because the setting from which the participants were drawn from prohibited the random assignment of participants to form artificial groups (Creswell, 2005). Instead, existing groups had to be relied upon for assignment to either Treatment or No Treatment conditions.

Consequently, “antecedent data” from the pretest was used to determine the “extent of similarity between groups” also known as homogeneity in an effort to control for selection bias as a threat to internal validity and avoid the misinterpretation of results (Wiersma & Jurs, 2009, p. 167). Despite the lack of random assignment “when the term non-equivalent groups is used, it [usually] means non-equivalent in a random sense” (Wiersma & Jurs, 2009, p. 166). This in turn results in the need for a sound and rigorous case to be made for establishing “the similarity of the groups” so that confidence “can be placed in the validity of the results” (Wiersma & Jurs, 2009, p. 166). Besides being used for “statistical control” the posttest minus pretest scores were also used for “generating gain scores” to determine the effectiveness of DLISt7 (Wiersma & Jurs, 2009, p. 169).

The justification for selecting the above mentioned research design is as follows. The initial plan was to continue to build on the work that had been started at the graduate level (Syaril Izwann, 2007) by conducting a “follow-up survey” (Tuckman, 1999, p. 11). It was decided that a web survey sampling an identified portion of the population would best enable data to be gathered quickly and inexpensively (Ary, Jacobs & Sorenson, 2010). More importantly, the use of a follow-up sample web survey would enable the researcher to achieve the objective of building on his previous work, obtain data that is current, and overcome time and financial constraints. Consequently, because of its objective the survey would be more analytical in nature rather than descriptive (Cochran, 1977).

However, a simple follow-up sample web survey would be inclined to suffer "from the absence of a designed comparison" (Tuckman, 1999, p. 11). The ability to compare is important because "survey research limited to a single group often leads to invalid conclusions about cause-and-effect relationships" (Tuckman, 1999, p. 11). This is because it only provides "a static snapshot for that particular point in time" (Gustafsson, 2010, p. 82). Thus, it is recommended that the simple survey research be improved upon by conducting it "within a research design utilizing comparison groups" (Tuckman, 1999, p. 11). Even then, "a simple causal relationship between independent and dependent variable" cannot always be assumed without further research which tests-and-retests the construct being studied (Tuckman, 1999, p. 181).

In view of this research project being about exploring learning and teaching strategies for online courses with an emphasis about finding out for example, "whether one instructional method is more effective than another at improving learning or attitudes under a given set of circumstances," it was considered that a quasi-experimental design would be feasible (Tuckman, 1999, p. 32). Taking into consideration that a true experiment was not possible, care had to be taken so as not to make the mistake of selecting a "queasy" or "pseudo experimental" design (Pedhazur & Schmelkin, 1991, p. 277), which in actuality is a pre-experiment or nondesign that is "inadequate as they stand" because "they do not control adequately against sources of internal invalidity" (Tuckman, 1999, p. 159).

Although not beyond reproach, quasi-experiments "provide substantially better control of the threats to validity than do pre-experimental designs" (Tuckman, 1999, p. 167), and may be used "where better designs are not feasible" (Campbell & Stanley, 1963, p. 204). As elucidated in plain words by Tuckman (1999);

> Quasi-experimental designs suit situations in which conditions complicate or prevent complete experimental control. The real world that confronts an educational researcher is fraught with practical limitations upon opportunities to select or assign Ss and manipulate conditions. School systems may not accept new programs for experimental testing; decision makers may not allow disruptions of intact classes or division into groups necessary to designate random or equivalent samples; policies may prohibit researchers from administering a treatment to some and withholding it from others... (p. 168).

Consequently, what started out as a simple follow-up sample web survey eventually evolved into a non-equivalent pretest-posttest control group Internet quasi-experiment. In light of the research being conducted over the Internet, it also qualifies as a field experiment because the research "is conducted in a real-life setting" and "the influence of as many extraneous variables" is being carefully controlled for "as the situation will permit" (Christensen, 1997, p. 93). An Internet experiment according to Johnson and Christensen (2008) generally has "the same characteristics as either a field or laboratory experiment" but without the ability to manipulate conditions, or randomly select and assign students as cautioned earlier (p. 294).

The significance of in the field Internet experiments cannot be overlooked because such experiments are very useful in terms of “determining if a manipulation works in a real-world setting” (Johnson & Christensen, 2012, p. 285). Thus, the design of this research attempted to make good use of the advantages offered by Internet experiments, for example, (1) easy access to participant populations that are demographically and culturally diverse, (2) being able to bring the quasi-experiment to the participant, instead of vice versa, (3) access to large samples enabling high statistical power, and (4) cost savings in terms of administration, equipment, person-hours and physical space (Johnson & Christensen, 2012).

Internet experiments are also known for their disadvantages, for instance “(1) multiple submissions, (2) lack of experimental control, (3) self-selection, and (4) dropout” (Reips, 2000, p. 89). Fortunately, the first three factors can be controlled for by consciously selecting and using the appropriate research design, sampling technique and software. However, “comparatively high dropout rates [also known as differential attrition (Johnson & Christensen, 2008), differential loss or experimental mortality (Campbell & Stanley, 1963)] are the downside of the voluntary nature of participation in Web experiments” (Reips, 2000, p. 108) and are a fact of life that online researchers have to contend with. Nonetheless, the obvious advantages of “speed, low cost, external validity, experimenting around the clock, a high degree of automation of the experiment (low maintenance, limited experimenter effects), and a wider sample” remain good reasons for “why the Internet may be the setting of choice for an experiment” (Reips, 2002, p. 244), or in the context of this research project a quasi-experiment.

3.3 Research Variables

The variables used in this research are as follows;

3.3.1 Independent Variables

By definition, "the independent variable is an antecedent variable because it must come before another variable if it is to produce a change in it" and can either be manipulated or studied to find out what naturally happens (Johnson & Christensen, 2012, p. 40). Seeing as independent variables (IVs) can influence "the dependent variable through the intervening variable" they are often interchangeably referred to in literature as "factors, treatments, predictors, determinants, or antecedent variables" (Creswell, 2012, p. 116). Although there are fundamentally just "two types of independent variables: treatment and organismic or attribute variables" (Best & Kahn, 2006, p. 168), dilettante researchers can sometimes become mystified about what goes where and why, especially in the context of establishing what "occurs between two variables in a causal chain" (Johnson & Christensen, 2012, p. 40).

As a remedy, Tuckman and Harper (2012) advocate that researchers categorize their independent variables (IVs) as either primary or secondary, and identify whether they are dispositional or situational. This is a very important consideration that can sometimes be overlooked. Quite often, primary dispositional independent variables (PDIVs) are selected for use as control variables "to cancel out or neutralize any effect they might have on observed phenomena" (Tuckman & Harper, 2012, p. 75). This stems from the fact that PDIVs are often attribute variables such as age, ethnicity, gender, disabilities, intelligence, motivation, self-concept or socioeconomic status, that are characteristics which are not alterable and cannot be randomly assigned to different categories because they are qualities "that a subject has before a study begins" (Ary, et al., 2010, p. 331). Typically, a sequence of PDIVs would be used as control variables to categorize participants so that the researcher "can decide to include them or remove them as variables to be studied" (Best & Kahn, 2006, p. 168). Only after the effects of PDIVs have been neutralized can the influence of the moderator variable, a special type of secondary independent variable, be studied (Tuckman & Harper, 2012).

Secondary moderating treatment independent variables (SMTIVs) are often studied "to learn how [they interact] with the independent variable to produce differential effects on the dependent variable" (Tuckman & Harper, 2012, p. 81). It is the "variable that delineates how a relationship changes under different conditions [situations] or contexts or for different kinds of people" (Johnson & Christensen, 2012, p. 40 - 41). By definition, "a moderator variable is a factor that is measured, manipulated, or selected by the experimenter to discover whether it modifies the relationship of the independent variable to an observed phenomenon" (Tuckman & Harper, 2012, p. 73). It is "a special type of independent variable that is of secondary interest and combines with another independent variable to influence the dependent variable" (Creswell, 2012, p. 116).

In the context of this research, there was an intervening independent variable (IIV) that was also used as a direct effect mediating variable (MV) which was hypothesized to be part of the causal chain (Johnson & Christensen, 2012). As a conceptual framework that "theoretically affects observed phenomena", an IIV "cannot be seen, measured, or manipulated; its effect must be inferred from the effects of the independent and moderator variables on the observed phenomena" (Tuckman & Harper, 2012, p. 76).

However, an IIV can be “an attribute or characteristic that ‘stands between’ the independent and dependent variables and exercises influence on the dependent variable apart from the independent variable (Creswell, 2012, p. 118). Hence, an IIV can also be an MV because the variable can “transmit (or mediate) the effect of the independent variable on the dependent variable” (Creswell, 2012, p. 118).

According to Vockell and Asher (1995) “this variable intervenes in the sense that the treatment does not produce the observable outcome directly but rather through the mediation (intervention) of this invisible, conceptual, hypothetical, internalized process” (p. 28). Moreover, an intervening variable “is usually not stated as part of the hypothesis” but “at the culmination of the review of literature (prior to the hypothesis) as the specific rationale behind why the hypothesis is going to be stated in the form it will take (Vockell & Asher, 1995, p. 29).

Therefore, the variables proposed for this study are as follows. Firstly, there was the IIV of students’ Awareness of DLISt7, which also functioned as the MV. Secondly, there were the PDIVs of gender, nationality, academic progress at USQ i.e. type of degree and academic year, and faculty affiliation. Thirdly, there was the pretest baseline (Tuckman & Harper, 2012) that functioned as the “concomitant variable”, otherwise known as the covariate (CV) (Maxwell, Delaney & O’Callaghan, 1993, p. 78). Fourthly, there was DLISt7 operating as SMTIVs because they were designed to be manipulated as a rubric for extrinsically prompting and stimulating conditional responses from students. As a rubric, DLISt7 has eight levels i.e., (1) different levels of instructional strategy, (2) encouraging interaction between students and teaching staff, (3) developing reciprocity and cooperation among students, (4) encouraging active learning, (5) giving prompt feedback, (6) emphasizing time on task, (7) communicating high expectations and finally, (8) respecting talents and diverse ways of learning. Lastly, there was the posttest that fulfilled the role of dependent variable (DV). Table 3.3.1 was used to summarize the sequence of variables used.

Table 3.3.1
Sequencing of Variables

Intervening Independent Variable (IIV)	Primary Dispositional Independent Variables (PDIVs)	Covariate (CV)	Secondary Moderating Treatment Independent Variables (SMTIVs)	Mediating Variable (MV)	Dependent Variable (DV)
What	Who	Baseline	How	Why	Outcome
Awareness of DLISt7	1. Gender 2. Nationality 3. Academic Progress 4. Faculty Affiliation	Pretest	DLISt7 (8 Levels)	Awareness of DLISt7	Posttest

3.3.2 Dependent Variables

The variable that is not manipulated but "on which the effects of changes are observed" is called the dependent variable (Ary, et al., 2010, p. 266). Dependent variables can also be "labelled in the literature as the outcome, effect, criterion, or consequence variables" (Creswell, 2012, p. 115). Technically, a dependent variable "is the variable that is presumed to be influenced by one or more independent variables" (Johnson & Christensen, 2012, p. 40). Hence, a "dependent variable is the factor that is observed and measured to determine the effect of the independent variable; it is the factor that appears, disappears, or varies as the researcher introduces, removes, or varies the independent variable" (Tuckman & Harper, 2012, p. 68).

For example, to determine the effectiveness of different teaching methods on reading achievement, a researcher "would manipulate method (the independent variable) by using different teaching methods in order to assess their effect on reading achievement (the dependent variable)" (Ary, et al., 2010, p. 266). This is because, upon conscientious analysis of higher order interactions for example (Maxwell & Delaney, 2004), a researcher would need to contend with having to differentiate between indirect moderating and direct mediating situational variables, as well as treat a "potentially confounding variable as a control variable (one to be neutralized) rather than as a moderator variable (one to be studied)" or vice versa (Tuckman & Harper, 2012, p. 136).

Within the milieu of this research, the eight levels of instructional strategies were re-used at the posttest stage as constants in a criterion measure (Drew, Hardman & Hosp, 2008) to determine to what extent instructional strategies were being used for online learning. As a criterion measure, students' Awareness of DLISt7 and the perception of its effectiveness were categorized using the following PDIVs: (a) gender, (b) nationality, (c) academic progress at USQ i.e. type of degree and academic year, (d) faculty affiliation, and (e) the use of communication technology or online resources by teaching staff to convey instructional strategies for online learning.

3.4 Research Instrument

In replicating Guidera's (2003) doctoral research project at the masters' level (2004-2007), a variant of the Faculty Inventory that was originally developed by Ehrmann, Gamson and Barsi (1989) was utilized. It was with much effort that this version of the Faculty Inventory was translated from English to Bahasa Malaysia, rephrased, and adapted for use as a Student Inventory. The objectivity and content validity of the adapted version of the research instrument was informally evaluated by a panel of experts consisting of one Associate Dean of Academic Affairs and two subject matter experts (SME) from the Faculty of Education & Human Development, and one SME from the Faculty of Languages & Communication at Sultan Idris University of Education (UPSI), Malaysia. For the pilot study an "excellent" value for Cronbach's alpha ($\alpha = 0.97$, $n = 74$) was obtained with individual items having alphas ranging from a lower limit (LL) of 0.972 to an upper limit (UL) of 0.974, while for the main study a slightly lower but still "excellent" value for alpha ($\alpha = 0.94$, $N = 397$) was obtained with individual items having alphas ranging from 0.938 (LL) to 0.941 (UL) (see e.g., George & Mallery, 2011, p. 231; Syaril Izwann, 2007). No items were identified to be problematical requiring omission. This was followed by an EFA to determine the construct validity of the intangible constructs that constitute the conceptual framework known as the Seven Principles.

A principal component analysis (PCA) was conducted on the 34 items using orthogonal varimax rotation to verify construct validity. Kaiser-Meyer-Olkin's (KMO = 0.93) measure of sampling adequacy (MSA), which is an indicator of factorability, was very high indicating that the ratio for sample size and the number of items (10.45:1) was adequate. Bartlett's Test of Sphericity ($\chi^2 = 6255.20$, $p < 0.05$) was also significant supporting the factorability of the correlational matrix (Ahmad Mahdzan, 2005). Communalities for individual items were > 0.25 which meant that the factor model was working well enough with no items requiring exclusion (Garson, 2009). Total variance explained indicated that there are indeed seven components with eigenvalues > 1, which was confirmed using Cattell's scree test. An analysis of the component matrix indicated that the dimensionality of the items were good with no items requiring exclusion because of loadings < 0.40 (Brace, Kemp &

Snelgar, 2009, p. 375). The rotated component matrix revealed that of the 34 items used, 23 were pure variables, while 11 were complex variables (Coakes, Steed & Price, 2008). However, these complex variables did not have factor loadings that made their structure ambiguous and subsequent interpretation difficult (Syaril Izwann, 2007).

More recent revisions to the standardized measure being developed at the post-graduate level (2009-2013) involved attaching DLIS to the Seven Principles framework to form DLISt7. The research instrument did not however require retranslation back into English from Bahasa Malaysia because the earlier version had been tooled using both languages. The Likert scales were then switched to a Sentence Completion Rating scale "with descriptive statements on either end" (Tuckman & Harper, 2012, p. 229). This was in an effort to circumvent "the multidimensionality innate in Likert-type scales" and to eliminate "the extra cognitive load associated with the use of item reversals" (Hodge, 2007, p. 289). Furthermore, the use of such a scale would be an improvement in terms of fulfilling parametric assumptions and coping with issues such as "coarse response categories" and "equating the neutral option with a not applicable response" (Hodge & Gillespie, 2003, p. 53).

The utilization of such a Sentence Completion Rating Scale attempted to capture and then measure the expressed perception of USQ undergraduate students towards the effectiveness of DLISt7, and offer scores which can be easily interpreted as low, medium or high. The consistency of the original inventory has been retained to avoid it becoming completely unrecognizable in the eyes of the original author/s. For all intents and purposes, the integrity of the Different Levels of Instructional Strategy and the Seven Principles has been preserved and the essential concepts are intact. See Appendix M and N to view the print and online version of the research instrument.

Table 3.4
A Breakdown of the Questionnaire

Type of Variable	Section	Content	Number of Items
IIV/MV	a)	Awareness of the DLISt7	1
PDIV	b)	Gender	1
PDIV	c)	Nationality	1
PDIV	d)	Academic Progress	3
PDIV	e)	Faculty Affiliation	1
PDIV	f)	Communication technology or online resources used by teaching staff	1
SMTIV	1.	Different Levels of Instructional Strategy	4
SMTIV	2.	Encouraging Interaction between Students & Teaching Staff	5
SMTIV	3.	Developing Reciprocity & Cooperation among Students	5
SMTIV	4.	Encouraging Active, Contextual & Meaningful Learning	5
SMTIV	5.	Giving Prompt Feedback	5
SMTIV	6.	Emphasizing Time on Task	4
SMTIV	7.	Communicating High Expectations	5
SMTIV	8.	Respecting Diverse Talents & Ways of Learning	5
White space	g)	Suggestion	1
White space	h)	Reason for suggestion	1
		Total	48

3.5 Field Test

A field test of the questionnaire was conducted "to identify ambiguities, misunderstandings or other inadequacies" (Ary, et al., 2010, p. 402). The research instrument was field tested on five individuals comprising two female lecturers, two female postgraduate students, and one male postgraduate student from the Faculty of Education at USQ. They were all conveniently attending the 4th (2009) Annual Research Symposium organized by the Faculty of Education's Postgraduate and Early Career Research Group (PGECR), and were able to provide qualified feedback based upon level of education. Overall, the questionnaire was well received and had a few minor ambiguities and misunderstandings that required attention.

3.6 Pilot Study

In an effort to determine sampling distributions and evaluate the questionnaires' intercorrelation among items (Cronbach 1990), a pilot study was conducted during Semester 3, 2010 with a sample of 39 respondents. The courses used were EDC1300 (Perspectives in Education; Toowoomba Campus) and EDC3100 (ICT & Pedagogy; Springfield Campus). An *n* close to the upper confines of the central limit theorem would have been desirable for removing doubts about the ensuing shape of the sampling distribution (Bartz, 1999), and is as a rule, sufficient to facilitate the discovery of "major flaws in a questionnaire before they damage the main study" (Sudman, 1983, p. 181). According to Field (2009), research has shown that the normality of sampling "distributions with light tails" can be predicted using a sample of 40 respondents but "with heavy-tailed distributions larger samples would be necessary to invoke the central limit theorem" (p. 156). The sample size was just too meager in terms of the number of participants to the number of items, in which the ratio was only 1.03:1, therefore limiting the types of statistical tests that could be piloted. This can be contrasted with the sample size that was obtained when the research instrument was piloted at UPSI, Malaysia (n = 74; N = 397).

Consequently, using data obtained from the main study which took place during Semester 1, 2011, a second reliability analysis was conducted using a sample of 283 respondents; with the ratio for the number of participants to the number of items being 7.45:1. The courses that were used were mostly from Toowoomba

Campus unless otherwise stated namely CIS1000 (Information Systems Concepts), EDC1100 (Lifespan Development & Learning), EDC_3100 (ICT & Pedagogy), GIS1402 (Geographic Information System), HIS1000 (World Civilizations to 1500 CE), MAT1008 (Building Professional Nursing Attributes B), MAT_1008 (Building Professional Nursing Attributes B; Fraser Coast Campus) and SVY4203 (Urban & Regional Planning). All of the data sets were screened using frequency distributions and analyzed using Cronbach's alpha.

3.7 Research Sampling

The process of research sampling began by working out a design that detailed the steps to a sampling plan and how sample size was to be determined. In accordance with the sampling plan, the target population, which was of USQ undergraduate students, had to be defined. However, in view of its size, the target population had to be narrowed down to a more accessible sample. In order to accomplish this, the researcher had to randomly identify sample members (Ary, et al., 2010). Due to the fact that a sampling frame enumerating all the possible participants was very difficult to obtain, the researcher instead used a sampling frame of naturally occurring clusters to facilitate sample member identification (Levy & Lemeshow, 1991). Thus, sample members were drawn using a three-stage purposive cluster sampling technique (see e.g., Ary, et al., 2010; Cochran, 1977; Johnson & Christensen, 2008).

The first sampling element used was that of nationality, for example, was the participant a local or international student (Johnson & Christensen, 2008)? The researcher then narrowed down the population further by using a second sampling element, which was of how far the participant had progressed in his or her degree at the university. For example, was the participant a First or Second Year student? First Year, inclusive of Head Start students, were supposed to be having their first experience with USQ's online learning environment whereas Second, Third and Later Year students would have had prior experience. The third sampling element utilized was of academic affiliation, or in other words which faculty was the participant from. For instance, was the participant from the faculty of Arts, Business, Sciences, Education or Engineering and Surveying?

The goal was two-fold. Firstly, to obtain data from a sample that would be large enough to minimize the "effect [of] sampling error" and increase "the reliability of the correlations" (Child, 2006, p. 50). Secondly, to obtain a sample that would be "a representative portion of" the target population "thereby affording valid inferences and generalizations" to be made possibly across different nationalities (Pedhazur & Schmelkin, 1991, p. 318).

A cover letter addressed to all the Deans at USQ was drafted requesting permission to sample two online courses from each faculty. The purpose of the request was to satisfy the sampling frame for the research project in terms of minimizing the possibility of sampling the same student twice, ensuring that the sample would be representative of the student population, and be large enough to enable reliable inferences or generalisations to be made. See Appendix F, and I to L, for a copy of the cover letter; Requesting Permission to Sample Two Online Classes from each Faculty.

Participants were recruited based on their enrolment in certain intact courses subject to approval from Faculty. The whole process took sixteen months to complete beginning late November 2009, when the ethics application was first submitted followed by feedback that conditional approval had been granted subject to evidence of approval from the relevant USQ faculties before the granting of full clearance. Upon successfully obtaining approval from Faculty, full ethics clearance was granted by the University's Fast Track Human Research Ethics Committee (HREC) on November 15, 2010 (H10REA016). Only then was the researcher able to proceed and begin accessing courses with the aid of course examiners who had to be briefed about the purpose, objective, focus, sampling frame, and administration of treatment. The whole process finally came to fruition by early March 2011 in time for the start of Semester 1, 2011.

Nevertheless, due to unforeseen circumstances the Faculty of Arts and the Faculty of Business & Law were only able to provide access to First Year courses which were subsequently used as Treatment groups. Despite the best of efforts, no Second, Third or Later Year courses were available for use as No Treatment control groups. See Appendix G for a copy of Ethics Application Memorandum, Appendix H for a copy of Ethics Committee Application, and Appendix O for a copy of Ethics Approval.

3.8 Sample Size

According to Child, a decision about the size of the sample that a researcher should be looking at ought to be formulated before a study begins because "the smaller the number of individuals, the greater is the effect on sampling error and the reliability of the correlations" (2006, p. 50). Since "factor analysis is a large-sample procedure, so it is important to use guidelines to choose the sample size which will be minimally adequate for an analysis" (Hatcher, 2007, p. 73). It had been emphasized by Gorsuch that the "absolute minimum ratio is five individuals to every variable, but not less than 100 individuals for any analysis" (1983, p. 332). This was followed by the recommendation that the "only safe conclusion is that any factors of interest should be based upon *n's* greater than the above rate" (Gorsuch, 1983, p. 332). It is presumed that the judgement call to use the 5:1 ratio should only be made when the item pool is excessively large.

Subsequently, this researcher was able to calculate that based on the number of items in the research instrument (38), this study should have a minimum of 190 respondents. In recognition of the fact that it is generally better to have higher ratios, a maximum sample size of 380 respondents was calculated using Nunnally and Bernstein's Direct (Subjective Estimate) Model (1994, p. 56), better known as Nunnally's rule of thumb (Bhasah Abu Bakar, 2003), which suggests that for exploratory factor analysis, the subject to item ratio ought to be 10:1 (Osborne & Costello, 2004).

Next, the researcher used the minimally adequate sample range that had been calculated to establish a population target using Krejcie and Morgan's (1970) Table for Determining Sample Size from a Given Population. Table 3.2 is put forth as an aid for the novice researcher who might find it difficult to visualize that a sample (*S*) the size of 384 respondents would be representative for a population (*N)* of 100,000 and was the target that the researcher had set for himself. In the end, an *S* of 319 participants was successfully obtained for the pre-test.

Table 3.8.1
Krejcie & Morgan's (1970) Table for Determining Sample Size from a Given Population

N	*S*	*N*	*S*	*N*	*S*
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	100000	384

Note: *N* is population size
S is sample size

From an *S* of 319 pre-test participants, 283 completed responses (*n*) were obtained. Based on Krejcie and Morgan's table, a subsample (*s*) of 285 participants would enable generalizations to be made for an *N* of only 1100. Hence, the need arose to use Cohen's Statistical Power Analysis to determine anticipated effect size (ES) and the desired statistical power level.

Due to the fact that the formula varies depending on the type of statistical test performed, a secondary range will have to be calculated for the minimum and maximum sample size required beginning with the simplest test ranging to the most complex (refer to Diagram 3.1: Process Map; Section: Analysis of Data). The values for these statistical tests will also range from the smallest to the largest for a medium ES. Because of the complexity of ES indices, Cohen has "proposed as conventions, or operational definitions, 'small,' 'medium,' and 'large' values of each ES index to provide the user with some sense of its scale" (1992a, p. 99). Cohen's stated "intent was that medium ES represent an effect likely to be visible to the naked eye of a careful observer" (1992b, p. 156) not to mention "comparable across different statistical tests" (1992a, p. 99).

Table 3.8.2
Cohen's (1992b) ES Indexes and Their Values for Small, Medium, and Large Effects

Test	ES index	Effect size		
		Small	Medium	Large
1. m_A vs. m_B for independent means	$d = \frac{m_A - m_B}{\sigma}$	.20	.50	.80
2. Significance of product–moment r	r	.10	.30	.50
3. r_A vs. r_B for independent rs	$q = z_A - z_B$ where z = Fisher's z	.10	.30	.50
4. $P = .5$ and the sign test	$g = P - .50$	.05	.15	.25
5. P_A vs. P_B for independent proportions	$h = \phi_A - \phi_B$ where ϕ = arcsine transformation	.20	.50	.80
6. Chi-square for goodness of fit and contingency	$w = \sqrt{\sum_{i=1}^{k} \frac{(P_{1i} - P_{0i})^2}{P_{0i}}}$	.10	.30	.50
7. One-way analysis of variance	$f = \frac{\sigma_m}{\sigma}$	.10	.25	.40
8. Multiple and multiple partial correlation	$f^2 = \frac{R^2}{1 - R^2}$	.02	.15	.35

Note: ES = population effect size

Although "every statistical test has its own ES index" researchers from a variety of fields "find specifying the ES the most difficult aspect of power analysis" (Cohen, 1992a, p. 99). By definition, effect size is "the degree to which the phenomenon is present in the population" or "the degree to which the null hypothesis is false" (Cohen, 1988, p. 9 & 10). Due to the influence of "Fisherian null hypothesis testing (where the alternative to H_0 is simply its negation, so that H_1 is specified)", a tendency has developed over the years for the magnitude of the phenomena being studied to be overlooked in favour of *p* values generated by significance testing (Cohen, 1992a, p. 99).

Power on the other hand, means the probability of a statistical test to reject a null hypothesis (H_0) when it is false, which in turn would "result in the conclusion that the phenomenon exists" (Cohen, 1988, p. 4). Determining "the power of a statistical test depends upon three parameters: the significance criterion, the reliability of the sample results, and the 'effect size,' that is the degree to which the phenomenon exists" (Cohen, 1988, p. 4).

It had been proposed as a convention by Cohen "that, when the investigator has no other basis for setting the desired power value, the value .80 is used [which means that b, Type II error rate, is automatically set at .20]" (1988, p. 56). The use of this arbitrary value would, over the years, develop into the practice of pinning significance levels (α) at 0.05 and power at 0.80. Di Stefano refers to this practice as the "five-eighty convention" in which "the probabilities of making Type I and Type II error are 5% and 20%, respectively" (2003, p. 79). The message that has somehow been lost over the years is the fact that the 0.80 power convention was "offered with the hope that it will be ignored whenever an investigator can find a basis in his substantive concerns in his research investigation to choose a value *ad hoc"* (Cohen, 1988, p. 56).

Chuan in comparing Krejcie and Morgan's approach to determining sample size with Cohen's Statistical Power Analysis highlights that with a sample that is too large, time and resources would often be wasted for only minimal gain, whereas when a sample is too small it would lack precision in terms of providing "reliable answers to research questions" (2006, p. 78). Thus, the relationship between power and sample size is actually about being able to describe the characteristics of a population using the smallest number of respondents likely to provide the researcher with reliable statistical information.

This is a very important concept that has to be understood well because too many neophyte researchers have been misled to believe "that the law of large numbers holds for small numbers as well" (Cohen, 1988, p. xv). The misconception that small samples can "mirror the characteristics of their parent populations" and that a significant result "in one study, even if only barely so" can be "significant in a replication, even if it has only half the sample size of the original" can lead to "incorrect intuitions about significance level, power, and confidence intervals" (Cohen, 1988 p. xv).

Fittingly, a range was calculated to incorporate the ES for the simplest test ranging to the most complex test that would be performed. For the simplest test, which was the test for Independent means (two-tailed hypothesis), the parameters were; anticipated ES (Cohen's *d*) = 0.50 (medium), desired statistical power level = 0.80, and probability level (p) = 0.05, resulting in a minimum sample size of 128 [rounded off to 130] (Soper, 2011a). As for the most complex test, which would be the test for Multiple and multiple partial correlation pigeonholed as "Principal

Component Regression…a procedure [also] known as principal component analysis," (Cohen, Cohen, West & Aiken, 2003, p. 428) the parameters used were; anticipated ES (f^2) = 0.15 (medium), desired statistical power level = 0.80, number of predictors = 38, and probability level (p) = 0.05, which resulted in a maximum sample size of 208 [rounded off to 210] (Soper, 2011b).

Basically, what this meant was that the LL for sample size could range from 130 to 190 participants with an UL of between 210 to 380 participants depending on the type of statistical test that was used. With 283 complete responses in hand statistical power for the Independent means test (two-tailed hypothesis) would be 0.987, with the possibility of alpha being 0.013 resulting in a 99% level of confidence (C). Caution nonetheless must be exercised to avoid committing a Type II error (Cumming, 2012). For Multiple and multiple partial correlation, statistical power would be 0.979, $\alpha = 0.021$, and C = 98% (Cohen, 1992b). Since the ES value for the two tests ranged from largest (0.50) to smallest (0.15), all possible variations to sample size depending on the combination of statistical test to be performed are covered.

"Although there is general agreement that a larger *N* is always desirable, there seems to be much confusion about what minimum *N* is desirable under what circumstances" when conducting CFA with small sample sizes (Marsh & Hau, 1999, p. 252). For example, with samples the size of 50 (0.353) and 100 (0.313) factor correlations vary significantly, but with samples the size of 200 (0.303), 400 (0.300) and 1000 (0.302) the variances in factor correlations are ≤ 0.003 (Marsh & Hau, 1999, p. 265).

It is expected that the findings from the above mentioned example, will put to rest, any lingering qualms about the "reliability of correlation coefficients," and the adequacy of sample size “evaluated very roughly on the following scale: 50 - very poor; 100 - poor: 200 - fair; 300 - good; 500 - very good; and 1000 or more – excellent” (Comrey & Lee, 1992, p. 217). Hence, this researcher would like to use this opportunity to reiterate the importance of being able to identify an appropriate and reasonable sample size that would enable all possible scenarios to be accounted for without wasting valuable time and resources, not to mention invalidate misleading and unrealistic expectations.

3.9 Research Location

This research was conducted online via USQStudyDesk which is a portal for connecting students and teaching staff to the university’s learning management system (Moodle 1.9, which was upgraded to Moodle 2.0 in early 2012). Both fully online and hybrid courses were accessed in order to fulfil the conditions of the sampling design that had been earlier outlined. Hybrid courses are courses in which students still attended conventional face to face lectures but accessed communication technology or online resources via USQStudyDesk.

3.10 Research Procedure for Administration of Treatment

Teaching staff working with the Treatment groups were provided copies of the research instrument (DLISt7). They were invited, but were not forced to refer to DLISt7 during the course of the semester as they managed their interaction with students. They were briefed that DLISt7 was to be used as a rubric for extrinsically prompting and stimulating conditional responses from students. No changes were required of course content, or to teaching and learning activities. Teaching staff were to continue to deliver course content as they would normally do because although DLISt7 was designed as a rubric for thrusting into practice varying levels of instructional strategies for communicating expectations and relaying information, its inherent qualities also meant that it could be used as an unobtrusive measure that does not "require acceptance or awareness by the experimental subjects" (Tuckman & Harper, 2012, p. 126).

If additional elaboration was required for the purpose of raising awareness and seeking acceptance, then teaching staff could engage in structured dialogue with students using strategies such as "summarizing, question generating, clarifying and predicting" (Palincsar, 1986, p. 1). Such instructional activities would be considered a form of reciprocal teaching which "involves teaching the strategies while students are learning instructional content" (West, Farmer & Wolff, 1991, p. 18).

The procedure entails little or no risk or imposition to participants and teaching staff alike, because DLISt7 is actually a categorization of desirable learning experiences that often occur naturally in good learning environments. For that reason, this quasi-experiment attempted to investigate the effectiveness of generating student Awareness about DLISt7. This was in an effort to find out if the participants in the Treatment group would develop and mature at a faster rate having been exposed to DLISt7 compared to those in the No Treatment Control Group (Tuckman, 1999).

Despite not being exposed to DLISt7, participants in the No Treatment Control Group are not at a disadvantage in terms of differential treatment. This is because they would still experience similar developmental and maturational experiences during the course of the semester as part of their normal development

(Tuckman & Harper, 2012). For the reason that “a control group composed of comparable persons who can be expected to have the same (or similar) maturational and developmental experiences” was used, the posttest minus pretest scores were in turn employed to generate gain scores meant to assess the effectiveness of the treatment, and subsequently enable “the experimenter to make conclusions about the experimental treatment independent of the confounding maturation effect (Tuckman & Harper, 2012, p. 128).

In his etymology of teaching, Skinner (1968) was quoted as saying that the modest role of the teacher can be metaphorically assigned as thou “who cannot really teach but only help the student learn” (p. 1). Later, Hyman (1974) summed up the role of the teacher well when he proposed “The *A B C*’s of Teaching” (p. xiii). It was proposed then that, *A* was for asking questions, *B* was for books, *C* was for curriculum, *D* was for dialogue and discipline problems, *E* was for exams and evaluations, *F* was for firing line, *G* was for grading, *H* was for homework, *I* was for independence and intellectual integrity, *J* was for jail, *K* was for knowledge, *L* was for listening, *M* was for music, *N* was for nongraded schools, *O* was for observe, *P* was for principles, *Q* was quaerere (latin root for inquire), *R* was for relevance, *S* was for student, *T* was for thinking (critically and reflectively), *U* was for understanding, *V* was for values, *W* was for writing, *X* was for the unknown, *Y* was intentionally left blank, and *Z* was for zonked (Hyman, 1974).

3.11 Research Procedure for Data Collection

Pre and posttest data were collected by asking the participants to complete online versions of the research instrument. This was done by the teaching staff working with the groups sampled. Invitations and reminders were sent out by the researcher in an attempt to get as many complete responses as possible from the students using email generated by the Token management function of the Lime Survey software (www.limesurvey.org). The researcher was allowed use of this software courtesy of his Principal Supervisor, Professor Peter R. Albion at; (http://pama.net.au/survey/admin/admin.php?action=logout)

3.12 Research Procedure for Analysis of Data

The data collected by this researcher was analyzed using the Statistical Package for Social Sciences (SPSS) and Analysis of Moment Structures (AMOS) Version 19 for Windows. The data were analyzed using a battery of parametric statistical tests beginning with frequency distributions, missing data, assessing normality, outliers among cases, reliability analysis, cross-tabulation, chi-square test for independence or relatedness, independent-samples t-test, paired sample t-test, ANOVA, ANCOVA, simple linear regression, EFA, and last but not least CFA to determine what would survive the analysis (Coakes, et al., 2008; Hatcher, 2007).

CHAPTER 4

ANALYSIS OF DATA

4.1 Introduction

The first part of this chapter reports the demographic distribution of the sampling for the pilot and main study to establish a sound and rigorous case that the groups are about the same in most characteristics and that selection differences would probably not have an effect on the results (McMillan & Schumacher, 2009). This is then followed by a report about the frequency and percentage of missing data, along with an assessment of normality which “is a prerequisite for many inferential statistical techniques” (Coakes & Ong, 2011, p. 38). The reliability analysis of the pilot and main study are then detailed.

Next, data regarding students’ Awareness of DLISt7 and their observation of teaching staff utilization of communication technology and online resources to convey instructional strategies for online learning are described. Accordingly, the findings about students’ Awareness of DLISt7 and its relationship with the grouping independent variable (Pallant, 2007) of No Treatment-Treatment group, and the attribute independent variables of gender, nationality, academic progress at USQ i.e. type of degree and academic year, faculty affiliation, together with figures for the utilization of communication technology or online resources by teaching staff, are also detailed.

Lastly, findings pertaining to the reliability and validity of amalgamating the Different Levels of Instructional Strategy with the Seven Principles to form DLISt7 are disclosed.

4.2 Demographic Data

4.2.1 Pilot Study

Table 4.2.1 reports the frequency (f) and percentage (%) of students involved in the pilot study who indicated Awareness of DLISt7. Of the 45 participants, a majority of 60.0% indicated 'Yes' they were aware, and 40.0% indicated 'No' they were not aware.

Table 4.2.1
The Frequency and Percentage for Students' Awareness of DLISt7

Awareness	f	%
Yes	27	60.0%
No	18	40.0%
Total	45	100 %

Table 4.2.2 conveys the frequency and percentage of students who participated in the pilot study according to gender. Of the 45 participants, the majority of 93.3% were Female, which then fell to 6.7% for Males.

Table 4.2.2
The Frequency and Percentage of Students According to Gender

Gender	f	%
Female	42	93.3%
Male	3	6.7%
Total	45	100 %

Table 4.2.3 details the frequency and percentage of students who participated in the pilot study according to nationality. Of the 45 participants, 2.2% were English, 6.7% were Malaysian, 4.4% were New Zealanders, 2.2% were American Australian,

and the remaining 4.4% were British Australian. The majority peaked at 80.0% for Australians.

Table 4.2.3
The Frequency and Percentage of Students According to Nationality

Nationality	f	%
English	1	2.2%
Malaysian	3	6.7%
New Zealander	2	4.4%
American Australian	1	2.2%
Australian	36	80.0%
British Australian	2	4.4%
Total	45	100 %

Table 4.2.4 illustrates the frequency and percentage of students who participated in the pilot study collapsed into different nationality categories based on indigenous geographical and political boundaries. Of the 45 participants, 6.7% were from Asia, 2.2% were from Europe, and the majority of 91.1% were from Oceania.

Table 4.2.4
The Frequency and Percentage of Students from Different Nationality Categories

Nationality Categories	f	%
Asians	3	6.7%
Europeans	1	2.2%
Oceanians	41	91.1%
Total	45	100 %

Table 4.2.5 discloses the frequency and percentage of local and international students who participated in the pilot study. Of the 45 participants, the majority of 91.1% were Local, which dropped to 8.9% for International.

Table 4.2.5
The Frequency and Percentage of Local and International Students

Local & International	f	%
Local	41	91.1%
International	4	8.9%
Total	45	100 %

Table 4.2.6 reports the frequency and percentage of students involved in the pilot study based on their academic progress at USQ. In the first instance, this was based on the name of degree that they were studying for. Of the 45 participants, most of them were studying for some sort of Education degree with a substantial 46.7% studying for a Bachelor of Education (BEDU).

Table 4.2.6
The Frequency and Percentage of Students Based on Name of Degree

Name of Degree	f	%
Bachelor of Early Childhood (BECH)	5	11.1%
Bachelor of Education (BEDU)	21	46.7%
Bachelor of Education (Early Childhood)	8	17.8%
Bachelor of Education (Primary)	4	8.9%
Bachelor of Education (Secondary)	2	4.4%
Bachelor of Education (Technical & Vocational Education - TVE)	1	2.2%
Bachelor of Vocational Education & Training (BVET)	3	6.7%
Bachelor of Arts (BARTS)	1	2.2%
Total	45	100 %

Table 4.2.7 also conveys the frequency and percentage of students collapsed into the type of degree they were studying for. Of the 45 participants, 2.2% were studying for an Arts degree, while the majority of 97.8% were studying for an Education degree.

Table 4.2.7
The Frequency and Percentage of Students According to Type of Degree

Type of Degree	f	%
Arts	1	2.2%
Education	44	97.8%
Total	45	100 %

Table 4.2.8 again details the frequency and percentage of students based on their academic progress at USQ, but in this second instance, it was based on the academic year they were in. Of the 45 participants, the majority of 51.1% were First

Year students, 6.7% were Second Year students, the major minority of 31.1% were Third Year students, 8.9% were Fourth Year students, and 2.2% were Sixth Year students.

Table 4.2.8
The Frequency and Percentage of Students According to Academic Year

Academic Year	f	%
First Year	23	51.1%
Second Year	3	6.7%
Third Year	14	31.1%
Fourth Year	4	8.9%
Sixth Year	1	2.2%
Total	45	100 %

Table 4.2.9 illustrates the frequency and percentage of students collapsed into the type of academic year they were in. Of the 45 participants, the majority of 51.1% were First Year and Head Start, who are Year 11 or 12 high school students, while 48.9% were Second, Third and Later Year students.

Table 4.2.9
The Frequency and Percentage of Students According to Type of Academic Year

Type of Academic Year	f	%
First Year & Head Start	23	51.1%
Second Year & >	22	48.9%
Total	45	100 %

Table 4.2.10 discloses the frequency and percentage of students based on Academic Semester. Of the 45 participants, 20.0% were from Semester One, 4.4% were from Semester Two, and the majority of 75.6% were from Semester Three.

Table 4.2.10
The Frequency and Percentage of Students Based on Academic Semester

Academic Semester	f	%
One	9	20.0%
Two	2	4.4%
Three	34	75.6%
Total	45	100 %

Table 4.2.11 discloses the frequency and percentage of students based on Faculty Affiliation. Of the 45 participants, 2.2% were from the Faculty of Arts (FOA), and the majority of 97.8% were from the Faculty of Education (FOE).

Table 4.2.11
The Frequency and Percentage of Students Based on Faculty Affiliation

Faculty Affiliation	f	%
FOA	1	2.2%
FOE	44	97.8%
Total	45	100 %

A larger sample that would invoke the central limit theorem would have been desirable for removing doubts about the ensuing shape of the sampling distribution (see e.g., Bartz, 1999; Field, 2009; Syaril Izwann, 2007). Consequently, a second reliability analysis would have to be conducted using the sample from the main study.

4.3.1 Main Study

Table 4.3.1 reports the frequency and percentage of students involved in the main study who indicated their Awareness of DLISt7. Of the 319 participants, a majority of 60.8% indicated 'Yes' they were aware, and 39.2% indicated 'No' they were not aware.

Table 4.3.1
The Frequency and Percentage for Students' Awareness of DLISt7

Awareness	f	%
Yes	194	60.8%
No	125	40.0%
Total	319	100 %

Table 4.3.2 conveys the frequency and percentage of students who participated in the main study according to whether they were in the No Treatment or Treatment Group. Of the 319 participants, 23.5% were in the No Treatment group, and the majority of 76.5% were in the Treatment group.

Table 4.3.2
The Frequency and Percentage of Students According to No Treatment-Treatment Group

No Treatment-Treatment	f	%
No Treatment	75	23.5 %
Treatment	244	76.5 %
Total	319	100 %

Table 4.3.3 details the frequency and percentage of students who participated in the main study according to gender. Of the 319 participants, the majority of 76.2% were Female, which then fell to 23.8% for Males.

Table 4.3.3
The Frequency and Percentage of Students According to Gender

Gender	f	%
Female	243	76.2 %
Male	76	23.8 %
Total	319	100 %

Table 4.3.4 illustrates the frequency and percentage of students who participated in the main study according to nationality. Of the 319 participants, the distribution was varied with the majority peaking at 84.0% for Australians.

Table 4.3.4
The Frequency and Percentage of Students According to Nationality

Nationality	f	%
Aboriginal	3	0.9%
Ecuadorian	1	0.3%
English	5	1.6%
Fijian	1	0.3%
Indian	6	1.9%
Irish	1	0.3%
Kenyan	1	0.3%
Malaysian	4	1.3%
Maori	1	0.3%
Nepalese	4	1.3%
New Zealander	4	1.3%
Rwandan	1	0.3%
Saudi Arabian	5	1.6%
Slovakian	1	0.3%
South African	3	0.9%
South African British	1	0.3%
Thai	1	0.3%
Vietnamese	1	0.3%
American Australian	1	0.3%
Australian	268	84.0%
British Australian	1	0.3%
Canadian	1	0.3%
Canadian Australian	1	0.3%
Chinese	1	0.3%
Dutch	2	0.6%
Total	319	100 %

Table 4.3.5 discloses the frequency and percentage of students who participated in the main study collapsed into different nationality categories based on indigenous geopolitical boundaries. Of the 319 participants, 1.9% were from Africa, 0.6% were from the Americas, 6.9% were from Asia, 2.8% were from Europe, and the majority 87.8% were from Oceania.

Table 4.3.5
The Frequency and Percentage of Students from Different Nationality Categories

Nationality Categories	f	%
Africans	6	1.9%
Americas	2	0.6%
Asians	22	6.9%
Europeans	9	2.8%
Oceanians	280	87.8%
Total	319	100 %

Table 4.3.6 reports the frequency and percentage of local and international students who participated in the main study. Of the 319 participants, the majority of 85.9% were Local, which dropped to 14.1% for International.

Table 4.3.6
The Frequency and Percentage of Local and International Students

Local & International	f	%
Local	274	85.9%
International	45	14.1%
Total	319	100 %

Table 4.3.7 reports the frequency and percentage of students involved in the main study based on their academic progress at USQ. In the first instance, this was based on the name of the degree that they were studying for. However, because of the long and varied names of the degrees, the existing categories were collapsed into more succinct groupings that are used in the subsequent table. The notable degrees that were well represented in the distribution are Bachelor of Nursing (BNUR) at 25.7%, and similar to the pilot study Bachelor of Education (BEDU) at 19.4%. In addition, there was also an increase for Bachelor of Education (Primary) with 12.9%, plus Bachelor of Education (Early Childhood) with 9.4%.

Table 4.3.7

The Frequency and Percentage of Students Based on Name of Degree

Name of Degree	f	%
Associate Degree of Engineering (Civil-ADNG)	3	0.9%
Bachelor of Early Childhood (BECH)	4	1.3%
Bachelor of Education (BEDU)	62	19.4%
Bachelor of Education (Early Childhood)	30	9.4%
Bachelor of Education (Primary)	41	12.9%
Bachelor of Education (Secondary)	13	4.1%
Bachelor of Education (Special Education)	6	1.9%
Bachelor of Education (Technical & Vocational Education - TVE)	1	0.3%
Bachelor of Engineering (Civil-BENG)	3	0.9%
Bachelor of Engineering & Bachelor of Business(BEBB)	1	0.3%
Bachelor of General Studies (BGEN)	6	1.9%
Associate Degree of Engineering (Power Engineering-ADNG)	2	0.6%
Bachelor of Human Services (BHMS)	3	0.9%
Bachelor of Information Technology (BINT)	3	0.9%
Bachelor of Laws (BLAW)	3	0.9%
Bachelor of Nursing (BNUR)	82	25.7%
Bachelor of Science (Psychology-BSCI)	2	0.6%
Bachelor of Social Science (BSSC)	1	0.3%
Bachelor of Spatial Science Technology (BSST)	8	2.5%
Bachelor of Vocational Education & Training (BVET)	3	0.9%
Graduate Diploma of Spatial Science Technology (GDST)	3	0.9%
Associate Degree of Spatial Science (ADSS)	10	3.1%
Head Start Program	1	0.3%
Master of Engineering (Spatial Science – MEx)	1	0.3%
Master of Spatial Science Technology (MSST)	1	0.3%
Bachelor of Spatial Science (BSPS)	1	0.3%
Diploma of Arts (History-BART)	1	0.3%
Bachelor of Applied Media (BAPM)	3	0.9%
Bachelor of Arts (BART)	12	3.8%
Bachelor of Business (BBUS)	5	1.6%
Bachelor of Business & Bachelor of Information Technology (BBIT)	1	0.3%
Bachelor of Commerce (BCOM)	2	0.6%
Bachelor of Commerce & Bachelor of Information Technology (BCIT)	1	0.3%
Total	319	100 %

Table 4.3.8 conveys the frequency and percentage of students collapsed into the type of degree they were studying for. Of the 319 participants, 6.3% were studying for an Arts degree, 4.7% for either a Business or Law degree, and 10.3% for an Engineering or Surveying degree. The majority of 52.4% were studying for an Education degree, while the major minority of 26.3% were after a Sciences degree.

Table 4.3.8
The Frequency and Percentage of Students According to Type of Degree

Type of Degree	f	%
Arts	20	6.3%
Business & Law	15	4.7%
Sciences	84	26.3%
Education	167	52.4%
Engineering & Surveying	33	10.3%
Total	319	100 %

Table 4.3.9 again details the frequency and percentage of students based on their academic progress at USQ, but in this second instance, it was based on the academic year they were in. Of the 319 participants, the majority of 73.4% were First Year students, 0.3% was from the Head Start Program, 11.9% were Second and Third Year students, 1.9% were Fourth Year students, and 0.6% were Sixth Year students.

Table 4.3.9
The Frequency and Percentage of Students According to Academic Year

Academic Year	f	%
First Year	234	73.4%
Head Start Program-Year 11/12	1	0.3%
Second Year	38	11.9%
Third Year	38	11.9%
Fourth Year	6	1.9%
Sixth Year	2	0.6%
Total	45	100 %

Table 4.3.10 illustrates the frequency and percentage of students collapsed into the type of academic year they were in. Of the 319 participants, the majority of 73.7% were First Year and Head Start students, while 26.3% were Second, Third and Later Year students.

Table 4.3.10
The Frequency and Percentage of Students According to Type of Academic Year

Type of Academic Year	f	%
First Year & Head Start	235	73.7%
Second Year & >	84	26.3%
Total	319	100 %

Table 4.3.11 discloses the frequency and percentage of students based on Academic Semester. Of the 319 participants, the majority of 89.3% were from Semester One, 7.2% were from Semester Two, and 3.4% were from Semester Three.

Table 4.3.11
The Frequency and Percentage of Students Based on Academic Semester

Academic Semester	f	%
One	285	89.3%
Two	23	7.2%
Three	11	3.4%
Total	319	100 %

Table 4.3.12 discloses the frequency and percentage of students based on Faculty Affiliation. Of the 319 participants, 6.9% were from the Faculty of Arts (FOA), 4.4% were from Business and Law (FOBL), and 10.7% were from Engineering and Surveying (FOES). The majority of 51.4% were from Education (FOE), while the major minority of 26.6% was from Sciences (FOS). Such figures from FOE and FOS are representative of the two faculties that provided the most number of participants for the research project. This confirms the distribution pattern for the sample that was obtained earlier from Tables 4.3.7 and 4.3.8.

Table 4.3.12
The Frequency and Percentage of Students Based on Faculty Affiliation

Faculty Affiliation	f	%
FOA	22	6.9%
FOBL	14	4.4%
FOS	85	26.6%
FOE	164	51.4%
FOES	34	10.7%
Total	319	100 %

Based on information obtained from the data collected, it would probably be reasonable to approximate that the groups sampled during the pilot and main study were about the same in most characteristics. Thus, it would be probable to assume that selection differences would not have affected the results of the quasi-experiment (McMillan &Schumacher, 2009). Furthermore, it would be conceivable to generalize that the sample portion obtained was representative of the target population.

4.4 Missing Data

In view of the fact that “missing data can have a detrimental effect on the legitimacy of the inferences drawn by statistical tests” it is important “that the frequency of percentages of missing data [is] reported along with any empirical evidence and/or theoretical arguments for the causes of data that are missing” (American Psychological Association, 2010, p. 33). During the course of this research project, there were initially 45 participants listed for the pilot study. Upon running Cronbach’s alpha reliability analysis, 6 (13.3%) participants were excluded (n=39) listwise (Pallant, 2007). As for the main study, there were initially 324 listed participants for the pretest and 143 participants who returned for the posttest. However, after preliminary data screening (N = 319) it was discovered that the recurring reason for the missing data was that some of the participants did not provide complete responses. As a result, 36 (11.1%) incomplete responses were excluded pairwise (George & Mallery, 2009) from the pretest making the sub-total 288, and 24 (16.78%) from the posttest resulting in a sub-total of 119.

4.5 Assessing Normality

Prior to analysis, assumptions of normality had to be inspected using established numerical and graphical methods such as the 5% trimmed mean, skewness-kurtosis (S-K) statistic, the Kolmogorov-Smirnov (*D*) statistic with Lillefors significance correction, and the Shapiro-Wilks (*W)* statistic (Coakes & Ong, 2011). The visual inspection of histograms, stem-and-leaf plots, normal quantile-quantile (Q-Q) plots, detrended normal Q-Q plots and boxplots are also important. This is because the use of dichotomous categories like Yes versus No, Passes versus Failures, and Gender for example, would often result in "a special type of bimodal distribution" making an appearance in histograms or stem-and-leaf plots (Glass & Hopkins, 1996, p. 24).

Said in a different but clearer way, because of how the responses had been grouped into dichotomous categories such as Awareness of DLISt7, No Treatment or Treatment group, Female or Male, Local or International student, First Year and Head Start or Second, Third and Later Year participants, the scores from the respondents would have a tendency to cluster around certain points forming a bimodal distribution with major and minor modes (Glass & Hopkins, 1996). Although not a Gaussian distribution in terms of being unimodal and having no skew, means (M) and standard deviations (SD) for the distribution would still be usable because it retains symmetry around the vertical axis (Glass & Hopkins, 1996) and is consistent with the data.

Fundamentally, it would be quite rare for a phenomenon being studied to produce “distributions of data that approximate a normal distribution” (George & Mallery, 2009, p. 97). This is simply because real life “rarely conform[s] to a classic normal distribution. More often [than not], distributions are skewed and display varying degrees of kurtosis” (Coakes & Ong, 2011, p. 43). Take for example the different times a random sample of runners would need to complete a 10 kilometer race (George & Mallery, 2009). The reason why the majority of values would probably be above the mean and result in a negatively skewed distribution is because most recreational runners would perhaps take about 40 minutes to complete the distance. Some would undoubtedly be able to do it in roughly 30 minutes time, while only a select few would be able to dip below the half hour mark.

The probability of someone being able to do it in less than 27 minutes is very slim because the current Olympic record for the 10,000 meter run is 27:01.17 and the world record is 26:17.53 both set by Kenenisa Bekele from Ethiopia, who by the way, also holds the current Olympic (12:57.82) and world record (12:37.35) for the 5,000 meters (Rosenbaum, 2012). This is quite a significant achievement for someone who would be termed an outlier from a statistics point of view, but excruciating for those of us who have a clue to what it takes to run the 12 minute Cooper test at that kind of pace. Even for someone like Mohamed Farah, the Somali born British representative, who is the reigning London 2012 double Olympic champion for the 10, 000 and 5, 000 meters, such record times are incredibly hard to better.

In statistics, “the most fundamentally important distribution” is the Gaussian or normal probability curve (Glass & Hopkins, 1996, p. 81). This distribution informs the researcher if means and standard deviations would be appropriate statistics for summarising the centre and spread of the distribution (McDonald, 2009). A valuable statistic that is used to determine if “extreme values are having a strong influence on the mean” is the 5% Trimmed Mean (Pallant, 2007, p. 59). If a comparison of the mean and the 5% trimmed mean reveal two very different values, then the data points in the Extreme Values table should be investigated (Pallant, 2007).

In Table 4.5.1 a comparison was made between a preliminary assessment of normality before the deletion of outliers (N = 288, 119) with a subsequent assessment of normality after the deletion of outliers (N = 283, 116) for the pre and posttest scores of participants regarding their Awareness of DLISt7. A review of the descriptive statistics revealed “minimal violation to the assumption of normality” (Coakes & Ong, 2011, p. 75). Using the information available, it was calculated that the average “magnitude of change” (Maxwell & Delaney, 2004, p. 7) between the mean and the 5% trimmed mean was only 0.19, and the average variance between before and after standard deviation was 0.56. Thus, it would be acceptable to assume that the two averages are not very different, and that the spread of the distribution is normal.

Table 4.5.1
Assessing Normality for Awareness of DLISt7

	Assessment of Normality before Deletion of Outliers				Assessment of Normality after Deletion of Outliers			
	Pretest		Posttest		Pretest		Posttest	
	Yes	No	Yes	No	Yes	No	Yes	No
N	171	117	72	47	169	114	70	46
Mean	78.41	74.11	80.44	74.08	78.70	74.84	81.30	74.54
5% Trimmed Mean	78.70	74.40	80.85	74.08	78.90	74.92	81.51	74.58
Standard Deviation	11.46	12.62	12.33	15.22	11.14	11.80	11.42	15.05
Skewness	-0.35	-0.39	-0.48	-0.21	-0.24	-0.16	-0.30	-0.25
Kurtosis	-0.22	-0.27	-0.21	-1.17	-0.58	-0.91	-0.60	-1.10

Likewise, the function of “trimming is to obtain a measure of central tendency that is unaffected by extreme values” (Coakes & Ong, 2011, p. 43). This is simply because symmetric distributions “are reactive to skewness and outliers”, either negatively or positively, which can result in standard deviations not always being appropriate measures of spread around the mean unless it is actually measuring the centre of the distribution (McDonald, 2009). With regards to kurtosis, a normal distribution that is mesokurtic would have a γ (gamma) value of 0 (Glass & Hopkins, 1996). Flat distributions are negative instances of kurtosis termed platykurtic while peaked distributions are instances of positive kurtosis which are dubbed leptokurtic (Hatcher, 2007).

The Satorra-Bentler robust standard errors estimate suggests that distributions with skewness = 3; kurtosis = 21 be described as highly non-normal, skewness = 2; kurtosis = 7 as moderately non-normal, and skewness = 0; kurtosis = 3 as normal (West, Finch, & Curran, 1995). However, it has become “common practice to subtract the constant value of 3 from the kurtosis estimate so that the normal distribution is characterized by zero skewness and zero kurtosis” (Curran, West &

Finch, 1996, p.17). As is evident in Table 4.5.1 the values for the data are well within the parameters of a normal distribution with a negligible hint of negative S-K.

Table 4.5.2 presents the findings for the test of normality for pre and posttest scores regarding Awareness of DLISt7 after the deletion of outliers. As exhibited below, the results of the Kolmogorov-Smirnov and Shapiro-Wilk statistic, which "is also calculated when the sample size is less than one hundred" (Coakes & Ong, 2011, p. 43), reveals a significant result for the pretest 'No' responses ($D = 0.09$, $df = 114$, $p = 0.04$; $W = 0.97$, $df = 114$, $p = 0.01$). Such a result suggests that the assumption of normality had been violated for this particular category (Pallant, 2007).

Table 4.5.2
Test of Normality for Pre and Posttest Scores Regarding Awareness of DLISt7 after the Deletion of Outliers

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
Awareness		Statistic	df	Sig.	Statistic	df	Sig.
Pretest	Yes	0.06	169	0.20*	0.98	169	0.03
	No	0.09	114	0.04	0.97	114	0.01
Posttest	Yes	0.09	70	0.20*	0.97	70	0.13
	No	0.11	46	0.17	0.95	46	0.04

Lilliefors Significance Correction
This is a lower bound of the true significance

Upon a visual inspection of Table 4.5.3 and 4.5.4 for the pretest 'No' responses, a trimodal distribution also known as polymodal (Taylor, 1965), with three distinct modes was unearthed. With the two minor modes, the lesser one has 16 scores ranging from 60 to 64, and the larger one has 20 scores ranging from 75 to 79. The third and most popular major mode (Glass & Hopkins, 1996) has 21 scores ranging from 80 to 84.

This does not however "indicate a problem with the scale, but rather reflects the underlying nature of the construct being measured" (Pallant, 2007, p. 62). In other words, the scores of the participants were clustering around certain points resulting in a polymodal distribution with major and minor modes indicative of a lower and upper limit for responses. Although not a Gaussian distribution in the classic sense, because it retains symmetry around the vertical axis the values for the mean and standard deviation can still be used to interpret and gauge how participants had responded.

Table 4.5.3
Normality Histogram for Awareness / Pretest = No Responses

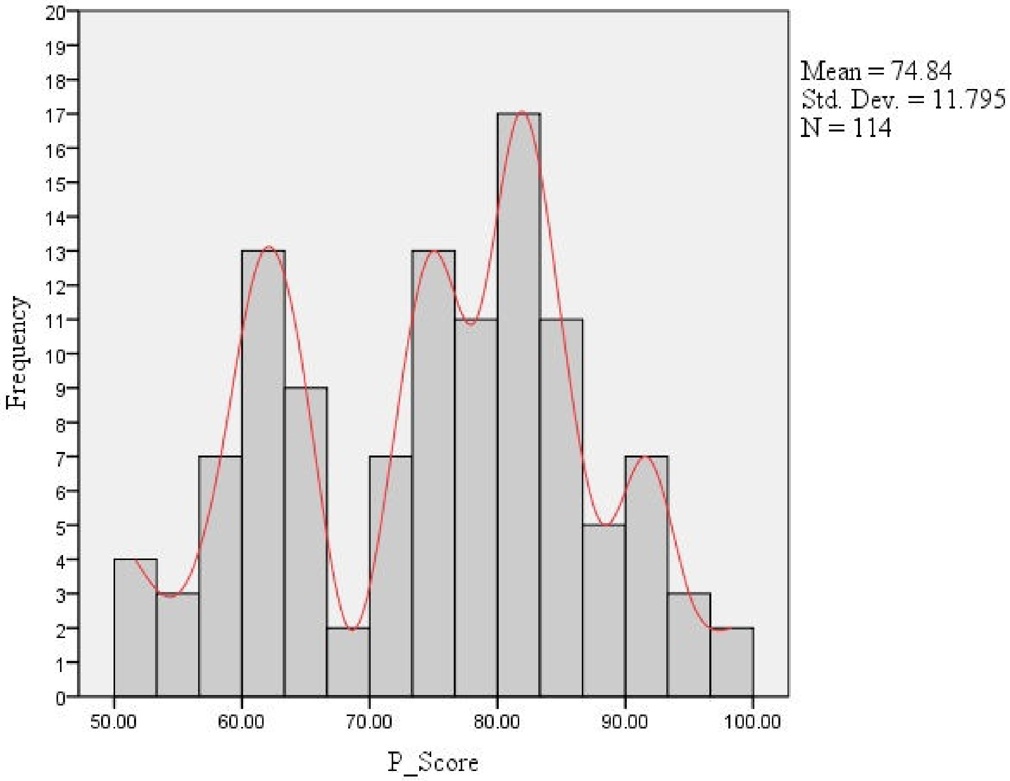

Table 4.5.4
Stem-and-Leaf Plot for Awareness / Pretest = No Responses

Frequency	Stem & Leaf	
5.00	5 .	02233
9.00	5 .	566778889
16.00	6 .	0001222222333334
8.00	6 .	55555677
11.00	7 .	00011223333
20.00	7 .	55555556666788889999
21.00	8 .	000001111111222233344
12.00	8 .	555566667889
9.00	9 .	011122334
3.00	9 .	678

Stem width: 10.00
Each leaf: 1 case(s)

4.6 Outliers among Cases

The final plot that had to be inspected was the boxplot. This was an important consideration that had to be carefully addressed because “factor analysis is sensitive to outlying cases” (Coakes & Ong, 2011, p. 128). A decision had to be made whether to recode, transform or remove the outliers. Such a decision had to be made carefully because the deletion of outliers “often results in the generation of further outlying cases” (Coakes & Ong, p. 140). After a preliminary assessment of normality, all outliers within 1.5 to 3 box-lengths were deleted (Pallant, 2007). This effectively improved the shape of the distribution and also the figures for S-K, Kolmogorov-Smirnov, and Shapiro-Wilk statistic. In total 5 outliers (1.74%) were deleted from the pretest and 3 (2.52%) from the posttest making the total number of participants 283 for the former and 116 for the latter.

4.7 Reliability Analysis

In psychometric literature there are two broad types of reliability “(a) test-retest (temporal stability) and (b) internal consistency: the inter-relatedness among items or sets of items in a scale” (Netemeyer et al., 2003, p. 10). When Cronbach’s alpha reliability analysis is used, what is really being ascertained is the internal consistency, or in simpler terms the extent to which the items that constitute the research instrument are either convergent or discriminant in relation to each other via an assessment of the overall index for test-retest reliability (Pallant, 2007). This is for the purpose of answering the “simple question, [to which] there are legitimate disagreements about the correct answer,” the issue of “how are such measures developed and validated" (Nunnally & Bernstein, 1994, p. 86) in relation to the "psychometrical properties of the questionnaire, such as construct validity and reliability" (Vandewaetere & Desmet, 2009, p. 349).

By utilizing the earlier mentioned Sentence Completion Rating Scale, the expressed perception of USQ undergraduate students towards the effectiveness of DLISt7 was captured and measured using a scale that can offer scores which can be easily interpreted as low, medium or high. Accordingly, Cronbach's alpha for the pilot study revealed an excellent coefficient ($\alpha = 0.92$, $n = 39$) with individual items for DLISt7 having alphas ranging from 0.913 (LL) to 0.918 (UL) (George & Mallery, 2011). As for the main study, a slightly higher alpha coefficient ($\alpha = 0.95$, $N = 283$) was obtained using a better sample with individual items having alphas ranging from 0.950 (LL) to 0.952 (UL). Hence, by assessing alpha coefficients from both pilot and main study, it was determined that the temporal stability of the research instrument was excellent (George & Mallery, 2011). No items were identified to be problematical requiring exclusion from the measure (Coakes & Ong, 2011).

With regards to convergent validity, which "is indicated by evidence that different indicators of theoretically similar or overlapping construct are strongly interrelated", the researcher will later discuss results for the CFA in Table 4.16.9 to determine if there is "compelling evidence of the convergent [or] discriminant validity of [the] theoretical constructs" used in the development, validation, and standardization of this research instrument (Brown, 2006, p. 3). As of the moment the internal consistency of the measure is holding up well, because when estimating the "correlation (reliability coefficient) to be expected if two independent, more or less equivalent forms of a test are applied on the same occasion," it is expected that "the stronger the intercorrelations among a test's items, the greater its homogeneity" (Cronbach, 1990, p. 704). Although validation can be obtained from a single study, "the ideal is a process that accumulates and integrates evidence on appropriateness of content, correlations with external variables, and hypotheses about constructs (Cronbach, 1990, p. 707). The data was then be analyzed using a battery of parametric statistical tests to determine what would survive (Coakes, et al., 2008; Hatcher, 2007).

4.8 The Use of Communication Technology and Online Resources by Teaching Staff to convey Instructional Strategies for Online Learning

Table 4.8.1 describes the frequency and percentage of communication technology and online resources used by teaching staff to convey instructional strategies for online learning. USQStudyDesk was the most frequently utilized with 89.0% of the respondents indicating 'Yes' teaching staff who taught them used this technology. This was followed by Email with 80.3%, Wimba Online Classroom with 25.7%, Moodle Forum with 25.4%, Blogs with 22.3 %, Telephone: Voice with 10%, Moodle Chat with 9.1%, and Instant Messaging with 8.8%.

Based on experience gained from five semesters of being a teaching assistant/marker for the course EDO 4675 (Research Approaches for Contemporary Educators), such usage trends for communication technology and online resources by teaching staff is reasonably accurate. When available Teleconferencing and Video Conferencing both at 4.4% are an option for teaching staff, but is dependent on whether the students can book a room that supports the use of such communication technology.

Table 4.8.1

The Frequency and Percentage of Communication Technology or Online Resources used by Teaching Staff

Communication Technology/Online Resource	Yes		Not Selected		Missing		Total	
	f	%	f	%	f	%	f	%
Blogs	71	22.3%	217	68.0%	31	9.7%	319	100.0%
Email	256	80.3%	32	10.0%	31	9.7%	319	100.0%
USQStudyDesk	284	89.0%	4	1.3%	31	9.7%	319	100.0%
Moodle Chat	29	9.1%	259	81.2%	31	9.7%	319	100.0%
Moodle Forum	81	25.4%	207	64.9%	31	9.7%	319	100.0%
Teleconferencing	14	4.4%	274	85.9%	31	9.7%	319	100.0%
Video Conferencing	14	4.4%	274	85.9%	31	9.7%	319	100.0%
Instant Messaging	28	8.8%	260	81.5%	31	9.7%	319	100.0%
Wimba Online Classroom	82	25.7%	206	64.6%	31	9.7%	319	100.0%
Telephone: Text Messaging	9	2.8%	279	87.5%	31	9.7%	319	100.0%
Telephone: Voice	32	10.0%	256	80.3%	31	9.7%	319	100.0%
Skype Video	6	1.9%	282	88.4%	31	9.7%	319	100.0%
Skype: Voice	4	1.3%	284	89.0%	31	9.7%	319	100.0%
Skype: Text	4	1.3%	284	89.0%	31	9.7%	319	100.0%

Table 4.8.2 reports the frequency and percentage of other types of communication technology or online resources used by teaching staff to convey instructional strategies for online learning. Among those suggested by the participants were CD Resources (0.3%), YouTube Presentations (0.3%), Flash video (0.3%) Videos (0.3%), and Wikis (0.3%). Although the response rates could have been better, such suggestions could be interpreted as teaching staff being resourceful in utilizing whatever communication technology and online resources readily available to get the job done.

Table 4.8.2
The Frequency and Percentage of Other Types of Communication Technology & Online Resources used by Teaching Staff

Other	f	%
CD Resources	1	0.3%
YouTube Presentation	1	0.3%
Flash Video	1	0.3%
Videos	1	0.3%
Wikis	1	0.3%
Total	319	100%

4.9 The Relationship between being in the No Treatment group compared to the Treatment group and Students' Awareness of DLISt7 (pre and post)

Table 4.9.1.i, details that students' Awareness of DLISt7 at the pretest stage was independent of or not related to being in the No Treatment-Treatment group; χ^2 (1, N = 319) = 2.54^b, p = 0.11, w = 0.09 (trivial effect). Thus, the null hypothesis (H_{O1}) that there was no statistically significant relationship between students' Awareness of DLISt7 and being in the No Treatment-Treatment group at the pretest stage was retained.

Table 4.9.1.ii, illustrates that students' Awareness of DLISt7 at the posttest stage was related to being in the No Treatment-Treatment group; χ^2 (1, N = 124) = 4.09^b, p = 0.04, w = 0.18 (small effect). Hence, the null hypothesis ($H_{O1.1}$) was rejected and the alternative hypothesis ($H_{A1.1}$) that there was a statistically significant relationship between students' Awareness of DLISt7 and being in the No Treatment-Treatment group at the posttest stage was accepted.

Table 4.9.1
Chi-Square Test of Independence or Relatedness between Students' Awareness of DLISt7 at the Pre and Posttest stage compared to being in the No Treatment-Treatment group

Students' Awareness of DLISt7 compared to being in the No Treatment-Treatment group	Chi-Square Test of Independence or Relatedness		
	Value (Chi-Square[a]/Continuity Correction[b]	df	Asymp. Sig. (2-sided)
i. Pretest-Awareness*No Treatment-Treatment	2.537[b]	1	0.111
ii. Posttest-Awareness*No Treatment-Treatment	4.093[b]	1	0.043

i. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 29.39.
ii. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 14.52.
Computed only for a 2x2 table.

4.10 The Relationship between Attribute Independent Variables and Awareness of DLISt7 (pre and post)

Table 4.10.1 discloses that students' Awareness of DLISt7 at the pretest stage was independent of or not related to the attribute independent variable of Gender; χ^2 (1, N = 319) = 1.33[b], p = 0.25, *w* = 0.06 (trivial effect), Nationality; χ^2 (1, N = 319) = 2.86[b], p = 0.09, *w* = 0.09 (trivial effect), Type of Degree; χ^2 (4, N = 319) = 3.52[a], p = 0.48, *w* = 0.10 (small effect), Academic year; χ^2 (1, N = 319) = 0.40[b], p = 0.53, *w* = 0.04 (trivial effect) and Faculty Affiliation; χ^2 (4, N = 319) = 3.25[a], p = 0.52, *w* = 0.10 (small effect).

Therefore, the following null hypotheses (H_{O2}, $H_{O3,}$ $H_{O4,}$ H_{O5} & H_{O6}) that there was no statistically significant relationship between female students compared to male students, local compared to international, the type of degree being studied, the number of years students had experienced online learning, and faculty affiliation with Awareness of DLISt7 at the pretest stage were all retained.

Table 4.10.1
Chi-Square Test of Independence or Relatedness between Attribute Independent Variables and Awareness of DLISt7 at the Pretest stage

Attribute Independent Variables and Awareness of DLISt7 at the Pretest stage	Chi-Square Test of Independence or Relatedness		
	Value (Chi-Square[a]/Continuity Correction[b])	df	Asymp. Sig. (2-sided)
i. Gender	1.328[b]	1	0.249
ii. Nationality	2.861[b]	1	0.091
iii. Type of Degree	3.516[a](χ^2)	4	0.475
iv. Academic Year	0.396[b]	1	0.529
v. Faculty Affiliation	3.254[a](χ^2)	4	0.516

i. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 29.78.
ii. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 17.63.
iii. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.88.
iv. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 32.92.
v. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.49.
b. Computed only for a 2x2 table.

Table 4.10.2 describes that students' Awareness of DLISt7 at the posttest stage was independent of or not related to the attribute independent variable of Gender; χ^2 (1, N = 124) = 0.03[b], p = 0.88, *w* = 0.01 (trivial effect), Nationality; χ^2 (1, N = 124) = 0.70[b], p = 0.40, *w* = 0.08 (trivial effect), Type of Degree; χ^2 (4, N = 124) = 1.68[a], p = 0.80, *w* = 0.12 (small effect), Academic year; χ^2 (1, N = 124) = 0.03[b], p = 0.87, *w* = 0.02 (trivial effect), and Faculty Affiliation; χ^2 (4, N = 124) = 2.05[a], p = 0.73, *w* = 0.13 (small effect).

Thus, the ensuing null hypotheses ($H_{O2.1}$, $H_{O3.1}$, $H_{O4.1}$, $H_{O5.1}$ & $H_{O6.1}$) that there was no statistically significant relationship between female students compared to male students, local compared to international, the type of degree being studied, the number of years students had experienced online learning, and faculty affiliation with students' Awareness of DLISt7 at the posttest stage were all retained.

Table 4.10.2

Chi-Square Test of Independence or Relatedness between Attribute Independent Variables and Awareness of DLISt7 at the Posttest stage

Attribute Independent Variables and Awareness of DLISt7 at the Posttest stage	Chi-Square Test of Independence or Relatedness		
	Value (Chi-Square[a]/Continuity Correction[b])	df	Asymp. Sig. (2-sided)
i. Gender	0.025[b]	1	0.718
ii. Nationality	0.698[b]	1	0.284
iii. Type of Degree	1.675[a](χ^2)	4	0.795
iv. Academic Year	0.028[b]	1	0.713
v . Faculty Affiliation	2.050[a](χ^2)	4	0.727

i. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 14.11.
ii. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 9.27.
iii. 4 cells (40.0%) have expected count less than 5. The minimum expected count is 2.02.
iv. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 14.92.
v. 4 cells (40.0%) have expected count less than 5. The minimum expected count is 2.02.
b. Computed only for a 2x2 table.

4.11 The Relationship between the Utilization of Communication Technology and Online Resources by Teaching Staff, and Students' Awareness of DLISt7 (pre and post)

Table 4.11.1.a summarizes the report that there was a statistically significant relationship between students' Awareness of DLISt7 and the utilization of communication technology and online resources by teaching staff to convey instructional strategies for online learning at the pretest stage.

Table 4.11.1.a

The Relationship between Students' Awareness of DLISt7, and the Utilization of Communication Technology and Online Resources by Teaching Staff (pretest)

Communication Technology/Online Resource	Chi-Square[a]/Continuity Correction[b]	Effect Size
Blogs	χ^2 (1, N = 288) = 8.29[b], p = 0.004	*w* = 0.17 (small)
Moodle Chat	χ^2 (1, N = 288) = 8.43[b], p = 0.004	*w* = 0.17 (small)
Moodle Forum	χ^2 (1, N = 288) = 6.30[b], p = 0.012	*w* = 0.15 (small)
Videoconferencing	χ^2 (1, N = 288) = 3.16[b], p = 0.075	*w* = 0.10 (small)

Hence, the null hypothesis (H_{O7}) was rejected and the alternative hypothesis (H_{A7}) that there was a statistically significant relationship between students' Awareness of DLISt7 and the utilization of communication technology and online resources by teaching staff to convey instructional strategies for online learning at the pretest stage was accepted.

Table 4.11.1.b

Chi-Square Test of Independence or Relatedness between the Utilization of Communication Technology and Online Resources by Teaching Staff, and Students' Awareness of DLISt7 at the Pretest stage

The Relationship between the Utilization of Communication Technology and Online Resources by Teaching Staff to convey Instructional Strategies for Online Learning and students' Awareness of DLISt7 at the Pretest stage	Chi-Square Test of Independence or Relatedness		
	Value (Chi-Square[a]/Continuity Correction[b])	df	Asymp. Sig. (2-sided)
i. Blogs	8.292[b]	1	0.004
ii. Email	0.000[b]	1	1.000
iii. USQStudyDesk	1.330[b]	1	0.249
iv. Moodle Chat	8.428[b]	1	0.004
v. Moddle Forum	6.300[b]	1	0.012
vi. Teleconferencing	1.978[b]	1	0.160
vii. Videoconferencing	3.162[b]	1	0.075
viii. Instant Messaging	0.126[b]	1	0.723
ix. Wimba Online Classroom	2.386[b]	1	0.122
x. Telephone: Text Messaging	0.636[b]	1	0.425
xi. Telephone: Voice	0.911[b]	1	0.340
xii. *Skype: Video	2.649[b]	1	0.104
xiii. Skype: Voice	1.330[b]	1	0.249
xiv. Skype: Text	0.016[b]	1	0.898

* The minimum expected count is less than 5. The chi-square value is less likely to be valid.
i. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 28.84.
ii. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 13.00.
iii. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.63.
iv. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 11.78.
v. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 32.91.
vi. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 2.03.
vii. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.69.
viii. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 11.38.
ix. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 33.31.
x. 1 cell (25.0%) has expected count less than 5. The minimum expected count is 3.66.
xi. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 13.00.
xii. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 2.44.
xiii. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.63.
xiv. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.63.
b. Computed only for a 2x2 table.

Table 4.11.2.a summarizes that there was no statistically significant relationship between students' Awareness of DLISt7 and the utilization of communication technology and online resources by teaching staff to convey instructional strategies for online learning at the posttest stage.

Table 4.11.2.a

The Relationship between Students' Awareness of DLISt7, and the Utilization of Communication Technology and Online Resources by Teaching Staff (posttest)

Communication Technology/Online Resource	Chi-Square[a]/Continuity Correction[b]	Effect Size
Blogs	χ^2 (1, N = 124) = 1.26[b], p = 0.26	*w* = 0.10 (small)
Email	χ^2 (1, N = 124) = 0.00[b], p = 0.97	*w* = 0.00 (trivial)
USQStudyDesk	χ^2 (1, N = 124) = 1.02[b], p = 0.31	*w* = 0.09 (trivial)
Moodle Chat	χ^2 (1, N = 124) = 0.44[b], p = 0.51	*w* = 0.06 (trivial)
Moodle Forum	χ^2 (1, N = 124) = 0.11[b], p = 0.74	*w* = 0.03 (trivial)
Teleconferencing;	χ^2 (1, N = 124) = 0.62[b], p = 0.43	*w* = 0.07 (trivial)
Videoconferencing;	χ^2 (1, N = 124) = 1.10[b], p = 0.29	*w* = 0.09 (trivial)
Instant Messaging	χ^2 (1, N = 124) = 0.33[b], p = 0.57	*w* = 0.05 (trivial)
Telephone: Text Messaging	χ^2 (1, N = 124) = 0.23[b], p = 0.63	*w* = 0.04 (trivial)
Telephone: Voice	χ^2 (1, N = 124) = 0.16[b], p = 0.69	*w* = 0.03 (trivial)
Skype: Video	χ^2 (1, N = 124) = 0.00[b], p = 1.00	*w* = 0.00 (trivial)
Skype: Voice	χ^2 (1, N = 124) = 0.00[b], p = 1.00	*w* = 0.00 (trivial)
Skype: Text	χ^2 (1, N = 124) = 0.00[b], p = 1.00	*w* = 0.00 (trivial)

Therefore, the null hypothesis ($H_{O7.1}$) that there was no statistically significant relationship between students' Awareness of DLISt7 and the utilization of communication technology and online resources by teaching staff to convey instructional strategies for online learning at the posttest stage was retained.

Table 4.11.2.b

Chi-Square Test of Independence or Relatedness between the Utilization of Communication Technology and Online Resources by Teaching Staff, and Students' Awareness of DLISt7 at the Posttest stage

The Relationship between the Utilization of Communication Technology and Online Resources by Teaching Staff to convey Instructional Strategies for Online Learning and students' Awareness of DLISt7 at the Posttest stage	Chi-Square Test of Independence or Relatedness		
	Value (Chi-Square[a]/Continuity Correction[b])	df	Asymp. Sig. (2-sided)
i. Blogs	1.256[b]	1	0.262
ii. Email	0.002[b]	1	0.967
iii. USQStudyDesk	1.016[b]	1	0.314
iv. Moodle Chat	0.439[b]	1	0.508
v. Moddle Forum	0.107[b]	1	0.744
vi. Teleconferencing	0.615[b]	1	0.433
vii. Videoconferencing	1.101[b]	1	0.294
viii. Instant Messaging	0.328[b]	1	0.567
ix. Wimba Online Classroom	0.008[b]	1	0.929
x. Telephone: Text Messaging	0.231[b]	1	0.631
xi. Telephone: Voice	0.155[b]	1	0.694
xii. *Skype: Video	0.000[b]	1	1.000
xiii. Skype: Voice	0.000[b]	1	1.000
xiv. Skype: Text	0.000[b]	1	1.000

* The minimum expected count is less than 5. The chi-square value is less likely to be valid.
i. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 15.32.
ii. 1 cell (25.0%) has expected count less than 5. The minimum expected count is 4.44.
iii. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 0.81.
iv. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.65.
v. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 15.32.
vi. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 2.42.
vii. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 2.82.
viii. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.45.
ix. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 15.73.
x. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 2.02.
xi. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.26.
xii. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 0.81.
xiii. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.21.
xiv. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.21.
b. Computed only for a 2x2 table.

4.12 The Difference in Perception towards the Effectiveness of DLISt7 by Undergraduate Students from USQ

By utilizing a Sentence Completion Rating Scale, this researcher attempted to capture and then measure the expressed perception of USQ undergraduate students towards the effectiveness of DLISt7 using the scale listed in Table 4.12.1.that offers scores which can be easily interpreted as low, medium or high.

Table 4.12.1
Levels of Effectiveness

Range	Levels of Effectiveness
100-91	Very High
90-81	High
80-71	Moderately High
70-61	Above Average
60-51	Average
50-41	Below Average
40-31	Moderately Low
30-21	Low
20-10	Very Low

Table 4.12.2 and 4.12.4 details the statistics for a paired sample *t*-test indicating that for the 80 participants who provided pre and posttest responses, the mean score for the posttest (M = 78.49) was not significantly greater than the mean score for the pretest (M = 77.90) at the $p < 0.05$ level ($p = 0.555$). The result for the paired samples correlations in Table 4.12.3 reveals a strong (Weinberg & Abramowitz, 2002) and significant correlation between the covariate and dependent variable ($R = 0.76$, $p = 0.000$).

This was interpreted as an indication that participants who are inclined to score highly on the posttest would have also scored highly on the pretest. It is a scenario that is probable because “the data in each condition come from the same people and so there could be some consistency in their responses” (Field, 2009, p. 330). However, as illustrated in Table 4.12.4 because the magnitude of change in the gain score was only 0.59 (95% CI [-1.40, 2.59], $d = 0.09$) such a difference can only be considered a trivial effect size (Gray & Kinnear, 2012). Thus, the null hypothesis (H_{O8}) that there was no statistically significant difference in the gain scores of participants who provided pre and posttest responses were retained.

Table 4.12.2

Paired Samples Statistics for Determining if there was a Significant Difference in the Mean Score of Participants who provided Pre and Posttest Responses

	Mean	N	Standard Deviation	Standard Error Mean
Posttest Score	78.4901	80	13.48779	1.50798
Pretest Score	77.8947	80	11.74477	1.31311

Table 4.12.3

Paired Samples Correlations for Determining if there was a Significant Difference in the Mean Score of Participants who provided Pre and Posttest Responses

	N	Correlation	Sig.
Posttest Score & Pretest Score	80	0.755	0.000

Table 4.12.4

Paired Samples Test for Determining if there was a Significant Difference in the Mean Score of Participants who provided Pre and Posttest Responses

	Paired Differences							
				95% Confidence Interval of the Difference				
	Mean	Standard Deviation	Standard Error Mean	Lower	Upper	T	Df	Sig.(2-tailed)
Posttest Score – Pretest Score	0.59539	8.97268	1.00318	-1.40138	2.59217	0.594	79	0.555

Table 4.12.6 illustrates the results for independent-samples *t*-tests that were conducted across a sequence of grouping independent variables to analyze students' perception towards the effectiveness of DLISt7. This was for the purpose of deciding what to include or remove for further analysis. Mean scores were initially compared to determine if there were differences at the pretest stage. It was learnt that there was a significant difference in the mean scores of participants who answered 'Yes' (M = 78.70, SD = 11.14) compared to those who answered 'No' (M = 74.84, SD = 11.80); t (281) = 2.790, p = 0.006 (two-tailed), No Treatment group (M = 79.85, SD = 9.75) compared to Treatment group (M = 76.37, SD = 11.91); t (120.185) = 2.369, p =

0.019 (two-tailed), and Female participants ($M = 78.43$, $SD = 11.01$) compared to Male participants ($M = 72.74$, $SD = 12.30$); $t(281) = 3.538$, $p = 0.000$ (two-tailed). Since Levene's test was significant at the $p < 0.05$ level for the No Treatment-Treatment group ($p = 0.021$), the assumption that had to be made was that equal variances had been violated and the alternative t-value listed under 'Equal variances not assumed' would have to be used (Pallant, 2007).

There was however no significant difference in the mean scores of Local participants ($M = 76.87$, $SD = 11.38$) compared to International participants ($M = 79.00$, $SD = 12.59$); $t(281) = -1.032$, $p = 0.303$ (two-tailed), nor First Year and Head Start participants ($M = 77.17$, $SD = 11.79$) compared to Second, Third and Later Year participants ($M = 77.08$, $SD = 10.86$); $t(281) = 0.057$, $p = 0.954$ (two-tailed).

The magnitude of difference between means was calculated for Awareness (Mean Difference = 3.86, 95% CI [1.14, 6.58], $d = 0.23$ (small effect), No Treatment-Treatment group (Mean Difference = 3.48, 95% CI [0.57, 6.38], $d = 0.20$ (small effect), and Gender (Mean Difference = 5.69, 95% CI [2.52, 8.85], $d = 0.30$ (small effect). The magnitude of difference between means was also calculated for Nationality Category (Mean Difference = -2.13, 95% CI [-6.18, 1.93], $d = -0.09$ (trivial effect), and Type of Academic Year (Mean Difference = 0.09, 95% CI [-3.00, 3.18], $d = 0.01$ (trivial effect).

Hence, the following null hypotheses (H_{09}, H_{010} & H_{011}) were rejected, and the ensuing alternative hypotheses (H_{A9}, H_{A10} & H_{A11}) that there was a statistically significant difference in the mean scores of participants who answered 'Yes' or 'No' about Awareness of DLISt7, were in the No Treatment-Treatment group, and Female participants compared to Male participants at the pretest stage, were all accepted. Conversely, the null hypotheses (H_{012} & H_{013}) that there was no statistically significant difference in the mean scores of Local participants compared to International participants, First Year and Head Start participants compared to Second, Third and Later Year participants at the pretest stage, were retained.

Table 4.12.5
Group Statistics for Independent-Samples t-tests comparing the Scores for Participants to determine if there were Differences at the Pretest stage

Pretest		N	Mean	Standard Deviation
a. Awareness	Yes	169	78.6967	11.13478
	No	114	74.8407	11.79513
b. No Treatment-Treatment	No Treatment	63	79.8454	9.74563
	Treatment	220	76.3696	11.91336
c. Gender	Female	219	78.4295	11.01210
	Male	64	72.7426	12.29580
d. Nationality Category	Local	247	76.8730	11.38243
	International	36	78.9985	12.59123
e. Type of Academic Year	First Year & Head Start	210	77.1667	11.79262
	Second Year & >	73	77.0764	10.86362

Table 4.12.6
Independent-Samples t-tests comparing the Scores for Participants to determine if there were Differences at the Pretest stage

Pretest		Levene's Test for Equality of Variances		*t*-test for Equality of Means					
								95% Confidence Interval of the Difference	
		F	Sig	t	df	Sig.(2-tailed)	Mean Difference	Lower	Upper
a. Awareness	Equal variances assumed	0.955	0.329	2.790	281	0.006	3.85595	1.13505	6.57685
	Equal variances ≠ assumed			2.758	233.047	0.006	3.85595	1.10188	6.61001
b. No Treatment-Treatment	Equal variances assumed	5.380	0.021	2.121	281	0.035	3.47583	0.24948	6.70217
	Equal variances ≠ assumed			2.369	120.185	0.019	3.47583	0.57090	6.38076
c. Gender	Equal variances assumed	0.920	0.338	3.538	281	0.000	5.68687	2.52265	8.85108
	Equal variances ≠ assumed			3.330	94.496	0.001	5.68687	2.29655	9.07718

d. Nationality Category	Equal variances assumed	0.458	0.499	-1.032	281	0.303	-2.12554	-6.17799	1.92692
	Equal variances ≠ assumed			-0.957	43.746	0.344	-2.12554	-6.60038	2.34931
e. Type of Academic Year	Equal variances assumed	2.735	0.099	0.057	281	0.954	0.09024	-3.00195	3.18244
	Equal variances ≠ assumed			0.060	135.248	0.952	0.09024	-2.89524	3.07573

Table 4.12.8 illustrates the results for independent-samples *t*-tests that were conducted across a sequence of grouping independent variables to analyze students' perception towards the effectiveness of DLISt7. Mean scores were again compared to determine if there were differences at the posttest stage for the purpose of deciding what to include or remove from further analysis. Similarly, there was a significant difference in the mean scores of participants who answered 'Yes' (M = 81.26, SD = 11.42) compared to those who answered 'No' (M = 74.54, SD = 15.05); t (78.119) = 2.582, p = 0.012 (two-tailed), No Treatment group (M = 84.23, SD = 9.80) compared to Treatment group (M = 76.26, SD = 13.95); t (86.800) = 3.494, p = 0.001 (two-tailed), and Female participants (M = 81.33, SD = 12.27) compared to Male participants (M = 72.01, SD = 13.67); t (114) = 3.602, p = 0.000 (two-tailed). Since Levene's test was again significant at the $p < 0.05$ level for Awareness (p = 0.008) and No Treatment-Treatment group (p = 0.008), the assumption that had to be made was that equal variances had been violated and the alternative t-value would have to be used instead.

There was however no significant difference in the mean scores of Local participants (M = 78.59, SD = 13.22) compared to International participants (M = 78.64, SD = 14.11); t (114) = -0.017, p = 0.986 (two-tailed), nor First Year and Head

Start participants (M = 78.55, SD = 13.17) compared to Second, Third and Later Year participants (M = 78.72, SD = 13.92); t (114) = -0.062, p = 0.951 (two-tailed).

The magnitude of difference between means was calculated again for Awareness (Mean Difference = 6.73, 95% CI [1.54, 11.91], *d* = 0.34 (small effect), No Treatment-Treatment group (Mean Difference = 7.97, 95% CI [3.43, 12.50], *d* = 0.46 (small effect), and Gender (Mean Difference = 9.32, 95% CI [4.20, 14.45], *d* = 0.47 (small effect). The magnitude of difference between means was also calculated for Nationality Category (Mean Difference = -0.05, 95% CI [-6.23, 6.13], *d* = -0.00 (trivial effect), and Type of Academic Year (Mean Difference = 0.17, 95% CI [-5.28, 5.24], *d* = -0.01 (trivial effect).

Thus, the following null hypotheses ($H_{09.1,}$ $H_{010.1}$ & $H_{011.1}$) were rejected, and the ensuing alternative hypotheses ($H_{A9.1,}$ $H_{A10.1}$ & $H_{A11.1}$) that there was a statistically significant difference in the mean scores of participants who answered 'Yes' or 'No' about Awareness of DLISt7, were in the No Treatment-Treatment group, and Female participants compared to Male participants at the posttest stage, were all accepted. Conversely, the null hypotheses ($H_{O12.1}$ & $H_{O13.1}$) that there was no statistically significant difference in the mean scores of Local participants compared to International participants, First Year and Head Start participants compared to Second, Third and Later Year participants at the posttest stage, were retained.

Table 4.12.7
Group Statistics for Independent-Samples t- tests comparing the Scores for Participants to determine if there were Differences at the Posttest stage

Posttest		N	Mean	Standard Deviation
a. Awareness	Yes	70	81.2632	11.42200
	No	46	74.5366	15.05159
b. No Treatment-Treatment	No Treatment	34	84.2260	9.79753
	Treatment	82	76.2612	13.94885
c. Gender	Female	82	81.3286	12.27081
	Male	34	72.0046	13.67010

d. Nationality Category	Local	93	78.5852	13.21759
	International	23	78.6384	14.10952
e. Type of Academic Year	First Year & Head Start	82	78.5462	13.17278
	Second Year & >	34	78.7152	13.92256

Table 4.12.8

Independent-Samples t-tests comparing the Scores for Participants to determine if there were Differences at the Posttest stage

Posttest		Levene's Test for Equality of Variances		*t*-test for Equality of Means					
								95% Confidence Interval of the Difference	
		F	Sig	t	df	Sig.(2-tailed)	Mean Difference	Lower	Upper
a. Awareness	Equal variances assumed	7.404	0.008	2.731	114	0.007	6.72654	1.84740	11.60569
	Equal variances ≠ assumed			2.582	78.199	0.012	6.72654	1.53955	11.91353
b. No Treatment-Treatment	Equal variances assumed	7.214	0.008	3.030	114	0.003	7.96477	2.75805	13.17150
	Equal variances ≠ assumed			3.494	86.800	0.001	7.96477	3.43389	12.49566
c. Gender	Equal variances assumed	0.644	0.424	3.602	114	0.000	9.32398	4.19553	14.45244
	Equal variances ≠ assumed			3.443	56.179	0.001	9.32398	3.89988	14.74808
d. Nationality Category	Equal variances assumed	0.582	0.447	-0.017	114	0.986	-0.05327	-6.17799	1.92692
	Equal variances ≠ assumed			-0.016	32.223	0.987	-0.05327	-6.60038	2.34931
e. Type of Academic Year	Equal variances assumed	0.087	0.769	-0.062	114	0.951	-0.16896	-5.58124	5.24332
	Equal variances ≠ assumed			-0.060	58.747	0.952	0.16896	-5.76411	5.42619

4.13 The Difference between the Posttest Scores of Participants who Answered 'Yes' compared to those who Answered 'No', after Controlling for Scores on the Pretest Administered Prior to the Intervention

A one-way between-group analysis of covariance (ANCOVA) was conducted to determine if there was a significant difference in the posttest scores of participants who answered 'Yes' compared to those who answered 'No', after controlling for scores on the Awareness of DLISt7 pretest administered prior to the intervention. Table 4.13.1 and 4.13.2 discloses the results for preliminary checks that were conducted to ensure that there were no violations of assumptions in terms of measurement of the covariate, reliability of the covariate, correlations among covariates, linearity, and homogeneity of regression slopes (Pallant, 2007). Table 4.13.3 describes an examination of Levene's Test of Equality of Error Variances that reported the assumption of equality had not been violated and thus it would be safe to proceed ($p > 0.05$).

The output shown in Table 4.13.4 conveys that there was no main effect for Awareness $F(1, 77) = 1.214$, $p = 0.274$, $p > 0.05$, $f = 0.13$ (small effect). This meant that there was no statistically significant difference in the posttest scores of participants who answered 'Yes' compared to those who answered 'No', after controlling for scores on the Awareness of DLISt7 pretest administered prior to the intervention. A significant relationship did however exist between Pretest and Posttest Scores, $F(1, 77) = 93.326$, $p = 0.000$, $p < 0.05$, $f = 1.10$ (large effect). Therefore, it can be reasoned that when Pretest Scores were statistically controlled for, Awareness had no influence on Posttest Scores. The researcher's hunch based on "logic and correlations" (Cronbach, 1990, p. 470) that Posttest Scores were related to Pretest Scores was confirmed ($R = 0.76$, $p = 0.000$). Hence, the null hypotheses (Ho_{14}) that there was no statistically significant difference in the posttest scores of participants who answered 'Yes' compared to those who answered 'No', after controlling for scores on the Awareness of DLISt7 pretest administered prior to the intervention, was retained.

Table 4.13.1
Checking for Linearity & Homogeneity of Regression Slopes

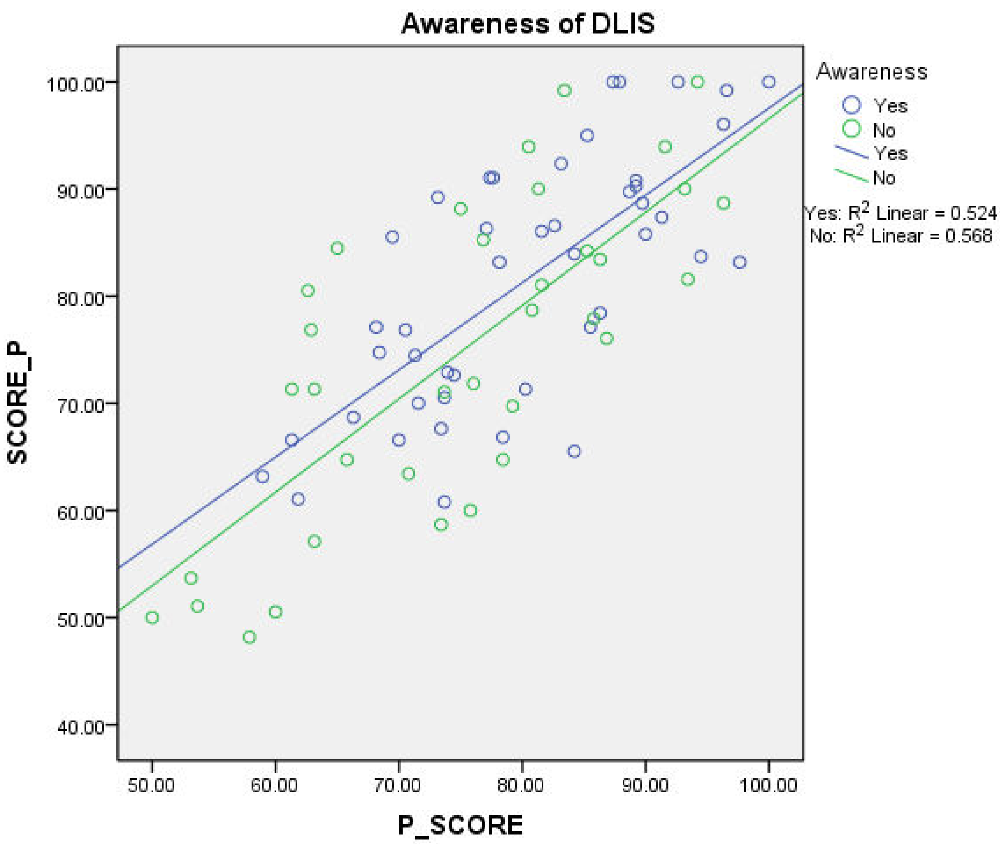

Table 4.13.2
Tests of Between-Subjects Interaction

Dependent Variable: Posttest Score

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	8306.797[a]	3	2768.932	34.698	0.000
Intercept	270.060	1	270.060	3.384	0.070
Awareness	18.817	1	18.817	0.236	0.629
Pretest Score	7276.863	1	7276.863	91.187	0.000
Awareness*Posttest Score	8.474	1	8.474	0.106	0.745
Error	6064.913	76	79.801		
Total	507227.770	80			
Corrected Total	14371.710	79			

R Squared = 0.578 (Adjusted R Squared = 0.561)

Table 4.13.3
Levene's Test of Equality of Error Variances[a]

Dependent Variable: Posttest Score

F	df1	df2	Sig.
2.182	1	78	0.144

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.
Design: Intercept + Pretest Score + Awareness

Table 4.13.4
Tests of Between-Subjects Effects

Dependent Variable: Posttest Score

Source	Type II Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Corrected Model	8298.323[a]	2	4149.161	52.604	0.000	0.577	105.208	1.000
Intercept	262.741	1	262.741	3.331	0.072	0.041	3.331	0.437
Pretest Score	7361.069	1	7361.069	93.326	0.000	0.548	93.326	1.000
Awareness	95.782	1	95.782	1.214	0.274	0.016	1.212	0.193
Error	6073.387	77	78.875					
Total	507227.770	80						
Corrected Total	14371.710	79						

R Squared = 0.577 (Adjusted R Squared = 0.566)
Computed using alpha = 0.05

4.14 The Interaction between Awareness of DLISt7, No Treatment-Treatment group, and Gender

A higher order between-subjects three-way analysis of variance (Maxwell & Delaney, 2004) using a 2 x 2 x 2 factorial design with 8 data cells (Coakes & Ong, 2011) was conducted to explore the interaction between Awareness of DLISt7, No Treatment-Treatment Group and Gender. Because participants had been drawn from naturally occurring clusters using a three stage purposive sampling technique, Levene's Test of Equality of Error Variances (Table 4.14.2) reported a significant result ($p < 0.05$) suggesting the variance for the dependent variable across the groups was not equal. Pallant (2007) recommends fixing a more stringent significance level of 0.01 so as to be able to safely proceed.

Table 4.14.3 details that there was no statistically significant interaction between the posttest scores for Awareness, No Treatment-Treatment group, and Gender, F (1, 108) = 1.035, p = 0.311, partial eta squared (η_p^2) = 0.01 (small effect). Thus, the null hypothesis (Ho_{15}) that there was no statistically significant interaction between the posttest scores for Awareness, No Treatment-Treatment group, and Gender was retained. There was however a statistically significant main effect for the No Treatment-Treatment group F (1, 108) = 4.182, p = 0.043, η_p^2 = 0.04 (small effect).

Upon closer inspection of Tables 4.14.4 to 4.14.14, it was ascertained that the 34 participants in the No Treatment group were primarily Female (29 = 85.3%), Australian (25 = 73.5%), studying for a Bachelor of Nursing (BNUR: 21 = 61.8%), and were First Year students (18 = 52.9%), and were registered for semester one at USQ (33 = 97.1%). The remaining 5 participants in the No Treatment group were Male (5 = 14.7%), 4 Australians (11.8 %) and 1 Nepalese (2.9%), 4 of whom were studying for their Bachelor of Nursing (BNUR: 11.6%) and 1 for a Bachelor of Education (Secondary; 2.9%), of whom 3 were First Year and Head Start students (8.7%), with 1 Second Year (2.9%) and 1 Third Year (2.9%), who were all registered for semester one at USQ (33 = 97.1%). The researcher’s concern was that the 5 male participants may fall short of being statistically representative of the population mean.

Table 4.14.1

Descriptive Statistics for a Three-Way ANOVA between the Posttest Scores for Awareness of DLISt7, No Treatment-Treatment group & Gender

Dependent Variable: Posttest Score

Awareness	No Treatment-Treatment	Gender	Mean	Std. Deviation	N
Yes	No Treatment	Female	86.3553	10.51325	20
		Male	76.9737	6.73156	4
		Total	84.7917	10.48676	24
	Treatment	Female	81.6606	10.97698	29
		Male	75.6037	11.86065	17
		Total	79.4222	11.56413	46
	Total	Female	83.5768	10.93042	49
		Male	75.8647	10.93805	21
		Total	81.2632	11.42200	70
No	No Treatment	Female	82.8070	8.74579	9
		Male	83.4211	.	1
		Total	82.8684	8.24790	10
	Treatment	Female	76.1842	14.66618	24
		Male	64.2982	15.42740	12
		Total	72.2222	15.76206	36
	Total	Female	77.9904	13.51647	33
		Male	65.7692	15.69396	13
		Total	74.5366	15.05159	46
Total	No Treatment	Female	85.2541	9.98230	29
		Male	78.2632	6.50378	5
		Total	84.2260	9.79753	34
	Treatment	Female	79.1807	12.94583	53
		Male	70.9256	14.35264	29
		Total	76.2612	13.94885	82
	Total	Female	81.3286	12.27081	82
		Male	72.0046	13.67010	34
		Total	78.5957	13.33600	116

Table 4.14.2

Levene's Test of Equality of Error Variances[a]

Dependent Variable: Posttest Score

F	df1	df2	Sig.
2.418	7	108	0.024

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

Design: Intercept + Awareness + No Treatment-Treatment + Gender + Awareness*No Treatment-Treatment + Awareness*Gender + No Treatment-Treatment * Gender + Awareness*No Treatment-Treatment*Gender

Table 4.14.3

Test of Between-Subjects Effects

Dependent Variable: Posttest Score

Source	Type III Sum of Square	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Corrected Model	4414.815[a]	7	630.688	4.247	0.000	0.216	29.730	0.941
Intercept	241503.527	1	241503.537	1626.306	0.000	0.938	1626.306	1.000
Awareness	118.282	1	118.282	0.797	0.374	0.007	0.797	0.045
No Treatment-Treatment	621.014	1	621.014	4.182	0.043	0.037	4.182	0.287
Gender	437.854	1	437.853	2.949	0.089	0.027	2.949	0.188
Awareness* No Treatment-Treatment	237.718	1	237.718	1.601	0.209		1.601	0.092
Awareness* Gender	10.654	1	10.654	0.072	0.789	0.015	0.072	0.013
No Treatment-Treatment* Gender	51.667	1	51.667	0.348	0.557	0.001	0.348	0.024
Awareness* No Treatment-Treatment* Gender	153.687	1	153.687	1.035	0.311	0.003	1.035	0.058
Error	16037.808	108	148.498			0.009		
Total	737018.213	116						
Corrected Total	20452.624	115						

R Squared = 0.216 (Adjusted R Squared = 0.165)

Computed using alpha = 0.01

Table 4.14.4

The Frequency and Percentage of Students' Awareness of DLISt7 for the No Treatment group

Awareness	f	%
Yes	24	70.6%
No	10	29.4%
Total	34	100 %

Table 4.14.5

The Frequency and Percentage of Students According to Gender for the No Treatment group

Gender	f	%
Female	29	85.3%
Male	5	14.7%
Total	45	100 %

Table 4.14.6

The Frequency and Percentage of Students According to Nationality for the No Treatment group

Nationality	f	%
English	2	5.9%
Indian	2	5.9%
Kenyan	1	2.9%
Nepalese	1	2.9%
New Zealander	1	2.9%
South African	1	2.9%
South African British	1	2.9%
Australian	25	73.5%
Total	34	100 %

Table 4.14.7

The Frequency and Percentage of Students from Different Nationality Categories for the No Treatment group

Nationality Categories	f	%
Africans	3	8.8%
Asians	3	8.8%
Europeans	2	5.9%
Oceanians	26	76.5%
Total	34	100 %

Table 4.14.8

The Frequency and Percentage of Local and International Students for the No Treatment group

Local & International	f	%
Local	25	73.5%
International	9	26.5%
Total	34	100 %

Table 4.14.9

The Frequency and Percentage of Students Based on Name of Degree for the No Treatment group

Name of Degree	f	%
Bachelor of Education (BEDU)	3	8.8%
Bachelor of Education (Early Childhood)	6	17.6%
Bachelor of Education (Primary)	1	2.9%
Bachelor of Education (Secondary)	1	2.9%
Bachelor of Education (Technical & Vocational Education - TVE)	1	2.9%
Bachelor of Nursing (BNUR)	21	61.8%
Bachelor of Vocational Education & Training (BVET)	1	2.9%
Total	34	100 %

Table 4.14.10

The Frequency and Percentage of Students According to Type of Degree for the No Treatment group

Type of Degree	f	%
Sciences	21	61.8%
Education	13	38.2%
Total	34	100 %

Table 4.14.11

The Frequency and Percentage of Students According to Academic Year for the No Treatment group

Academic Year	f	%
First Year	18	52.9%
Second Year	4	11.8%
Third Year	8	23.5%
Fourth Year	4	11.8%
Total	34	100 %

Table 4.14.12

The Frequency and Percentage of Students According to Type of Academic Year for the No Treatment group

Type Of Academic Year	f	%
First Year & Head Start	18	51.1%
Second Year >	16	48.9%
Total	34	100 %

Table 4.14.13

The Frequency and Percentage of Students According to Academic Semester for the No Treatment group

Academic Semester	f	%
One	33	97.1%
Two	1	2.9%
Three		
Total	34	100 %

Table 4.14.14

The Frequency and Percentage of Students Based on Faculty Affiliation for the No Treatment group

Faculty Affiliation	f	%
FOA	1	2.2%
FOE	44	97.8%
Total	45	100 %

4.15 Predicting Students' Perception towards the Effectiveness of DLISt7 using Pre and Posttest scores

A simple linear regression was performed to determine the correlation between pre and posttest scores to establish how well the scores co-vary so that such scores could be used to "predict a score on one variable with knowledge about the individual's score on another variable" (Creswell, 2012, p. 338). Preliminary checks were also conducted to ascertain that there were no serious violations of the assumptions for normality, linearity, multicollinearity and homoscedasticity (Pallant, 2007).

Table 4.15.1 and 4.15.2 illustrates the adjusted $\check{R}^2$ value (0.565, F (1, 78) = 103.709, p < 0.000, r^2 = 0.57 (large effect) which accounted for 56.5 percent of the variance in the dependent variable. With the unstandardized coefficient (*B)* for the constant being 0.873 it is predicted that for every one unit increase in Pretest scores, there would be a statistically significant unit contribution of 0.9 in the regression equation for Posttest scores (Pallant, 2007). A big t value (10.18) and a significant p value (0.00) as in Table 4.15.3.a, would roughly indicate how well the predictor variable can influence, and has in this instance, the criterion variable (Brace, et al., 2009).

Collinearity statistics (see Table 4.15.3.b) and diagnostics (see Table 4.15.4) were then requested to check if multicollinearity and singularity would be a problem. The root for Tolerance (> 0.10), Variance Inflation Factor (VIF < 10), Eigenvalue, and Condition Index (< 30) with no Variance Proportions greater than 0.50 across a minimum of two different dimensions indicated that multicollinearity and singularity would not be an issue (Tabachnick & Fidel, 2007). Hence, the null hypothesis (H_{016}) was rejected, and the alternative hypothesis (H_{A16}) that there was a statistically significant linear relationship between how well the pre and posttest scores could be used to predict the score for students' perception towards the effectiveness of DLISt7, was accepted.

Table 4.15.1
Model Summary

R	R Square	Adjusted R Square	Standard Error of the Estimate
0.755[a]	0.571	0.565	8.79328

Predictors: (Constant), Pretest Score
Dependent Variable; Posttest Score

Table 4.15.2
ANOVA[b]

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	8018.964	1	8018.964	103.709	0.000[a]
Residual	6031.099	78	77.322		
Total	14050.063	79			

Predictors: (Constant), Pretest Score
Dependent Variable; Posttest Score

Table 4.15.3.a
Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Standard Error	Beta		
(Constant)	11.253	6.685		1.683	0.096
Pretest Score	0.873	0.086	0.755	10.184	0.000

a. Dependent Variable: Posttest Score

Table 4.15.3.b
Coefficients[a]

Model	95.0% Confidence Interval for B		Correlations		Correlations	Collinearity Statistics	
	Lower Bound	Upper Bound	Zero-Order	Partial	Part	Tolerance	VIF
(Constant)	-2.057	24.563					
Pretest Score	0.702	1.044	0.755	0.755	0.755	1.000	1.000

a. Dependent Variable: Posttest Score

Table 4.15.4
Collinearity Diagonostics[a]

Dimension	Eigenvalue	Condition Index	Variance Proportions	
			(Constant)	Pretest Score
1	1.8989	1.000	0.01	0.01
2	0.011	13.527	0.99	0.99

a. Dependent Variable: Posttest Score

4.16 The Reliability and Validity of DLISt7

Exploratory and confirmatory factor analysis was conducted to verify the reliability and validity of the intangible constructs that constitute the conceptual framework of DLISt7, which if used as instructional strategies, could advance the effectiveness, efficiency and engagement of online learning. A sample size of 283 participants, which is a ratio of 7.45:1 satisfactorily meets the desired case-to-variables ratio for PCA (see e.g. Gorsuch, 1983; Hatcher, 2007). In an attempt to identify simple structure the 38 items that constitute DLISt7 were subjected to both principal factor analysis (PFA) extraction with varimax rotation and generalized least squares (GLS) extraction with direct oblimin rotation. Inspection of the correlation matrix for both extraction methods revealed similar correlations above 0.3 which meant that the two matrices were suitable for factoring.

The Kaiser-Meyer-Olkin's measure of sampling adequacy were both identical and very high (KMO = 0.93). Similarly, Bartlett's Test of Sphericity were the same and significant ($\chi^2 = 5955.068$, $p < 0.001$) suggesting that the two correlational matrices were not identity matrices and that further analysis would be appropriate (Pett, Lackey & Sullivan, 2003). Inspection of the anti-image correlation matrices revealed that MSA along the diagonal for both extractions were similar and well above 0.5 (Coakes & Ong, 2011).

Table 4.16.1

Results for Kaiser-Meyer-Olkin and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.926
Bartlett's Test of Sphericity	Approx. Chi-Square	5955.068
	df	703
	Sig.	0.000

Communalities (h^2) for individual items were across the board > 0.30 (Pallant, 2007) except for Item 1.3 which had for PFA (h^2 = 0.295) and GLS (h^2 = 0.279). Nevertheless, these values are still > 0.25 which means that the factor model was working well enough with no items requiring exclusion (Garson, 2009).

Table 4.16.2

Communalities for Principal Factor Analysis & Generalized Least Squares

Item	Principal Factor Analysis		Generalized Least Squares	
	Initial	Extraction	Initial	Extraction
1.1	0.437	0.447	0.437	0.345
1.2	0.555	0.590	0.555	0.485
1.3	0.358	0.295	0.358	0.279
1.4	0.484	0.390	0.484	0.375
2.1	0.615	0.647	0.615	0.694
2.2	0.576	0.565	0.576	0.610
2.3	0.568	0.568	0.568	0.547
2.4	0.389	0.338	0.389	0.304
2.5	0.495	0.482	0.495	0.439
3.1	0.527	0.520	0.527	0.527
3.2	0.526	0.553	0.526	0.589
3.3	0.500	0.518	0.500	0.477
3.4	0.651	0.630	0.651	0.661
3.5	0.440	0.339	0.440	0.329
4.1	0.609	0.486	0.609	0.478
4.2	0.631	0.493	0.631	0.480
4.3	0.586	0.520	0.586	0.530
4.4	0.542	0.515	0.542	0.516
4.5	0.540	0.560	0.540	0.506
5.1	0.675	0.622	0.675	0.687
5.2	0.591	0.527	0.591	0.574
5.3	0.632	0.577	0.632	0.602
5.4	0.521	0.478	0.521	0.445
5.5	0.660	0.634	0.660	0.615
6.1	0.532	0.548	0.532	0.546
6.2	0.637	0.661	0.637	0.678
6.3	0.608	0.586	0.608	0.595
6.4	0.632	0.604	0.632	0.610
7.1	0.549	0.495	0.549	0.500
7.2	0.614	0.661	0.614	0.699
7.3	0.639	0.614	0.639	0.608
7.4	0.413	0.328	0.413	0.322
7.5	0.613	0.535	0.613	0.532

8.1	0.666	0.734	0.666	0.865
8.2	0.670	0.674	0.670	0.721
8.3	0.526	0.517	0.526	0.515
8.4	0.564	0.479	0.564	0.461
8.5	0.595	0.506	0.595	0.469

Total variance explained for both extractions indicated that there were seven factors (*f*) with eigenvalues > 1. The variance explained for PFA (53.25%) was comparable to GLS (53.20%). Both extractions produced identical *f* numbers which were confirmed using Cattell's scree test.

Table 4.16.3.a
Total Variance Explained for PFA

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Factor	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	13.652	35.927	35.927	13.194	34.722	34.722
2	3.212	8.454	44.381	2.777	7.308	42.030
3	1.649	4.340	48.720	1.205	3.170	45.200
4	1.419	3.734	52.454	0.986	2.594	47.795
5	1.203	3.167	55.621	0.761	2.002	49.797
6	1.145	3.012	58.633	0.719	1.893	51.689
7	1.091	2.871	61.504	0.594	1.563	53.252
8	0.939	2.471	63.975			
9	0.898	2.363	66.338			
10	0.882	2.321	68.659			
11	0.832	2.188	70.847			
12	0.790	2.079	72.927			
13	0.752	1.978	74.905			
14	0.663	1.744	76.649			
15	0.635	1.672	78.321			
16	0.599	1.577	79.897			
17	0.589	1.549	81.447			
18	0.565	1.486	82.933			
19	0.520	1.369	84.302			
20	0.505	1.330	85.632			
21	0.457	1.203	86.835			
22	0.451	1.187	88.022			
23	0.425	1.118	89.140			
24	0.397	1.045	90.186			
25	0.394	1.038	91.223			
26	0.378	0.995	92.218			
27	0.333	0.877	93.096			
28	0.321	0.844	93.939			
29	0.313	0.825	94.764			
30	0.296	0.778	95.542			
31	0.267	0.704	96.245			
32	0.240	0.633	96.878			
33	0.236	0.622	97.499			

34	0.228	0.600	98.099
35	0.202	0.532	98.631
36	0.183	0.481	99.112
37	0.173	0.456	99.568
38	0.164	0.432	100.00

Extraction Method: Principal Factor Analysis

Table 4.16.3.b
Results for PFA after Rotation

	Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %
1	7.903	20.796	20.796
2	2.904	7.643	28.440
3	2.768	7.283	35.723
4	2.707	7.123	42.846
5	1.567	4.124	46.970
6	1.562	4.111	51.081
7	0.825	2.171	53.252

Table 4.16.4
Total Variance Explained for GLS

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
Factor	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	13.652	35.927	35.927	13.096	34.392	34.392	11.296
2	3.212	8.454	44.381	2.665	7.013	41.406	8.127
3	1.649	4.340	48.720	1.348	3.548	44.954	3.528
4	1.419	3.734	52.454	1.063	2.797	47.751	5.948
5	1.203	3.167	55.621	0.790	2.079	49.830	6.692
6	1.145	3.012	58.633	0.701	1.846	51.676	6.241
7	1.091	2.871	61.504	0.579	1.524	53.200	3.428
8	0.939	2.471	63.975				
9	0.898	2.363	66.338				
10	0.882	2.321	68.659				
11	0.832	2.188	70.847				
12	0.790	2.079	72.927				
13	0.752	1.978	74.905				
14	0.663	1.744	76.649				
15	0.635	1.672	78.321				
16	0.599	1.577	79.897				
17	0.589	1.549	81.447				
18	0.565	1.486	82.933				
19	0.520	1.369	84.302				
20	0.505	1.330	85.632				
21	0.457	1.203	86.835				
22	0.451	1.187	88.022				
23	0.425	1.118	89.140				
24	0.397	1.045	90.186				
25	0.394	1.038	91.223				
26	0.378	0.995	92.218				
27	0.333	0.877	93.096				

28	0.321	0.844	93.939
29	0.313	0.825	94.764
30	0.296	0.778	95.542
31	0.267	0.704	96.245
32	0.240	0.633	96.878
33	0.236	0.622	97.499
34	0.228	0.600	98.099
35	0.202	0.532	98.631
36	0.183	0.481	99.112
37	0.173	0.456	99.568
38	0.164	0.432	100.00

Extraction Method: Generalized Least Squares
When factors are correlated, sums of squared loadings cannot be added to obtain a total variance

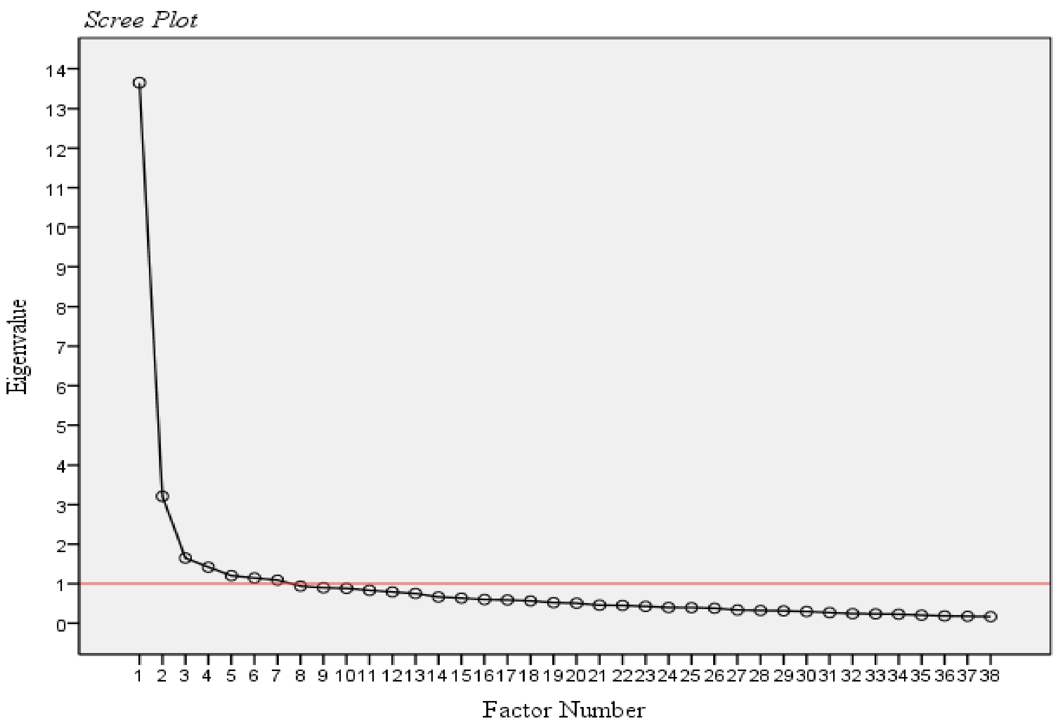

Diagram 4.1: A Scree Plot Illustrating the Factor Numbers with Eigenvalues greater than 1

Additionally, Watkins' Monte Carlo PCA for Parallel Analysis was also used to compare corresponding criterion values from a randomly generated data matrix of the same size (38 variables x 283 participants). Again, seven components that did not exceed the eigenvalues of the original extractions were revealed (Pallant, 2007).

An analysis of the *f* matrices indicated that seven factors were indeed extracted in 10 iterations for PFA and 11 iterations for GLS. Item dimensionality for the two extractions were good with no items requiring exclusion because of loadings

< 0.40 (Brace, et al., 2009). The rotated factor (*f'*) matrix for PFA revealed that of the 38 items used, 17 variables were loading > 0.3 purely on one factor, and 21 complex variables were loading on more than one factor (Coakes, et al., 2008).

Table 4.16.5
Rotated Factor Matrix[a]

	Factor						
	1	2	3	4	5	6	7
1.1			0.594				
1.2			0.679				
1.3	0.507						
1.4	0.509						
2.1				0.748			
2.2				0.620			
2.3	0.643			0.300			
2.4	0.519						
2.5	0.651						
3.1			0.338	0.513	0.339		
3.2					0.601		
3.3	0.337	0.327			0.428		
3.4	0.588						0.368
3.5		0.400					
4.1		0.354	0.417				
4.2	0.396		0.391				
4.3	0.589						
4.4	0.648						
4.5	0.457						0.433
5.1		0.382	0.578	0.315			
5.2		0.303	0.518				
5.3	0.663						
5.4	0.519						
5.5	0.669					0.318	
6.1				0.579		0.356	
6.2	0.472				0.409	0.345	0.303
6.3	0.641					0.327	
6.4	0.655					0.306	
7.1				0.458		0.380	
7.2	0.340	0.333				0.556	
7.3	0.586					0.402	
7.4	0.469						
7.5	0.694						
8.1		0.757		0.333			
8.2		0.721					
8.3	0.624					0.330	
8.4	0.419	0.484					
8.5	0.501	0.404					

Extraction method: Principal Factor Analysis
Rotation Method: Varimax with Kaiser Normalization
a. Rotation converged in 8 iterations

Oblique rotation was then performed to confirm the interpretation of the *f* model. The goodness of fit test for GLS, was significant, χ^2 (458, N = 283) = 869.44, p = 0.000, *w* = 1.75 (large effect) suggesting that the model does not fit the data well (Albright & Park, 2009). This validates the earlier findings gleaned from the two tables for total variance explained in which an eighth construct missed the cut with eigenvalues of 0.939 for both PFA and GLS extractions. Thus, the null hypothesis (H_{017}) was rejected, and the alternative hypothesis (H_{A17}) of there was a statistically significant relationship between the expected and observed model fit for DLISt7, was accepted.

Table 4.16.6
Goodness-of-fit Test

Chi-Square	df	Sig
869.439	458	0.000

Interpretation of the GLS pattern matrix (P_{vf}) revealed 29 pure main loadings with 1 item read as an overlap, 12 as excellent, 8 as very good, 5 as good, 2 as fair and 1 as poor (Comrey & Lee, 1992). As for the 8 complex cross-loadings, 1 was recognized as very good, 3 as good and 4 as fair. However, item 3.5 was suppressed (Field, 2009).

In the search for simple structure, findings from the GLS structure matrix (S_{vf}) will be used in Chapter 5 to double check and thereafter revise the research instrument (Field, 2009). No oblique factor loadings < 0.30 will be used to define factors (Comrey & Lee, 1992).

Table 4.16.7
Pattern Matrix[a]

	Factor						
	1	2	3	4	5	6	7
1.1		0.603					
1.2		0.678					
1.3	0.571						
1.4	0.480						
2.1			0.768				
2.2			0.622				
2.3	0.743						
2.4	0.583						
2.5	0.706						
3.1			0.367			0.355	
3.2						0.724	
3.3						0.461	
3.4	0.455						0.500
3.5	-	-	-	-	-	-	-
4.1		0.404					
4.2		0.308					
4.3	0.569						
4.4	0.694						
4.5	0.419						
5.1		0.748					
5.2		0.667					
5.3	0.727						
5.4	0.378						
5.5	0.640						
6.1			0.436		0.389		
6.2						0.330	0.497
6.3	0.599						
6.4	0.589						
7.1					0.493		
7.2					0.707		
7.3	0.521				0.383		
7.4	0.503						
7.5	0.749						
8.1				0.978			
8.2				0.758			
8.3	0.618				0.303		
8.4	0.367			0.327			
8.5	0.471						

Extraction method: Generalized Least Square
Rotation Method: Direct Oblimin with Kaiser Normalization
Rotation converged in 9 iterations

Table 4.16.8
Structure Matrix

	Factor						
	1	2	3	4	5	6	7
1.1		0.570					
1.2	0.403	0.669	0.322		0.376	0.363	
1.3	0.481						
1.4	0.577	0.410		0.304	0.339	0.424	
2.1		0.436	0.812	0.355		0.316	
2.2	0.403	0.452	0.658	0.379	0.365	0.448	
2.3	0.666	0.310	0.325			0.405	0.307
2.4	0.528					0.324	
2.5	0.648	0.315				0.369	
3.1		0.524	0.567	0.333	0.320	0.528	
3.2	0.365	0.506		0.323	0.335	0.742	
3.3	0.486	0.368		0.443	0.302	0.591	0.343
3.4	0.667	0.370			0.427	0.424	0.634
3.5	0.427	0.445		0.480	0.344	0.416	
4.1	0.373	0.640	0.381	0528	0.356	0.487	
4.2	0.565	0.598		0.418	0.410	0.555	
4.3	0.696	0.482		0.364	0.410	0.437	
4.4	0.705	0.401		0.328	0.392	0.334	0.316
4.5	0.578	0.480		0.400		0.322	0.490
5.1	0.350	0.799	0.410	0.572		0.458	
5.2	0.455	0.740		0.443	0.364	0.523	
5.3	0.734	0.506		0.343	0.365		
5.4	0.614	0.436		0.308	0.497	0.434	
5.5	0.732	0.458			0.586		
6.1		0.391	0.589		0.535		0.429
6.2	0.598	0.434			0.561	0.505	0.638
6.3	0.670	0.309			0.513		0.510
6.4	0.723	0.371			0.546		0.477
7.1	0.364	0.453	0.445	0.400	0.610	0.376	
7.2	0.535	0.491		0.443	0.804	0.438	
7.3	0.683	0.344		0.331	0.647	0.304	0.376
7.4	0.540	0.325		0.350			
7.5	0.717				0.437	0.307	
8.1		0.451	0.396	0.878		0.312	
8.2	0.481	0.472		0.796	0.474	0.440	
8.3	0.652				0.546		0.301
8.4	0.576	0.452		0.535	0.360	0.468	
8.5	0.637	0.473		0.465	0.378	0.405	

Extraction Method: Generalized Least Square
Rotation Method: Direct Oblimin with Kaiser Normalization

The factor correlation matrix (R_{ff}) indicates relationships ranging from slight, almost negligible (0.12) to moderate (0.58) correlations (Coakes & Ong, 2011). Thus, orthogonality and construct validity of the discriminate variety can be safely assumed (see e.g., Brown 2006; Garson, 2009). As for the internal consistency of the model, due process and the integration of evidence about the “appropriateness of content, correlations with external variables, and hypotheses about constructs" (Cronbach, 1990, p. 707) has revealed evidence that the conceptual framework known as DLISt7 is discriminate by nature (Brown, 2006). This is because the off-diagonal elements indicate that this "matrix of the correlations among the factors" is not an identity matrix but of an uncorrelated model (Gorsuch, 1983, p. 40).

Table 4.16.9
Factor Correlation Matrix

Factor	1	2	3	4	5	6	7
1	1.000	0.523	0.151	0.416	0.551	0.494	0.336
2	0.523	1.000	0.369	0.574	0.441	0.581	0.221
3	0.151	0.369	1.000	0.292	0.231	0.305	0.275
4	0.416	0.574	0.292	1.000	0.300	0.506	0.147
5	0.551	0.441	0.231	0.300	1.000	0.361	0.348
6	0.494	0.581	0.305	0.506	0.361	1.000	0.121
7	0.336	0.221	0.275	0.147	0.348	0.121	1.000

Extraction Method: Generalized Least Square
Rotation Method: Direct Oblimin with Kaiser Normalization

4.17 Summary

After determining the validity and reliability of DLISt7 as a conceptual framework that theoretically can affect observable phenomena, the research questions became systematically answerable. Firstly, of the eight principles specified, seven loaded successfully. Secondly, from the factor loadings it was ascertained that the items utilized were actually measuring the appropriate constructs, and were thus reliably tapping into what was supposed to be measured seeing as accumulated and integrated evidence had indicated that such a conclusion would be appropriate (Cronbach, 1990). However, an assessment of the summated gain scores about the perceived effectiveness of DLISt7 was inconclusive. This was because of issues associated with the validity and reliability of the mean scores from the No Treatment group (McMillan & Schumacher, 2009) based upon correlations and logic (Cronbach, 1990).

CHAPTER 5

DISCUSSIONS, SUGGESTIONS, IMPLICATIONS & CONCLUSION

5.1 Introduction

The initial discussion for this chapter will centre on students' Awareness of the Different Levels of Instructional Strategies (DLISt7) for Online Learning. This is then followed by a description of teaching staff utilization of communication technology and online resources. A comparison was conducted using the findings from a previous study at UPSI with the current findings from USQ in an effort to gain insight about the similarities and differences in usage trends between respondents from a university in Malaysia compared to participants from a university in Australia (Nellis & Parker, 1992). Although it may be too much to expect the discovery of precise answers, it is expected that there will be lessons that can be learnt in terms of the options available for finding new ways to improve the instructional design of future online courses.

The discussion will then move on to students' Awareness of DLISt7 and its relationship with the grouping independent variable of No Treatment-Treatment group, the attribute independent variables of gender, nationality, academic progress at USQ i.e. type of degree and academic year, along with faculty affiliation. The discussion will then shift in relation to the utilization of communication technology and online resources by teaching staff, assessing the difference in students' perception towards Awareness of DLISt7 and how it interacts with the grouping variables, and also the use of pre and posttest scores to predict students' perception towards the effectiveness of DLISt7.

Next, findings from the analysis will be used to verify the development of DLISt7 as a valid and reliable conceptual framework that has been standardized as a measure. Additionally, the expected and observed model fit for DLISt7 will also be discussed. Finally, suggestions will then be made by the researcher about the validity of amalgamating the Different Levels of Instructional Strategy with the Seven Principles to form DLISt7 followed by a conclusion that brings the research project to a close.

5.2 Students' Awareness of the Principles for Good Practice in Undergraduate Education

Based on the findings from a previous study at UPSI (N = 397) the number of respondents irrespective of race, gender, number of semesters they had experienced online learning, or faculty affiliation, who indicated 'No' they were not aware of the Seven Principles for Good Practice in Undergraduate Education was 381 (96%). Only 16 (4%) indicated 'Yes' they were aware of the principles. Consequently, it was rationalized then, that as a whole UPSI undergraduate students were not aware of the Seven Principles. Any claim made contrary to the fact, probably occurred purely by chance (Syaril Izwann, 2007).

Contrastingly, of the 319 participants from USQ regardless of gender, nationality, academic progress, or faculty affiliation, 194 (60.8%) indicated 'Yes' they were aware of DLISt7 and 125 (40.0%) indicated 'No' they were not aware. In view of DLISt7 being an unpublished conceptual framework, it is doubtful that USQ undergraduate students could have had a priori knowledge about it. Any claim made contrary to the fact, could have occurred purely by chance, but is more likely to have been a combination of circumstances that cannot be isolated without further study. The following reasons are suggested to explain why there was a sixty/forty split in the responses.

Firstly, there was the possibility that it was a case of the Hawthorne effect which "refers to performance increments prompted by mere inclusion in an experiment" (Tuckman, 2012, p. 132). This is because, once research participants become suspicious or were tipped-off, they might under this condition, become anxious, fake responses, or react differently in order to look good (McMillan & Schumacher, 2009). This could have come to pass because of a mix up when allocating participants from MAT1008 (Building Professional Nursing Attributes B) and MAT_1008 (Building Professional Nursing Attributes B; Fraser Coast Campus) to the No Treatment-Treatment conditions. This concern was relayed to the researcher by the teaching staff involved.

Secondly, there was also the possibility that performance on the posttest was affected by experience from the pretest (Tuckman & Harper, 2012). Problems related to testing occur because "experience of taking such a pretest may increase the likelihood that the subjects will improve their performance on the subsequent posttest, particularly when it is identical to the pretest" (Tuckman & Harper, 2012, p. 126). The use of an unobtrusive measure, defined by Tuckman and Harper (2012) as "measurement techniques that do not require acceptance or awareness by the experimental subjects" is advocated so that testing problems can be avoided (p. 126).

This was after all what DLISt7 was designed to function as, a rubric for extrinsically prompting and stimulating conditional responses from students that can also double as an unobtrusive diagnostic indicator of process for assessing the quality of learning intrinsically experienced by students. The solution for the problem of testing is to "rule out the effect of the pretest on the intervention" by using a Solomon four-group design which is a "combination of the posttest-only control group and pretest-posttest control group design" (McMillan & Schumacher, 2009, p. 278). However, because of the complex sampling and statistics involved, this recommendation would require the researcher to apply for a research grant and bring into play a team of researchers.

Thirdly, there is the "tendency to mark a single choice for all questions out of boredom, disinterest, or hostility" (Tuckman & Harper, 2012, p. 264) known as "acquiescent" response bias (Cronbach, 1990, p. 470). Lastly, there is also the predisposition to "provide the answer they want others to hear about themselves rather than the truth....that shows oneself in the best possible light" which is known as the social desirability response bias (Tuckman & Harper, 2012, p. 265).

5.3 The Utilization of Communication Technology and Online Resources by Teaching Staff at UPSI and USQ

At UPSI, 345 (86.9%) respondents selected 'No' indicating that teaching staff did not use either telephone or text messaging to convey instructional strategies for online learning. Only 52 (13.1%) selected 'Yes' indicating that teaching staff used either of these communication tools. The same can also be said about email utilization by teaching staff. 311 (78.3%) respondents selected 'No' indicating that teaching staff did not use this type of communication tool, and 86 (21.7%) selected 'Yes' indicating that teaching staff used email. Thus, it was perceived that the utilization level of telephone, text messaging and email by UPSI teaching staff to encourage communication and interaction with and among students was relatively low (Syaril Izwann, 2007).

The same however cannot be said for the utilization of forums in MyGuru by teaching staff at UPSI. Of the 397 participants, 373 (94%) selected ‘Yes’ indicating that teaching staff who taught them used forums, while only 24 (6%) selected ‘No’ indicating that teaching staff did not do so. Perhaps this has something to do with the fact that teaching staff are required by the university’s administration to incorporate into their instructional repertoire the use of forums which is part of the MyGuru, Integrated Management System (IMS) (Syaril Izwann, 2007). MyGuru is now MyGuru2, having been upgraded not too long ago.

As for online resource utilization by teaching staff at UPSI, 179 (45.1%) participants selected ‘Yes’ indicating that teaching staff who taught them used online learning materials, while the remaining 218 (54.9%) selected ‘No’ indicating that teaching staff did not do so. The reason for this could possibly be that some teaching staff readily had learning materials that could be uploaded onto MyGuru as online resources, whereas others might have limited or possibly no material whatsoever. Students would only be interested in accessing, and in all probability do so repeatedly, online resources that were useful and beneficial to them (Syaril Izwann, 2007).

Comparably, 288 respondents from USQ also indicated low levels of utilization for Blogs ($f = 71$, 22.30%), Moodle Chat ($f = 29$, 9.1%), Moodle Forum ($f = 81$, 25.4%), Teleconferencing ($f = 5$, 1.6%), Video Conferencing ($f = 14$, 4.4%), Instant Messaging ($f = 28$, 8.8%), Wimba Online Classroom ($f = 82$, 25.7%), Telephone: Text Messaging ($f = 9$, 2.8%), Telephone: Voice ($f = 32$, 10.0%), Skype: Video ($f = 6$, 1.9%), Skype: Voice ($f = 4$, 1.3%), and Skype: Text ($f = 4$, 1.3%).

It was learnt that at USQ the most frequently utilized communication technology or online resource utilized for conveying instructional strategies was USQStudyDesk with 284 (89.0%) ‘Yes’ responses followed by Email with 256 (80.3%) ‘Yes’ responses. This was followed in descending order by Wimba Online Classrooms (f = 82, 25.7%), Moodle Forums (f = 81, 25.4%), Blogs (f = 71, 22.3%), Telephone: Voice (f = 32, 10.0%), Moodle Chat (f = 29, 9.1%), and Instant Messaging (f = 28, 8.8%).

Hence, it would probably be reasonable to assume that teaching staff at USQ had the tendency to rely heavily on two of the more important communication technologies made available to them by the university’s administration whilst preferring to be eclectic when choosing what other online resources to incorporate into their instructional repertoire. Such findings are in line with the recent suggestion that previous research involving the CoI model “may have resulted in a systematic underrepresentation of the instructional effort involved in online education” (Shea et al., 2012, p. 90). This is because it is “within and external to threaded discussion areas” such as assessments, emails and private folders that much of online learning and teaching occurs (Shea et al., 2012, p. 90).

There were also a few one-off instances of USQ students suggesting that teaching staff also utilized communication technology and online resources such as compact-discs (CDs) (f = 1, 0.3%), YouTube presentations (f = 1, 0.3%), Flash video (f = 1, 0.3%), Videos (f = 1, 0.3%), and Wikis (f = 1, 0.3%). Based on personal observations made by the researcher during his time as a teaching assistant/marker for EDO 4675, teaching staff at USQ are predisposed to utilizing online resources in a variety of different ways. For example during the main study, a lot of learning materials were uploaded in bulk onto the main page of USQStudyDesk for CIS1000

(Information Systems Concepts) whereas for GIS1402 (Geographic Information System), learning materials were uploaded to Moodle Forum and unveiled at regular intervals as a way of initiating weekly discussion threads.

In summary, the lesson that can be learnt in terms of the possible instructional design options available for finding new ways to improve future online courses via a comparison of the usage trend between teaching staff at UPSI and USQ was that, they would all incorporate into their instructional repertoire whatever the university's administration would provide and require them to use. If and when teaching staff had learning materials readily available for upload, then they would most likely do so because students would probably be interested in repeatedly accessing online resources that were beneficial and useful.

As for teaching staff that are technically challenged, they can opt to provide links that direct students to the appropriate universal resource locator (URL), expert in the field or professional. Activities or exercises associated with critical discourse and reflection that assess the validity of the information and determine the reliability of its source can later be arranged and conducted using instructional technology (Syaril Izwann, 2007). Hence, educational administrators and instructional designers should make a note that teaching staff at both institutions had the tendency to make good use of whatever was made available to them while preferring to remain eclectic when deciding what the balance should be for utilizing asynchronous or synchronous communication technology and online resources. The end goal would be to "identify broader categories of learning outcomes [and their effects] in order to foresee to what extent their findings can be generalized [using the categories of human performance]" (Gagne, 1984, p. 377).

5.4 The Relationship between being in the No Treatment group compared to the Treatment group and Students' Awareness of DLISt7

Initial findings revealed that students' Awareness of DLISt7 at the pretest stage was independent of or not related to being in the No Treatment-Treatment group. However, students' Awareness of DLISt7 at the posttest stage was related to being in the No Treatment-Treatment group. Hence, the need arose to further investigate whether it would be reasonable to assume that Awareness of DLISt7, as an IIV was actually mediating the effect of the SMTIVs onto the DV (Creswell, 2012), or was it a case of "extraneous variables that remain uncontrolled" confounding the results, and "casting doubt about the validity of inferences made" (Pedhazur & Schmelkin, 1991, p. 212).

5.5 The Relationship between Attribute Independent Variables and Awareness of DLISt7

Further investigation revealed that students' Awareness of DLISt7 at the pretest stage was independent of or not related to the attribute independent variables of Gender, Nationality, Type of Degree, Academic Year and Faculty Affiliation. Similarly, students' Awareness of DLISt7 at the posttest stage was independent of or not related to any of the above mentioned attribute independent variables. Therefore, there was no pre and post relationship that would be grounds for further analysis.

5.6 The Relationship between the Use of Communication Technology and Online Resources by Teaching Staff, and Students' Awareness of DLISt7

Initially, there was a statistically significant relationship between students' Awareness of DLISt7, and the utilization of communication technology and online resources such as Blogs, Moodle Chat, Moodle Forum and Videoconferencing by teaching staff to convey instructional strategies for online learning at the pretest stage. However, there was no statistically significant relationship between students' Awareness of DLISt7, and the utilization of communication technology and online resources by teaching staff to convey instructional strategies for online learning at the posttest stage. Yet again, there was no pre and post relationship that would be grounds for further analysis.

5.7 The Difference in Perception towards the Effectiveness of DLISt7 by Undergraduate Students from USQ

For the 80 participants who provided pre and posttest responses, the effectiveness mean score for the posttest was not significantly greater than the mean score for the pretest. However, there was a strong and significant correlation between the CV and DV. This was interpreted as an indication that participants who are inclined to score highly on the posttest could have also scored highly on the pretest. Thus, further analysis would be required to determine the reason for why the mean score for the posttest was not significantly greater than the mean score for the pretest. Did the IIV not mediate the effect of the SMTIVs onto the DV or was there an uncontrolled extraneous variable that was causing the results of the study to become confounded.

Further analysis was conducted using a sequence of PDIVs to analyze students' perception towards the effectiveness of DLISt7. This was for the purpose of identifying which control attribute independent variable warranted further study and which could be dropped. A comparison of the pretest mean scores revealed that there was a significant difference in the scores of participants who answered 'Yes' or 'No' about Awareness of DLISt7, No Treatment compared to Treatment group, and Female compared to Male participants. There was however no significant difference in the mean scores of Local participants compared to International participants, nor First Year and Head Start participants compared to Second, Third and Later Year participants.

Mean scores were again compared at the posttest stage for the same set of PDIVs. Similarly, there was a significant difference in the mean scores of participants who answered ‘Yes’ or ‘No’ about Awareness of DLISt7, No Treatment compared to Treatment group, and Female compared to Male participants. There was yet again no significant difference in the mean scores of Local participants compared to International participants, nor First Year and Head Start participants compared to Second, Third and Later Year participants.

Hence, the three control attribute independent variables of Awareness, No Treatment-Treatment group and Gender were successfully identified as PDIVs that warranted further study. The two dispositional independent variables of Nationality Category and Type of Academic Year were dropped.

5.8 The Difference between the Posttest Scores of Participants who Answered ‘Yes’ compared to those who Answered ‘No’, after Controlling for Scores on the Pretest Administered Prior to the Intervention

A one-way between-group ANCOVA was conducted to determine if there was a significant difference in the posttest scores of participants who answered ‘Yes’ compared to those who answered ‘No’, after controlling for scores on the Awareness of DLISt7 pretest administered prior to the intervention. Information from the output revealed that there was no main effect for Awareness which meant that there was no statistically significant difference in the posttest scores of participants who answered

'Yes' compared to those who answered 'No', after controlling for scores on the pretest administered prior to the intervention. However, a significant relationship did exist between Pretest and Posttest Scores. Consequently, it would probably be reasonable to assume that when Pretest Scores were statistically controlled for, Awareness had no influence on Posttest Scores despite Posttest Scores being related to Pretest Scores. Yet again, further analysis would be required to determine the reason why the results of the study had become confounded in this manner and was not as expected since it would be logical to assume that awareness of the DLISt7 should affect the perception of its effectiveness.

5.9 The Interaction between Awareness of DLISt7, No Treatment-Treatment group and Gender

A higher order between-subjects three-way ANOVA revealed that there was no statistically significant interaction between the posttest scores for Awareness, No Treatment-Treatment group and Gender. However, there was a statistically significant main effect for the No Treatment-Treatment group (see Table 4.14.3). Based on earlier findings, it had been established that students' Awareness of DLISt7 at the posttest stage was related to being in the No Treatment-Treatment group and that pre and posttest scores were related. Once again the researcher had to attempt to "understand the nature and the source" of why the mean scores for the posttest were not significantly greater than the mean scores for the pretest (Cohen, et al., 2003, p. 430). From where did the uncertainty originate overshadowing "the accuracy of the inferences, interpretations, or actions made on the basis of test scores" provided by the participants from the No Treatment group (Johnson & Christensen, 2012, p. 597).

The following explanation was proposed by the researcher to clarify how the confounding variable of group mean scores and the extraneous factor of group sample size for the No Treatment group have come together to limit the reliability and validity of the inferences derived from the findings of this study. In view of DLISt7 being an unpublished conceptual framework it is doubtful that USQ undergraduate students, particularly those from the No Treatment group, could have a priori knowledge about DLISt7.

Although the probability does exist that such scores could have occurred purely by chance, common sense favours the assumption that the scores were either confounded by the Hawthorn or testing effect, together with the acquiescent and social desirability response bias, that cannot be isolated without further study. As stated by McMillan and Schumacher (2009), "scores cannot be valid unless they are reliable….Reliability is needed for validity; scores can be reliable but not valid" (p. 185). Hence, the only way to know for sure is to conduct further research using the Solomon four-group design (McMillan & Schumacher, 2009).

Justification for this alternative explanation was realized while conducting a detailed analysis of the mean scores for the No Treatment-Treatment group (see Tables 4.12.5 and 4.12.7). For the pretest, the mean score for the No Treatment group was 79.85 (N = 63) but, for the posttest the mean score was 84.23 (N = 34). By examining the same tables, it was also determined that the pretest mean score for the Treatment group was 76.37 (N = 220) and the posttest mean score was 76.26 (N = 82), an insignificant difference that did not register on any of the statistical tests that were ran but would merit further research to conclusively determine the effectiveness or ineffectiveness of DLISt7, preferably funded by a research grant and employing a team of researchers utilizing the Solomon four-group design.

It was at this juncture that the confounding variable of group mean scores and the extraneous factor of group sample size could be seen to have become entangled, and made clear why the outcome of the research was not as expected (Creswell, 2012). The primary point of contention that warranted careful consideration was whether the posttest mean scores for the No Treatment group (M=84.23) was representative of the population mean since they were from a sample of 34 participants made up of 29 Females (M = 85.25) and 5 Males (M = 78.26). Of particularly concern were the mean scores from the 5 male participants. This was because, mean scores that are between 90-81 would indicate that the level of effectiveness for DLISt7 was perceived as being 'high' and a mean score of between 80-71 would be perceived as being 'moderately high.'

As a result, the posttest mean scores from the No Treatment group would appear inflated when compared to the posttest mean scores from the Treatment group (M = 76.26) which was from a better sample of 82 participants made up of 53 Females (M = 79.18) and 29 Males (M = 70.93). Mean scores of between 80-71 were interpreted as an indication that the level of effectiveness for DLISt7 was perceived as being 'moderately high' and a mean score of between 70-61 was perceived as being 'above average.' Consequently, the mean scores that came from the latter Treatment group and not the former No Treatment group would appear to best represent the population mean without giving the impression of being overstated.

The next point of contention would be the fact that a sample of approximately 40 would have been better for invoking the central limit theorem (Field, 2009). This is because with a sample of less than 30 the resulting sampling distribution would have a different shape compared to the parent population causing doubt about whether "the sampling distribution has a normal distribution with a mean equal to the population mean" (Field, 2009, p. 42).

According to Glass and Hopkins (1996), "the validity of the central limit theorem allows [for] statistical inferences to [be made across] a much broader range of applications than would otherwise be possible" (p. 235). This theorem applies "even when the parent population is not normal, [because] the formula $\sigma_{\bar{x}} = \sigma / \sqrt{n}$ accurately depicts the degree of variability in the sampling distribution" (Glass & Hopkins, 1996, p. 239). For example, when "sample sizes are small (1, 2, 5 and 10); some degree of non-normality in the parent population continues to be evident in the sampling distributions, but progressively less so as *n* increases" (Glass & Hopkins, 1996, p. 239). When *n* was increased to 25 the "theoretical standard error of the mean" agrees almost perfectly with the standard deviation from the sample means despite a skewed parent population from which the sample was drawn (Glass & Hopkins, 1996, p. 239).

In terms of the standard error of proportion, an *n* close to the upper confines of the central limit theorem would have been better for removing doubts about the ensuing shape of the sampling distribution (see e.g., Bartz, 1999; Field, 2009). This is because;

> The central limit theorem states that whatever the shape of the frequency distribution-even if it is bimodal, dichotomous, or some other configuration-the sampling distribution of the mean (in this case, *p*) will approach the normal distribution as *n* increases....Suppose you randomly selected a sample of 100 persons from a defined population (e.g., a large university)….Now suppose you replicate the study many, many times, each time selecting a new

> random sample of 100 persons. The distribution of these many values of p will be essentially normal, with a mean ≈ π...(Glass & Hopkins, 1996, p. 321).

All things considered, be it the Hawthorne effect, testing effect, acquiescence response bias, or social desirability response bias, there is no other way to establish the reliability and validity of the mean scores for the No Treatment group but to conduct further research. As a result, the means scores from the No Treatment group should not for the time being be used to make approximations about the population. Although the scores are valid, they might not be reliable. This is because the sample size for Male participants falls far short of being statistically representative of the population mean.

As for the mean scores from the Treatment group, bear in mind that teaching staff working with the Treatment groups were only invited, but not obligated, to refer to DLISt7 during the course of the semester as they managed their interaction with students. They were briefed that DLISt7 was to be used as a rubric for extrinsically prompting and stimulating conditional responses from students. No changes were required of course content, or to teaching and learning activities. Teaching staff were to continue to deliver course content as they would normally do because DLISt7 was an unobtrusive measure that did not require awareness or acceptance by the participants of the experiment (Tuckman & Harper, 2012). Hence, if further research were to be conducted using the Solomon four-group design, then the aim would be of raising awareness about DLISt7 to see whether or not it would be accepted by participants and teaching staff alike.

Consequently, if additional elaboration was required for the purpose of raising awareness and seeking acceptance, then teaching staff could engage in structured dialogue with students' i.e. reciprocal teaching. Such procedure entails little or no risk or imposition to participants and teaching staff alike because DLISt7 is actually a categorization of desirable learning experiences that often occur naturally in good learning environments. It was because of this reason that the quasi-experiment was attempted to investigate the effectiveness of generating student Awareness about DLISt7. This was in an effort to find out if the participants in the Treatment group would develop and mature at a faster rate having been exposed to DLISt7 compared to those in the No Treatment control group (Tuckman, 1999).

Despite not being exposed to DLISt7, participants in the No Treatment control group were not at a disadvantage in terms of differential treatment. This is because they would still experience similar developmental and maturational experiences during the course of the semester as part of their normal development (Tuckman & Harper, 2012). For the reason that "a control group composed of comparable persons who can be expected to have the same (or similar) maturational and developmental experiences" was used, the posttest minus pretest scores used to generate gain scores were meant to assess the effectiveness of the treatment, and therefore enable "the experimenter to make conclusions about the experimental treatment independent of the confounding maturation effect" (Tuckman & Harper, 2012, p. 128).

Notwithstanding the best of efforts to control for extraneous variables using procedures such as "pretest, covariates, matching of participants, homogeneous samples and blocking variables," (Creswell, 2012, p. 297) confounding variables and extraneous factors did come together to "render uncertain conclusions we can draw from [the] study," and limit the generalizability of the findings (Vockell & Asher, 1995, p. 29). Also intertwined was the lack of random assignment characteristic of quasi-experiments, and the setback of not being able to access Second, Third and Later Year courses from either the Faculty of Arts nor Business and Law for use as No Treatment control groups. Perhaps this could have provided the numbers needed for the No Treatment control groups so that the number of participants for the No Treatment-Treatment groups would have been reasonably balanced.

All of these have been identified as credible reasons for why the mean score for the posttest was not significantly greater than the mean score for the pretest. Although there is a solution to this conundrum, the option of using a Solomon four-group design in future studies involving DLISt7 would be a considerable undertaking for the reason that "it is difficult to carry out in education because it requires twice as many subjects and groups as other designs" (McMillan & Schumacher, 2009, p. 278).

5.10 Predicting Students' Perception towards the Effectiveness of DLISt7 using Pre and Posttest scores

A simple linear regression was performed to determine how well the pre and posttest scores could be used to predict the score for students' perception towards the effectiveness of DLISt7. Since the adjusted $\check{R}^2$ value (r^2 = 0.57) would account for 56.5 percent of the variance in the dependent variable, it was predicted that the unstandardized coefficient (B = 0.873) for the constant would contribute 0.9 unit to the regression equation for posttest scores with every one unit increase in Pretest scores. Thus, the predictor variable can, and has in this instance, influenced the criterion variable or in simple terms, for every action there will be an equal and opposite reaction. This is very important in the terms of establishing the temporal (test-retest) validity of the research design used to standardize DLISt7. The point is, would it be worth the effort to raise awareness about DLISt7 to see whether or not it would be accepted by participants and teaching staff alike. In view of DLISt7 being a categorization of desirable learning experiences that often occur naturally in good learning environments, would generating student Awareness about DLISt7 at the former stage improve the quality of online learning experienced by participants during the latter stage. Statistically, the answer would be a why not.

5.11 Discussion regarding the Validity of DLISt7 and the Reliability of the Items Utilized

Findings from the confirmatory factor analysis verified the validity of the intangible constructs that constitute the conceptual framework of DLISt7. Although only seven of the possible eight successfully loaded, there is a simple and logical explanation for this. According to Brown (2006) the number of observed measures (p) that are submitted for analysis limits the number of factors that can be extracted (m). Unequivocally, $p - 1$ is the maximum number of factors that can be extracted or "the number of parameters that are estimated in the factor solution (a) must be equal to or less than the number of elements (b) in the input correlation or covariance matrix (i.e., $a \leq b$)" (Brown, 2006, p. 23).

Providentially, the factor correlation matrix revealed an uncorrelated model with the oblique rotation producing a solution that was "virtually the same as one produced by orthogonal rotation" (Brown, 2006, p. 32). In fact, the interpretation of the oblique solution, although more complicated than the orthogonal solution, did "provide better results" (Hatcher, 2007, p. 87). This was achieved in terms of "slightly higher values on the highest loadings and correspondingly lower values on the low loadings, as indeed it is meant to" (Jolliffe, 2002, p. 164).

Together with the fact that the test-retest (temporal) coefficient for Cronbach's alpha reliability analysis was excellent each time the research instrument was administered, formerly in Malaysia (pilot: $\alpha = 0.97$, n = 74; main: $\alpha = 0.94$, N = 397) (Syaril Izwann, 2007), and latter in Australia (pilot: $\alpha = 0.92$, n = 39; main: $\alpha = 0.95$, N = 283), it would probably be safe to assume that the items are actually measuring "the underlying construct comparably across groups" (Brown, 2006, p. 4). As clearly stated by Cronbach (1990), a reliability coefficient can reach 1.00 if and when the measurement contains no variable variance, for example "if there is as much error as true information in scores, the coefficient is 0.50" (p. 194).

Although no items were identified to be problematical and required omission, item 3.5 in the GLS P_{vf} matrix was suppressed and items 2.1, 7.2 and 8.1 in the S_{vf} matrix were identified to have factor inter-correlations above 0.80. According to Field (2009), "there are situations in which values in the pattern matrix are suppressed because of relationships between factors. Therefore, the structure matrix is a useful double-check" (p. 666). The skill of being able to interpret factor correlation estimates is invaluable because it enables a researcher to pin-point the "existence of redundant factors or a potential higher-order structure" (Brown, 2006, p. 32).

According to Brown (2006) when factor inter-correlations are above 0.80 or 0.85 poor discriminant validity is inferred and the suggestion of "a more parsimonious solution" is probable (p. 32). For the reason that data variables are not perfect, "they cannot correlate perfectly with a factor" (Comrey & Lee, 1992, p. 240). A factor loading of 0.90 for example, would denote "a total overlap in true variance between the data variable and the factor....making it essentially identical with the factor except for its error variance" (Comrey & Lee, 1992, p. 240).

It is also quite common for items in a S_{vf} matrix to have strong loadings > 0.30 on multiple factors “especially with an oblique rotation” (Pett, et al., 2003, p. 173). Sometimes there will also be items “that are important but rarely checked” and thus fail to load because of loadings < 0.30" (Pett, et al., 2003, p. 173). “Yet these weak-loadings items are such important contributors” to the overall content of the instrument that they cannot be easily dropped and shelved (Pett, et al., 2003, p. 172). If and when this happens, it is recommended that the items be examined “closely for their relevance to your construct” and the decision about what to do with them is included in the write-up (Pett, et al., 2003, p. 173).

Consequently, Table 5.1 is put forth to help answer the question of “how high the correlation between a data variable and a factor must be before it can be regarded as ‘significant’ for interpretive purposes” (Comrey & Lee, 1992, p. 242). The values at the lower end of this table would also be useful in helping to “decide when the data variable is too unlike the factor to be considered in the factor interpretation” (Comrey & Lee, 1992, p. 242). The indexes of viability contained in the table were meant to be used to interpret the values for variable-factor correlations. However, caution must be exercised when generalizing to oblique solutions because the principal oblique factor coefficients must load onto a particular factor before the S_{vf} matrix can be confidently interpreted (see e.g., Brown, 2006; Comrey & Lee, 1992; Gorsuch, 1983).

Table 5.1
Scale of Variable-Factor Correlations

Factor Loading	Percentage of Variance	Rating
0.79 - 0.65	62.41	Excellent
0.64 - 0.56	40.96	Very good
0.55 - 0.46	30.25	Good
0.45 - 0.33	20.25	Fair
0.32 – 0.00	10.24	Poor

In order to simplify the findings from the S_{vf} matrix, items "with high factor loadings are considered to be 'like' the factor in some sense and those with zero or near-zero loadings are treated as being 'not like' the factor" (Comrey & Lee, 1992, p. 240). These high loading items "are examined to find out what they have in common that could be the basis for the factor that has emerged" (Comrey & Lee, 1992, p. 240). Hence, although item 3.5 was suppressed, and items 2.1, 7.2 and 8.1 had overlapping factor inter-correlations, these items cannot be easily dropped and shelved because of relevance as important contributors (Pett, et al., 2003). Moreover, factor interpretation must always be made cautiously with the expectancy that future revision and modification may be necessary (Comrey & Lee, 1992). In order to be able to confirm a stable simple structure, a factor should occur "across several simple structure solutions" after which an investigator can begin to gain confidence "that his factors have a high likelihood of replicating in a new sample, regardless of the type of analytical rotation" (Gorsuch, 1983, p. 206).

Having used the findings from the GLS S_{vf} matrix to double check and revise the research instrument, the following Table 5.2 illustrates how the items were interpreted, reorganized and subsequently relabelled. Fortunately, the variables did not have *f* loadings that made their structure ambiguous and interpretation difficult.

Table 5.2
Revised Questionnaire

1.1	**DIFFERENT LEVELS OF INSTRUCTIONAL STRATEGY**	**Factor Loading**	**Factor Rating**
1.1.1	I recall attempts by Teaching staff to promote higher levels of performance on complex tasks by way of presenting information and demonstrating its application.	0.669	Excellent
1.1.2	I noticed instances of Teaching staff trying to present information with accompanying recall questions.	0.570	Very good

1.2	DIFFERENT LEVELS FOR PROMPTING AND STIMULATING CONDITIONAL RESPONSES	Factor Loading	Factor Rating
1.2.1	I value attempts by Teaching staff to use a task-centred approach to promote efficiency, effectiveness and engagement.	0.577	Very good
1.2.2	I can understand why Teaching Staff would be willing to provide corrective feedback in order to promote improvement in my performance on complex tasks.	0.481	Good

2.1	ENCOURAGING INTERACTION	Factor Loading	Factor Rating
2.1.1	I noticed instances of Teaching staff trying to communicate with me.	0.812	Overlap
2.2.2	I recall attempts by Teaching Staff to facilitate informal interaction with me.	0.658	Excellent

2.2	PROVIDING SUPPORT	Factor Loading	Factor Rating
2.2.1	I can understand why Teaching staff would demonstrate a willingness to serve as a mentor to me.	0.666	Excellent
2.2.2	I am appreciative of teaching staff attempting to provide extra material or exercises if I lack the essential background knowledge or skills.	0.648	Very good
2.2.3	I value attempts by Teaching staff to contact me when I have fallen behind to discuss my study habits, schedules and other commitments.	0.528	Good

3.1	DEVELOPING RECIPROCITY	Factor Loading	Factor Rating
3.1.1	I recall attempts by Teaching staff to get me to explain difficult ideas or concepts to others within online communities of inquiry.	0.742	Excellent
3.1.2	I can understand why Teaching staff would demonstrate an eagerness to get me to discuss openly with colleagues through a forum about interests and backgrounds.	0.591	Very good

3.2	DEVELOPING COOPERATION	Factor Loading	Factor Rating
3.2.1	I value attempts by Teaching staff to utilize a Learning Management System such as *USQStudyDesk* to encourage communities of inquiry in my course.	0.667	Excellent
3.2.2	I noticed instances of Teaching staff trying to encourage me to participate in online activities.	0.567	Very good
3.2.3	I am appreciative of Teaching staff attempting to get me and my colleagues to work on projects together.	0.480	Good

4.1.	ENCOURAGING ACTIVE LEARNING	Factor Loading	Factor Rating
4.1.1	I value attempts by Teaching staff to encourage me to express myself when I do not understand a particular subject matter.	0.705	Excellent
4.1.2	I can understand why Teaching staff would demonstrate a willingness to link me with professionals who are experts in the field of study so that opinions and ideas can be exchanged.	0.696	Excellent
4.1.3	I am appreciative of attempts to include independent study assignments where I seek out information from the Internet and later discuss with Teaching staff the validity of the information and the reliability of its source.	0.578	Very good

4.2	ENCOURAGING CONTEXTUAL AND MEANINGFUL LEARNING	Factor Loading	Factor Rating
4.2.1	I noticed instances of Teaching staff trying to get me to apply meaningful learning by relating events that happened in real life to what was being learnt.	0.640	Very good
4.2.2	I recall attempts by Teaching staff to get me to apply contextual learning by analyzing real-life contexts.	0.598	Very good

5.1	INSTRUCTIONAL SCAFFOLDING FOR PROVIDING FEEDBACK	Factor Loading	Factor Rating
5.1.1	I noticed instances of Teaching staff trying to adjust their instructional strategy to include problem solving and task-centred activities that provided me with immediate feedback.	0.799	Excellent
5.1.2	I recall attempts by Teaching staff to provide corrective feedback regarding my performance on problem solving and task-centred activities.	0.740	Excellent

5.2	GIVING PROMPT FEEDBACK	Factor Loading	Factor Rating
5.2.1	I can understand why Teaching staff would demonstrate a willingness to politely inquire about my strengths and weaknesses in tutorials, quizzes and tests.	0.734	Excellent
5.2.2	I am appreciative of attempts by Teaching staff to provide me with an evaluation of my proficiency.	0.732	Excellent
5.2.3	I value attempts by Teaching staff to get me to go online and contact them to discuss my academic progress.	0.614	Very good

6.1	EMPHASIZING TIME ON TASK	Factor Loading	Factor Rating
6.1.1	I value attempts by Teaching staff to make it clear to me the amount of time that is required to understand complex material.	0.723	Excellent
6.1.2	I can understand why Teaching staff would demonstrate an eagerness to emphasize to me the importance of diligence, sound self-pacing and scheduling.	0.670	Excellent

6.2	ACTUAL TIME ON TASK	Factor Loading	Factor Rating
6.2.1	I recall attempts by Teaching staff to deliver course materials, quizzes and assignments online.	0.638	Very good
6.2.2	I noticed instances of Teaching staff tying to communicate to me that I am expected to complete my assignments promptly.	0.589	Very good

7.1	COMMUNICATING HIGH EXPECTATIONS	Factor Loading	Factor Rating
7.1.1	I recall attempts by Teaching staff to emphasize the importance of holding on to high standards for academic achievement.	0.804	Overlap
7.1.2	I noticed instances of Teaching staff trying to communicate to me that I am expected to work hard.	0.610	Very good

7.2	ATTAINING HIGH EXPECTATIONS	Factor Loading	Factor Rating
7.2.1	I am appreciative of attempts by Teaching staff to discuss my academic progress especially near the end of the course.	0.717	Excellent
7.2.2	I can understand why Teaching staff would demonstrate a willingness to share with me past experiences, attitudes and values.	0.683	Excellent
7.2.3	I value attempts by Teaching staff to provide me with a pre-test at the beginning of the course.	0.540	Good

8.1	RESPECTING DIVERSE TALENTS AND WAYS OF LEARNING	Factor Loading	Factor Rating
8.1.1	I noticed instances of Teaching staff trying to determine my learning style, interests or background at the beginning of the course.	0.878	Overlap
8.1.2	I recall attempts by Teaching staff to relate learning activities to my learning style, interests or background.	0.796	Excellent

8.2	ACKNOWLEDGING MULTIPLICATIVE WAYS OF LEARNING	Factor Loading	Factor Rating
8.2.1	I can understand why Teaching staff would demonstrate a willingness to use multiple methods to communicate their own expectations at the beginning of the course.	0.652	Excellent
8.2.2	I am appreciative of attempts by Teaching staff to work with me to set challenging objectives for learning.	0.637	Very good
8.2.3	I value attempts by Teaching staff to encourage mastery learning or learning contracts as instructional strategies.	0.576	Very good

In essence, "CFA is an indispensable analytic tool for construct validation in the social and behavioral sciences" (Brown, 2006, p. 3). No matter how well a conceptual framework is specified, the construct validity of a measure cannot be justified without evidence of either convergent or discriminant validity (see e.g., Brown, 2006; Netemeyer et al., 2003). It is the purposeful act of defining, testing and retesting the boundaries, content domain and dimensions of a construct that make possible the process of validation (Netemeyer, 2003, p. 90). To be precise;

> There are three major aspects of construct validation: (1) specifying the domain of observables related to the construct; (2) determining the extent to which observables tend to measure the same thing, several different things, or many different things from empirical research and statistical analyses; and (3) performing subsequent individual differences studies and/or experiments to determine the extent to which supposed measures of the construct are consistent with "best guesses" about the construct. Often, a particular construct becomes popular, and different researchers attempt to devise their own measures. As the number of proposed measures of the construct grows, suspicion [also] grows that they might not all measure the same thing (Nunnally & Bernstein, 1994, p. 86-87).

Hence, the real world utility of factor analysis is the ability to “summarize the interrelationships among the variables in a concise but accurate manner as an aid in conceptualization” (Gorsuch, 1983, p. 2). A conceptual framework is only as good as it can “reduce the amount of trial-and-error effort, and people who explore theories stand at the vanguard of each field of science” (Nunnally & Bernstein, 1994, p. 317). Only through such efforts can the hierarchical levels of a construct, also known as depth psychometry, be studied (Cattell & Schuerger, 1978b, p. 223).

5.12 Suggestions

This researcher would like to suggest that further research be attempted using the revised version of DLISt7 because validation as a process, is unending and requires measures to be “constantly evaluated and re-evaluated to see if they are behaving as they should” (Nunnally & Bernstein, 1994, p. 84). Cronbach (1990), stated that the “more reliable a measuring procedure is, the greater the agreement between scores obtained when the procedure is applied twice” (p. 705). Thus, not only would replication make possible a fresh reliability index based on test-retest reliability, but factor analysis could then be used to refine the extent to which a measure actually measures the construct that it is purported to measure, or in other words its construct validity (see e.g., Netemeyer et al., 2003; Rust & Golombok, 1989).

Originally developed by Spearman, factor analysis was meant to enable researchers to investigate the underlying structure of matrices (Rust & Golombok, 1989). The continued revision of an unobtrusive diagnostic indicator of process would contribute immensely to the process of validating constructs by accruing and amalgamating proof about the suitability of content, correlations and hypotheses (Cronbach, 1990). By continuing to develop, validate and standardize a measure for assessing the effectiveness of DLISt7, it is hoped that further refinements and modifications to the rubric can be made to pin-point exact applications and valuations of good practice in online learning and teaching pedagogy.

As a research technique, factor analysis is supposed to begin with the proper selection of “identifying marker variables from related analyses in the literature” (Gorsuch, 1983, p. 352). This was by the way, how this research project began (Guidera, 2003). Subsequently turning your back on fundamentally good research prevents science from moving forward. The results from a good factor analysis would contribute to existing bodies of knowledge by giving “rise to a set of variables that will, hopefully, be interrelated in causative and explanatory ways” (Gorsuch, 1983, p. 354). A theory is just another theory unless measurement operations can be used to represent the constructs being studied. This is because;

> The concepts identified by factor analysis that are the same as previous concepts do not add greatly to an area, but the serendipitous results could, with further research, aid in the development of the substantive area....Once the factor is clarified and appropriate measurement techniques are available, then the causes producing the factor and the factor's impact in the area can be further investigated (Gorsuch, 1983, p. 371).

Among the pitfalls that this researcher wanted to side-step were; assuming generalizability of factors from just one research study, overlooking important unobtrusive diagnostic indicators of process because of tunnel-vision, inadequate reporting of what had been previously done for the purpose of approximating findings from one analysis to another, and lastly factors that have already been well replicated are re-discovered only to be given a different name (Gorsuch, 1983). For example, if the oblique solution is equal to or provides a better solution and adds to the hyperplane count over the orthogonal solution, then further analysis is warranted to examine in detail the higher-order relationship among factors (Gorsuch, 1983). Although such ideas have been with us for a quite a while, it is only now that technology has caught up and made it practical for such complex calculations to be performed on modern desktop computers using the appropriate software.

However, the task of naming factors is still "a poetic, theoretical and inductive leap" (Pett, et al., 2003, p. 210). Normally, researchers would be looking for a common theme to emerge from an absolute minimum of three items per factor that survived the analysis (Hatcher, 2007). It has been suggested that "a descriptive name should be selected that would be representative of all the items loaded on that factor" (Pett, et al., 2003, p. 210). A useful tip is to consider the item with the highest loading first because it should provide the strongest clue.

When selecting the factor name "it is best that the interpretation remain simple but at the same time suggestive….Being too clever, imprudent or indifferent in the naming of factors in an instrument is unwise" (Pett, et al., 2003, p. 210). Usually, "the identity of the items is often lost and the given name of the factor is what is communicated to those who are interested either in using the instrument for other research or in applying the results of studies that have used the instrument" (Pett, et al., 2003, p. 210). Thus, the original descriptions used to identify the factors were deferred to and new designations were carefully selected that convincingly characterize the factors and their sub-components.

As for the pursuit of simple structure, Cronbach (1990) proposes that a factor be defined as a hypothetical or latent variable that “accumulated research has produced consistent interpretations” (p. 373). Consequently, during exploratory factor analysis it is expected that “the investigator twists and turns the factors until satisfied with the pattern” (Cronbach, 1990, p. 378). While with confirmatory factoring “a positive answer does not prove that the author’s structure is best; it says only that the data do not contradict her idea” because the results are suppose to “look neater and seems to provide stronger support for the test structure” (Cronbach, 1990, p. 378).

The most important concept that can be extrapolated using the law of parsimony, also known as Occam's razor, is that although the simplest explanation that fits the data should probably be selected, the supposed simple structure from the “factor analysis would be a worthless scientific procedure if the factors changed from study to study” (Kline, 1994, p. 66). In other words, the mapping of factors will only stabilize after many replications “in which factors have been located in their correct strata in a hierarchy of primaries, secondaries, tertiaries” (Cattell & Schuerger, 1978b, p. 212). Consequently, this researcher has sketched a practical stratoplex that visualizes the different strata levels of DLISt7 as a stratified uncorrelated determiners (SUD) model (Cattell, 1978a).

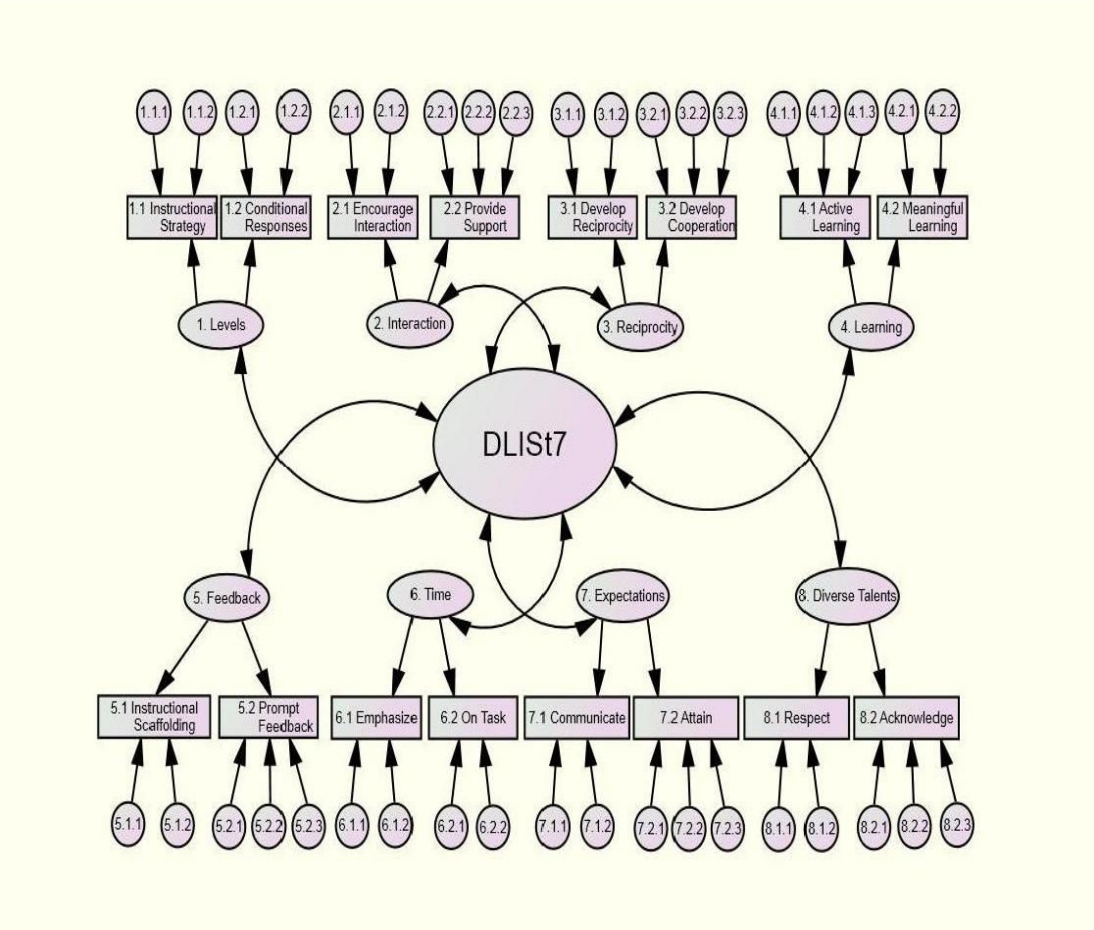

Diagram 5.1: DLISt7 Stratoplex

5.13 Implications

Based on the findings from this study, further research could be attempted using the Solomon four-group design to increase the number of participants in terms of the subject to item ratio for the purpose of improving upon the shortcomings of the sample utilized (Osborne & Costello, 2004). The issues that were raised regarding the size of the sample for the No Treatment control groups were probably related to not being able to access courses from either the Faculty of Arts, nor Business and Law.

This researcher was aware beforehand, that Comrey and Lee’s (1992) scale for evaluating the adequacy of sample size recommends the use of a large sample whenever possible, “preferably 500 or more” but with the stern reminder that “there is probably little to be gained by going over 1000 cases” (p. 217). This is simply because there is not much to be gained from using sample sizes that are just too large (see e.g., Chuan, 2006; Marsh & Hau, 1999). Unless the study was being funded by a university grant and conducted by a group of researchers, the issue of undertaking a manageable sample size would be significant, especially for a one man research project. Therefore, the key was to determine the power of a sample and be able to use it to describe the characteristics of an entire population using the least number of respondents (Chuan, 2006). As a rule of thumb, Tabachnick and Fidell (2007) advocate that it would be “comforting to have at least 300 cases for factor analysis” (p. 613). This according to Krejcie and Morgan’s (1970) table would represent a population of 1400.

As for the ratio between subject to item, Osborne and Costello (2004) have suggested a possible minimum of 5:1 and a maximum of 30:1. Hatcher (2007) advises that the final sample should have “usable (complete) data from at least 250 subjects” (p. 73). He cautions the novice researcher “that any subject who fails to answer just one item will not provide usable data for the factor analysis, and will therefore be dropped from the final sample” (Hatcher, 2007, p. 73). He also suggests administering “the questionnaire to perhaps 300 subjects” in order “to ensure that the final sample includes at least 250 usable responses” (Hatcher, 2007, p. 73). In accordance with Krejcie and Morgan’s (1970) table, such a sample size would sufficiently represent a population of 700.

In consideration of evidence that undergraduate students are simply not aware of the DLISt7 together with the low utilization levels for Blogs, Moodle Chat, Moodle Forum, Teleconferencing, Video Conferencing, Instant Messaging, Wimba

Online Classroom, Telephone: Text & Voice and Skype: Video, Voice & Text by teaching staff. Further research could be conducted to synthesize what has been happening to higher education in an attempt to forecast future trends or single-out pointless fads (Naisbitt, 1984). Thus, a study that has the sensible co-operation of students and the unreserved support of teaching staff would increase the possibility of being able to utilize the perception from both parties enabling a more complete picture to be formed with regards to the effectiveness of DLISt7.

A good example would be the 2005 research project by Mary K. Tallent-Runnels, William Y. Lan, Wesley Fryer, Julie A. Thomas, Sandi Cooper & Kun Wang entitled; *The Relationship between Problems with Technology and Graduate Students' Evaluations of Online Teaching*. Their study attempted to determine if the evaluation of instructors for online classes was influenced by technological problems experienced by students.

Consequently, they utilized two instruments to collect data. Firstly, a university teaching evaluation scale was used to measure graduate students' perception towards the effectiveness of online instruction. Secondly the questionnaire entitled; *Survey of Student Experiences in Online Courses* was used to gauge the technological problems experienced by graduate students and the unfavourable effects these problems might have on the quality of learning experienced (Tallent-Runnels et al., 2005). The result of their research revealed a positive relationship that indicated the frequency of technological problems encountered would actually impede the learning experienced, resulting in adverse evaluations of teaching staff and their courses by graduate students (Tallent-Runnels et al., 2005).

In an effort to replicate and improve upon the research design, a singular research instrument could be designed to assess the initial expectations of students and teaching staff about what they perceived as the characteristics of good online learning experiences. Later, the same cohort of students and teaching staff could be revisited and asked to share their observation about what the actual online learning experience was like. Potentially, such information would enable the identification of existing design flaws that can be improved upon through the process of analysis, design, development, implementation and evaluation.

Moreover, based on the lessons learnt while summarizing and synthesizing the review of literature, it is now better understood why traditional educational experiences do not translate seamlessly to the online environment. For the most part, this might be because teaching staff can no longer observe the clues traditionally relied upon to develop confidence, engagement and trust (Haughton & Romero, 2009). This probably explains why consumers of educational technology ranging from the learner, to the instructional designer, to teaching staff with limited or no online teaching experience, to veteran faculty asked to conduct a familiar course in an unfamiliar environment, struggle to leverage what instructional technology has to offer.

Secondary to the lack of observable clues, is the complexity of the innovation in which it actually hinders the accurate description of the necessary characteristics, or common thread, that instruction must have in order to be effective in helping learners learn (Gagné & Briggs, 1979). For example, research conducted at USQ which focused on what constitutes a pedagogical framework of principles for online learning and teaching has revealed, that the adoption of online technologies has caused teaching staff to experiencing change in terms of their teaching philosophies, relationships with learners, work patterns and activities (Postle et al., 2003; Reushle, 2003; Reushle & McDonald, 2004).

Thus, what is now needed is for a small, but educated and enthusiastic group of first adopters who would be willing to give the prototype version of DLISt7 a go using the Solomon four-group design. The objective is to demonstrate that learning success will no longer be about retention, but instead be about assimilation. As it should be, the transformation of facts into ideas constitutes the process of knowledge construction, instead of just the accrual and memorization of specifics (Hanafi et al., 2003).

Such a course of action would in a certain way parallel Krathwohl's (2002) revision of Bloom's Taxonomy in terms of breadth and depth. Sequenced from simple to complex, and represented as a cumulative hierarchy, "mastery of each simpler category was prerequisite to mastery of the next more complex one" (Krathwohl, 200, p. 213). This is because "it is of increasing significance as researchers continue to demonstrate the importance of students being made aware of their metacognitive activity, and then using this knowledge to appropriately adapt the ways in which they think and operate" (Krathwohl, 2002, p. 214).

Fundamental to unlocking this potential is the notion of having an instructional strategy being supported by different types of technology, or having a range of technologies supporting various instructional strategies (Chickering & Ehrmann, 1996, p. 1). The goal is to help learners and teaching staff focus on tasks and activities that have been positively linked to desirable learning outcomes, such as critical discourse and reflection which are objectives that can be classified using the "Structure of the Cognitive Process Dimension of the Revised [Bloom's] Taxonomy" (Krathwohl, 2002, p. 215). This is because research has indicated that in terms of effective, efficient and engaging interaction between learners and teaching staff, online instruction maybe equivalent to conventional instruction (Robertson et al., 2004).

Thus, it is proposed, that such lessons be utilised as pathways to bridging the digital divide between face to face and online learning and teaching practices (Grant & Thronton, 2007). Potentially, such lessons could be used to inform future research, development and implementation of online courses, not to mention the practical implications with regards to policy decisions in an era of budgetary economization and fiscal management (Wuensch et al., 2009).

5.14 Conclusion

As an educator, have you ever stopped to wonder how successful we have been at leveraging what the PC and Internet have to offer in terms of conceptualizing and delivering online education to learners? What use is there of knowing what instructional technology has to offer when educators themselves are hesitant about when, where and how to best use instructional technology to support learners and the teaching process. Particularly, when there seems to be a missing link in the synergy of events between cognitive presences, social presences, teaching presences and strategies or tactics for online learning and teaching.

Clearly, there is a need for a guiding philosophy that educators can adapt to their personal style, course content, student population and available technology (Shneiderman, 1998). Gone are the days of the holeshot approach that was the pioneering spirit of the dot.com bubble. Thus, it is proposed that in order for the science of learning and the art of teaching (Skinner, 1954) to be more effective in blended or online environments, the eclectic selection of appropriate pedagogy should consider the systematic use of conscientious and contextual engagement.

Based on Chickering and Gamson's Seven Principles for Good Practice, this research project attempted to revitalize the principles by amalgamating it with Merrill's Different Levels of Instructional Strategy. The primary aim was to obtain data that could facilitate the development, validation and standardization of a measure for assessing the effectiveness of the newly proposed DLISt7. As a measure DLISt7 has been standardized because; (a) its rules of measurement are clear, (b) it is practical to apply, (c) is not demanding of the administrator or respondent, and (d) its results do not depend upon the administrator (see e.g., Netemeyer, Bearden & Sharma, 2003; Nunnally & Bernstein, 1994). Consequently, DLISt7 fulfils all the right criteria and has yielded similar scores across applications that can be easily interpreted as low, medium or high indicating that as a measurement model it is reliable (Netemeyer et al., 2003).

Furthermore, DLISt7 also meets the terms of Nunnally and Bernstein's (1994) three major aspects of construct validation namely; (1) the domain of observables related to the construct have been specified, (2) the extent the observables tend to measure the same things have been determined, and (3) individual differences studies or experiments that attempt to determine the extent the supposed measures of construct are consistent with best guesses have also been performed. Moreover, the factors that have been identified via replication of the research project have been located using a stratoplex that visualizes the different hierarchy of primaries, secondaries and tertiaries that constitute the strata levels of DLISt7 in the form of a SUD model (see e.g., Cattell, 1978a; Cattell & Schuerger, 1978b).

The resultant standardized measure is now ready to be used either as a rubric for facilitating the extrinsic implementation of DLISt7, or as unobtrusive diagnostic indicators of process for assessing the quality of learning intrinsically experienced by students in online courses having been developed using depth psychometry. Further research should be conducted using the Solomon four-group design to collect data for the purpose of generating awareness about the likelihood of thrusting into practice varying levels of instructional strategies for communicating expectations and relaying information in view of improving the instructional design of future online courses. The suggested Solomon four-group design is said to be "the most desirable of all the…basic experimental designs" because it "adds a higher degree of external validity in addition to its internal validity" (Braver & Braver, 1988, p. 150). In spite of its strength, the design is underused primarily because of the number of groups that it requires and "the lack of certainty concerning the proper statistical treatment" (Braver & Braver, 1988, p. 153).

In an effort to build on what is there and not reinvent the wheel, it is proposed that DLISt7 be utilized to enable the learning experienced by students to be systematically scalable to different levels of complexity. Skilfully wielded, this should culminate in the ability to traverse and satisfactorily complete complex tasks. The rationale is to move away from information-only presentations towards a task-centred approach that increases in level of complexity to promote more effective, efficient and engaging learning (Merrill, 2006).

Teaching staff would conceivably have the flexibility of being eclectic in their choice of pedagogy for providing students with directed facilitation to work their way through the pathways of knowledge to find their own answers.

Successively less facilitated guidance should be provided with each scaffolded task until students are functioning autonomously.

Metacognitive comprehension about DLISt7 could potentially be beneficial for students in terms of generating conscientious and contextual awareness about the difference between planned instances of instructional strategies as opposed to random acts when engaging and interacting with teaching staff. The "evils of shotgun empiricism" as an unhealthy and unnecessary practice is no longer necessary because the "random efforts to relate things to one another" often leaves a bitter after taste (Nunnally & Bernstein, 1994, p. 317).

Will any of this make a difference in bridging the continental digital divide using pedagogy that facilitates the communication of expectations, and the relaying of information across different cultures that operate using different value systems for the purpose of improving the online learning and teaching experience? Terry Anderson and Jon Dron (2011) seem to have articulated the idea well in their paper entitled; *Three Generations of Distance Education Pedagogy.*

Firstly, "each era developed distinct pedagogies, technologies, learning activities and assessment criteria, consistent with the social worldview of the era in which they [were] developed" (Anderson & Dron, 2011, p. 1). Secondly, the analogy of pedagogy defining the moves and technology setting the beat while creating the music was used to visualize the relationship between the two (Anderson & Dron, 2011). And lastly, behaviourists, cognitivists, connectivists and constructivists theories all have an important role to play in a well-rounded educational experience. Regardless of whether a learner is at the centre or is a part of a learning community or network, learning effectiveness requires engagement in different contexts, involves diverse knowledge structures and with different individuals.

To identify the best mix of pedagogy and instructional technology, the learning and teaching process has to be seen as a progression because a single theory cannot possibly provide all the answers and neither can a single generation (Anderson & Dron, 2011). Over the past three decades many technologies have come and gone, and so has the popularity of different approaches to pedagogy. But each has built upon the shortcomings of the instructional technology left behind by its predecessor instead of replacing the first of its kind so as to continue the cycle of birth, growth, development, maturity, old age and death.

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APPENDICES

Appendix A

Based on the problems and objectives that had been identified, the researcher would like to put forward the following null hypotheses and their respective alternative hypotheses.

H_{O1}: There was no statistically significant relationship between students' Awareness of DLISt and being in the No Treatment-Treatment group at the pretest stage,

H_{A1}: There was a statistically significant relationship between students' Awareness of DLISt and being in the No Treatment-Treatment group at the pretest stage

$H_{O1.1}$: There was no statistically significant relationship between students' Awareness of DLISt and being in the No Treatment-Treatment group at the posttest stage,

$H_{A1.1}$: There was a statistically significant relationship between students' Awareness of DLISt and being in the No Treatment-Treatment group at the posttest stage.

H_{O2}: There was no statistically significant relationship between female students compared to male students and their Awareness of DLISt at the pretest stage,

H_{A2}: There was a statistically significant relationship between female students compared to male students and their Awareness of DLISt at the pretest stage.

$H_{O2.1}$: There was no statistically significant relationship between female students compared to male students and their Awareness of DLISt at the posttest stage,

$H_{A2.1}$: There was a statistically significant relationship between female students compared to male students and their Awareness of DLISt at the posttest stage.

H_{O3}: There was no statistically significant relationship between local students compared to international students and their Awareness of DLISt at the pretest stage,

H_{A3}: There was a statistically significant relationship between local students compared to international students and their Awareness of DLISt at the pretest stage.

$H_{O3.1}$: There was no statistically significant relationship between local students compared to international students and their Awareness of DLISt at the posttest stage,

$H_{A3.1}$: There was a statistically significant relationship between local students compared to international students and their Awareness of DLISt at the posttest stage.

H_{O4}: There was no statistically significant relationship between the type of degree being studied and students' Awareness of DLISt at the pretest stage,

H_{A4}: There was a statistically significant relationship between the type of degree being studied and students' Awareness of DLISt at the pretest stage.

$H_{O4.1}$: There was no statistically significant relationship between the type of degree being studied and students' Awareness of DLISt at the posttest stage,

$H_{A4.1}$: There was a statistically significant relationship between the type of degree being studied and students' Awareness of DLISt at the posttest stage.

H_{O5}: There was no statistically significant relationship between the number of years students had experienced online learning and their Awareness of DLISt at the pretest stage,

H_{A5}: There was a statistically significant relationship between the number of years students had experienced online learning and their Awareness of DLISt at the pretest stage.

$H_{O5.1}$: There was no statistically significant relationship between the number of years students had experienced online learning and their Awareness of DLISt at the posttest stage,

$H_{A5.1}$: There was a statistically significant relationship between the number of years students had experienced online learning and their Awareness of DLISt at the posttest stage.

H_{O6}: There was no statistically significant relationship between faculty affiliation and students' Awareness of DLISt at the pretest stage,

H_{A6}: There was a statistically significant relationship between faculty affiliation and students' Awareness of DLISt at the pretest stage.

$H_{O6.1}$: There was no statistically significant relationship between faculty affiliation and students' Awareness of DLISt at the posttest stage,

$H_{A6.1}$: There was a statistically significant relationship between faculty affiliation and students' Awareness of DLISt at the posttest stage.

H_{O7}: There was no statistically significant relationship between students' Awareness of DLISt and the utilization of communication technology and online resources by teaching staff to convey instructional strategies for online learning at the pretest stage,

H_{A7}: There was a statistically significant relationship between students' Awareness of DLISt and the utilization of communication technology and online resources by teaching staff to convey instructional strategies for online learning at the pretest stage.

$H_{O7.1}$: There was no statistically significant relationship between students' Awareness of DLISt and the utilization of communication technology and online resources by teaching staff to convey instructional strategies for online learning at the posttest stage,

$H_{A7.1}$: There was a statistically significant relationship between students' Awareness of DLISt and the utilization of communication technology and online resources by teaching staff to convey instructional strategies for online learning at the posttest stage.

H_{O8}: There was no statistically significant difference in the gain scores of participants who provided pre and posttest responses,

H_{A8}: There was a statistically significant difference in the gain scores of participants who provided pre and posttest responses.

H_{O9}: There was no statistically significant difference in the mean scores of participants who answered 'Yes' or 'No' about Awareness of DLISt at the pretest stage,

H_{A9}: There was a statistically significant difference in the mean scores of participants who answered 'Yes' or 'No' about Awareness of DLISt at the pretest stage.

$H_{O9.1}$: There was no statistically significant difference in the mean scores of participants who answered 'Yes' or 'No' about Awareness of DLISt at the posttest stage,

$H_{A9.1}$: There was a statistically significant difference in the mean scores of participants who answered 'Yes' or 'No' about Awareness of DLISt at the posttest stage.

H_{O10}: There was no statistically significant difference in the mean scores of participants who were in the No Treatment-Treatment group at the pretest stage,

H_{A10}: There was a statistically significant difference in the mean scores of participants who were in the No Treatment-Treatment group at the pretest stage.

$H_{O10.1}$: There was no statistically significant difference in the mean scores of participants who were in the No Treatment-Treatment group at the posttest stage,

$H_{A10.1}$: There was a statistically significant difference in the mean scores of participants who were in the No Treatment-Treatment group at the posttest stage.

H_{011}: There was no statistically significant difference in the mean scores of Female participants compared to Male participants at the pretest stage,

H_{A11}: There was a statistically significant difference in the mean scores of Female participants compared to Male participants at the pretest stage.

$H_{O11.1}$: There was no statistically significant difference in the mean scores of Female participants compared to Male participants at the posttest stage,

$H_{A11.1}$: There was a statistically significant difference in the mean scores of Female participants compared to Male participants at the posttest stage.

H_{012}: There was no statistically significant difference in the mean scores of Local participants compared to International participants at the pretest stage,

H_{A12}: There was a statistically significant difference in the mean scores of Local participants compared to International participants at the pretest stage.

$H_{O12.1}$: There was no statistically significant difference in the mean scores of Local participants compared to International participants at the posttest stage,

$H_{A12.1}$: There was a statistically significant difference in the mean scores of Local participants compared to International participants at the posttest stage.

H_{013}: There was no statistically significant difference in the mean scores of First Year and Head Start participants compared to Second, Third and Later Year participants at the pretest stage,

H_{A13}: There was a statistically significant difference in the mean scores of First Year and Head Start participants compared to Second, Third and Later Year participants at the pretest stage.

$H_{O13.1}$: There was no statistically significant difference in the mean scores of First Year and Head Start participants compared to Second, Third and Later Year participants at the posttest stage,

$H_{A13.1}$: There was a statistically significant difference in the mean scores of First Year and Head Start participants compared to Second, Third and Later Year participants at the posttest stage.

H_{014}: There was no statistically significant difference in the posttest scores of participants who answered 'Yes' compared to those who answered 'No', after controlling for scores on the Awareness of DLISt pretest administered prior to the intervention,

H_{A14}: There was a statistically significant difference in the posttest scores of participants who answered 'Yes' compared to those who answered 'No', after controlling for scores on the Awareness of DLISt pretest administered prior to the intervention.

H_{015}: There was no statistically significant interaction between the posttest scores for Awareness, No Treatment-Treatment group, and Gender,

H_{A15}: There was a statistically significant interaction between the posttest scores for Awareness, No Treatment-Treatment group, and Gender.

H_{016}: There was no statistically significant linear relationship between how well the pre and posttest scores could be used to predict the score for students' perception towards the effectiveness of DLISt,

H_{A16}: There was a statistically significant linear relationship between how well the pre and posttest scores could be used to predict the score for students' perception towards the effectiveness of DLISt.

H_{017}: There was no statistically significant relationship between the expected and observed model fit for DLISt,

H_{A17}: There was a statistically significant relationship between the expected and observed model fit for DLISt.

Appendix B

Chickering & Gamson's Seven Principles for Good Practice in Undergraduate Education;

1. ***Encouraging Contact Between Students and Teaching Staff***

   Frequent student-teaching staff contact in and out of class is the most important factor in student motivation and involvement. Teaching staff concern helps students get through rough times and keep on working. Knowing a few staff members well enhances students' intellectual commitment and encourages them to think about their own values and future plans.

2. ***Developing Reciprocity and Cooperation Among Students***

   Learning is enhanced when it is more like a team effort than a solo race. Good learning, like good work, is collaborative and social, not competitive and isolated. Working with others often increases involvement in learning. Sharing one's own ideas and responding to others' reactions often increases involvement in learning, sharpens thinking and deepens understanding.

3. ***Encouraging Active Learning***

   Learning is not a spectator sport. Students do not learn much just by sitting in classes listening to teaching staff, memorizing pre-packaged assignments, and spitting out answers. They must talk about what they are learning, write about it, relate it to past experiences and apply it to their daily lives. They must make what they learn part of themselves.

4. Giving Prompt Feedback

Knowing what you know and don't know focuses learning. Students need appropriate feedback on performance to benefit from courses. When getting started, students need help in assessing existing knowledge and competence. In class, students need frequent opportunities to perform and receive suggestions for improvement. At various points during college, and at the end, students need chances to reflect on what they have learned, what they still need to know, and how to assess themselves.

5. Emphasizing Time on Task

Time plus energy equals learning. There is no substitute for time on task. Learning to use one's time well is critical for students and professionals alike. Students need help in learning effective time management. Allocating realistic amounts of time means effective learning for students, teaching staff, administrators, and others so as to be able to establish a basis of high performance for all.

6. Communicating High Expectations

Expect more and you will get more. High expectations are important for everyone, from the poorly prepared, to those unwilling to exert themselves, and for the bright and well motivated. Expecting students to perform well becomes a self-fulfilling prophecy when teaching staff and institutions hold high expectations for themselves and make extra efforts.

7. Respecting Diverse Talents and Ways of Learning

There are many roads to learning. People bring different talents and styles of learning to college. Brilliant students in the seminar room may be all thumbs in the lab or art studio. Students rich in hands-on experience may not do so well with theory. Students need the opportunity to show their talents and learn in ways that work for them. Then they can be pushed to learn in new ways that do not come so easily.

Appendix C

Merrill's First Principles of Instruction;

Demonstration principle

- *Learning is promoted when learners observe a demonstration of the skills to be learned that is consistent with the type of content being taught.*
- *Demonstrations are enhanced when learners receive guidance that relates instances to generalities.*
- *Demonstrations are enhanced when learners observe media that is relevant to the content.*

Application principle

- *Learning is promoted when learners engage in applying their newly acquired knowledge or skill in ways consistent with the type of content being taught.*
- *Application is effective only when learners receive intrinsic or corrective feedback.*
- *Application is enhanced when learners are coached and when this coaching is gradually withdrawn for each subsequent task.*

Task-centred approach

- *Learning is promoted when learners are engaged in a task-centred approach which includes demonstration and application of component skills.*
- *A task-centred approach is enhanced when learners undertake a progression of whole tasks.*

Activation principle

- *Learning is promoted when learners activate relevant cognitive structures by being directed to recall, describe, or demonstrate relevant prior knowledge or experience.*
- *Activation is enhanced when learners recall or acquire a structure for organizing the new knowledge.*

Integration principle

- *Learning is promoted when learners integrate their new knowledge into their everyday life by being directed to reflect-on, discuss, or defend their new knowledge or skill.*
- *Integration is enhanced when learners create, invent, or extrapolate personal ways to use their new knowledge or skill in situations related to their world.*
- *Integration is enhanced when learners publicly demonstrate their new knowledge or skill.*

Appendix D

Merrill's Different Levels of Instructional Strategy;

Level 0 – Information Only

- *Information is presented with or without accompanying recall questions.*

Level 1 – Information Only Plus Demonstration

- *Consistent demonstration is added to information only strategy to promote higher levels of performance on scaled complex tasks.*
- *Guidance in conjunction with demonstration promotes an additional increment in the level of efficient and effective performance on complex tasks.*
- *The inclusion of relevant media in demonstrations promotes an additional increment in learning efficiency, effectiveness and engagement.*

Level 2 – Information Only Plus Demonstration Plus Application

- *Consistent application along with corrective feedback is added to Level 1 instructional strategy for additional increment in performance on complex tasks.*
- *Gradually diminishing coaching is added to consistent application to promote additional increment in learning efficiency, effectiveness and engagement.*

Level 3 – Task-Centred with Demonstration and Application

- *Consists of a task-centred approach that includes consistent demonstration and application of component skills to promote efficiency, effectiveness and engagement.*

Appendix E

Merrill's proposed Options for Task Progression meant for Task-Centred Instructional Strategies;

Activation Enhancement

- *Providing or recalling relevant experiences with any of the above instructional strategies to promote additional increments in learning efficiency, effectiveness and engagement.*

Structure Enhancement

- *Adding an activation structure to any of the above instructional strategies to promote additional increments in learning efficiency, effectiveness and engagement.*

Reflection Enhancement

- *Adding reflective integration to any of the above instructional strategies to promote additional increments in learning efficiency, effectiveness and engagement.*

Extrapolation Enhancement

- *Adding extrapolation-integration to any of the above instructional strategies promotes transfer of newly acquired knowledge and skill to performance on similar tasks in the real-world beyond the instructional situation.*

Going Public Enhancement

- *Adding go public-integration to any of the above instructional strategies to promote additional increments in learning efficiency, effectiveness and engagement.*

Appendix F

Syaril Izwann Jabar
Doctoral Program,
Faculty of Education,
University of Southern Queensland
Toowoomba, 3450 QLD.

Via: 21 September, 2010

Associate Professor Dr. Peter Albion,
Principal Supervisor,
Faculty of Education,
University of Southern Queensland,
Toowoomba, 3450 QLD.

To:

Professor Nita Temmerman
Dean, Faculty of Education &
Pro Vice-Chancellor, Academic Programs,
University of Southern Queensland,
Toowoomba, 3450 QLD.

ATTN: REQUESTING PERMISSION TO SAMPLE TWO ONLINE CLASSES FROM EACH FACULTY

With regards to the above,

I Syaril Izwann Jabar, a Doctoral student in the field of Online Pedagogies and Transformative Learning with the Faculty of Education, am formally approaching all University of Southern Queensland (USQ) faculties requesting permission to sample two online classes from each faculty. The intention is to assign one class to a Treatment group and another to a Control group as part of a larger Pre-test / Post-test Non-equivalent Control Group Quasi-Experiment.

The USQ Fast Track Human Research Ethics Committee has already assessed the researcher's application and resolved to conditionally approve the application subject to certain points being addressed to the satisfaction of the Chair, most notably, evidence of approval from the relevant USQ faculties for the use of their students in this research. Please refer to the memorandum concerning Ethics Application – H10REA016 attached as Appendix G.

The purpose of this request is to satisfy the sampling frame for the research*; Assessing the Effectiveness of the Different Levels of Instructional Strategies for Online Learning (DLIS) by Undergraduate Students at the University of Southern Queensland (USQ), Australia.*

As an important aspect of the research design, samples from all the Faculties are essential in order to be able to;

a) minimize the possibility of sampling error in terms of sampling the same student twice,
b) ensure that the sample will be representative of the student population at USQ,
c) and will be large enough to enable the researcher to make reliable inferences or generalisation from the sample statistics relative to the statistical population.

Upon successfully obtaining permission from Faculty and being allocated actual classes, this researcher will then approach and provide details to the course examiner about the purpose, objective, rationale and treatment of the research. The researcher will then ask the course examiners to request the students in the allocated online classes to respond to a web survey intended to assess the effectiveness of the treatment.

Potentially, this research could prove to be beneficial to Faculty in terms of facilitating improvements to the quality of learning experienced by their online students. It is proposed that by generating student awareness about the need for conditional knowledge regarding when and why a particular cognitive strategy is appropriate, students would be better able to differentiate between planned instances of instructional strategy as opposed to random acts by teaching staff. In turn, teaching staff would then stand to profit in terms of finding it easier to nurture the developmental progression of students and thus be in a better position to develop their metacognitive sophistication.

Your cooperation is very much appreciated.

Thank you.

Yours sincerely,

____

Syaril Izwann b. Jabar
Student ID: 0050102213

Endorsed by;

____

Associate Professor Dr. Peter Albion,
Principal Supervisor

____

Professor Nita Temmerman,
Dean, Faculty of Education

Cc: Associate Dean (Research) &
Program Coordinator (Doctoral Programs),
Faculty of Education

Appendix G

USQ
AUSTRALIA

University of Southern Queensland

Memorandum

To:	Syaril Izwann Jabar
From:	William Farmer, Ethics Officer
Date:	Tuesday, 9 February 2010
Re:	**Ethics Application – H10REA016**

Dear Syaril,

Thank you for submitting this application for ethical approval of the project:

H10REA016 Assessing the Effectiveness of the Different Levels of Instructional Strategies for Online Learning by Undergraduate Students at the University of Southern Queensland (USQ), Australia

The USQ Fast Track Human Research Ethics Committee recently assessed your application. The Committee resolved to **conditionally approve** the application **subject to the following points being addressed** to the satisfaction of the Chair.

Please note you may not commence your research until you have obtained 'approval'.

Could you please translate the plain language statement into plain language, without the use of discipline based jargon? This includes terms such as "Different Levels of Instructional Strategies for Online Learning" (DLIS)
The "Seven Principles for Good Practice" describes practices that educators habitually implement, often unconsciously. Contemporary belief is that learning is more effective when it is task-centered. The introduction of the "Different Levels of Instructional Strategy" is meant to promote a shift from information-only presentations towards a more task-centered approach. This exploratory research intends to investigate the potential of combining the Seven Principles with the Different Levels, and the benefits of increasing learners' awareness of such instructional principals. Students in the treatment group will be provided with additional information about the principles. Their responses, at beginning and end of semester, to an instrument designed to measure awareness of the principles will be compared with those of a control group who will not be provided with additional information.

In Q2(a) could you please specify exactly how participants are recruited? Will this be by email, letter, flyer etc?
This researcher intends to approach all USQ faculties with a formal letter seeking permission to access 2 online classes from each faculty. The intention is to assign one class to a Treatment group and another to a Control group as part of a larger Pre-test / Post-test Non-equivalent Control Group Quasi-Experiment. As an important aspect of the research design, samples from all the Faculties are essential in order to objectively be able to; a) minimize the possibility of sampling error in terms of sampling the same student twice, b) ensure that the sample will be representative of the student population at USQ, c) and will be large enough to enable the researcher to make reliable inferences or generalisation from the sample statistics relative to the statistical population. Upon successfully obtaining permission, this researcher will then approach and explain to the course examiner the purpose, objective, rationale and treatment of the research. The researcher will then ask the course examiners to ask the students in the identified online classes to respond to a web-based instrument.
Could you please provide evidence of approval from the relevant USQ faculties for the use of their students in this project?
Permission has been obtained and evidence of approval is available. Kindly refer to Appendices.
This research includes an experimental intervention in which one group is exposed to DLIS and the other is not. Is this intervention likely to have an impact on course outcome (final grade)? If it is likely, has compensation for the control group been considered?
The role of the participants in this study is to provide data about the effectiveness of DLIS. As the field experiment to be conducted is designed to facilitate improvements in the quality of learning that will be experienced by participants in the treatment group, it is anticipated that DLIS will serve as an aid to teaching staff in guiding students to complete complex tasks. Additionally, metacognitive comprehension about DLIS could prove to be beneficial to students in terms of generating awareness about the difference between planned instances of instructional strategies as opposed to random acts by teaching staff The No-Treatment control group will go about the semester as they would normally do. They will only be asked to respond to the instrument in its pre-test and post-test versions.

Please respond in the spaces provided underneath the question. You may use as much space as you require.

If the comment requires amendments to the application, participant information sheet, consent form, or questionnaire please make the corrections on that documentation and forward as an attachment in an email to ethics@usq.edu.au.

If you have any further queries please do not hesitate to contact me on 4631 2690 or ethics@usq.edu.au

William Farmer
Ethics Officer
Office of Research & Higher Degrees

Appendix H

ver 1203

Please submit this application to the ***Postgraduate & Ethics Officer,*** Office of Research and Higher Degrees.

THE UNIVERSITY OF SOUTHERN QUEENSLAND

ETHICS COMMITTEE APPLICATION FOR

ETHICS CLEARANCE FOR INVESTIGATIONS INVOLVING

HUMAN RESEARCH

Psychological and Sociological Research

1. Attach a plain English outline of your research project (approximately 1 page) to the Application for Ethics Clearance.

2. A copy of any questionnaires and/or consent forms to be used should be included with your application.

3. Define and explain all technical details, terminology and acronyms in terms which can be readily understood by an informed lay person.

4. If a section is not applicable, write N/A in the section.

5. Typed applications are preferred but if this is not possible, please print legibly. **Please ensure that each page is numbered and the document is secured *with a clip* (not stapled).**

6. Please note that on the electronic version of this application proforma, the questions are presented in a **bold** font. DO NOT USE A BOLD FONT FOR YOUR ANSWERS. Length of answers and spacing between questions is at your discretion.

7. Please forward your completed application and an electronic copy in Microsoft Word (with attachments) to the ***Postgraduate & Ethics Officer* - Office of Research and Higher Degrees. Email: ethics@usq.edu.au**

Name of Chief Researcher: Syaril Izwann Jabar

Address for Future Correspondence: Unit 2-13, Maplewood Drive, Darling Heights, Toowoomba, Queensland, 4350, Australia

Title of Project: An Assessment of the Effectiveness of the Different Levels of Instructional Strategies for Online Learning (DLIS) by Undergraduate Students at the University of Southern Queensland (USQ), Australia.

Funding Body: N/A

Other Principal Investigators: N/A

Is this a postgraduate research project? Yes. Doctor of Philosophy (PhD)

If 'yes' name Supervisor: Assoc. Prof. Peter Albion (Principal Supervisor)
Prof. Alan Smith (Associate Supervisor)

Indicate the principal methodology to be employed in this research project:

- ☐ **Anonymous Survey**
- ☑ **Identified Survey**
- ☐ **In-depth Interviews**
- ☑ **Human Experiment**
- ☐ **Other (**Documents / Course Materials**)**

1. In plain language give a brief explanation of the study and the importance of the study (approximately 100 words).

This research will attempt to bring together the Seven Principles for Good Practice in Undergraduate Education (Chickering & Gamson, 1987) with the Different Levels of Instructional Strategy (Merrill, 2006). The purpose of this exploratory study is to determine whether the Seven Principles can be further improved by way of amalgamating it with the Different Levels of Instructional Strategy. Its objective is to obtain data that would facilitate the development and validation of a standardized measure for assessing the effectiveness of the newly formed Different Levels of Instructional Strategies for Online Learning (DLIS). The resultant standardized measure will then be proposed for use either as a rubric or checklist for facilitating the implementation of DLIS, or as a diagnostic tool for assessing the quality of learning experienced by students for the purpose of improving the design of future online courses.

2. Describe the study's stages, processes and instruments.

This study will attempt a Pre-test / Post-test Non-equivalent Control Group Quasi-Experiment. The target population will be that of University of Southern Queensland (USQ) undergraduate students. It will attempt to obtain data from a sample (S) that is $S \geq 399$. Its sampling frame will be that of students in intact clusters, who in this instance are those who have enrolled in certain classes to be accessed by this study. Upon being identified, these clusters will be randomly assigned to two groups; a Treatment group, and a No-Treatment control group. A pre-test will be conducted on both groups to

determine their homogeneity in order to rule out selection bias as a threat to internal validity.
Treatment will require the researcher to expose DLIS to the Treatment group. This is done via a briefing / question and answer session that will occur after the pre-test. From this point onwards, the teaching staff conducting the experiment will be asked to initiate recurring instances of DLIS by way of reciprocal teachings i.e., teaching the strategies while students are learning instructional content for the duration of the semester. Only minimal risk or imposition is expected to be experienced because DLIS is actually a collection of desirable learning experiences that often occur unknowingly in a learning environment that is of good quality. For that reason, this quasi-experiment will attempt to knowingly test these desirable learning experiences to determine their effectiveness. That is why the instrument was designed to perform two functions. Firstly, to be used as a rubric to guide staff conducting the experiment about how they could go about initiating recurring instances of DLIS by way of reciprocal teachings, and secondly as a measure for assessing the effectiveness of the DLIS.

The No-Treatment control group will not have to undergo or experience anything. Their only obligation is to respond to the instrument in its pre-test and post-test versions.

Scores from both groups' pre-test and post-test will subsequently be used to generate gain scores to assess the effectiveness of the treatment.

2(a). How will the participants in your study be recruited?

Participants will be recruited based on their enrolment in certain classes to be accessed by this study. For example, participants from the Faculty of Education could possibly be students who have enrolled in classes such as EDI 1100: Lifespan Development and Learning, EDC 1200: Self, Education and Society, EDC 2100: Managing Supportive Learning Environments, EDC 2400: Diversity in Pedagogy, EDX 2260: Teaching Science for Understanding and EDC 3100: ICT and Pedagogy. The researcher will personally address and ask the teaching staff and students of these classes, and expectantly other classes from different faculties, whether or not they would consent to participation in this study.

From a sampling stand point of view, the target population for this study would be that of USQ undergraduate students. However because of its size, the target population needs to be narrowed down to a more accessible sample. Hence, sample members will be drawn from the above mentioned sampling frame using a two-stage purposive cluster sampling technique. The first sampling frame will be of how far the participant has progressed in his or her degree at the university. For example, is the participant in his or her first, second or third year of their degree? The second sampling frame will be that of their academic affiliation, or in other words which faculty is the participant from. For instances, is the participant from the faculty of Arts, Business, Sciences, Education or Engineering and Surveying?

2(b). Do you have written permission to recruit participants from the relevant organisation(s)?

The researcher plans to seek written permission from the university, with guidance and assistance from my Principal Supervisor.

3. Specify any psychological and other risks to the participants.

There will be no psychological risk to the participants. Although this study's research design will require the participants to respond to the same instrument twice, their initial exposure to the instrument will be in its intended form. Randomization of the instrument will only occur later during the post-test. This is because staff and participants assigned to the Treatment group need to familiarise themselves with DLIS before the experiment can occur. Staff and participants assigned to the No-Treatment control group will not have to undergo this familiarization process. They will only be required to respond to the instrument. Hence, no disorientation is expected to be experienced by the participants of either group.

4. Justify the study in terms of the risk to, and imposition on, the participants.

The role of the participants in this study is to provide data about the effectiveness of DLIS. The field experiment to be conducted is designed to facilitate improvements in the quality of learning that will be experienced by the participants. Neither the experiment nor its instrument, will in any way negatively affect the participants' academic progress. Any risk or imposition to or on the participants will be minimal. If successful the resultant standardized measure will in the not too distant future, be proposed for use either as a rubric for facilitating the implementation of DLIS, or as a diagnostic tool for assessing the quality of learning experience by students for the purpose of improving course design.

5. What steps will be taken to ensure protection of the participants' physical, social and psychological welfare?

All information provided will remain confidential. No identities will be disclosed. Only consenting participants will be involved in the study.

6. Does the study involve deception? If so, explain why it is necessary and justify.

No.

7. How will the study benefit the participants?

This study will benefit the participants by generating awareness about DLIS. Anyone of us, who has had the opportunity to study under a good teacher, would have either knowingly or unknowingly experienced the Seven Principles first hand. In an effort to build on what's there and not reinvent the wheel, this researcher would like to try to improve the Seven Principles by affixing to it a component that introduces the function of utilizing instructional strategies that enable the learning to be experienced by participants to be systematically scalable to different levels culminating in the ability to traverse and satisfactorily complete complex tasks i.e., the Different

Levels of Instructional Strategy. The rationale for this course of action is to move away from information-only presentations towards a more task-centered approach that is designed to promote more effective, efficient and engaging learning. Hence, that is why this study will attempt a quasi-experiment that puts the Treatment group in a situation in which they will knowingly experience DLIS.

8. Will the aims of the study be communicated effectively to the participants? How will this be done?

Yes. During the familiarization process both staff and participants assigned to the Treatment group will be made aware of the aims of the study.

9. What steps will be taken to ensure informed consent of the participants/guardians?

A cover letter will be attached to the front of the instrument asking for the participant's consent. Subsequently, in the instructions section of the instrument it will be stated that: *By completing this questionnaire you are consenting to participation in this experiment*.

10. Will the participants be assured that they may withdraw from the study at any time without any fear of the consequences?

Yes. In the cover letter attached to the front of the instrument, participants will be informed that they may withdraw from the study at any time without any fear or consequences.

If the answer is NO, please explain.

11. What steps will be taken to:

(a) provide feedback to subjects?

Feedback will initially be provided during the briefing / question and answer session. After that, feedback will be provided by teaching staff during recurring instances of DLIS by way of reciprocal teachings while conducting the experiment.

(b) debrief participants?

There will be no debriefing of the participants. However, they will be allowed to make suggestions at the end of the instrument.

12. Describe the measures which will be taken to ensure the confidentiality of the participants. If confidentiality is not ensured, justify.

Confidentiality of the participants will be ensured because no identities will be disclosed. Only wide-ranging demographic information such as gender, nationality, academic progress and faculty affiliation will be required.

13. **Explain how you intend to store and protect the confidentiality of the data.**
    The data will be stored under lock and key. Only the researcher will know where the data will be stored and have access to it.

14. **Do you certify that the persons undertaking the administration of the study are suitably qualified?**
    The researcher and teaching staff undertaking the administration of the study should have the prerequisite theoretical knowledge and experience to be suitably qualified. In addition, supervision and guidance will be provided by the researcher's Principal Supervisor.

    If NO, explain.

15. **Do you certify that you will administer the project with due regard to recognised principles for the ethical conduct of research?**
    Yes.

16. **Date by which it is anticipated that the research project will be completed**
    June 2010

    After this date you will be requested to report to the Committee certifying that the research was conducted in accordance with the approval granted by the Ethics Committee for Research Involving Human Subjects.

Signed: ____________________________________ Dated: __________________

<u>Please add information (if necessary)</u>

Appendix I

Syaril Izwann Jabar
Doctoral Program,
Faculty of Education,
University of Southern Queensland
Toowoomba, 3450 QLD.
Email: shae.izwann@gmail.com

Via: 27 September, 2010

Associate Professor Dr. Peter Albion,
Principal Supervisor,
Faculty of Education,
University of Southern Queensland,
Toowoomba, 3450 QLD.

To:

Professor Peter Goodall
Dean, Faculty of Arts &
Pro Vice-Chancellor, Social Justice,
University of Southern Queensland,
Toowoomba, 3450 QLD.

ATTN: REQUESTING PERMISSION TO SAMPLE TWO ONLINE CLASSES FROM EACH FACULTY

With regards to the above,

I Syaril Izwann Jabar, a Doctoral student in the field of Online Pedagogies and Transformative Learning with the Faculty of Education, am formally approaching all University of Southern Queensland (USQ) faculties requesting permission to sample two online classes from each faculty. The intention is to assign one class to a Treatment group and another to a Control group as part of a larger Pre-test / Post-test Non-equivalent Control Group Quasi-Experiment.

The USQ Fast Track Human Research Ethics Committee has already assessed the researcher's application and resolved to conditionally approve the application subject to certain points being addressed to the satisfaction of the Chair, most notably, evidence of approval from the relevant USQ faculties for the use of their students in this research. Please refer to the memorandum concerning Ethics Application – H10REA016 attached as Appendix G.

The purpose of this request is to satisfy the sampling frame for the research*; Assessing the Effectiveness of the Different Levels of Instructional Strategies for Online Learning (DLIS) by Undergraduate Students at the University of Southern Queensland (USQ), Australia.*

As an important aspect of the research design, samples from all the Faculties are essential in order to be able to;

a) minimize the possibility of sampling error in terms of sampling the same student twice,
b) ensure that the sample will be representative of the student population at USQ,
c) and will be large enough to enable the researcher to make reliable inferences or generalisation from the sample statistics relative to the statistical population.

Upon successfully obtaining permission from Faculty and being allocated actual classes, this researcher will then approach and provide details to the course examiner about the purpose, objective, rationale and treatment of the research. The researcher will then ask the course examiners to request the students in the allocated online classes to respond to a web survey intended to assess the effectiveness of the treatment.

Potentially, this research could prove to be beneficial to Faculty in terms of facilitating improvements to the quality of learning experienced by their online students. It is proposed that by generating student awareness about the need for conditional knowledge regarding when and why a particular cognitive strategy is appropriate, students would be better able to differentiate between planned instances of instructional strategy as opposed to random acts by teaching staff. In turn, teaching staff would then stand to profit in terms of finding it easier to nurture the developmental progression of students and thus be in a better position to develop their metacognitive sophistication.

Your cooperation is very much appreciated.

Thank you.

Yours sincerely,

____

Syaril Izwann b. Jabar
Student ID: 0050102213

Endorsed by;

____

Associate Professor Dr. Peter Albion,
Principal Supervisor

____

Professor Peter Goodall,
Dean, Faculty of Arts

Cc: Associate Dean (Research) &
Program Coordinator (Doctoral Programs),
Faculty of Education

Appendix J

Syaril Izwann Jabar
Doctoral Program,
Faculty of Education,
University of Southern Queensland
Toowoomba, 3450 QLD.
Email: shae.izwann@gmail.com

Via: 27 September, 2010

Associate Professor Dr. Peter Albion,
Principal Supervisor,
Faculty of Education,
University of Southern Queensland,
Toowoomba, 3450 QLD.

To:

Professor Allan Layton
Dean, Faculty of Business &
Pro Vice-Chancellor, Institutional Partnerships,
University of Southern Queensland,
Toowoomba, 3450 QLD.

ATTN: REQUESTING PERMISSION TO SAMPLE TWO ONLINE CLASSES FROM EACH FACULTY

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Thank you.

Yours sincerely,

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Syaril Izwann b. Jabar
Student ID: 0050102213

Endorsed by;

____

Associate Professor Dr. Peter Albion,
Principal Supervisor

____

Professor Allan Layton,
Dean, Faculty of Business

Cc: Associate Dean (Research) &
Program Coordinator (Doctoral Programs),
Faculty of Education

Appendix K

Syaril Izwann Jabar
Doctoral Program,
Faculty of Education,
University of Southern Queensland
Toowoomba, 3450 QLD.
Email: shae.izwann@gmail.com

Via: 27 September, 2010

Associate Professor Dr. Peter Albion,
Principal Supervisor,
Faculty of Education,
University of Southern Queensland,
Toowoomba, 3450 QLD.

To:

Professor Janet Verbyla
Dean, Faculty of Sciences &
Pro Vice-Chancellor, Flexible Learning,
University of Southern Queensland,
Toowoomba, 3450 QLD.

ATTN: REQUESTING PERMISSION TO SAMPLE TWO ONLINE CLASSES FROM EACH FACULTY

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Thank you.

Yours sincerely,

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Syaril Izwann b. Jabar
Student ID: 0050102213

Endorsed by;

____
Associate Professor Dr. Peter Albion,
Principal Supervisor

____
Professor Janet Verbyla,
Dean, Faculty of Sciences

Cc: Associate Dean (Research) &
Program Coordinator (Doctoral Programs),
Faculty of Education

Appendix L

Syaril Izwann Jabar
Doctoral Program,
Faculty of Education,
University of Southern Queensland
Toowoomba, 3450 QLD.
Email: shae.izwann@gmail.com

Via: 27 September, 2010

Associate Professor Dr. Peter Albion,
Principal Supervisor,
Faculty of Education,
University of Southern Queensland,
Toowoomba, 3450 QLD.

To:

Professor Frank Bullen
Dean, Faculty of Engineering and Surveying &
Pro Vice-Chancellor, Research,
University of Southern Queensland,
Toowoomba, 3450 QLD.

ATTN: REQUESTING PERMISSION TO SAMPLE TWO ONLINE CLASSES FROM EACH FACULTY

With regards to the above,

I Syaril Izwann Jabar, a Doctoral student in the field of Online Pedagogies and Transformative Learning with the Faculty of Education, am formally approaching all University of Southern Queensland (USQ) faculties requesting permission to sample two online classes from each faculty. The intention is to assign one class to a Treatment group and another to a Control group as part of a larger Pre-test / Post-test Non-equivalent Control Group Quasi-Experiment.

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As an important aspect of the research design, samples from all the Faculties are essential in order to be able to;

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c) and will be large enough to enable the researcher to make reliable inferences or generalisation from the sample statistics relative to the statistical population.

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Potentially, this research could prove to be beneficial to Faculty in terms of facilitating improvements to the quality of learning experienced by their online students. It is proposed that by generating student awareness about the need for conditional knowledge regarding when and why a particular cognitive strategy is appropriate, students would be better able to differentiate between planned instances of instructional strategy as opposed to random acts by teaching staff. In turn, teaching staff would then stand to profit in terms of finding it easier to nurture the developmental progression of students and thus be in a better position to develop their metacognitive sophistication.

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Thank you.

Yours sincerely,

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Syaril Izwann b. Jabar
Student ID: 0050102213

Endorsed by;

____
Associate Professor Dr. Peter Albion,
Principal Supervisor

____
Professor Frank Bullen,
Dean, Faculty of Engineering and Surveying

Cc: Associate Dean (Research) &
Program Coordinator (Doctoral Programs),
Faculty of Education

Appendix M; Printed version; 28 July 2010

ASSESSING THE EFFECTIVENESS OF THE DIFFERENT LEVELS OF INSTRUCTIONAL STRATEGIES (DLIS) FOR ONLINE LEARNING BY UNDERGRADUATE STUDENTS AT THE UNIVERSITY OF SOUTHERN QUEENSLAND (USQ), AUSTRALIA

This questionnaire is designed to measure and assess various attributes associated with students' perception towards the effectiveness of the different levels of instructional strategies that can be used to conduct online learning.

All information provided will remain confidential and your identity will not be disclosed. By completing this survey you are consenting to being a participant in this research.

Please **fill in the blanks** or **check ☑ the appropriate boxes** to indicate your response.

Kindly return the completed questionnaire to the researcher after you have finished.

a) Are you aware that there are Different Levels of Instructional Strategies that can be used to conduct online learning?
☐ Yes
☐ No

b) What is your Gender?
☐ Female
☐ Male

c) What is your Nationality?
____

d) How far have you progressed in your degree at USQ?
Degree : ____
Year (1^{st}, 2^{nd}, etc.,) : ______________________
Semester : ______________________

e) Which Faculty are you from?
☐ Arts
☐ Business
☐ Sciences
☐ Education
☐ Engineering & Surveying

f) Please check the boxes that indicate the communication technology or online resource utilized by teaching staff to convey instructional strategies for online learning. Check any that apply.
☐ Blogs
☐ Email
☐ StudyDesk
☐ Moodle Chat / ☐ Moodle Forum
☐ Teleconferencing
☐ Videoconferencing
☐ Instant Messaging
☐ Wimba Online Classroom
☐ Telephone: Text Messaging / ☐ Telephone: Voice
☐ Skype Video / ☐ Skype Voice / ☐ Skype Text
☐ None are utilized
Other ______________________

The following statements use a sentence completion format to measure various attributes associated with students' perception towards the effectiveness of the different levels of instructional strategies for online learning.

A partially completed sentence is provided, followed by a scale ranging from 1 to 10. The 1 to 10 range provides you with a continuum on which to reply, with *1* corresponding to a *minimum* amount of the attribute, while *10* corresponds to the *maximum* amount of the attribute. A *5* corresponds to an *average* amount of the attribute.

Please **circle** a number along the continuum that best reflects your initial feeling.

1. DIFFERENT LEVELS OF INSTRUCTIONAL STRATEGY

1.1 I __________ noticed instances of Teaching staff trying to present information with accompanying recall questions.

Rarely **Frequently**

1 2 3 4 5 6 7 8 9 10

1.2 I recall attempts by Teaching staff to promote higher levels of performance on complex tasks by way of presenting information, and demonstrating its application as being __________.

Meaningless **Significant**

1 2 3 4 5 6 7 8 9 10

1.3 I can __________ understand why Teaching Staff would be willing to provide corrective feedback in order to promote improvement in my performance on complex tasks.

Completely **Vaguely**

10 9 8 7 6 5 4 3 2 1

1.4 I __________ value attempts by Teaching staff to use a task-centred approach to promote efficiency, effectiveness and engagement.

Scarcely **Very much**

1 2 3 4 5 6 7 8 9 10

2. ENCOURAGING INTERACTION BETWEEN STUDENTS AND TEACHING STAFF

2.1 I __________ noticed instances of Teaching staff trying to communicate with me.

Rarely **Frequently**

1 2 3 4 5 6 7 8 9 10

2.2 I recall attempts by Teaching Staff to facilitate informal interaction with me as being __________.

Meaningless **Significant**

1 2 3 4 5 6 7 8 9 10

2.3 I can __________ understand why Teaching staff would demonstrate a willingness to serve as a mentor to me.

Completely **Vaguely**

10 9 8 7 6 5 4 3 2 1

2.4 I __________ value attempts by Teaching staff to contact me when I have fallen behind to discuss my study habits, schedules, and other commitments.

Scarcely **Very much**

1 2 3 4 5 6 7 8 9 10

2.5 I am __________ of teaching staff attempting to provide extra material or exercises if I lack the essential background knowledge or skills.

Appreciative **Unappreciative**

10 9 8 7 6 5 4 3 2 1

3. DEVELOPING RECIPROCITY AND COOPERATION AMONG STUDENTS

3.1 I __________ noticed instances of Teaching staff trying to encourage me to participate in online activities.

Rarely									**Frequently**
1	2	3	4	5	6	7	8	9	**10**

3.2 I recall attempts by Teaching staff to get me to explain difficult ideas or concepts to others within an online learning group as being __________.

Meaningless									**Significant**
1	2	3	4	5	6	7	8	9	**10**

3.3 I can __________ understand why Teaching staff would demonstrate an eagerness to get me to discuss openly with colleagues through a forum about interests and backgrounds.

Completely									**Vaguely**
10	9	8	7	6	5	4	3	2	**1**

3.4 I __________ value attempts by Teaching staff to utilize a Learning Management System such as *USQStudyDesk* to encourage learning communities in my course.

Scarcely									**Very much**
1	2	3	4	5	6	7	8	9	**10**

3.5 I am __________ of Teaching staff attempting to get me and my colleagues to work on projects together.

Appreciative									**Unappreciative**
10	9	8	7	6	5	4	3	2	**1**

4. ENCOURAGING ACTIVE, CONTEXTUAL AND MEANINGFUL LEARNING

4.1 I __________ noticed instances of Teaching staff trying to get me to apply meaningful learning by relating events that happened in real life to what was being learnt.

Rarely									**Frequently**
1	2	3	4	5	6	7	8	9	**10**

4.2 I recall attempts by Teaching staff to get me to apply contextual learning by analyzing real-life contexts as being __________.

Meaningless									**Significant**
1	2	3	4	5	6	7	8	9	**10**

4.3 I can __________ understand why Teaching staff would demonstrate a willingness to link me with professionals who are experts in the field of study so that opinions and ideas can be exchanged.

Completely									**Vaguely**
10	9	8	7	6	5	4	3	2	**1**

4.4 I __________ value attempts by Teaching staff to encourage me to express myself when I do not understand a particular subject matter.

Scarcely									**Very much**
1	2	3	4	5	6	7	8	9	**10**

4.5 I am __________ of attempts to include independent study assignments where I seek out information from the Internet and later discuss with Teaching staff the validity of the information and the reliability of its source.

Appreciative									**Unappreciative**
10	9	8	7	6	5	4	3	2	**1**

5. GIVING PROMPT FEEDBACK

5.1 I __________ noticed instances of Teaching staff trying to adjust their instructional strategy to include problem solving and task-centred activities that provided me with immediate feedback.

Rarely									**Frequently**
1	2	3	4	5	6	7	8	9	**10**

5.2 I recall attempts by Teaching staff to provide corrective feedback regarding my performance on problem solving and task-centred activities as being __________.

Meaningless									**Significant**
1	2	3	4	5	6	7	8	9	**10**

5.3 I can __________ understand why Teaching staff would demonstrate a willingness to politely inquire about my strengths and weaknesses in tutorials, quizzes and tests.

Completely									**Vaguely**
10	9	8	7	6	5	4	3	2	**1**

5.4 I __________ value attempts by Teaching staff to get me to go online and contact them to discuss my academic progress.

Scarcely									**Very much**
1	2	3	4	5	6	7	8	9	**10**

5.5 I am __________ of attempts by Teaching staff to provide me with an evaluation of my proficiency.

Appreciative									**Unappreciative**
10	9	8	7	6	5	4	3	2	**1**

6. EMPHASIZING TIME ON TASK

6.1 I __________ noticed instances of Teaching staff tying to communicate to me that I am expected to complete my assignments promptly.

Rarely									**Frequently**
1	2	3	4	5	6	7	8	9	**10**

6.2 I recall attempts by Teaching staff to deliver course materials, quizzes and assignments online as being __________.

Meaningless									**Significant**
1	2	3	4	5	6	7	8	9	**10**

6.3 I can __________ understand why Teaching staff would demonstrate an eagerness to emphasize to me the importance of diligence, sound self-pacing and scheduling.

Completely									**Vaguely**
10	9	8	7	6	5	4	3	2	**1**

6.4 I __________ value attempts by Teaching staff to make it clear to me the amount of time that is required to understand complex material.

Scarcely									**Very Much**
1	2	3	4	5	6	7	8	9	**10**

7. COMMUNICATING HIGH EXPECTATIONS

7.1 I __________ noticed instances of Teaching staff trying to communicate to me that I am expected to work hard.

Rarely									**Frequently**
1	2	3	4	5	6	7	8	9	**10**

7.2 I recall attempts by Teaching staff to emphasize the importance of holding on to high standards for academic achievement as being __________.

Meaningless									**Significant**
1	2	3	4	5	6	7	8	9	**10**

7.3 I can __________ understand why Teaching staff would demonstrate a willingness to share with me past experiences, attitudes and values.

Completely									**Vaguely**
10	9	8	7	6	5	4	3	2	**1**

7.4 I __________ value attempts by Teaching staff to provide me with a pre-test at the beginning of the course.

Scarcely									**Very much**
1	2	3	4	5	6	7	8	9	**10**

7.5 I am __________ of attempts by Teaching staff to discuss my academic progress especially near the end of the course.

Appreciative									**Unappreciative**
10	9	8	7	6	5	4	3	2	**1**

8. RESPECTING DIVERSE TALENTS AND WAYS OF LEARNING

8.1 I __________ noticed instances of Teaching staff trying to determine my learning style, interests or background at the beginning of the course.

Rarely									**Frequently**
1	2	3	4	5	6	7	8	9	**10**

8.2 I recall attempts by Teaching staff to relate learning activities to my learning style, interests or background as being __________.

Meaningless									**Significant**
1	2	3	4	5	6	7	8	9	**10**

8.3 I can __________ understand why Teaching staff would demonstrate a willingness to use multiple methods to communicate their own expectations at the beginning of the course.

Completely									**Vaguely**
10	9	8	7	6	5	4	3	2	**1**

8.4 I __________ value attempts by Teaching staff to encourage mastery learning or learning contracts as instructional strategies.

Scarcely									**Very much**
1	2	3	4	5	6	7	8	9	**10**

8.5 I am __________ of attempts by Teaching staff to work with me to set challenging objectives for learning outcomes.

Appreciative									**Unappreciative**
10	9	8	7	6	5	4	3	2	**1**

g) With regards to the effectiveness of the proposed Different Levels of Instructional Strategies for Online Learning, I would like to suggest that;

h) This is because I believe that such strategies would;

Thank you for your cooperation

Appendix N; Online version; 28 July 2010

ASSESSING THE EFFECTIVENESS OF THE DIFFERENT LEVELS OF INSTRUCTIONAL STRATEGIES (DLIS) FOR ONLINE LEARNING BY UNDERGRADUATE STUDENTS AT THE UNIVERSITY OF SOUTHERN QUEENSLAND (USQ), AUSTRALIA

This survey is designed to measure and assess various attributes associated with students' perception towards the effectiveness of the different levels of instructional strategies that can be used to conduct online learning.

All information provided will remain confidential and your identity will not be disclosed. By completing this survey you are consenting to being a participant in this research.

Please **fill in the blanks** or **check the appropriate boxes** to indicate your response.

a) Are you aware that there are Different Levels of Instructional Strategies that can be used to conduct online learning?
- ☐ Yes
- ☐ No

b) What is your Gender?
- ☐ Female
- ☐ Male

c) What is your Nationality?
____

d) How far have you progressed in your degree at USQ?
Degree : ____
Year (1st, 2nd, etc.,) : _____________________
Semester : _____________________

e) Which Faculty are you from?
- ☐ Arts
- ☐ Business
- ☐ Sciences
- ☐ Education
- ☐ Engineering & Surveying

f) Please check the boxes that indicate the communication technology or online resource utilized by teaching staff to convey instructional strategies for online learning. Check any that apply.
- ☐ Blogs
- ☐ Email
- ☐ StudyDesk
- ☐ Moodle Chat
- ☐ Moodle Forum
- ☐ Teleconferencing
- ☐ Videoconferencing
- ☐ Instant Messaging
- ☐ Wimba Online Classroom
- ☐ Telephone: Text Messaging
- ☐ Telephone: Voice
- ☐ Skype Video
- ☐ Skype Voice
- ☐ Skype Text
- ☐ None are utilized

Other _____________________

The following statements use a sentence completion format to measure various attributes associated with students' perception towards the effectiveness of the different levels of instructional strategies for online learning.

A partially completed sentence is provided, followed by a scale ranging from 1 to 10. The 1 to 10 range provides you with a continuum on which to reply, with *1* corresponding to a *minimum* amount of the attribute, while *10* corresponds to the *maximum* amount of the attribute. A *5* corresponds to an *average* amount of the attribute.

Please **select** a number along the continuum that best reflects your initial feeling.

1. DIFFERENT LEVELS OF INSTRUCTIONAL STRATEGY

1.1 I __________ noticed instances of Teaching staff trying to present information with accompanying recall questions.

Rarely									**Frequently**
1	2	3	4	5	6	7	8	9	**10**

1.2 I recall attempts by Teaching staff to promote higher levels of performance on complex tasks by way of presenting information, and demonstrating its application as being __________.

Meaningless									**Significant**
1	2	3	4	5	6	7	8	9	**10**

1.3 I can __________ understand why Teaching Staff would be willing to provide corrective feedback in order to promote improvement in my performance on complex tasks.

Completely									**Vaguely**
10	9	8	7	6	5	4	3	2	**1**

1.4 I __________ value attempts by Teaching staff to use a task-centred approach to promote efficiency, effectiveness and engagement.

Scarcely									**Very much**
1	2	3	4	5	6	7	8	9	**10**

2. ENCOURAGING INTERACTION BETWEEN STUDENTS AND TEACHING STAFF

2.1 I __________ noticed instances of Teaching staff trying to communicate with me.

Rarely									**Frequently**
1	2	3	4	5	6	7	8	9	**10**

2.2 I recall attempts by Teaching Staff to facilitate informal interaction with me as being __________.

Meaningless									**Significant**
1	2	3	4	5	6	7	8	9	**10**

2.3 I can __________ understand why Teaching staff would demonstrate a willingness to serve as a mentor to me.

Completely									**Vaguely**
10	9	8	7	6	5	4	3	2	**1**

2.4 I __________ value attempts by Teaching staff to contact me when I have fallen behind to discuss my study habits, schedules, and other commitments.

Scarcely									**Very much**
1	2	3	4	5	6	7	8	9	**10**

2.5 I am __________ of teaching staff attempting to provide extra material or exercises if I lack the essential background knowledge or skills.

Appreciative									**Unappreciative**
10	9	8	7	6	5	4	3	2	**1**

3. DEVELOPING RECIPROCITY AND COOPERATION AMONG STUDENTS

3.1 I __________ noticed instances of Teaching staff trying to encourage me to participate in online activities.

Rarely									**Frequently**
1	2	3	4	5	6	7	8	9	**10**

3.2 I recall attempts by Teaching staff to get me to explain difficult ideas or concepts to others within an online learning group as being __________.

Meaningless									**Significant**
1	2	3	4	5	6	7	8	9	**10**

3.3 I can __________ understand why Teaching staff would demonstrate an eagerness to get me to discuss openly with colleagues through a forum about interests and backgrounds.

Completely									**Vaguely**
10	9	8	7	6	5	4	3	2	**1**

3.4 I __________ value attempts by Teaching staff to utilize a Learning Management System such as *USQStudyDesk* to encourage learning communities in my course.

Scarcely									**Very much**
1	2	3	4	5	6	7	8	9	**10**

3.5 I am __________ of Teaching staff attempting to get me and my colleagues to work on projects together.

Appreciative									**Unappreciative**
10	9	8	7	6	5	4	3	2	**1**

4. ENCOURAGING ACTIVE, CONTEXTUAL AND MEANINGFUL LEARNING

4.1 I __________ noticed instances of Teaching staff trying to get me to apply meaningful learning by relating events that happened in real life to what was being learnt.

Rarely									**Frequently**
1	2	3	4	5	6	7	8	9	**10**

4.2 I recall attempts by Teaching staff to get me to apply contextual learning by analyzing real-life contexts as being __________.

Meaningless									**Significant**
1	2	3	4	5	6	7	8	9	**10**

4.3 I can __________ understand why Teaching staff would demonstrate a willingness to link me with professionals who are experts in the field of study so that opinions and ideas can be exchanged.

Completely									**Vaguely**
10	9	8	7	6	5	4	3	2	**1**

4.4 I __________ value attempts by Teaching staff to encourage me to express myself when I do not understand a particular subject matter.

Scarcely									**Very much**
1	2	3	4	5	6	7	8	9	**10**

4.5 I am __________ of attempts to include independent study assignments where I seek out information from the Internet and later discuss with Teaching staff the validity of the information and the reliability of its source.

Appreciative									**Unappreciative**
10	9	8	7	6	5	4	3	2	**1**

5. GIVING PROMPT FEEDBACK

5.1 I __________ noticed instances of Teaching staff trying to adjust their instructional strategy to include problem solving and task-centred activities that provided me with immediate feedback.

Rarely									**Frequently**
1	2	3	4	5	6	7	8	9	**10**

5.2 I recall attempts by Teaching staff to provide corrective feedback regarding my performance on problem solving and task-centred activities as being __________.

Meaningless									**Significant**
1	2	3	4	5	6	7	8	9	**10**

5.3 I can __________ understand why Teaching staff would demonstrate a willingness to politely inquire about my strengths and weaknesses in tutorials, quizzes and tests.

Completely									**Vaguely**
10	9	8	7	6	5	4	3	2	**1**

5.4 I __________ value attempts by Teaching staff to get me to go online and contact them to discuss my academic progress.

Scarcely									**Very much**
1	2	3	4	5	6	7	8	9	**10**

5.5 I am __________ of attempts by Teaching staff to provide me with an evaluation of my proficiency.

Appreciative									**Unappreciative**
10	9	8	7	6	5	4	3	2	**1**

6. EMPHASIZING TIME ON TASK

6.1 I __________ noticed instances of Teaching staff tying to communicate to me that I am expected to complete my assignments promptly.

Rarely									**Frequently**
1	2	3	4	5	6	7	8	9	**10**

6.2 I recall attempts by Teaching staff to deliver course materials, quizzes and assignments online as being __________.

Meaningless									**Significant**
1	2	3	4	5	6	7	8	9	**10**

6.3 I can __________ understand why Teaching staff would demonstrate an eagerness to emphasize to me the importance of diligence, sound self-pacing and scheduling.

Completely									**Vaguely**
10	9	8	7	6	5	4	3	2	**1**

6.4 I __________ value attempts by Teaching staff to make it clear to me the amount of time that is required to understand complex material.

Scarcely									**Very Much**
1	2	3	4	5	6	7	8	9	**10**

7. COMMUNICATING HIGH EXPECTATIONS

7.1 I __________ noticed instances of Teaching staff trying to communicate to me that I am expected to work hard.

Rarely									Frequently
1	2	3	4	5	6	7	8	9	10

7.2 I recall attempts by Teaching staff to emphasize the importance of holding on to high standards for academic achievement as being __________.

Meaningless									Significant
1	2	3	4	5	6	7	8	9	10

7.3 I can __________ understand why Teaching staff would demonstrate a willingness to share with me past experiences, attitudes and values.

Completely									Vaguely
10	9	8	7	6	5	4	3	2	1

7.4 I __________ value attempts by Teaching staff to provide me with a pre-test at the beginning of the course.

Scarcely									Very much
1	2	3	4	5	6	7	8	9	10

7.5 I am __________ of attempts by Teaching staff to discuss my academic progress especially near the end of the course.

Appreciative									Unappreciative
10	9	8	7	6	5	4	3	2	1

8. RESPECTING DIVERSE TALENTS AND WAYS OF LEARNING

8.1 I __________ noticed instances of Teaching staff trying to determine my learning style, interests or background at the beginning of the course.

Rarely									Frequently
1	2	3	4	5	6	7	8	9	10

8.2 I recall attempts by Teaching staff to relate learning activities to my learning style, interests or background as being __________.

Meaningless									Significant
1	2	3	4	5	6	7	8	9	10

8.3 I can __________ understand why Teaching staff would demonstrate a willingness to use multiple methods to communicate their own expectations at the beginning of the course.

Completely									Vaguely
10	9	8	7	6	5	4	3	2	1

8.4 I __________ value attempts by Teaching staff to encourage mastery learning or learning contracts as instructional strategies.

Scarcely									Very much
1	2	3	4	5	6	7	8	9	10

8.5 I am __________ of attempts by Teaching staff to work with me to set challenging objectives for learning outcomes.

Appreciative									Unappreciative
10	9	8	7	6	5	4	3	2	1

g) With regards to the effectiveness of the proposed Different Levels of Instructional Strategies for Online Learning, I would like to suggest that;

h) This is because I believe that such strategies would;

Thank you for completing this survey

Appendix O

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Monday, 15 November 2010

Mr Syaril Izwann Jabar
Unit 2, 13 Maplewood Drive,
Darling Heights QLD 4350

Dear Mr Syaril Izwann Jabar

The Faculty Ethics Chair recently reviewed your responses to the conditions placed upon the ethical approval for the below project. Your proposal now meets the requirements of the *National Statement on Ethical Conduct in Human Research (2007)* and full ethics approval has been granted.

Project Title	An Assessment of the Effectiveness of the Different Levels of Instructional Strategies for Online Learning by Undergraduate Students at the University of Southern Queensland (USQ), Australia
Approval no.	H10REA016
Expiry date	15/11/2011
Faculty Decision	**Approved**

The standard conditions of this approval are:

(a) conduct the project strictly in accordance with the proposal submitted and granted ethics approval, including any amendments made to the proposal required by the HREC
(b) advise (email: ethics@usq.edu.au) immediately of any complaints or other issues in relation to the project which may warrant review of the ethical approval of the project
(c) make submission for approval of amendments to the approved project before implementing such changes
(d) provide a 'progress report' for every year of approval
(e) provide a 'final report' when the project is complete
(f) advise in writing if the project has been discontinued.

For (c) to (e) forms are available on the USQ ethics website: http://www.usq.edu.au/research/ethicsbio/human

Please note that failure to comply with the conditions of approval and the *National Statement (2007)* may result in withdrawal of approval for the project.

You may now commence your project. I wish you all the best for the conduct of the project.

Helen Phillips
Ethics Officer
Office of Research and Higher Degrees

Appendix P

The following are operational definitions that have been contextualized by the researcher for use in this research.

1.11.1 Asynchronous Communication

Online tools that do not require real-time interaction. For example, email, [forums] and electronic bulletin boards (Lever-Duffy et al., 2003).

1.11.2 Behaviourists

Those who view all behaviour as a response to external stimuli; they believe that the learner acquires behaviours, skills, and knowledge in response to the rewards, punishments, or withheld responses associated with them (Lever-Duffy et al., 2003).

1.11.3 Catalyst

An instrument to bring about change.

1.11.4 Cognitivists

Those who focus on learning as a mental operation that begins when information enters through the senses, undergoes mental manipulation, is stored, and finally used (Lever-Duffy et al., 2003).

1.11.5 Cognitive-constructivists

Those who advocate learning as the result of an individual's efforts to cognitively construct personal knowledge (Lever-Duffy et al., 2005).

1.11.6 Cognitive presence

The extent to which learners in any particular configuration of a community of inquiry (COI) are able to construct and confirm meaning through sustained communication, discourse and reflection (Arbaugh & Hwang, 2005; Garrison, Anderson & Archer, 2000).

1.11.7 Communication Technology

The use of 'microprocessor-based resources' such as mobilephones, text messaging, PDAs, email, and forums to interconnect with learners (Seels & Richey, 1994).

1.11.8 Constructivism

A school of psychology which holds that learning occurs because personal knowledge is constructed by deriving meaning from experience and the context in which that experience takes place (Seels & Richey, 1994).

1.11.9 Competency

Knowledge, skills, or attitudes which the student can demonstrate at a pre-determined level (Seels & Richey, 1994).

1.11.10 Diffusion of Innovations

The process of communicating through planned strategies for the purpose of gaining adoption (Seels & Richey, 1994).

1.11.11 Dissemination

Deliberately and systematically making others aware of a development by circulating information (Seels & Richey, 1994).

1.11.12 Effectiveness

"Measuring the degree to which" students perceive the successful use of instructional strategies for online learning (Morrison et al., 2001).

1.11.13 Efficiency

The economical pursuit of ends through use of resource (Seels & Richey, 1994).

1.11.14 Engagement

Engagement can be defined as the quality of effort, in terms of time and energy learners invest and devote, towards purposeful involvement in educational activities and conditions that are likely to contribute directly to the construction of understanding (Coates, 2006; Hu & Kuh, 2001).

1.11.15 Feedback

Providing learners with answers to exercises and other information relative for progress in learning (Morrison et al., 2001).

1.11.16 Individualized Learning

Allowing learners to learn by providing appropriate objectives and activities with regards to their characteristics, preparations, needs, and interests (Morrison et al., 2001).

1.11.17 Instruction

A set of events, [either in the form of activities or commands, which] affects learners in such a way that learning is facilitated (Gagné & Briggs, 1979).

1.11.18 Instructional Design

The systematic planning of instruction in which attention is given to nine related elements (Morrison et al., 2001).

1.11.19 Instructional Designer

The person responsible for carrying out and coordinating the systematic design procedure (Morrison et al., 2001).

1.11.20 Instructional Development

Managing the planning, development, and implementation procedure for instruction or training (Morrison et al., 2001).

1.11.21 Instructional Event

The manner in which a learning experience has been designed beginning with learning objectives all the way to outcomes (Lever-Duffy et al., 2003).

1.11.22 Instructional Objective

Statements describing what the learner is specifically required to learn or accomplish relative to a topic or task (Morrison et al., 2001).

1.11.23 Instructional Strategy

Specifications for selecting and [arranging] events and activities within a lesson (Seels & Richey, 1994).

1.11.24 Instructional Technology

The use of resources such as [equipment, media] and materials [that have been enhanced by technology] for the process of instruction (Morrison et al., 2001; Reiser 2012).

1.11.25 Intellectual Skill

Organizing and structuring facts for learning to form concepts, principles, rules, attitudes, and interactions (Morrison et al., 2001).

1.11.26 Learner Characteristics

Factors relating to personal and social traits of individuals and learner groups that need to be considered during planning or learning (Morrison et al., 2001).

1.11.27 Learning

The active process of acquiring knowledge or skills, before permanent changes in behavior or attitude occur due to experience (Seels & Richey, 1994).

1.11.28 Learning Activity

"The activity carried out by a learner either by means of self-instruction or with guidance" from teaching staff that result in learning (Dewan Bahasa & Pustaka, 2002).

1.11.29 Learning Strategy

The manner in which instruction is presented determines how the student can process the information (Lever-Duffy et al., 2003).

1.11.30 Learning Styles

Various methods of learning that are preferred by individuals or may be more effective with different individuals (Morrison et al., 2001).

1.11.31 Online Instruction

Either the "presentation of information" or arrangement of learning activities or distribution of commands; conducted or communicated electronically using "microprocessor-based resources" that "affect learners in such a way that learning is facilitated" (Gagné & Briggs, 1979; Lever-Duffy et al., 2003; Seels & Richey, 1994).

1.11.32 Online Learning

Is any learning that utilizes the Internet to deliver instruction to learners separated by time, distance or both. However, there are forms of synchronous or asynchronous learning that cannot be considered online learning for example correspondence courses and computer-based training using CD-ROMs without web components (Reiser & Dempsey, 2002).

1.11.33 Paradigm

The mind-set that guides an individuals' course of action.

1.11.34 Paradigm Paralysis

An individuals' state of closed mindedness that rejects suggestions about improving their course of action.

1.11.35 Pedagogy

The actual function of teaching, or what teachers do when implementing their craft to assist their students' learning" (Lever-Duffy et al., 2005, p. 48).

1.11.36 Perception

Student observation concerning the degree of success to which instructional strategies are being used for online learning.

1.11.37 Pretest

A test administered prior to the start of instruction to determine the learner's level of knowledge and the necessary preparation relative to a topic or task (Morrison et al., 2001).

1.11.38 Principles

Principles are relationships that are "always true under appropriate conditions regardless of program or practice" and whose underlying function is "to promote more effective, efficient, or engaging learning" (Merrill, 2008; Merrill, 2009, p. 43).

1.11.39 Proficiency Level

The amount of knowledge, skill or experience possessed by a student prior to receiving instruction (Cambridge, 2003).

1.11.40 Rubric

A form of check-list that specifies the objective application, successful evaluation and effective assessment of definite principles (Lever-Duffy et al., 2003).

1.11.41 Scaffolding

The process of building bridges to prior knowledge at the beginning of a lesson (Lever-Duffy et al., 2003).

1.11.42 Self-Paced Learning

Allowing learner's to satisfy required learning activities by accomplishing objectives at their own speed or convenience (Morrison et al., 2001).

1.11.43 Seven Principles

Refers to the Seven Principles for Good Practice in Undergraduate Education. They are;

(i) Encourages Contact Between Students and Teaching Staff,
(ii) Develops Reciprocity and Cooperation Among Students,
(iii) Encourages Active Learning,
(iv) Gives Prompt Feedback,
(v) Emphasizes Time on Task,
(vi) Communicates High Expectations &
(vii) Respects Diverse Talents and Ways of Learning.

1.11.44 Social presence

Is the ability of learners in a community of inquiry to project their personal characteristics into the community, thereby presenting themselves as 'real people' (Arbaugh & Hwang, 2005; Garrison et al., 2000)

1.11.45 Synchronous Communication

A method of communication in which the participants interact at the same [or in real] time (Lever-Duffy et al., 2003).

1.11.46 Theory of Multiple Intelligences

Howard Gardner theorized that each individual has multiple types of intelligences, only a few of which can be measured by IQ tests. These intelligences [or talents] include the verbal linguistic, mathematical-logical, musical, visual-spatial, bodily kinesthetic, interpersonal, intrapersonal, naturalistic, and existential intelligences (Lever-Duffy et al., 2003).

1.11.47 Teaching

The "presentation of information" or arrangement of learning activities or commands by an individual entrusted with the responsibility to conduct learning activities or provide guidance (Lever-Duffy et al., 2003).

1.11.48 Teaching presence

Is the design, facilitation and direction of cognitive social processes for the purpose of realizing meaningful and worthwhile educational learning outcomes (Arbaugh & Hwang, 2005).

1.11.49 Teaching Staff

The individual entrusted with the responsibility to formally conduct learning activities or provide guidance. Also known as educator, teacher, tutor, instructor, coach, trainer, facilitator, lecturer or professor.