Data Driven Decision Making Processes
for Pedagogical Purposes in the Case of
Latin and South American Bi-lingual International Schools

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Abstract

A student's educational journey is one that is governed by decision makers. There is very little research examining the decision making processes of Latin and South American bi-lingual international schools and the use being made of information gained from the analysis of this recorded data. Many aspects of student performance are measured and recorded, then reported in some manner. Decisions are made for and about students in a manner that is, at best, rational and reasoned, but in reality may be ad-hoc and reactionary without resorting to data or information that could affect the decision and its ramifications. Data Driven Decision Making (DDDM) potentially provides a structure that affords strength and transparency to the decision making process.

There were three research questions that guided this study. Why is DDDM important in an educational context? What are the issues and challenges surrounding the use of DDDM in relation to making pedagogical decisions within Latin American bi-lingual international schools? What are the issues surrounding the use of digital technologies in procuring and analysing relevant data within Latin American bi-lingual international schools?

Key issues from the Literature Review focus on defining aspects of Data Driven Decision Making processes, ensuring that the data being used is valid, identifying the issues and challenges created by staff development and use of DDDM processes, and discussing the issues and challenges surrounding the use of digital technologies for collecting and analysing data. An interpretative viewpoint was adopted to analyse qualitative data generated from a written questionnaire, which was then followed up with three interviews forming a Case Study of nine Latin American bi-lingual international schools affiliated to Latin American Heads Conference (LAHC).

Six key issues arose from the findings of the research processes which mirrored corresponding themes in the literature. These issues are discussed in relation to the theory base and were combined into two categories which are: People Related Issues and Systems Related Issues. A series of recommendations, combined with a suggested set of principles to follow when employing DDDM, were generated to help management consider and understand the issues and challenges of implementing DDDM processes.

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List of Abbreviations

Abbreviation	Full Title
DDDM	Data Driven Decision Making
EO	Executive Officer of the Latin American Heads Conference
LAHC	Latin American Heads Conference
DoS	Director of Studies
DP / DH	Deputy Principal / Deputy Headmaster
SMT	Senior Management Team
IT	Information Technology
MIS	Management Information System
SIS	School (or Student) Information System (usually an interchangeable term with MIS)
MIDYIS	Middle Years Information System
YELLIS	Year 11 Information System
IGCSE	International General Certificate of Secondary Education
IB	International Baccalaureate Diploma programme
MYP	Middle Years Programme
UK SAT	United Kingdom Standardised Assessment Tests
GL	GL online assessment
SIMCE	Sistema de Medición de la Calidad de la Educación
PSU	Prueba de Selección Universitaria
CAT3	Canadian Achievement Tests – Third Edition
PTA	Parent and Teacher's Association
SEL	Self Elected Learning workshops

Chapter 1   Introduction

As an experienced teacher and senior administrator, I have often wondered how decisions can be made that consistently ensure that successful outcomes are achieved which will benefit a student's educational journey. Further, queries have arisen as to whether decisions are made with a degree of rationality, or if many decisions are simply made out of convenience, ignorance or from a lack of knowledge. Unfortunately, the making of "decisions based on informed intuition, personal experience or anecdotal evidence" (Ingram, Louis & Schroeder, 2004, p. 1260) can create less than ideal solutions; solutions which have the potential to impact negatively on the student's education journey. Given that a school leader has the option of many different styles of decision making, from the autocratic style through to the full group agreement style (Hoy & Miskel, 2008), my observations also seemed to indicate that some leaders rely mostly on their experiences and intuition rather than a structured or data based approach in their decision making processes. Whilst leaders endeavour to make the optimum decision, much evidence exists which suggests that their decisions are often only "satisficing – that is, finding a satisfactory solution rather than the best one" (Hoy & Miskel, 2008, p. 325).

Further, based on anecdotal evidence, it appears that much time is spent reviewing and rescuing the results of what, in hindsight, were decisions made during processes that rarely involved any reflection or analysis of data and facts. The initial decisions are often challenged by other parties involved with the student or group, and thus may not result in a binding or final decision. This process of changing an initial decision at the request of, or from pressure exerted by, other parties occurs in an environment termed "fluid" by Owens (2004, p. 299) and results from an "environment in which the work done is characterized by ambiguity, uncertainty and disorder" (Owens, 2004, p. 299). Leaders of schools must also guard against "organizational defensive routines" (Argyis, 1993, p. 20) which follow the basic premise of doing things the way they have always been done in the past. Busher (2006, p.5) warns that these processes can inhibit an organisation from being "responsive to the shifting environmental contexts" and leads to "less effective organizational performance" (Argyris, 1993, p. 19). It appears that if an analytical, "informed reflection" (Flowers & Carpenter, 2009, p. 67) approach is taken in making a decision, then schools can move towards structures where "Administrators and teachers share in decision making, with both groups focussed on common interests and with both committed to a

single set of shared goals … [and where] school effectiveness is predicted to be high" (Hoy & Miskel, 2008, p. 107). Combining both administration and teaching staff in a collaborative environment surrounding the decision making process appears to be a key factor in ensuring successful and effective decisions are made.

Teachers spend a lot of time assessing student work and reporting on it but questions arise as to how much benefit is gained from these processes, or indeed if any analysis is performed on the data generated, and then subsequently used in future decision making processes. Literature reflects this concern when Wayman (2005, p. 296) describes schools as places which are "data rich" but "information poor", suggesting that while teachers and administrators generate a lot of measurement data on students, there is very little useful information that is extracted from it. Mokhtari, Rosemary and Edwards (2007, p. 354) write that:

> We often found and continue to find that although these educators spend significant amounts of time collecting assessment data, they do not take the time, or perhaps know how to organise and use data consistently and efficiently in instructional decision making.

These issues surrounding the moving of assessment data through a process of analysis which is subsequently used in decision making scenarios appear to be relevant in most educational institutions.

Also connected with my current role are observations and experiences of the challenges surrounding the use of digital technologies – challenges of cost, lack of local expertise and support / infrastructure problems. The Head of IT at one international school in South America commented that "We have problems with internet access … we use 4 separate internet suppliers to ensure a degree of continual access to the Web". At another international school, the Head of IT stated that "The cost of procuring a suitable Student Information System (SIS) is enormous – considering our low exchange rate to the US dollar, I would need my budget figure to be the same number in US dollars to meet the cheapest quote I have got". A start-up company in one country is attempting to bridge this gap in technology and support but they are struggling with the issues of school infrastructure, lack of local expertise, and country wide web support. The Chief Operations Officer related that "We have a great product and a sound business plan to

meet the need of schools but we can't find the people with the skills to implement and support our product, and we get crucified with lack of band width and school resources".

Finally, I have found an apparent scarcity of academic research written in English which is focussed on aspects of the international school environment, in particular research relating to international schools within Latin or South America. Searches conducted in the Unitec Library resources with terms such as "International School pedagogical decision making" revealed less than 20 items. Indeed, there was a zero response to searches for articles relating to educational practices in bilingual international schools in Latin America. By conducting research into school decision making processes related to pedagogical matters, this research project will endeavour to be adding to the almost non-existent body of research knowledge in this arena, as well as improving current practice and procedures. This thesis will endeavour to form a picture of a topic that requires a rigorous academic research approach in order to positively impact on the education climate in Latin and South America.

1.1   Background and Setting

World-wide, international schools appear to be facing similar problems such as the lack of centrally funded support, staffing and infrastructure (Leggate & Thompson, 1997). Johnson (2008) discusses the challenges of assisting schools of librarianship and information studies and mentioned that in Latin America these particular challenges were magnified "In the developing countries these differences are exaggerated by the prevailing circumstances: not only less money for investment, but also a shortage of skilled labour to meet a growing need for professional services" (p. 337). In many Latin and South American countries, international schools are often registered as bi-lingual schools with the local educational authority. They are required to operate within the educational laws and statutes of the country with some flexibilities of programme, but are treated to all extent and purposes as independent international schools would be in other countries. Leggate and Thompson (1997) argue that this independence affords the potential to develop good educational practice in environments that are not subject to external dictates and directions.

In order to create a collaborative environment for international schools facing these challenges and problems, the Latin American Heads Conference (LAHC) was formed in 1985. This is a group of bi-lingual international schools located throughout South and Latin America who are "a network of schools of British inspiration throughout Latin America that aim to share expertise for the purpose of school improvement. The membership is motivated by a quest for excellence in all areas of education and collaborative networking at all levels" (http://www.lahc.net/www/, downloaded 26/4/2011). There are 42 schools currently affiliated to LAHC and the Conference is overseen by an Executive Officer (EO). The schools are grouped into four zones, A – D, according to geographical location.

The reason for choosing to research the topic below is based around the researcher's experiences as a senior manager at two international schools in South America. As a senior manager with responsibility for academic programmes, there is a desire to make a positive impact on the teaching and learning processes in schools. However, after observing and working alongside several Headmasters, staff members and Boards of Governors, there appears to be a wide variety of acceptance and understanding surrounding the importance and use of relevant data to support decision making processes, and thus this topic of research will endeavour to investigate whether Data Driven Decision Making (DDDM) processes can be used and relied upon to drive these improvements as well as providing strength and transparency to decisions.

1.2   Research Aim

The overall aim of this research will be to examine, within a structured academic research frame, the use of DDDM processes for pedagogical decisions in the case of Latin and South American bi-lingual international schools affiliated to the LAHC

The LAHC is a community of schools committed to school improvement, and therefore emerged as a natural source of information and researchable data. Thus, by investigating school and teacher decision making processes, I aimed to assess the suitability and use of DDDM processes where best value solutions are sought. Further, research was conducted into the challenges of implementation and professional development that is required for DDDM processes, as well as

assessing the infrastructure requirements and problems of sourcing and servicing digital technologies in South American schools.

As an added benefit to the result of conducting this research, I wished to potentially improve the levels of awareness surrounding the benefits of DDDM processes as they are used within international schools; increase the very limited body of knowledge that currently exists which is focussed on international schools in general; and add to the almost complete absence of academic knowledge on the use of DDDM in bi-lingual international schools in South America.

1.3   Research Questions

In order to achieve the stated aims, aspects of current practice will be assessed through research based around the following three questions. The questions will create a reference structure for the Literature Review and act as guides to the research methods employed.

- Why is DDDM important in an educational context?
- What are the issues and challenges surrounding the use of DDDM in relation to making pedagogical decisions within Latin American bi-lingual international schools?
- What are the issues surrounding the use of digital technologies in procuring and analysing relevant data within Latin American bi-lingual international schools?

1.4   Thesis Outline

This thesis provides a record of the research conducted from April 2011 until June 2012.

Chapter 1: Introduction outlines the rationale for the research and provides the reasons why this concept was chosen for study. The development of three research questions to be investigated will outline the focus and procedures of this research project.

Chapter 2: Literature Review provides an overview of current thinking to build a theoretical base for the research which will be used later to compare and contrast with findings from the

questionnaire and interviews. This chapter also discusses the relevance of the three research questions.

Chapter 3: Methodology outlines the rationale behind, and the structure of, the processes employed in the research process. It describes the research approach adopted, the design of the research and the methods of data collection and analysis employed, as well as discussing questions of validity and the ethical issues surrounding the research processes that were adopted.

Chapter 4: Findings discusses the findings from the responses received. The chapter is divided into two subsections; the first is focussed on responses received in the questionnaire while the second subsection discusses the interview responses. Both subsections synthesise the responses received around the three research questions in order to compare and contrast the varying responses, and to seek for common themes and practices. At the end of the chapter, six key issues that have arisen throughout the chapter will be clarified in order to provide a structure of the following chapter's content.

Chapter 5: Discussion establishes links between the literature from Chapter 2 with the actual practices, procedures and findings outlined in Chapter 4 through analysing the six themes that were listed at the conclusion of Chapter 4.

Chapter 6: Conclusions and Recommendations completes the thesis by synthesising the issues discussed in Chapter 5 into two overall categories, and provides in each category several recommendations for senior managers to assist them in planning to eliminate barriers and implement sustainable DDDM procedures. This chapter concludes with comments on the limitations of the research, some ideas for future research, and a summarising statement.

Chapter 2   Literature Review

There is no question that data are readily available in schools. However, a plethora of data by itself is not a solution to school improvement; the challenge that faces most educational institutions is in knowing how to effectively use data to drive the instructional or decision making process. Shen and Cooley (2008) warn that "Data are not a panacea for school improvement" (p. 319) and is certainly not "another band-aid" (p. 320). They go on to write that "School improvement will not occur until teachers, principals and central administrators enter into problem-solving mode and use data as a diagnostic tool" (p. 325). Data of itself will not solve problems but, as argued by Shen & Cooley, it could prove to be the "nexus among these dimensions" (2008, p. 320) of teaching, leadership, curriculum and community involvement in the on-going and evolving process of school improvement.

Clearly, a key role of any administrator is making decisions. Hoy & Miskel stated this when writing "Deciding is a sine qua non of educational administration because the school, like all formal organisations, is basically a decision-making structure" (2008, p. 325). However, the structures and processes that leaders use and the techniques they employ during decision making are varied and range in complexity. Hoy and Miskel (2008) postulated four basic models of managerial decision making. These are; the Classical model with its optimizing strategy of "best possible alternatives to maximize the achievement" (p. 324); the Administrative model with its satisficing strategy of "finding a satisfactory solution rather than the best one" (p. 325); the Incremental model with its strategy of successive limited comparisons of "a small and limited set of alternatives" (p. 337); and the Contingency model of matching strategy and situation where "the correct approach is one that best matches the circumstances" (p. 341). Regardless of the management decision making model implemented, Hoy and Miskel (2008) state that the best decisions are made where a degree of data analysis is conducted. They assert that "Better decisions are likely if the decision makers are vigilant; that is, they search carefully for relevant information, assimilate the information in an unbiased manner, and then evaluate the alternatives before making a reflective choice" (p. 346). Thus, searching for relevant information and then making a decision in an unbiased and reflective manner is a goal that leaders should aspire to.

2.1   Data Driven Decision Making

Data Driven Decision Making is the term given to the process whereby data are collected through a number of differing processes, measures and assessments about a variety of aspects of student performances. This data is processed and analysed to produce information that reflects relevant and potentially useful features, themes, statistical values and measures about the student or group performances or behaviours. This information is then used as a basis to make decisions about the teaching and learning processes, or to improve the effectiveness of school operations, generally through a collaborative or group decision making process. Please note that terms 'information' and 'data' are interchangeable depending on the author, but the key point is that DDDM is a process where data collection occurs, which is then processed to produce information that can be used in a decision making process.

Making decisions utilising relevant data has been shown to be a potentially valuable tool when attempting to achieve positive and effective improvements in the education process. "Data-driven decision-making is an effort to capitalize on information available at school level to improve classroom instruction and, ultimately, the educational performance of students" (Wohlstetter et al, 2008, p. 254) clearly states how this process of using information is accepted practice. Wayman (2005) asserts that "Research on school improvement and school effectiveness has suggested that data use is central to the school improvement process" (p. 297). Wayman concludes that "The use of data for school improvement is no longer a choice, it is a must" (p. 305). It is clear from this literature that the use of data must permeate through any decision making process if the decision is to be effective and school improvement, in whatever area, is to be achieved.

Within a classroom environment, there is evidence that effective learning can be facilitated when a teacher is able to respond to information gained through assessment-generated data. Shepard (2001) effectively argues that the learning process can only proceed if data (information and insights) generated from assessments is used to direct the learning process by stating "the gathering and use of assessment information and insights must become a part of the on-going learning process" (p. 1). Ainsworth and Viegut (2006) termed the concept of using data from assessments to direct the learning process as "formative assessments for learning" (p. 2) rather

that the more traditional processes of "assessment 'of' learning" (p. 2) which is seen when simply recording the results of tests and examinations without applying any form of analysis to inform future practice.

Further, it is both stated and implied that DDDM processes must involve the teacher community working collaboratively rather than an individual undertaking a decision making process in a vacuum and then simply announcing their final decision. "Empowering people to participate in important decisions is highly motivating to them … infuses the decision-making process with the full spectrum of knowledge and good ideas that people throughout the organization have to contribute" (Owens, 2004, p. 286). Bowers (2009) indicates that DDDM processes rely on collaborative efforts and can be utilised at all levels of school operation and administration with the comment "Data-driven decision making has been defined as teachers, school leaders, and administrators gathering around this data to discuss student-level information" (p. 609). He clarifies that discussion of data is a vital feature of the decision making process when writing that this "discussion has been shown to be an important element in helping to create a constructive dialogue around student-level data that helps promote teacher professional community and overall school success"(p. 610).

There is potentially an aspect of professional development that can arise from the utilisation of DDDM processes. Williams (2008) comments that the sharing of ideas in a DDDM process can result in the up-skilling of all involved, an effect he terms the "democratisation of expertise" (p. 215). The use of the word democracy is deliberate in that democracy is a concept which brings with it the ideals of group ownership and support in the decision made.

Finally, schools are faced with limited resources, and management are tasked with ensuring their efficient use. Bowers (2009) infers that DDDM processes can be utilised to "focus the limited resource of a school district in the best interests of its students based on the students' performance in the system to date" (p. 610). The limited resource term refers to all the finite measures of finances, staff abilities and skill levels, time allocations and school utilities.

In today's digital age, the use of digital methods to collect and analyse data is essential. As early as 2005, Wayman (2005) was commenting that "A positive response to this problem lies in the

application of advanced computer technology to efficiently organise, store and produce data for educator use" (p. 298). Prior to this statement, Bober (2001) wrote about the "School Information System (SIS)" that is "designed to help school personnel perform their assigned duties" (p. 5) which is based on using digital technologies. Closer to current times, Williams in 2008 expounds that Web 2.0 technologies enable "the generation and sharing of *user-generated content*" (p. 215) which will strengthen the accuracy and availability of different types of data.

In order to fully explore the use of DDDM processes within a digital environment, there are several underlying themes that need further exploration in order to expand and build the theoretical base for this research. These themes are all relevant to the research topic chosen as they form the skeleton on which the use of DDDM processes in South American schools is built. Failing to comprehend and address the issues raised in these themes may cause difficulties with the effective use of DDDM processes in schools.

The following themes have been isolated and discussed

2.2   The collection and validity of data

Whilst data are abundantly available in schools, the collecting of relevant, accurate or valid data is the first challenge in the process of creating truly effective and efficient DDDM processes. The data that is collected has the requirement of reflecting the true picture of what is happening in the situation and should demonstrate some form of influence on the required improvement initiative or plan. Flowers and Carpenter (2009) state that the data collected must be "relevant to [the] school improvement plan" as "By reducing the amount of data to only the most relevant information [will] you increase the likelihood that your improvement groups will use the data when examining improvement issues" (p. 66). The types of information or data which should be collected clearly vary depending on the situation or problem being faced, but any data which are collected must be relevant to the aims of the project. Shen and Cooley (2008) describe the types of data one may use for analysis by stating that processes can be employed in "analysing four types of data: (a) demographic data; (b) perceptual data; (c) student achievement data (both formal and informal); (d) school process data" (p. 322). Mokhtari et al (2007) also discuss

various types of data that can be analysed including "feedback surveys … coaches' logs … informal data … reading performance data … standardised tests, criterion-referenced tests, informal classroom assessments, and student work samples" (p. 355). Therefore, these writers are strongly suggesting that there is no one singular set of data measurements or components that should be analysed but rather a range of relevant data sets that combine to form a clear picture of the situation.

Further, the data which is collected should present a clear and accurate picture of the "poor (and good) performance of each and every agent" (Wohlstetter et al. 2008, p. 242). In order to ensure that the data collected achieves this aim, Wohlstetter et al. (2008) suggests that the system of data collection must have a "strong bottom-up information flow" (p. 242). They proceed to argue that the teacher is the key agent that can provide the information which can be used by school leaders to drive improvement changes.

However there is an underlying and often unspoken problem which has the potential of negating the accuracy and validity of any data generated, which can arise during the process of collecting the information from within the teacher's classroom. Teachers, as can be expected, want a degree of job security, therefore being asked to submit their work product in the form of student performance information to analysis may cause consternation and fear. There may be a reluctance of staff to submit their class performance measures to any form of external assessment outside of their classroom "to view their craft and their students' learning through the information lens" (Wayman, 2005, p. 301). Flowers and Carpenter (2009) suggest when writing "One of the most challenging aspects of examining your data is to do it objectively" (p. 66), that teachers may not relish the potentially uncomfortable process of data analysis as it may reveal that the root causes of the problems with underachievement are embedded in their personal practice. Bowers (2009) describes how the data produced may be subjected to "hodge podge grading practices" where "teachers' award grades based not only on an assessment of a student's academic knowledge, but also on a multitude of other factors ... effort, participation, attendance and behaviour" (p. 611). There is the implication here that assessment data may not accurately reflect the student's ability; that it may be tainted or skewed by factors of a social or behavioural nature related to job security, personal relationships with students etc.

Thus, it follows that in order for accurate data to be recorded and then analysed to produce useful information, teachers must be assured as to the potential uses of the data they produce. In order to support this assurance, Wayman (2005) writes that leaders must "not only model use of data but also establish conditions that support and encourage teachers to grow in their use of the system" (p. 303). Further, teachers must be able to trust that their classroom information will be respected and used in a professional manner; they need to be reassured by their leadership how any data they produce could be used as it is this process of analysing data synthesised from the analysis of raw information which is vital to school improvement. Kruse (2000) summarizes this by saying "organizational literature suggests that school reform efforts can be concentrated on the heart of the school – the teaching and learning process – through careful attention to how information enters and informs the practice of teachers" (p. 361). Data entry must be accurate and valid if the information produced from it is to have any relevance or usefulness to these reform efforts.

Another aspect which may assist with accurate information entry and acceptance of the data it generates is the use of groups to collaboratively make and support decisions based on that data. Wayman (2005, p. 304) refers to collaboration processes that involve frequent discussions and group work as potentially having the effect of removing the isolationism and fear that teachers may feel when sharing their work and student results. Robertson (2007) provokes further thought in this direction with her suggestion "Trust is critical in contexts where flattened hierarchies provide a work environment likely to encourage and sustain change" (p. 112), suggesting that the flattened hierarchy provided in a collaborative working group situation provides support for the development of sustainable change initiatives.

In conclusion, the implementation of DDDM processes within a school relies on having valid data which accurately reflects classroom practice. It is the responsibility of leadership to create an environment where the data obtained measures up to this ideal.

2.3 The professional development of staff

Teachers are key change agents in schools, operating as they do within their own "black box" of a classroom and rarely subject to the direct scrutiny of their work processes and procedures. Wohlstetter et al. states that "many studies conclude that teachers are not actively using data to guide planning and instructional decisions" (2008, p. 240). If this is the case, then it is a situation which may argue for a programme of professional development in order to educate the staffing body and create a sense of confidence in using DDDM processes.

Promoting professional development in education is an area of major challenge for any leader. Hargreaves and Fink (2006) are very clear in their attitudes towards sustainable change when writing "Change in education is easy to propose, hard to implement and extraordinarily difficult to sustain" (p. 1). Robertson (2007) alludes to this when she wrote "Actively moving forward usually means disengagement with old structures and ways of knowing, and commitment to engagement with new ways of knowing" (p. 111). Within an international school setting there are many issues to consider when contemplating professional development, including the potential lack of commitment by staff towards change, facilitating the repercussions of the instability caused by the relatively high turnover of the staff within the school, and the availability of relevant expertise in the area that is being developed.

Whatever programme of development is proposed, there must be a clear commitment created within the staff body towards ensuring its successful implementation is attempted. Scott (1999, p. 18) asserts that:

> Right from the outset, the driving force of change is people … If an organisation or unit is populated by people who are disaffected, who feel uninvolved, unappreciated, unsupported or who are unwilling to embrace change, then even the most committed leaders in the world will have difficulty gaining their commitment for educational reform.

These obstacles of people-based inertia towards change or development place burdens on leaders to manage their staff and lead the process of improvements. Hargreaves and Fink (2006) state that "Sustainable improvement depends on successful leadership" (p. 1). It is becoming increasingly obvious from academic research that leadership of sustainable change should not be

built on the 'follow me' type charismatic leadership model. Indeed, Fullan (2003) writes that "charismatic or savior-type leaders are dangerous to the long-term health of organizations" (p.37). He goes on to suggest that the development of leadership opportunities at all levels is the key to getting staff involvement in the change process. "Part and parcel of sustainability in organizations is the way in which they constantly spawn leadership and commitment in all quarters by fostering the flourishing of the intelligence, purpose and passion of all members of the organization" (p. 38). Cardno (1998) describes this concept as "the fostering of 'collective leadership' so that many people contribute appropriately, and at different stages, as leaders and followers" (p. 108). Creating a collective or distributed leadership model may work to ensure the success of any professional development programme such as implementing DDDM processes because it operates with staff enacting change themselves rather than coercing staff into change. Its success comes about through the feeling of empowerment and involvement of the individual staff members and is a key way to overcome the inertia that staff may exhibit.

One of the features of international schools that must be considered in any professional development process, and which may adversely affect the sustainability of the change or development, is the factor of instability created through the relatively high turnover of staff, students and parents. "This relative lack of stability, in large measure, arises from the nature of rapid turnover in students and staff that many schools experience." (Leggate & Thompson, 1997, p. 269). To cater for this challenge there is a need for the schools' Board of Governors to have a clear Strategic Plan or Direction as defined by Johnson and Scholes (p. 10). "Strategy is the *direction* and *scope* of an organisation over the *long term*, which achieves *advantage* for the organisation through its configuration of *resources* within a changing *environment* and to fulfil *stakeholder* expectations" (p. 10). By having this type of long-term strategic plan, the vagaries and inconsistencies caused by a high staff turnover rate may be diminished as Leggate and Thompson (1997) mentioned in stating that the "disadvantages of short-term considerations arising from the transient staff, student and parent bodies" can be negated through the "creation of a rational framework" (p. 273).

Staff development has been defined in a number of ways, all of which generally focus on providing educational opportunities to staff with the intended effect of bettering student learning (Black & Armstrong, 1995, p. 27). Thus, deciding on which form it will take, and the availability

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of relevant expertise and facilitators, are keys to consider when considering the creation of any staff development project.

International schools are not generally supported by a local educational authority and hence enjoy considerable autonomy (Leggate & Thompson, 1997, p. 269) but this brings with it the challenges of being able to adequately source external expertise and the potential loss of the advantages of integration into local school network support groups. Black and Armstrong, (1995) write about these challenges when stating that "Staff development in international schools has been shaped by different considerations and restrictions to those found in national systems" (p. 29) where the problems facing international schools are typified by a "greater order of magnitude; cost of travel and the difficulties of obtaining supply teachers (for covering of teachers absent on a course) being obvious examples" (p. 27).

Black & Armstrong's 1995 study of international schools' staff development programmes didn't negate the value of bringing in external expertise for workshop type programmes, nor of sending staff to conferences or short courses; but a strong recommendation from their research, based on a 96% agreement rate with the statement 'Faculty expertise should be used for staff development', is that more use should be made of the staffing bodys' professional expertise. Black and Armstrong (1995) allege in their research that they have found the use of staff expertise to be very helpful in the professional development process of staff at international schools, "it may be understood that there is considerable agreement that faculty expertise should be used for staff development … using staff expertise within schools and that more use should be made of this resource" (p. 30). The use of internal expertise is one area that should be explored as the experiences and skills of the international staffing body can be made up of levels of expertise not readily available within the local area, "where staff bring forward previous expertise from a wide range of national and cultural backgrounds" (Leggat & Thompson, 1997, p. 269). Adding to the attraction of using internal staff skills in any professional development programme is the by-product of corporate identity creation mentioned previously in this section. By delivering or managing a process of development, there is an immediate effect of staff ownership in the programme which can have a positive effect towards ensuring its success.

2.4   The challenges caused by the use of digital technologies

In order for DDDM processes to be successfully implemented, the using of digital technologies must help, rather than hinder, the flow of information from its source through an analysis process into the producing of relevant data for the teacher to consider. "What educators need is real-time information – data that can help them answer questions while their students are still in their classrooms" (Kadel, 2010, p. 19). As with professional development initiatives, there appears to be a similar issue of inertia to change exhibited when staff are faced with new IT technologies. Williams (2008) warns that "school teaching in England remains a conservative profession possessed of a massive inertia which has enabled it to remain largely impervious to reform agendas" (p. 214). Although he is referring to England, one may argue that this statement is true of many other countries. By failing to make any process simple to understand and easy to use, this inertia has the potential to stall any school improvement initiative.

The challenge facing most staff over the age of 30 is that the digital world they are faced with has only developed in the last 25 years or so, a situation that requires teachers to operate in a landscape of IT systems and technologies that was very different to their experiences at school. By having this landscape develop around them and being fronted with it, teachers are members of the group of the population called "Digital immigrants" (Prensky, 2001, p. 3), a term bringing with it the concept of entering into a foreign land and learning to survive and adapt to the challenges of the new environment. Younger generations are termed "digital natives" (Prensky, 2001, p. 1) as they were born into the digital world and appear to have a much higher comfort level in using the IT technologies resembling ""native speakers" of the digital language of computers, video games and the Internet" (Prensky, 2001, p. 1). Therefore, teachers who may lack a high level of confidence and competence in a digital environment need "systems that should make a teacher's day better, not worse, and should help teachers to become more efficient practitioners" (Wayman, 2005, p. 301). Further, Robertson (2007) highlighted this potential issue with digital technology within one of her five recommendations on using digital technologies to support pedagogical reform – "Professional learning and student success rely on adequate systems support at all levels of planning" (p. 120). Any digital technologies should therefore be extremely user friendly, otherwise there may be a lack of data input into the system. Ease of use also relates to the problem of staff being able to efficiently use IT systems in the time available

to them. Shen and Cooley (2008) refer to this when writing about "the question of ample time for teachers and administrators to conduct meaningful data analysis" (p. 323). If the system is not efficient and conducive to making the teacher's day easier, they are not likely to use it, and thus the lack of data input has the flow-on effect of limiting the ability of decision makers to develop an accurate picture of the situation within an institution; clarity which is essential if decisions are to be made to create solutions and processes that will result in programmes of improvement.

Once the data has been procured, there remains the challenge of ensuring it is analysed to produce information that is useful in the improvement process. Shen and Cooley (2008) state that the lack of infrastructure, and an inability to produce useful information from the analysis process, are both factors that can act to hinder the DDDM process. It is not sufficient to make data input relatively simple; there is a clear need to ensure that the IT infrastructure and software can manipulate the raw data into whatever format is required. They warn that "without the necessary technological infrastructure, data warehousing and analysis capabilities, or something as simple as a 'dashboard' showing critical 'vital signs' of a school, analysing data can be a cumbersome process" (Shen & Cooley, 2008, p. 324). Further, "one of the challenges is to provide data … in friendly, useful forms so that they can use the data to improve curriculum development, instruction, school and district planning" (Shen & Cooley, 2008, p. 323). The requirement on any system is one of ensuring it is designed to produce data and reports in formats that are relevant and useful in DDDM processes.

In conclusion then, user friendly digital technologies are clearly a key component of DDDM processes. Both input processes and analysis systems are equally vital to the DDDM process in order to allow well-trained and committed staff to both enter data and then be able to generate reports or relevant analysis from that data producing information which can be used to improve the teaching and learning process within a DDDM framework.

2.5   Relevance of the Research Questions

- **Why is DDDM important in an educational context?**

Within the Literature Review, research supporting DDDM as a suitable and vital process within educational organisations has been discussed. Having established a theoretical base on which to ground the analysis of research data, it was necessary to compare and contrast current practices and understandings within LAHC schools, and to study the apparent importance of using data in the decision making process. Literature supports DDDM, however the conundrum exists as to whether schools both understood the process or gave it any importance. This question is designed to find out how much use is made of data during the pedagogical decision making process; to understand what structured decision making processes are employed; and to ascertain how much use is made of the data available in schools (Booth, Colomb & Williams, 1995, p. 48). By researching the use of data in the decision making processes in South American schools, the researcher has endeavoured to ascertain if DDDM processes are occurring, or if there is an absence of the "culture of data-driven decision making and accountability" (Mokhtari, K. Rosemary, A. & Edwards, P. 2007, p. 355).

- **What are the issues and challenges surrounding the use of DDDM in relation to making pedagogical decisions within Latin American bi-lingual international schools?**

Whilst the Literature Review appears to outline the need for DDDM processes, supported by appropriate digital technologies, to be executed in educational contexts, the reality is that this may not be happening. This research project was aimed at trying to assess the "state of play" through the implementation of a Case Study approach into the bounded community of the Latin American bi-lingual international schools community.

In particular, this study explored the use of data in improving the teaching and learning processes by studying the issues and barriers that exist in schools that prevent or support the use of DDDM processes in these situations. In summary, it sought to assess whether the use of the results of the analysis of data is being used widely and in depth to improve the teaching and learning processes

in South American international schools or if "Current attempts to use data have largely been superficial and focussed on accountability" (Shen & Cooley, 2008, p. 320).

- **What are the issues surrounding the use of digital technologies in procuring and analysing relevant data within Latin American bi-lingual international schools?**

Digital technologies are the backbone of data collection, analysis and information presentation. Wayman (2005) comments that "With classroom access to these tools [digital data systems] school systems have the opportunity to allow every teacher to have access to previously unattainable data describing their students. These data can be turned into information to improve classroom practice" (p. 296). The need for utilisation of digital technologies is therefore well established, but the gap between need and actuality formed the basis of this research question. This research investigated the challenges of infrastructure provision and maintenance of hardware, as well as the availability of relevant software and technological support – all factors that may impact on whether data can be converted into information that may be used within DDDM processes to improve the teaching and learning that occurs in South American international schools.

The supply of suitable and user-friendly tools is only one aspect of the move towards implementing DDDM processes. Hardware, software and support systems are tangible assets that can be externally supplied, but there is also the question of whether there exists the intangible aspect of teacher support and commitment to using the technologies and processes. "Teachers need not only the capacity to use data but also the empowerment and the will to do so" (Wohlstetter, P., Datnow, A. & Park, V,, 2007, p. 240). Empowerment suggests the need for professional development, but there are specific challenges faced by international schools in providing sustainable professional development programmes. This research will investigate what the staff strengths and weaknesses are; the focusses of professional development programmes; the barriers in providing this development; and the importance attached to professional development programmes. These areas are extremely relevant to this topic as the ability to provide relevant professional development is crucial if DDDM processes are to be introduced and then continued in a sustainable and effective manner. Further, the intellectual commitment of staff to using DDDM processes – "the will to do so", which Wohlstetter, Datnow and Park refer to, will be investigated.

2.6   Summary

This thesis has endeavoured to provide a structured and rigorous academic research project into the topic of the use of DDDM processes within LAHC bi-lingual international schools. The "effectiveness of a decision depends on its quality, its acceptance and its timeliness" (Hoy & Miskel, 2008, p. 359). It is the researcher's feeling that employing DDDM within a collaborative environment "may be where the synergy lies that could really make a difference to the quality of school leadership and so help raise educational standards" (Wallace, 2001, p. 166). The challenge of seeking improvements in school performance through removing the hindrance of ineffective decision making, and making efficient and effective use of the copious amounts of teacher-generated assessment data to ensure decisions are made that are beneficial to the educational journey of students, provided the rationale for this research.

In summary, this research study was aimed at determining if schools simply observed their students at work by doing little more than gathering data through simply recording what they observed or assessed. It explored whether schools were taking the next step to generate information by analysing that data, or were they acting as agents of change by using that information to generate positive differences in their students' educational journey through directed and informed decision making processes?

The issues of data collection and validity, professional development and IT technologies, are all related to the use of DDDM processes in schools. The three research questions that have been created aim to explore these themes as they apply in the LAHC school community.

The first question relating to the importance of DDDM in an educational context explores whether there is an understanding of the process, and whether value is seen in its implementation. Researching DDDM use in schools and the use of digital technologies will seek to ascertain whether the issues and challenges posed by staff development programmes and digital technologies raised in the previous sections are reality or fiction in LAHC schools. By structuring this research around these three questions, the researcher will endeavour to confirm whether the suspicions and experiences of poor decision making and the non-existent or inefficient use of information generated in schools which were raised in the introduction of this

thesis are wide spread and applicable to the broader LAHC community, or if they are unique to the researcher's own educational journey.

Chapter 3   Methodology

3.1   The Research approach

The epistemological position adopted is an interpretative one. The research is aimed at collecting information about an aspect of social interaction within schools, namely the decision making process, and then using that information to analysis how or if schools use DDDM processes. It also endeavours to understand some of the issues that surround its usage. Davidson and Tolich (2003) defined the scenario in which an interpretative approach could be adopted by stating "The interpretative approach is the systematic analysis of socially meaningful action through the direct detailed observation of people in natural settings in order to arrive at understandings and interpretations of how people create and maintain their social worlds" (p. 26). This research study can be applied to this definition in the following manner. Decision making processes within schools are the 'socially meaningful actions' that were observed in the 'natural settings' of school settings. The aim of the research is to 'arrive at understandings and interpretations' of how the creation and maintenance of the decision making process is conducted.

In further support of the adoption of an interpretative approach, Bryman (2008) defines interpretivism as study of a subject which "requires the social scientist to grasp the subjective meaning of social action". The aim of the research was to reach a subjective (an interpretation of what has occurred) meaning of the 'social action' of decision making in schools. Davidson and Tolich (2003) define that the reason for interpretive research is to "understand and describe meaningful social action" (p. 27). This research project, therefore, seeks to "understand and describe" the challenges and issues surrounding the "meaningful social action" of DDDM processes in schools. Cohen, Manion and Morrison (2007) state that "interpretative approaches of various hue possess particular distinguishing features" and they continue to list some of these required features within the research, including the requirement that "many events are not reducible to simplistic interpretation hence 'thick descriptors' (Geertz, 1973b) are essential" and the need to "examine situations through the eyes of participants rather than the researcher" (p. 20). In this research, the respondents were asked to describe in their own terms on a 'blank page' their responses to the various questions being asked. By adopting this manner of questioning, the participants were able to respond using their own experiences and language as opposed to

choosing from premeditated answers or values, which would be the case using a Likert scale or multi choice type question structure.

In summary, adopting an interpretive approach for this research study into DDDM is fully justified based on the above definitions. Decision making is an act whereby people are able to take an active role in constructing their social world at school. Decisions that are made are the result of people interpreting events and situations occurring around them, and acting on the basis of these events. The process of decision making may not always be reduced to a simplistic interpretation, and therefore there is the need to examine this process through the perspective of the participant. It was envisaged that by allowing the respondent the freedom to respond in as much depth and in the structure that they wished without any form of direction from the researcher apart from the stated question, a clear synopsis of the participant's perspective would be provided when focussing on the issues and challenges of implementing DDDM processes.

The research study adopted the analysis of qualitative data as defined by Bryman (2008, p. 373) when he stated "the typical sequence of steps in qualitative research entails the generation of theories rather than the testing of theories that are specified at the outset". The researcher endeavoured to examine the issues and challenges of implementing DDDM processes without any prior theory as to what these issues and challenges might be. The research process aimed to look at themes in literature, which were then compared and contrasted to issues arising from the questionnaire and interview methods. Based on analysis of these issues, the researcher endeavoured to create a series of theories to describe how DDDM processes are being used in LAHC schools.

By seeking to examine the issues and challenges surrounding the use of DDDM processes in LAHC schools, the questions of how the social experience of decision making is created and given meaning were explored. Denzin and Lincoln (2005) write that qualitative researchers focus in on the social aspect of their inquiry and the factors that shape or constrain it. Qualitative researchers "seek answers to questions that stress *how* social experience is created and given meaning" (p. 10), that they research "the situational constraints that shape inquiry" (p. 10), and "are more likely to confront and come up against the constraints of the everyday social world" (p. 12). The research and focus on the issues and challenges surrounding the use of digital

technologies examined aspects of the situational background and constraints that may have helped develop or prevent the use of DDDM processes in the everyday social world of a school setting.

Prior to the start of the questionnaire and interview stages of the research study, and based solely on the Literature Review, three research questions were created without a clear agenda as to where the research would go. Effectively this meant that during the entire research process of Literature Review, questionnaire and interview, there was no specific theory of a scientific or structured nature that was to be tested through experimentation. This situation was mentioned by Bryman (2008, p. 391) when he stated that qualitative research "often begins in a relatively open-ended way and entails a gradual narrowing down of research questions or problems". The research process into the use of DDDM within LAHC schools began with the open-ended Literature Review on the three research questions listed in Chapter 1. This review then narrowed down the focus of the research into the questionnaire process. After analysis of the responses from the questionnaires, the focus of the interviews were then further refined into specific aspects that arose from the questionnaire responses.

3.2   Research Design – Case Study

The overall design adopted to investigate the topic of research was Case Study. This widely accepted research method enabled the researcher to conduct a research project that described features and issues of DDDM processes. Support for this design was based on the definition that a "descriptive Case Study in education … presents a detailed account of the phenomena under study" (Merriam, 1998, p. 38) and has been used to "illuminate educational practice for nearly thirty years" (Merriam, 1998, p. 26). Other writers such as Denzin and Lincoln (2005, p. 23) list Case Study as a viable research strategy for qualitative data researchers, whilst Merriam (1998) wrote that "Case Study research in education is conducted so that specific issues and problems of practice can be identified and explained" (p. 34). Given that the focus was researching the specific practice of DDDM processes, and needed to identify and explain the issues surrounding its usage, Case Study was the most suitable design structure to employ.

Due to reasons of practicality, language and accessibility, research was confined to the schools affiliated to LAHC. This created a specific community within which research could be conducted, mirroring the feature mentioned by Merriam (1998) that a Case Study allows for one to "fence in" what is being studied. Creswell's (2002) definition of Case Study research states that "Case studies, in which the researcher explores in depth a program, an event, an activity … bounded by time and activity … using a variety of data collection procedures" (p. 15) is an acceptable design for qualitative research processes. This research fully met these conditions by exploring in depth over a limited time span from April 2011 until March 2012, the use of DDDM processes through using two data collection processes of questionnaire and interview techniques within the activities and location of the community formed by the LAHC.

In summary, in order to address this research problem, which is focussed on ascertaining the challenges and issues surrounding the use of DDDM processes, an interpretative view point was adopted to analyse qualitative data generated within a Case Study of the bounded system of Latin American bi-lingual international schools affiliated to LAHC.

3.3 Methods of Data Collection

Generating data relevant to the research aims and questions presented numerous challenges as the research study was conducted within the 42 bi-lingual international schools affiliated to the LAHC organization. The schools are located in nine countries throughout Latin America, and within the LAHC are grouped into 4 geographical zones, A – D. Physically researching the use of DDDM processes in all 42 schools was impossible due to practical reasons of distance, accessibility and time. Therefore the researcher, through a process of email contact, approached all 42 schools in LAHC with a request to be involved in this research. This initial approach was followed up with several personal contacts or through his Headmaster at conferences and meetings. Eventually, 9 schools positively responded to the approach and returned the questionnaire, but adequate coverage representing the LAHC was attained as the sample contained at least one, and a maximum of three schools, from each zone.

Further, research was specifically focussed on each school's Director or Headmaster and their Deputy Headmaster – Academic (or an equivalent position - which is sometimes referred to as Director of Studies), as opposed to randomly selecting staff members from within those schools. This meant that the research undertook "purposeful sampling [which is] essentially to do with the selection of units … with direct reference to the research questions being asked" (Bryman, 2008, p. 375). This focus was in order to get a measure of the "specific issues and problems of practice … identified and explained" (Merriam, 1998, p. 38) from the people directly involved in the area of the research questions, and with the secondary benefit of involving those who may find the results of the research applicable and relevant.

The findings of the research process produced qualitative data. Writers suggest that research of qualitative data using Case Study can be conducted using a variety of data collection processes and the results can be analysed using a variety of methods. "Qualitative research, as a set of interpretative activities, privileges no single methodological practice over another" (Denzin & Lincoln, 2005, p. 6). "Any and all methods of gathering data, from testing to interviewing, can be used in a Case Study" (Merriam, 1998, p. 28). Although these statements allow the freedom to generate or collect data by any method, the methods of data collection that were employed in this study consisted of an open-ended questionnaire and a semi-structured interview; processes which were dictated by the research questions. This process of questionnaire followed by interview is one that is widely accepted for generating data in social science qualitative research. Hinds (2000) lists both methods when discussing research instruments. The need to use "rigorous, systematic inquiry" in a "Case Study (that) draws on a specific environment" (p. 41) clearly describes the research methods employed and should achieve what has been set out to measure, namely identifying issues and challenges of DDDM processes.

3.4   Questionnaire

The research process had many constraints in the aspects of time, location, funding and availability of relevant schools. In practical terms, the postage system in this country and continent is very inaccurate and unreliable, with post regularly being delayed or lost. Thus, a

system for the distribution and return of the questionnaires had to be created which met the needs of prompt response times but at the same time also maintained the respondents' anonymity. Secondly, whilst the process of generating data needed to be quick and efficient, it also needed to generate results that could have their validity checked. Therefore a questionnaire was created, which was both sent and returned by email, all the while following processes imposed by the ethical considerations required in a social research process.

More specific details and the rationale behind this method are outlined in the following Ethics section, but the actual process employed involved the researcher initially asking his Headmaster to approach the Executive Officer (E.O.) of LAHC and ask him to grant permission to approach all the members of the LAHC. Once this permission was granted by the E.O., individual emails were sent to all Headmasters in LAHC, asking for 'Permission to approach them and their Deputy Headmaster – Academic (or equivalent person)'. Upon receiving a positive response from a number of Headmasters, Ethics Approval for the research project was applied for and gained from Unitec # 2011-1169 in April 2011. Once the approval was granted, the questionnaire was emailed to the Headmasters who had indicated their willingness to be involved in the research project. They then returned the questionnaire through a 'Chinese wall' type process involving either the researcher's Headmaster or secretary, to ensure each school's confidentiality. To avoid language barriers, all documentation was produced in both Spanish and English. The one response received in Spanish was translated into English using a qualified translator who signed a confidentiality statement. Thus, any issues relating to language confusion and / or ethics concerns were avoided, and the accuracy and validity of the information received was assured.

The questionnaire method was used as it can "collect data from a large number of respondents", especially if the "information sought is not complex" (Hinds, 2000, p. 42 and 43). However, she goes on to warn that one should only use a questionnaire if the researcher is certain it will produce the information they want and that barriers of language will not be an issue. Bell (2007) also warns that while questionnaires may seem like a suitable and efficient process of generating data, there are many dangers with using them which may produce useless and inappropriate data unless the writer knows precisely what it is that they want to find out, and words the questions precisely and appropriately.

Heeding these warnings, open-ended questions were written such as "What types of data relating to students are generated in your school?", "How is this data used to make pedagogical decisions?" and "What collaborative steps or methods are taken in your school to make pedagogical decisions? Please give examples of how these work". Within the first question a definition of pedagogical decisions was supplied so as to clarify exactly what information was being sought whilst the rest of the questions aimed to explore facets of the decision making process, therefore generating a clear picture of how data is used and the issues and barriers surrounding DDDM process implementation. The questions were grouped in a manner that allowed analysis of the responses around the three research questions.

The questionnaire is appended as Appendix A.

3.5   Interview

As part of the Information for Participants document (Appendix C) which was issued to those who agreed to complete the questionnaire, a statement requesting the possibility of a follow up interview was included. The rationale for this option was to both generate further qualitative data and to give the respondents an opportunity to expand and develop their answers and points of view. The original plan was to conduct these interviews during early May, 2011 in Lima, Peru at the LAHC Annual Conference. Unfortunately, because of time and financial constraints, the researcher was unable to attend the conference so it was decided to interview the Deputy Headmaster – Academic (or equivalent person), from the schools within Buenos Aires who answered the questionnaire, generating a total of three interviews.

These interviews took the form of being "semi-structured" (Bryman, 2008, p. 438) by endeavouring to gain more understanding of the "complex behaviour of members of the society without imposing any a priori categorization that may limit the field of inquiry" (Fontana and Frey, 2005, p. 706). Bryman (2008, p. 437) refers to qualitative interviews as showing interest in the point of view of the interviewee rather than trying to get a measure of their responses to the interviewer's agenda. The aim of the interview was to explore and seek to gain an understanding

of the respondent's answers from their questionnaires as opposed to having them just explaining their answers (Fontana & Frey, 2005, p. 706).

Before the semi-structured interview began, an "interview guide" (Bryman, 2008, p. 438) (see Appendix B) was prepared based on the answers provided in the questionnaire and the themes that have arisen in both the questionnaire and the Literature Review. At the start of the interview, the interviewee was invited to complete an Informed Consent Form for Interview Participants (Appendix D) to ensure that the interview was conducted with their knowledge and support. During the interview, an open-ended style of questioning was employed where a topic was introduced and the interviewee was allowed to respond as they saw fit and in whatever direction they chose. This involved the interviewee "rambling" (Bryman, 2008, p. 437) in their verbal responses but was an acceptable part of the process in that it resulted in a deeper insight into the written responses submitted. Thus, as all the interviewer did was to introduce six broad concepts through an initial question statement, there was a great deal of flexibility in the direction that the interview took as it was the interviewee's views of their issues and challenges that were being obtained.

The interviews were conducted in an atmosphere where the interviewee felt comfortable, safe and able to respond to the open-ended question approach in a manner that generated data reflecting their situation. This was done to ensure that the interviewee felt that they were more than just a research object and that they were people with valuable perspectives on the problem so that "they will work with us to help create accounts of their lives" (Fontana and Frey, 2005, p. 722). Further, as the interviewer and researcher, I was interested in gaining "rich, detailed answers" (Bryman, 2008, p. 437) for this thesis so the power and direction of the interview process had to be shared between both parties to ensure that the interviewee offered enough data to allow the opportunity to gain these rich and detailed accounts

Interviews were recorded onto a laptop using the Gold Wave sound recording program. Once recorded, the interviews were transcribed, the files recorded onto a memory stick, and then the interview file was deleted from off the laptop. These steps were taken to ensure the anonymity of the interviewees.

3.6   Data Analysis

In the research process, the issues and challenges surrounding DDDM processes in schools were investigated by producing qualitative data using a Case Study method. Two separate methods of generating data, the Questionnaire and Interview processes, were used which were under-laid and guided by a prior Literature Review.

Qualitative data is "not straight forward to analyse." (Bryman, 2008, p. 538) and "clear cut rules about how qualitative data analysis should be carried out have not been developed." (Bryman, 2008, p. 538). This degree of ambiguity relating to data analysis was also noted by Lofland, Snow, Anderson and Lofland (2006) with their statement "you might think that there would be a widespread understanding among field workers as to how this (analysis) should be done. Such is not the case" (p. 195). However, there is an acceptance in much literature that the key operation in analysing the data is through the use of "coding" (Bryman, 2008, p. 539) to facilitate the "transformative process in which the raw data are turned into "findings" or "results"" (Lofland et al., 2006, p. 195). Further, the processes of qualitative data generation and its analysis are not discrete and may involve stages of interaction between each process. Lofland et al. (2006) describe this process as being "highly interactive" (p. 196) where the research is an inductive process driven by the researcher.

In the questionnaire analysis, a coding system was used to categorise the responses for each of the 13 questions, searching for common themes and concepts (Bryman, 2008, p. 550; Lofland et al., 2006, p. 200) that can be linked to, or drawn from the Literature Review. Thirteen tables were created, one for each of the questions contained in the questionnaire. In each of the 13 tables, every school's response to that question was listed in the first column. The second column of the table was used to initially code each school's response using a system of "initial" (Lofland et al., 2006, pg 201) or "open" (Bryman, 2008, p. 543) coding of each line of their response. The researcher endeavoured to highlight terms and ideas which can be used to develop "concepts which are later grouped and turned in categories" (Bryman, 2008, p. 543). In the third column of the table, the initial codes were developed into a more focussed structure by looking for concepts or themes that were evident in each line. This step followed the process suggested by Lofland et al. (2006) who directed that initial codings are knitted together and built upon using a process

called "focussed coding" (2006, p. 201) in the process of "categorizing your data more thoroughly and for further analytical elaboration" (2006, p. 201). The fourth column was then used to combine the categories from each school generated in column three to synthesise the overall themes and issues raised in the responses to the question. This final column is referred to by Bryman as producing "the central issue or focus around which all other categories are integrated" (2008, p. 543), and provides the key ideas to reflect overall practice in LAHC schools.

The interview analysis process was based on transcriptions of the recording of the original interviews (Bryman, 2008) but followed the same process of initial and then focussed coding. These transcripts allowed for thorough evaluation and analysis of what was said by the interviewees, and added to the credibility of the accuracy of the analysis.

3.7   Validity

Throughout the research project, one of the key concerns underpinning each step is that of ensuring that the data is valid. Hinds (2000, p. 42) warns that research "should aim to develop procedures which produce results that are both *reliable* and *valid*".

Validity is defined by Cohen, Manion and Morrison (2007, p. 149) as research that "can be regarded as a fit between what researchers record as data and what actually occurs in the natural setting that is being researched". As collecting of on-site evidence of practices in schools was not possible for numerous practical reasons, the researcher had to rely on the professional integrity of the respondents to ensure that the information supplied accurately reflected practice in the school, and therefore is valid. Also, by using both questionnaires and interviews, the opportunity to check data was afforded, and therefore insights from the two separate methods ensured that the data gathered reflected as accurately as possible the occurrences in the school setting.

The second issue of ensuring validity revolves around the ideal of ensuring the results of the research actually achieved its aims. Hinds (2000) defines validity as being the concept of being able to measure what was being set out to measure, namely identifying issues and challenges of DDDM processes. Cohen et. al (2007) suggest that issues of validity are met through the

"honesty, depth, richness and scope of the data achieved, the participants approached, the extent of triangulation and the disinterestedness or objectivity of the researcher" (p. 133). Cohen et al. also commented that "validity, then, should be seen as a matter of degree rather than an absolute state" (p. 133). By using open-ended questions in the questionnaire and interview processes, the researcher endeavoured to allow the respondents to have the opportunity to provide rich, deep and broad data as outlined above, and endeavoured to analyse the results in as objective a manner as possible. The following up of the questionnaire with interview also assessed aspects of the validity of data generated; this is termed 'triangulation' (Denzin, 1989b, Flick 1998 as cited in Fontana & Frey, 2005, p. 722). By taking these steps and approaches, the chances of ensuring that a clear understanding of the way in which the issues and challenges impact on DDDM processes was gained, and therefore the degree of research validity was raised.

3.8   Ethical Issues

Is research justifiable? Despite the potential that research "offers benefits", it can also "impose burdens" (Wilkinson, 2001, p. 446). The key ethical concerns faced by any research method is to ensure that no harm occurs to any party involved in the research. For the group on whom the research is being conducted, these concerns can be clarified into ensuring that participants in the research give "informed consent" before research is conducted, have an absolute "right to privacy", and enjoy "protection from harm" (Fontana & Frey, 2005, p. 715) during the research process and when the results of the research is produced.

As this research was conducted under the auspices of the Unitec Education Department, the project had to meet the ethical demands placed on it by the Unitec Research Ethics Committee (UREC). UREC has defined eight guiding ethical principles governing research using humans. These principles are outlined in both the Information Sheet for Participants (Appendix C) and the Informed Consent Form for Interview Participants (Appendix D).

Within the research process, the following steps were adopted to address the ethical concerns outlined above

To ensure informed consent, from the outset participants in the study were informed about the key aspects of the research and its implications. This was done in several stages. The researcher's Headmaster made an initial approach to the Executive Officer of LAHC with an outline of the proposed research requesting permission to approach all schools associated with LAHC. Once this permission was granted, the researcher sent a letter to all the LAHC Headmasters asking them for permission to approach their individual school with the questionnaire and the potential of a follow up interview. Once this permission to approach a school was granted (and after Ethics Approval # 2011 – 1169 from Unitec was granted), the following documents were sent to each respondent.

- An *Information for Participants* (contained in Appendix C) fact sheet was issued to all participants outlining the advantages and disadvantages of the research and fully informing them of its nature, their role, and how the findings were to be reported.

- The *Questionnaire* (contained in Appendix A) indicated to all participants the process by which their confidentiality and anonymity would be preserved. It was assumed that by completing the questionnaire, a respondent was giving their tacit, informed consent

- Prior to the interview process, a signed *Informed Consent Form for Interview Participants* (contained in Appendix D) was required to be completed before each interview was conducted

Voluntary participation was ensured as there were no inducements or direct personal gain for any participants in the research process.

In order to respect an interviewee's rights and confidentiality, and to ensure the anonymity of respondents, the following steps were taken in the data collection process:

- All responses were treated in the strictest of confidence at all times.

- The confidentiality and anonymity of responses to the questionnaire was ensured through a process where respondents returned the completed form as a PDF or electronic file attachment to the researcher's secretary, who worked in a separate office space to the researcher's office. Upon receiving the email, the secretary downloaded the attached file and saved it to the desktop with a file name such as School 1. The file was then sent to the researcher as an attachment in a new and clean email. Once the secretary verbally confirmed that the clean email had been received, both the original email and the file

were deleted from the computer where it had been saved. This process eliminated all opportunities by which the actual respondents could be tracked to the questionnaire, and so the anonymity of each response was preserved.

- In order to protect the anonymity of interview participants, all recordings of the interviews were removed from the laptop used and retained only on a memory stick.

- A confidentiality form was signed by the translator of the questionnaire answered in Spanish.

- Neither personal names, nor the name of any organization was used in any public reports, and respondents had the option to withdraw themselves or any information they provided for this project without penalty of any sort.

Given that there is potential for public presentation of the research's findings, and therefore a need to minimise potential harm to participants, all information is presented in a neutral manner and any potentially identifying features or facts are removed. During analysis and reporting, any identities and names of schools, participants and identifiable programs were removed and replaced with generic terms such as School 1, staff computer program, etc. This was a vital step as the bounded community in which this research was conducted is small, and no schools or persons should be identified. The negative results of being identifiable could be very harmful in many aspects such as reputation, credibility, staffing etc., for both the participants and the researcher.

Going hand-in-hand with human research studies is the need to be socially and culturally sensitive. It was endeavoured at all stages to be aware of, and sensitive to, the needs of the participants who came from a variety of ethnic backgrounds and cultures. Several major cultural issues had to be faced in this project; in particular the issues of Language and Legitimacy, and Hierarchy

Language – all documents were translated into both Spanish and English to cater for the potentially differing languages of respondents. For the respondent who wrote their answers in Spanish, a translator was employed who translated their written answers into English. It was essential that the content of the Spanish language answers and the native language of the subject be accurately translated into English, the researcher's native language, for analysis.

This was done to ensure that analysis could be conducted on what was actually said, rather than using a somewhat limited interpretation and thus avoiding any inference of selective or incorrect recording and reporting.

Legitimacy and Hierarchy – from the researcher's personal and professional experience, it has been noted that Latin and South America peoples need reassurance with ensuring that projects are legitimate and worth their time responding to. Also, there are cultural issues related to ensuring that the right people have been consulted in the process of any project. To gain legitimacy, the approach to respondents was initially ratified by the E.O. of LAHC. In terms of hierarchy, the researcher's Headmaster initially approached the E.O. of LAHC to ask for his support in distributing the Permission to Approach letter to the Headmasters of each school in an effort to follow unwritten protocols of working through superiors rather than around them. It is the researcher's belief that if he had attempted to go immediately to LAHC Headmasters without undertaking this process of garnering support, there would not have been as much success in gaining respondents as was finally achieved.

By following all the steps outlined in gaining permissions and approvals from LAHC and schools as listed above, there was no deception involved in this research project.

The concern for the respect of intellectual and cultural property ownership was met by sourcing and referencing any materials as per Unitec guidelines, and by the sharing of the results of the research in a timely manner.

Any conflict of interest was avoided by not considering any of the researcher's current or previous institutions as subjects of the research study, and not using participants with whom the researcher has close personal ties. However, whilst there was no formal relationship between the participants and the researcher, given the fact that the research was conducted within the LAHC, an organisation which contains a group of schools that are professionally linked with the researcher's school and with which interactions occur, casual friendship links with some respondents is unavoidable. Through the process of data gathering outlined above, there was no track of actual respondents or their questionnaire answers, so these links had no influence on the analysis or reporting of any research findings. Also, as there are no close personal or formal ties with any of the interview participants, the interviews are also free from personal bias.

In conclusion, the ethics of conducting research are a vital consideration in any research process. Throughout the research, every effort was made to ensure that no harm befell any participant or their school, and that at the conclusion of the research process and production of the thesis, some potential benefit is available to those who choose to read the thesis. The researcher strove to maintain an honest, open and professional relationship with those who assisted in the research as well as ensuring that all involved in the project were treated with the respect they deserve; respect that the researcher would appreciate receiving if they were the subject of a research process.

Chapter 4:   Findings

This research study consisted of a Literature Review, nine questionnaires and three interviews. The questionnaire was designed to produce information relating to the three research questions, whilst the interviews were conducted in order to elicit further information as to the practices and procedures of school operations. As the questionnaires were mainly completed by the Headmaster of the school and the interviews were conducted with the Director of Studies (DoS) or a person in an equivalent senior management position, there were varying views as to what should be, and what actually is, happening within a school. The contrast and comparison between what is perceived to be happening by the Headmaster or as dictated by school policy, and what the practicalities and eventualities are in terms of implementing the processes, procedures and outcomes as seen and experienced by the interviewee, produced both confirmation and conflict between the two points of view, and have highlighted potential areas for research beyond the scope of this thesis.

The structure of this chapter will be to look at the responses in two sections: firstly from the questionnaire results, and then from the interview responses. The analysis will be focussed on the three research questions. Following the analysis of responses to each research question, several key findings in both the questionnaire and the interview sections will be presented before synthesising issues that will become the themes for Chapter 5 of this thesis.

4.1   Questionnaire Responses

As the questionnaire produced responses of a qualitative nature, the response data did not give itself up to quantitative numerical analysis. However, it was noted that there are generally recurring themes in the majority of responses to each question within the questionnaire. Efforts will be made to give some idea of the proportion of responses that support that theme as well as any responses which oppose or provide another viewpoint to contradict the general consensus.

The written responses were analysed using a coding system as described in Chapter 3 – Data Analysis. Responses were grouped according to question number and school number, then analysed with an initial coding of each response by listing key ideas, phrases or terms. Following

on from this initial coding, a secondary or 'focussed' coding step was taken to derive the succinct points of each response, before a summary was conducted of all nine secondary codings to produce an overall summary of ideas and concepts for each question.

The research questions focussed on were:

- Why is DDDM important in an educational context? This question was explored in Questions 1, 2 and 13 of the questionnaire.
- What are the issues and challenges surrounding the use of DDDM in relation to making pedagogical decisions within Latin American bi-lingual international schools? This question was explored in Questions 3, 4, 5, 6, 7 and 8 of the questionnaire.
- What are the issues surrounding the use of digital technologies in procuring and analysing relevant data within Latin American bi-lingual international schools? This question was explored in Questions 7, 8, 9, 10, 11 and 12 of the questionnaire.

4.2   Why is DDDM important in an educational context?

To answer this question, the researcher investigated each respondent's understanding of what DDDM meant, what data is being generated in their schools, and whether it was important to schools to use this data in making pedagogical decisions.

Question 1 in the questionnaire focussed on the understanding that respondents had of DDDM. From the responses, it was clear that the term DDDM was generally understood to mean a process whereby information that is being used to make decisions is derived from generated data. All respondents used the terms "data", "information" and "decision" or "decision making" as well as some idea of collecting data over a period of time. Further, all the responses developed the idea of not only collecting data, but also analysing it in various methods to compare performances and then using the information generated to implement changes or decide policy at many levels. School 3 wrote "Data is collated and analysed in order to decide policy, from pupil to school-wide level, within the school", whilst School 9 clarified this process concept stating

"When decisions are being made, there is data available with regard to the variables and parameters of the implicit or explicit model that links inputs and outputs of the educational process viewed as a system". The fact that all of the respondents mentioned the concept of data collection and analysis prior to and supporting a decision process indicated that the concept of DDDM was well understood.

The broadening of the focus from student-focussed or curriculum-based programmes into school-wide concerns of policy and practice can be seen in the comparison between the responses to Question 1 from School 2 - who referred to DDDM as "The use of information (academic and other) gathered probably over an extended period of time to inform decisions about our students" whereas School 6 stated:

> DDDM refers to the use of data (information) derived from student assessments and other records to inform decisions related to instructional planning and practice or guide specific interventions. It can be used at any level of the educational structure (district, school, classroom, individual student).

School 7 highlighted the idea that DDDM is a process by stating "DDDM proposes that data is selected (even created) in a rational, coherent way with the clear intent of it being used to change individual and institutional practice with the ultimate goal of improvement of performance and standards." indicating that a period of time is needed to work through a process with the intention of achieving the stated goal of improving performances.

Question 2 asked about the types of data relating to students which is generated in the school. These responses were also fairly coherent and could generally be broken into two areas – namely academic performance and welfare (pastoral) areas.

Some of the types of academic data mentioned were external or international examination system results such as GL online assessments, Sistema de Medición de la Calidad de la Educación (SIMCE) and Prueba de Selección Universitaria (PSU) nation-wide examinations, Canadian Achievement Tests – Third Edition (CAT3) test results, Cambridge exams and International Baccalaureate (IB) grades (Schools 3, 4, 6 and 7). Other information was generated by internal assessments including "Test results, examination marks, partial marks from formal and informal

assessments (written tests, oral presentations, written work, work in class)" (School 6), and "Honour Roll Academic average" (School 1). Pastoral or welfare data included "Discipline, attendance" (School 8), "Personal information" (School 1), "Full family history" (School 2), "Observation of the student's attitude" (School 5) and "Sociometric testing" (School 4).

Not all data mentioned was of quantitative nature. Three schools mentioned the recording of observational data (Schools 4, 5 and 7); four discussed teacher reports on students (Schools 1, 2, 5 and 6 and two schools mentioned the idea of "Grade prediction exercises" (School 3 and 7).

School 7 raised the concept that schools only record selected or isolated types of data that can be of value or "utility", whereas "Every type of data is generated every second of the day by every individual in the school". The data that schools usually choose to record is of the type that can be classed as quantitative in that it can be readily transcribed into mathematical, statistical or graphic form that schools talk about as 'data'. Data presented in written, narrative form (tables, written reports etc.) may also be readily used whereas qualitative data such as "anecdotal (ideas, feelings, personal observations, personal histories)" also has its place but is not regarded as 'hard data'. School 4 also referred to the quantitative nature of data being the main source of recorded data when saying "The data that is commonly collected refers to subject-area content and skills, mainly based on diagnostic, but also formative and summative assessment".

Further, School 7 introduced the cyclical nature of the use of data in the decision making cycle with the response:

> Data eventually gets perceived, assimilated and interpreted by the decision-makers (teachers, counsellors and administrators) who then try to alter (in whatever form) the behaviour and performance of the pupils. This gets feedback to the pupils as more data. The response of the pupils provides new data and so on in a never-ending cycle (or hopefully, virtual spiral) of change.

The idea of an action research type cycle where the process of data is being used to inform the learning process was also mentioned by School 4 when stating "There are frequent and established mechanisms for communication to take place regarding data, via the departments and general teacher meetings." This response indicated that a key feature of data usage is

communication between involved parties, including administration, departments, teachers and students.

School 7 also concluded that while decisions are made based mainly on numerical or quantitative data, there is room for the use of qualitative data, and indeed most decisions are made using a mixture of both. "However, decisions often (and quite rightly) get made with both rational (usually quantitative) hard data in hand offset by considerations of data of an affective, intuitive or even emotional origin."

Question 13, in asking "Why do you consider it important to have a high level of knowledge in using generated and / or assessment data to make pedagogical decisions within the staff body?", provided the opportunity to discuss the importance of using data to inform the decision making process within a school and yielded a wide range of responses.

The vast majority of schools agreed that forms of DDDM processes are necessary with eight out of the nine expressing support for DDDM processes. Comments reflected that "making decisions based on fact is vital" (School 1), and "Knowing about techniques for data collection and to have the necessary elements for the interpretation, storage and recovery of it, is really important in an educational institution" (School 5). School 8 mentioned that DDDM "provides an objective frame of reference to make better informed instructional decisions, and to better ground pedagogical decisions based on hard facts rather than on more subjective perceptions by the staff and/or the Heads." School 4 went on to state that data allows decisions to be made which create consistency in a school with the comment "conceptions vary from teacher to teacher. The data is what can allow for accurate, collegiate, pedagogically driven decisions to actually occur, and for these decisions to truly benefit individual and collective learner outcomes." Looking into the community, School 3 wrote that "Parents need to see hard facts in order to be convinced to take action", suggesting that DDDM processes have a role in the broader fabric of school life as well.

Using a process of DDDM to help avoid problems or poor practice was mentioned by four schools as another reason for using DDDM. School 3 warned that "One cannot run a school based on anecdotal, staffroom stories", whilst School 1 alluded to the absence of DDDM processes in schools when saying "In education many decisions are taken on feelings". An absence of DDDM processes resulted in "knee-jerk decision making based on a few poor pupils

or a few vocal stakeholders" (School 3), and School 4 wrote "The absence of a data driven decision-making process produces a school that makes its decision on guesswork and personal beliefs".

However, the acceptance of DDDM processes by respondents came with caveats as there were five respondents who made comments which reflected that the use of the human factor in the interpretation of the information generated is also necessary. School 2 illustrated this when asserting that data use must be accompanied by the "Need to understand and appreciate its obvious limitations" and "Those with advanced knowledge of the data are the ones who appreciate that human instinct must sometimes supersede raw interpretation". School 7 warned "What is CRITICAL is ensuring that the school and individuals are collecting the *right* data and ensuring that individuals and groups have the competence to analyse and make appropriate use of that data". School 6 stated that "It is difficult to use what you don't understand" although it was admitted that "Constant use is perhaps the best teacher and revealer of what is possible". School 5 also mentioned the need for this interpretation of data when writing about the need for "Integrating analysis and data collection".

The strongest opposition to use of DDDM processes came from School 9 who wrote about their "Serious issues with the quasi scientific use of technology in education". In-depth analysis of results and quantitative data removed the "Human approach to education based on the whole person" (response to Question 6 by School 9), and they concluded with the statement that "As Einstein said 'not everything that counts can be counted, and not everything that can be counted, counts'".

In summary, the questionnaires revealed that all schools are collecting both qualitative and quantitative information about their students in a variety of methods and from a range of sources, and that there is an accepted need to analyse this information. However, the methods of analysis of this information and the subsequent use of the analysis data to influence practices and procedures in schools varies immensely.

From the responses, it seems that there are a range of rationales and viewpoints on the use and effectiveness of DDDM processes within schools, from strong acceptance to almost complete rejection. These viewpoints and rejections seem to be based strongly around the concept of

applying analysis to information whilst potentially ignoring the variability aspect of human nature.

Thus, in answer to the first research question, the questionnaire responses suggest DDDM processes are important in an educational context if the results of DDDM processes are combined with some form of interpretation based on the educator's experience. By combining these two aspects, a decision making process can be implemented which is effective and positively influences the educational journey of students and schools.

The following two research questions will investigate how data is analysed, what barriers exist to make the process more effective, and how the use of IT can impact the DDDM processes.

4.3 What are the issues and challenges surrounding the use of DDDM in relation to making pedagogical decisions within Latin American bi-lingual international schools?

In order to assess issues and challenges, the questionnaire was structured to investigate current practices in schools within Questions 3, 4, 5 and 6.

Question 3 asked "How is data used to make pedagogical decisions?" with 'Pedagogical decisions' then defined to be decisions which relate to the educational processes of students ie setting of classes, choosing of subjects, planning of courses and lessons. However, within the responses to Question 3, the educational processes of students could be more broadly grouped into 3 categories: decisions concerning student-focussed academic matters; department teaching programmes and practices; and pastoral concerns.

Data usage in student academic matters was mainly focussed around decisions of course choices or class setting, and was mentioned in all nine responses. In respect of course choices, School 1 stated "IB Diploma choices are discussed with the students looking at International General Certificate of Secondary Education (IGCSE) and Middle Years Programme (MYP) results" and School 2 discussed the use of data in the process where the school works with students to "Consider their subject options; level of graduation; ability or otherwise to move from one section of the school to the next". Class setting was mentioned by School 6 in "Data is used to make … seating arrangements, learning goals, … define options offers, student assignments to

groups", School 7 used data for "Defining sets in secondary school Science and Maths, guidance for subject options at Class 7 and for IGCSE and IB choices, identifying pupils with specific needs, and defining appropriate learning support (LS). (LS department has continuous access to data from class teacher)".

Data usage strongly featured in seven responses when discussing decisions taken at department level regarding teaching programmes, resource allocation, teacher assignment and performance assessment. School 4 stated "All teachers are involved. The data is the basis for decision-making in terms of planning and improving assessment tools" and "Commonly produces changes in planning and allocation of resource materials", while School 5 mentioned:

> The data obtained help us to make decisions based on the students´ needs, which are the most important thing in our educational practice. In our school we have developed the "Academic Recovery Programme" as an answer to academic results in areas such as Mathematics, Communication (Spanish), Science (Physics, Chemistry, Biology) and English.

School 5 also said that data was instrumental in "course planning" as did School 6 when they stated that data was used in "Teacher assignments, student assignment to groups, instructional approaches, texts etc." School 8 stated that data "Impacts decisions that are related to curriculum, course assignments, supplementary teaching needed".

In five responses the use of data in making decisions of a pastoral or social nature ranged from determining continued attendance or receiving privileges at school, through to determining student groupings. School 2 was clear in that data from "Conditional matriculation" was used to make "Informed decisions about whether a student is able academically, or in terms of discipline, to remain in the school". School 3 used data to "Decide whether pupils go on sporting trips during term time" while School 7 used data in "Defining how (and who) to celebrate good effort and progress (publicly and privately)".

Data was mentioned as being used by Schools 4 and 5 in forming student groups – in particular "Sociometric testing and sociograms are used to analyze and decide on group dynamics improvement" (School 4), while School 5 wrote:

The tutors arrange the student's classroom distribution with the teachers´ assistance before the classes start at the beginning of the year. The distribution is made taking into account the academic level, and trying to form heterogeneous groups; that the idea is to mix featured students with those who are not so.

By inference, within most responses, these areas are interconnected and influence each other. For example, a decision that needs to be made with respect to a behavioural issue can potentially influence another decision concerning academic progress, indicating that many decisions are not made in isolation.

However, there was a trend throughout the responses indicating that data is not the stand alone factor in any decision making process. School 9 was the only one to specifically highlight this point by mentioning that data is used in an almost ad-hoc way through its use "In an informal rather than a formal way. Decisions are usually taken on a case by case basis taking many factors into account. Data may be referred to but do not drive decision making". Phrases of the type such as "Data is used", "Data impacts decisions", or "The data obtained help us to make decisions" appeared in eight out of the nine responses, and was inferred in the ninth response, indicating that data is being used in many decision making processes in schools but doesn't necessarily drive them.

Question 5 developed the theme of data usage from Question 3 by asking "How much is data used to direct and predict the student's future?". The main use of data mentioned (eight out of nine schools) was derived from student performances in standardised tests, summative assessments or international exams, and was used to "Guide them and have a vision of their future" (School 5), or "For careers guidance" (School 9). The use of data to predict future performances was not a major feature of school operation with three respondents answering this question with the statements that data is used "Not very much" (School 8), "Very little" (School 9) and "Probably not enough!" (School 7).

However, four schools mentioned the use of data at levels prior to the final year of school to predict performances as a student progresses through school, rather than solely at graduation or progression into university or careers. School 2 wrote that "Data is used to a significant extent … will considerably influence any decision on whether a student stays or goes", and School 3 used

"Grade Sheet data to identify students who may fail the academic year". However, current use in three schools had either ceased or was in developmental stages. School 1 mentioned the use of Year 11 Information System (YELLIS) "In the past", while School 7 commented on "Developing individual student tracking throughout the Primary School but this is not coherently developed nor consistently used." School 7 then gave a specific example of how data was previously used in this manner but lack of suitable tools has now stalled the process.

> In the past we used the United Kingdom Standardised Assessment Tests (UK SATs) which started to build up some very useful individual and institutional data but with the demise of the SATs we subscribed to the GL online assessment process in 2010.

> A good example of how data has been used to direct future performance was when SAT data on reading levels was analysed across a Primary year group and a wide variation noted. This led to a review of reading practices established by the teachers and the sharing of good practice by the teacher whose pupil performance clearly surpassed the others.

Based on these comments, the use of data to predict future performances is a potential area that schools could be developing.

Question 4 asked about the collaborative steps or methods taken in schools to make pedagogical decisions. There was much evidence of collaboration amongst staff at various levels, with six out of the nine schools specifically mentioning collaborative processes, although there seemed to be a high representation of DoS and Heads of Department in the processes. School 1 wrote about the involvement of "Senior management team, Academic Board (Heads of department). Heads of Department", and School 5 listed "Senior Management Team (SMT) with the participation of the Heads of Faculties and the team leaders depending on the area involved". Schools 3 and 4 mentioned the involvement of the DoS in various decision making processes of option choices, new courses being offered, and other course planning. Schools 7 and 8 specifically mentioned various teams participating in decision making with the comments "A range of collaborative units involving school staff" and "Working parties that collaborate to make decisions that are related to the teaching and learning process".

The other feature of responses to this question was the regularity of scheduled meetings occurring in all nine schools – weekly, fortnightly, monthly, per term or annually depending on

the nature of the group meeting. Setting of classes and whole staff inset occurred annually (School 3, 4 and 7), department meetings were mentioned as being held weekly (School 6, 7 and 8), staff meetings were held monthly (School 6), while other groups meet as appropriate to discuss new courses, student issues or management (all schools).

It was of note that four schools mentioned the involvement of parents in the decision making process, usually at a later stage of a behavioural management process, as evidenced by School 2 who said that "After a discussion on an individual student's progress, parents may be called to interview. The academic record data is often used for the basis of any such meetings." However, School 3 had parent involvement in other areas such as option choices, and School 7 mentioned parental involvement in collaborative decision making processes through:

> The Executive Committee of the Parent Teacher Association (PTA) meets monthly. It is composed of parents, teachers and the Director. Agenda items often relate to issues of a pedagogical nature and often ideas that arise are fed into the system above.

Mention of student involvement in decision making processes was absent in many responses with six out of the nine questionnaires containing no mention of any student involvement in decision making processes. School 6 did involve students in some aspects of information gathering (as opposed to the actual decision making process) by involving them in "Self Elected Learning (SEL) workshops … At the end of each four week session cycle students evaluate the workshops and teachers adjust when consider necessary" as well as at "Assemblies – students voice their opinions and contribute ideas towards the improvement of different aspects of school life." School 9 also involved students and parents in some decision making processes, specifically mentioning the involvement of many parties in the school community when helping students make decisions on their IB subject choices. School 7 identified involvement of students in decision making processes as an area of potential development when they stated "As yet, formal student involvement in this process has not been developed – perhaps a serious omission!"

Question 6 completed the section of the questionnaire related to the second research question by asking "Are there any other potential opportunities for data that has been generated relating to students, that you would like to see being used in your school?", thus providing respondents with

a chance to clarify any issues or challenges that exist as, well as to indicate where DDDM may be used in their schools.

Two schools were very succinct and clear in their responses to the further development of data usage with the closed statements "I don't think so. We try to foster a human approach to education based on the whole person and not just their quantifiable characteristics" (School 9), and "I would like to see us limiting the generation of such data" (School 2). These statements provide a position that was almost the extreme opposite of the other seven schools who were open to developing opportunities for data usage.

The other seven responses indicated that there are several key areas that may be developed. All schools stated implicitly that some systems of information recording and data generation are in place but there is room for much more usage of data in decision making processes. School 1 wrote that "Secondary staff are all involved in research groups" with the rider that although research is happening, data is not being used productively, and concluding with the comment "…but not many are generating data to help solve the problems".

The use of data collection to track and monitor individual students in order to solve issues before they arise, or to reward achievement as opposed to whole group analysis of performances, was a major feature of four responses to this question: "Greater tracking of individual pupils … use of non-attendance to spot patterns … use of reward and sanction data to spot patterns" (School 3); "I would like to see the school develop a more coherent system for monitoring recording and celebrating students' involvement in activities and achievements outside of school" (School 7); and "Collecting sociometric data that might allow us to have a more efficient decision-making process to work with group dynamics to improve learner outcomes and to improve student relationships" (School 4). All four schools indicated a desire for a system of information gathering and data generation that will highlight student needs and issues.

It was also of note that three schools commented on the belief that whilst they have some systems in place to record data and generate information, they were pondering on whether the system itself is being used efficiently or effectively. There are several factors that impede the use of any system currently in place with the key one being the availability of time for teachers to assess and consider the information produced. "More reflection by teachers on the results of their

classes" (School 6), "More intensive use could be made of all the data accumulated in the academic system" (School 8), and "The systems we have already set up just need to be used more consistently, efficiently and effectively" (School 7). All suggest that allowing staff the time to reflect on results is the key issue to ensuring that any data generated is used in a manner that benefits the students and their educational journey.

School 5 did mention a positive result when discussing a process of using data:

> Our school has a psycopedagogical department that has been created to support students, parents and teachers. … This kind of intervention has recently been implemented and it is something that I considered a necessity. I see it as a generator of positive results.

This is an example of a structure that is in place and which is working well using data to drive the decision making processes.

In summary of the findings related to Research Question 2, it appears that all schools have forms of information gathering and data generation systems in place. Further, all school have forms of collaborative meetings and processes that occur, many of which appear to work well and provide a sense of team work and ownership of the results and decisions made. However, there does appear to be differing levels of comfort with ensuring that the data generated from the systems, forms the basis for the decisions made, ie the use of DDDM processes. One of the limiting reasons revolves around a philosophical acceptance of the use of data to make decisions and whether data can be, or should be, used as basis for making decisions, given that the decision process is focussed on human beings and their needs, and the decisions are being made by human beings.

The other key issue limiting the use of data by teachers or decision makers is that caused by a lack of time. The factor of time influences the ability to efficiently enter information, then fully comprehend, assess and apply the data generated. It seems that while educators are willing to use data to drive decisions, there is a challenge with procuring the data needed.

4.4 What are the issues surrounding the use of digital technologies in procuring and analysing relevant data within Latin American bi-lingual international schools?

The third research question focussed on the digital technologies used in schools to collect and analyse data, and was investigated in the final questions of the questionnaire. Questions were focussed on determining what Management Information Systems (MIS) are currently in place to record and access data; how accessible and organised is this data; inquiries as to the strengths and weaknesses of the current IT system; and how much actual use, potential use and improvements of the system in place are possible. Questions 11 and 12 of the questionnaire explored issues of staff involvement and use of IT systems. The questions were structured this way to explore what is happening in schools, what would be desirable, and what are some of the barriers to these achieving these desires.

The first part of Question 9 asked whether a school had an IT based student database systems in place. All nine schools mentioned an IT based system of data recording: specifically a centralised data base (Schools 1, 2, 3 and 5), administrative software (Schools 4 and 6), or academic system software (School 7, 8 and 9). These systems varied in nature from commercial packages to site-specific developed databases, but all recorded aspects of academic and behavioural information at varying depths and levels.

Question 7 and 8 asked for examples of how staff can record and / or access data generated about students, and the accessibility of this data to both the individual teacher and other interested parties.

School 2 was alone in stating that the data was "Highly organised and instantly accessible" while School 1 mentioned that the use of a commercial package was in the initial stages and so ability to enter data and then accessing information from the system is "Very much in the developmental stage."

On the aspect of entering information into the system, School 4 wrote that "Staff members record and access data" but mentioned that their commercial package has the problem of limited availability to users as access "…depends on a license. Only a certain number of users can access data at the same time. This constraint has caused difficulties over time." Three other schools that are using commercial packages (Schools 1, 2 and 5) also mentioned the need for access to enter

information is granted to staff as they required it. School 7 acknowledged that there is a problem with their site-developed system in that sections of it were too dispersed but they were hoping to consolidate the separate systems into one interlinking system by purchasing a new MIS.

However, in nearly half the schools questioned (four out of nine), access to information from the analysis of data appears to be limited and usually relied on a staff member seeking out the information from another party who was higher up the management line. School 5 exemplified this aspect by writing "If a teacher needs specific information of any students, should ask the Tutor or the Team Leader, or the Headmaster Academic, or the Academic Secretary who records all the personal files of the students." Three other schools offered only limited access to the information generated, typically with the permission of senior management – "It is made available to teachers when Heads consider it necessary" (School 6), "Senior management have access to it [data generated] as do head teachers. Should more people want it, it could be made available" (School 9), and "Analyses sent (by DoS) to tutors / Heads of Year / SMT before grades are published" (School 3).

The second part of Question 9 asked schools to list the strengths and weaknesses of their current IT database system and are summarised in the following table

Table 4.1 Strengths and Weaknesses of IT based student data bases

Strengths	Weaknesses
Ease of information collection (Schools 1, 2, 5, 6, 9)	Data being misinterpreted (Schools 1, 3)
Ease or speed of analysis (Schools 1, 3, 4, 5, 9)	Reliance on technology (Schools 1, 3, 6, 7, 9)
Transparency (School 1)	Lack of staff training or them accurately using the system (School 2)
Parental access (School 1)	Limited access to results by various parties (Schools 4, 6)
Customised features for each school (Schools 7, 8)	Reliance on external suppliers to support the system (Schools 4, 5)
	In house support needed to keep system operating (Schools 3, 5, 6, 7, 8)

In summary, the positive aspects of operating an IT based student database system focus around the ease with which data can be collected and analysed in order to produce relevant information, as well as allowing the system to be customised for each school.

The weaknesses could be grouped into two broad areas, firstly technical issues, and secondly, the issues surrounding staff training and correct usage of the system. Technical issues relate to the running of the system and its support, and featured in six school's responses as creating concern or being a weakness with their particular MIS. Using a commercial program can introduce the benefits of compatibility between the pastoral, academic and administrative sections of the database but may bring with it the need to rely on external agencies to support or introduce changes to the system. This support will usually incur costs of time and finance. Using a system that has been developed on-site can suffer from the vice-versa effect, ie the expertise to operate and support the system is readily available, but the package may not work as smoothly or cohesively as a commercial program.

There is also the concern expressed by five schools that regardless of the origin of the student database system, there is the total reliance on technology to support the process. Power outages were one concern, as is the fact that the actual school IT network may not be able to support the MIS in a manner that makes it easy to use. Various hardware issues such as the lack of band width, machine age and speed, intranet capabilities, etc can affect the network supporting the student database system, causing the system to crash or malfunction, with the resulting frustrations and lack of confidence this creates.

Issues surrounding the 'teacher as a user' form the other area of weakness perceived with student databases. If staff are not adequately trained in its usage and / or committed to inputting accurate information, the ability to create meaningful and useful data is severely limited. The limiting of access to generated data by interested parties mentioned by Schools 4 and 6 was also registered as a concern, although this may be seen as an internal management issue as opposed to an inherent weakness of a student data base system.

Given the acknowledged opportunities given by a system, and the strengths and weaknesses of the student database system currently in operation, Question 10 proceeded to investigate if use

was being made of the system by staff in the decision making process, and if more use could be made of it.

Of the nine responses, two schools showed a strong usage of IT in decision making processes. School 2 wrote that "IT resources are used a huge amount in the decision making process", and School 5 stated "The information contained in these files always help us in the decision making, in academic and tutorial matters".

In all of the other seven schools, there was acknowledgement that more use could be made of IT resources in the decision making process. The schools all stated that the IT system was not being used in the decision making process to any great extent, with comments such as "As an organization not much use is made" (School 1), "Very little" (School 3), "The aforementioned restriction limits teacher access. This discourages the use of IT in the decision-making processes" (School 4), and "Generally speaking though, teachers upload the information but don't use it" (School 6). Three schools noted that the use of IT varied depending on particular staff members' expertise with comments such as "Very varied in individual staff" (School 1). Finally, one school continued to raise a philosophical barrier to the use of IT sourced data with the response "Not much. More use could be made but I am not sure that that is what we want" (School 9).

School 7 questioned the sole reliance of staff on IT based DDDM processes with the statement "There always needs to be a balance between the statistical data-driven approach and the intuitive one" but also admitted the desire for staff to integrate a form of DDDM processes into their teaching by stating that they "Will need support and training in making data-based decision making (not data-DRIVEN decision-making) a natural part of the teaching and assessment for learning process."

The final point to be made was succinctly stated by School 7 who said that the key feature in improving the usage of IT resources is not introducing a new system but rather working on the attitude of staff towards using the system. "Again, is it accurate to assume that the new MIS system will be a panacea? No! It will provide a good tool but the changing of staff attitudes and training will be the key issue."

Also in this question, there was an opportunity for commenting on the potential use of IT resources. The key theme in seven of the nine responses focussed around the analysis of assessment data by teachers and departments in order to highlight learning or teaching patterns, and to improve results. School 3 wrote about this feature occurring at department level "HoD's should do a greater analysis of their department's grades in order to spot patterns etc", whilst School 4 mentioned analysis should be occurring at an individual teacher / student level:

> It would be very interesting to see all teachers access data regarding their students. The data they review might tell them more about their teaching, their strengths, the opportunities for improvement they might have and where they can support a specific child.

Although this thesis's research was focussed on the use of IT resources with respect to analysis of information contained in a database, in two of the responses, the term "use of IT resources" in the questionnaire was also taken to mean IT tools involved in teaching processes. School 5 mentioned the desire for staff to improve their use of "Informatics resources", namely tools used to assist the teaching process such as smart boards, while School 8 mentioned the desire for improved usage of a "Curriculum mapping platform" which could be used in curriculum development and planning and "Student response units", which are an interactive tool used to elicit student responses within the classroom. Although these particular types of usage are beyond the scope of this thesis, it is worthwhile noting that respondents saw IT resources being broader than the computer database and processor, and may be used as the focus for other research projects.

Questions 11 and 12 looked specifically at the issues and challenges surrounding empowering staff to effectively use IT resources. In their responses to Question 11, all schools mentioned professional development programmes of varying lengths and timing during the year. For some, inset courses occurred at the start of the year (Schools 3, 5 and 9), while other schools held on-going or on-demand courses throughout the year. Schools 1, 2 and 3 mentioned sending staff to training courses off-site and then using the staff involved as trainers within the school, whilst other schools (Schools 4, 6, 7 and 8) also mentioned the concept of using staff members as site

trainers. Ensuring that new staff members are bought up to similar skill levels of the existing staff was a feature of four professional development programmes.

As School 7 is planning to introduce a new MIS system, they are holding a series of inset workshops to prepare for its implementation, but they also made mention of an existing internal IT training program which is designed to raise the overall levels of staff members. This program is self-guided with staff completing it at their own pace. It consists of 3 levels, with all new staff required to complete the first level of basic IT skills. Staff are then encouraged to move into the second level relating to specific classroom applications, and ultimately onto the third level focussed on a "Personal development / interest project" which can be used to "share with others". This is a further example of using on-site expertise in professional development opportunities.

The theme of Question 12 was inquiring into perceived barriers to the effectiveness of these professional development programmes, and to developing IT resources. There were two recurring themes mentioned: one related to externally controlled matters such as time allocation, hardware and software availability and reliability, and suitable budgets being allocated; the second theme related to the intangible aspects of staff inertia to up-skill, and their willingness to use IT for educational purposes.

On a positive aspect, School 7 acknowledged that they have "Experienced few barriers" because of two key factors, namely the allocating of "Substantial budgets for both staff development and ICT development", combined with the fact that:

> ICT has a clearly developed Vision and Strategy document to guide practice and a very clear and continuously updated development plan. This development planning has taken place through wide and on-going consultation with school leaders and managers.

This combination of funding and collaborative planning appears to have removed many of the tangible barriers that were evidenced in other responses. The lack of time available for up-skilling of staff was mentioned in the responses of Schools 3, 6, 7, 8 and 9. Further, the pace of life at school due to "The demands of international examination programs" (School 8) and "Too many other things going on and being required of people" (School 7), means that time is a

valuable resource and not often available to be used in resource development "which leaves very little time for innovation" (School 8). Hardware reliability was listed as a barrier by School 3 and School 7, and "Lack of a comparable system elsewhere" (School 2), was also mentioned as presenting challenges, while budget, alluding to the high costs of hardware and software, appeared in the response from School 1.

It was noted that intangible issues surrounding staff usage also appeared in three responses. School 4 wrote that staff inertia to change is the main barrier to implementation with the statement "The main barrier I have faced is the resistance to change. There are too much (*sic.*) teachers that prefer to keep their own pedagogic style". School 3 used the term "Technophobia" to describe one of the barriers of usage by staff. In this school, IT usage is regarded highly, "There is an important level of recognition of the benefits of using IT-based decision-making and instruction.", but the actual use of these resources is very low as seen by the observation that "The statistics of access to IT falls short from what is desired." Despite acknowledging that they have not experienced many barriers in implementation, School 7 also raised the "human barrier" issue where teachers question "Issues of relevance/need – is this what I really need for my teaching?".

Finally, there appears to be a fear of exposure of the teacher's lack of skill in using IT technologies. These technologies can be beyond their area of expertise and thus teachers are likely to face being placed in a position of potential embarrassment by others, including students, who may seem to have a much higher degree of skill and comfort in the use of IT technologies. School 8 best summarised this when writing that there exists a barrier with "The fact that some teachers have certain difficulties operating the technology, and being out of their comfort zone, in an area where, more often than not, students know more about the technology than the teachers themselves."

In summary of Research Question 3, there appears to be a universal use of IT technologies in schools to record student information but the use of technologies to generate data from this information, and its use in any subsequent DDDM process, appears to be limited. Placing restraints on the successful procuring and analysis of data by limiting the efficient and effective use of IT technologies are issues which can be broadly themed as tangible and intangible barriers. The collaborative development of school-wide IT policies, vision and strategy,

combined with their acceptance and implementation, are key factors which help to remove the tangible barriers of time availability, and which also lend support to budget allocations to improve hardware and software reliability. These policies et al can also be used to drive solutions to the issues of low IT skill levels in staff, as well as allowing staff access to, and raising their knowledge of, how to use the technologies to generate data from the information recorded.

It is noteworthy to observe that many of these issues surrounding the use of IT technologies were mirrored in the findings of Research Question 2, including time availability, accuracy of information procurement and data analysis, and finally, the inertia of staff to engage in DDDM processes due to a lack of confidence or understanding of its potential uses to improve teaching programmes and outcomes. However, now that this research has clarified some of the issues surrounding the implementation of DDDM processes, a target has been provided for educational leaders to work on if they are convinced of the value of DDDM processes for improving the educational journey and outcomes of their students and institutions.

4.5   Interviews

In order to develop richer and deeper answers, examples, practices and processes mentioned by the responses provided in the questionnaires, and to triangulate some of the information gained, the researcher proceeded to conduct interviews with senior management persons in three schools that had responded to the questionnaire. The triangulation was enhanced in that in each case, the person who had been interviewed was not the person from the school who had completed the questionnaire, but all three were either the DoS or involved in the SMT through their position of running large departments within their school. All three interviews took around 30 minutes to complete, and participants completed an Informed Consent Form prior to the interview. The interview was recorded onto a digital file which was then transcribed and analysed following the interview.

Before the interview, and to ensure a degree of consistency in approach and questions, an "interview guide" (Bryman, 2008, p. 438) (see Appendix 2) was prepared which allowed the interviews to be conducted in a "semi-structured" (Bryman, 2008, p. 438) manner. During the

interview, an open-ended style of questioning was employed where a topic was introduced and the interviewee was allowed to respond as they saw fit and in whatever direction they chose. This meant that there was a great deal of variability in the direction that each interview took, but by referring to, and gaining guidance from, the interview guide the interview was directed into the desired areas of interest, exploring the three research questions from other viewpoints apart from the persons who completed the written questionnaires.

In order to maintain the confidential nature of the interview process and also to protect the anonymity of the respondents, the interviewees were labelled as A, B and C. Interviewee A was not necessarily from the school who returned the questionnaire labelled as school 1. This was done to eliminate any direct connection between the school response to the questionnaire and the person interviewed. Also, the male pronoun was used when describing responses, even if the interviewee was female.

The Interview Guide comprised of five guiding questions, loosely based on the focusses of the research questions and issues that arose from the questionnaires, without the clear delineation between each question that was offered within the questionnaire. Question 1 aimed to generate an understanding of whether data was actually manipulated and analysed in order to produce useable information. Questions 2 and 3 asked how decisions for the best possible educational journey of students were made against the backdrop of potentially conflicting expectations and requirements of parents, government, staff experiences, etc and how much the decision maker allowed others to assist in the decision process. These were asked so as to investigate the school's decision making processes, and to ascertain if DDDM featured. Question 4 proceeded to inquire as to how data may be used to make an optimum decision as opposed to one that is "satisficing – that is finding a satisfactory solution rather than the best one" (Hoy & Miskel, 2008 p. 324), aiming to broadly investigate the challenges and barriers to using DDDM. In concluding the interview, Question 5 probed the area of IT usage by asking if teachers have classroom access to a computer, and how much use of assessment data is made to improve classroom practice.

By allowing the interviews to proceed in a semi-structured manner, responses to each guiding question could potentially influence or relate to one or all of the three Research Questions.

Therefore, when analysing the interview responses, "thematic analysis approach" (Bryman, 2008, p. 554) was adopted where the complete interview was assessed against each of the three Research Questions. It was noted that recurring themes appeared in almost all of the five questions as the interviews proceeded. Finally, in all instances, examples of current practice to justify or support the answers given was asked for and generally provided.

4.5.1   Interview responses to Research Question 1 – Why is DDDM important in an educational context?

Interviewee A responded to the first interview question by stating that he believed the model of data rich but information poor, completely matched his school. He said that "There is lots of support for this statement. There is written information on paper and files everywhere but many don't know where it is or what to do with it." He did proceed to mention that some records were kept electronically which allowed for "Limited electronic access" but he finished Question 1 by restating that "Yes, we are neither information rich but we have plenty of data." The lack of any real structure in decision making was highlighted by Interviewee A in Question 2. When asked about how decisions were made, he simply stated "In my observation, decisions are not necessarily made … no initiatives are taking place … one year runs into another and any decisions on promotion are so minor." Further, in Question 3, the comment was made "(Decision making) is very much at the top – lot of SMT collectively making decisions, top down and no parental involvement in most decisions." Based on his comments, it appears that there is a lack of any formalised or structured adoption of DDDM processes and thus by implication, DDDM processes are not considered important in his school's educational context. Later comments and responses indicated that he personally saw value in DDDM-based decisions as when asked what his thoughts were, he replied "I'm not comfortable with this at all; we need to collect more data, use more data."

Interviewee B took a broader view to this question in his responses, providing a picture of data usage in decision making that wasn't specifically termed DDDM but exhibited many features of DDDM processes as it appeared to be built on the basis of a robust process of data collection, analysis and generation of information. When commenting during the interview about making decisions, he stated that numbers should be used as a starting point, but other factors which may also be considered as data should be considered. He stated "Use the numbers as your starting

point to create a sense of the student" and "Written data forms a basis – it's usually statistically valid at national level for example." Later on, he also stated that "Main data points form reference as to where students expect to be at a certain time on their journey so data points are also important on measuring student's progress and where they should be going."

Interviewee B proceeded to discuss the idea that numerical data may not necessarily be the only factor to consider. He discussed the concept of using other references within a decision making process as being equally valid. As an example, he discussed the process of setting of classes, which is the grouping of students in a structured manner that is usually (but not always) based on ability. His school created an initial list of classes based on achievement data, but then allowed other factors to impact on the final result:

> You may set them on ability from most able to least able and then chop them up into four or five or ten classes then give them to teachers sitting in a meeting somewhere and let them have their say to discuss their class whether they have students in the right place.

Other factors to influence the process include school policy or needs and were termed "The other information" that require "A little bit of fuzzy logic on the way" and utilise "The secondary data you use to try and create the most positive learning environment you can for all students" in order to "Eventually end up with classes sort of fitting the model you want". DDDM appeared to be an important feature of the process, but was not the sole determining factor as aspects of teacher experience or bias were allowed as influences in the decision making process, and thus impacted on its final result.

Interviewee B cautioned against complete use of DDDM processes because he saw DDDM as having the potential to reduce students to simple numbers or achievement objectives. It was his view that relying solely on numerical information has the potential effect of removing the variable elements arising from personal knowledge of a student, their broader environment and personality with his comment:

> Data rich suggests lots of information points of all student data including social background, achievement on national tests, progress we expect them to make – so yes, information poor might be that it reduces each child to a set of data points rather than thinking about the

individual as an entity or being that's got their own individual set of problems, desires and backgrounds. A set of numbers about a student don't make the whole picture … there's more about students than their base line data.

Interviewee C took a similar view to Interviewee A in that he felt very little use was made of data in any decision making process. He stated that "I don't find the schools are very analytical with the data or use the data to identify what is really going on in the school and then try to make decisions based on that." Despite the fact that his school had recently conducted standardised testing, he mentioned that little use had been made of the results apart from a broad instruction from Senior Management to improve one aspect of student learning. He stated that the sole feedback he received was that "Students were weak in their problem solving skills" and he bemoaned that "Now I have to come up with, to respond to that. However they didn't show me the tests so I have no idea what they were tested on." He further expressed frustration at a lack of DDDM processes in other areas when saying that

> To get precise information on kids is a difficult one – kids do have some weaknesses – I need to see exactly what the kids are not doing well so I can get specific feedback and begin to think about what we can do in the classroom.

He mentioned that data didn't have to mean solely student-generated assessment data. He developed the concept of data to include academic research and thinking as providing valid external referents with comments such as "I will go to them (SMT) and say, current educational thinking based on evidence collected now is this; these are the reasons behind it" and "Collecting information through papers and things like that so I can say current education is saying this and so why are we doing that?".

This frustration with senior management's inability to provide clear data based information, or their apparent lack of willingness to use information produced from other sources, appeared in many of Interviewee C's comments. He expressed the wish that "More data – yes I would hope we would use it, help us to become more analytical and decide the way forward" and in conclusion, he stated that "Data drives my decisions but not sure whether I can take the guys with me on it as they tend to go along with it but not sure how much they support it."

In summary, during all three interviews it was apparent that despite an acknowledgement of the value of DDDM processes, two out of the three schools had no clear processes in place, and the third school utilised DDDM with some misgivings and concerns. Data is being collected, but the analysis of the data, and use of information from that analysis, is very minimal in most cases. All three interviewees agreed as to the value of DDDM but all faced the common features raised against the use of DDDM as revolving around either a lack of understanding within the SMT of the value of DDDM, or an unwillingness from within the SMT to implement change procedures that utilised the information produced. Finally, the lack of data analysis was widely acknowledged as hindering school development and holding back the meeting of students' needs.

4.5.2 Interview responses to Research Question 2 – What are the issues and challenges surrounding the use of DDDM in relation to making pedagogical decisions within Latin American bi-lingual international schools?

When asked about the issues and challenges of using DDDM within schools, all three interviewees raised commonly recurring themes. As mentioned in the previous sub-chapter, some of the greatest challenges come from within the SMT, where there is either an apparent lack of understanding of the possibilities afforded by DDDM processes, or it seems that they exhibit unwillingness, for whatever reason, to implement the findings from the information generated.

However, there were several other recurring issues and challenges that arose during the interviews. The key ones concentrated around a lack of staff understanding or willingness to change their practice, the time needed to collect and analyse data, and the fear of the repercussions from other parties who may be affected by the information that is generated.

The first issue revolves around the willingness or otherwise of staff to change their practices based on information gathered. This issue featured strongly throughout the interviews conducted with A and C. Interviewee A stated that there was an overriding desire from school and parents for a student to progress through the school years and thus the need to alter programmes or practices based on the results of data analysis was not deemed necessary. "We make satisficing decisions to get a 7 … as long as a student receives promotion, gets through to the end, that's the

priority and for the teacher" and "They're concerned with getting through, passing the year, and promotion rather than decisions that might lead towards the right IB and IGCSE". However, if changes are made, they are generally made on the basis of the teacher's experience, and the use of any data is minimal - "Data is available but professional judgement may or may not be backed up with testing. Conversations are made but not necessarily backed by data."

Interviewee C also developed the theme of staff inertia to change when he stated:

> Teachers rely on gut feeling and they, you know, some of them are very traditional, very much chalk and talk … these really traditional, outdated sorts of ideas that are really proven not to be useful.

Further, within his observation that "Teacher's have a perspective based on their experience and their interpretation is not always the correct interpretation", there is the need for him to bluntly assert to his staff that "Your ideas are only based on nothing; just an opinion and my ideas are based on hard evidence collected over a period of time. I need to convince them that the ideas are valid." However, he concluded the interview on a positive theme when he admitted that some teachers are beginning to see value in DDDM processes. In particular he mentioned the Mathematics department where he felt that, as Mathematics teachers are generally comfortable with data analysis, they could see its value, and by them "having some data to base it on, it might help them change their minds and see that some other path might be a better way to do things."

Both interviewees mentioned the MIDYIS and YELLIS system of on-line predictive testing and how it had been less than enthusiastically received. Interviewee A mentioned that he saw the acceptance as being "not short-term, in a three or four year plan" while Interviewee C mentioned that "YELLIS had a cool reception as it is one way of teachers measuring kids but also measuring them." It appears that there may be a broader issue of change management and staff inertia to change that may hinder the implementation of any initiative and not be solely attributed to implementing DDDM processes, a question which is outside the scope of this thesis, but it is certainly a recognised barrier for DDDM processes.

The second major issue or barrier that arose during the interviews was the question of time availability. For the acceptance and implementation of a decision to be achieved, there are two aspects of time management that need to be considered. The first aspect involves the pre-

decision time of data collection and analysis, and then the post-decision period of explaining and supporting the decision that has been made. As both of these periods consume time, the value of investing time into the process was mentioned by all three interviewees.

Interviewee B discussed both aspects when considering the setting process. Much time is spent in endeavouring to set classes by "trying to find the best model given all the constraints" which he defined as "School strategic plan; background of inspection; I've only got four classes to work with instead of five", etc. Following this process of initial setting, there was then the process of consultation with staff as mentioned in the previous sub-chapter. He also discussed the post-decision period where he mentioned the need to hold "complex conversations" with parents and staff to explain the decision made.

Interviewee A mentioned that discussion was held around the YELLIS issue as "It is not requested by universities so why do it?", while Interviewee C queried the time available for the whole process when he stated "For me to have the time to collect the data, analyse it, and come to some valid conclusion, is very difficult – probably some outside agency to some extent is needed." Later in the interview, he stated "This evidence-based stuff is going on a lot in the UK" but when queried if it is happening in his school, there was a resounding answer of "NO, no time." The question of time availability also arose in connection with the issues and challenges associated with IT matters and will be further discussed in the next sub-chapter.

Finally, the third issue or challenge to implementation of DDDM processes within a school revolved around the question of who is affected by the information produced. These parties fell into two broad areas: school management and parents.

The SMT provided perhaps the biggest obstacle, and conversely, the biggest support of DDDM processes according to all three interviewees. Interviewee C mentioned that the SMT had embarked on a DDDM-type process when they implemented a series of standardised tests in order to review student performance and thus have some evidence to conduct future planning. The SMT wanted to assess "strengths and weaknesses, to plan around it" but "Students got the results we expected" and the process simply produced blanket statements from the SMT like "Improve the student's problem solving skills". He admitted that the whole process was a surprise, and "I was a bit shocked when these results were simply presented as fact." He went on

to say that unfortunately, this is not the first such poor handling of a DDDM process. Previously, when YELLIS testing was conducted, the poor results were a cause of concern to the management team as they "didn't always give the results management wanted as they weren't always nice, so it was a hard pill to swallow. So when you get this hard evidence, it's not always a nice thing to have." The YELLIS process was subsequently cancelled.

Interviewee A mentioned in further support of a lack of DDDM processes, that when there is a discussion of issues relating to a student, it is usually done with only minimal reference to existing data. "There are discussions of students at risk – not succeeding or underperforming – discussions are made but not backed up by data other than those report grades or trimester results."

The SMT were indirectly mentioned by Interviewee B when discussing the process of setting classes. They were the ones who were creating the rules of setting classes and hence forming the structure through which data needed to be analysed and used. The SMT were responsible for the setting of strategic objectives and thus were requiring Department heads to "consider the needs of the school – perhaps underachieving students from a demographic group – whatever are the aims of the school." This means that setting is done in a way that is quasi-DDDM resulting in decisions where "We have only satisfactory solutions for people because of the school strategic plan, such as to prioritise C grade passes in IGCSE." He mentioned that "In reality, I always try to find the best possible (solution) but probably not the best one" because of other external factors placed on the decision maker by limitations of resource such as number of available teachers. He stated that, given these constraints, he was forced to take the information and prioritise around one or two key areas when reaching the final decision. He said "I always try to find the best model given all these constraints. I normally prioritise something in the model and make sure that's best and then there are other things that have to be satisfactory".

The influence of parents as an impact on the decision making process, operating as a limitation on the use of DDDM processes, also appeared as a feature in all three interviews. The concept that was mentioned throughout revolved around the premise that as all three schools are private, fee-paying institutions, there was the need to possibly temper decisions to garner the parents' approval and thus not lose a potential income stream. The influence of parents was noted by Interviewee A as occurring especially when difficult decisions are to be made about, for

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example, a course of study. He stated that whilst the school would like to make a decision based on sound reason, in reality the decision is only a recommendation and the parent is accorded the right to accept or change the decision. He went on to say:

> Looking at difficult decisions about a course that a student chose which is not right, our decisions about subjects are recommendations, guidance, they (the student) are not necessarily prevented from the course. Private school parents are paying salaries so parents have the right to make decisions

He also said that parents are usually happy with the school decision and "What we are doing; (they) generally accept the school judgement in matters of course choice or suitability of classes" but the influence of parental acceptance looms large as their chief concern appeared to be "passing the year and promotion" of their children.

Interviewee B mentioned that parental interaction usually occurs as an end step of the decision making process. In particular, the decisions around the setting of classes which have used non-empirical data are sometimes the hardest to explain, and require "complex conversations" with parents in order to gain their acceptance and understanding. The use of "secondary data" to "try and create the most positive learning environment you can for all the students" creates the challenge for leaders with parents: "It's that bit that's more difficult to communicate to parents. They don't understand that as it's much less black and white." However, as with Interviewee A, he did mention that parents do accept decisions if the results are positive for their child. "If our model is right and all students are learning then the parents are generally happy – if not, we have difficulties" and the key to all discussion is "It's a matter of communication."

The parental influence mentioned by Interviewee C revolved around the process of sharing news that is not necessarily positive. As mentioned previously, the YELLIS test results revealed concerns about the students' abilities and performances, and thus, by implication, could be seen by the parents as indicative of poor teaching and school processes, hence the comment "Sometimes you think, 'I can't tell the parents that'". He mentioned that in any decision making process, the underlying concern was "At the top it seems to be to keep the parents happy." He mentioned an incident where an SMT member said to him "I've got this parent on my back so

sort it out" resulting in a decision and action that "May not be the best decision but it's the one the parents want."

In summary, the main issues or challenges to the implementation of DDDM processes appear to revolve around the time allocated to it, compounded by people-related factors. By not understanding the processes or appreciating the value of information generated, the influence and potential impact of DDDM processes are limited. In particular, if time is not allocated to data collection or analysis, then relevant results, a clear picture of performance, and thus useful information are not created. If the information produced is not useful or apparently relevant, then staff will be sceptical of it and will not see the need to alter their teaching practices, SMT will be loath to publicise or use the results, and parents will have no confidence in allowing their children to be subject to the decisions being made.

4.5.3   Interview responses to Research Question 3 – What are the issues surrounding the use of digital technologies in procuring and analysing relevant data within Latin American bi-lingual international schools?

All three interviewees discussed the use of IT systems within their schools as being a tool for the collection and analysis of data. All three mentioned that teachers had direct access to computers and that some form of a student information management database program was being used within their school, but all three reiterated and reinforced some of the issues against its widespread use that were mentioned in the written questionnaires; issues such as a lack of training for staff, teachers not being comfortable with new technologies, and the lack of confidence in the software to produce the results that are desired.

Interviewee A mentioned that his school has just begun the school-wide use of a new MIS database program which is being used for recording of data items such as attendance and assessment results. The process of implementation has been well received by staff, but he is concerned that the full potential of the system will not be reached as there isn't a person delegated to drive the project forward. He stated that:

> Feedback is pretty much positive; the system seems relatively easy; not time-consuming; straight forward… buy-in is very popular; its saved a lot of time and there isn't any sign of a wall of staff resistance; they seem quite happy with it – this was so even though the

system has had the occasional malfunction. We've had occasional problems with hardware but not a lot.

His concern is mainly around the lack of drive by the SMT to fully utilise the potential of the data being recorded. He noted that "There's a lot more the system can do" and "Beyond that (attendance and assessment results) as to pushing boundaries to their potential, it's not being used because there's a lack of drive from someone to push it forward."

Interviewee B was very positive about the use of IT within DDDM processes and its potential to quickly analyse data from numerous sources to produce trend lines, targets and other measures of progress or achievement. He particularly mentioned the way that IT can eliminate the need to have paper records, and the ease with which interested parties can access data for their particular needs. However, he raised concerns about several issues that mitigate against the successful school-wide use of a MIS system, concerns which have also been mentioned in the questionnaire – namely the consistency of suitable hardware, and the time available for staff to enter data in a manner and at a time that suits them.

According to Interviewee B, the potential of a MIS in a DDDM process is that "Base line data becomes a user-friendly thing – whatever that thing is about each student." He mentioned that "All that data converts into one target point that a teacher can measure progress against" and "Generally, the more data you record, the more trend you can generate." He praised the use of IT by commenting:

> I like IT – I hate bits of paper – the key with IT is you manipulate data very easily on spread sheets, databases and set up all sorts of tracking you can't do on paper … IT speeds up the process and also allows access to things you couldn't do anywhere else

However, he did raise concerns over issues such as the mixing and matching of resources within a school, which creates problems for the seamless use by staff:

> The wired networks, wireless or internet not working due to hardware or software – some are running on Windows XP, some on Windows 2000 and senior management on Windows 2010 – so they're sending stuff such as docx which we can't read or open

Further, the time factor was raised as being another issue or barrier to the successful use of an MIS within a school:

> Problem for a teacher in a lesson is you have 20 students in front of you, mark whatever you are doing and then enter that data in somewhere, some sort of thing and if that thing is not user-friendly or on-line or working when the teacher needs it, then the teachers will find another way of doing it.

In order to ensure that data is consistently recorded and available for analysis by whomever needs to access the data, he stated that there is the requirement for a MIS system which is user-friendly for all:

> Got to have teachers that are using it quickly and as a basis of what they are doing … got to have hardware available for teachers to access the program whenever and wherever they want to – out of the classroom, at home – got to have the right program.

When asked if he has had experience in whether these programs exist, he succinctly commented "Everything exists; it's just how much do you want to pay for it?". He finished by mentioning that generally a school will purchase a program which is satisficing and falls within the set budget

> They get a satisficing program – might not be perfect but as long as it focusses on what you need – maybe easy to use, up and running, data is safe, data is on site, cloud access, parent access – decide on the priorities and play with the variables.

Interviewee C discussed the situation at his school which appears to be similar to A in that the MIS has recently been introduced and is being used in a very limited capacity. He mentioned issues of hardware and software as limiting the potential use of the MIS, but the biggest challenge his school faced appeared to be in the understanding by the SMT of the potential uses, and confidence in the results garnered from MIS. These challenges may stem from a lack of training in the use of the system, and the inability of the software providers to clarify the system's potential, but it is problem that may take some time to resolve according to C.

He started the discussion of IT usage by stating that all staff have classroom access to computers "All teachers, yeah, there's a computer in every classroom", and that an MIS has been

implemented "We have got *** (name of commercial program omitted), used in a limited capacity to record trimester grades". This led to the comment that "Issues are bandwidth not good, also teething problems with ***". He believed that *** has potential to meet the school's needs as there is "Quite a lot you can do on that if it gets going well" but that time is needed to build up confidence. "Teachers are not confident; give it a year or so to see how it goes and then might use it more". He went on to mention that very little training was given in the system, and in reality, he ends up having to manage most of his department's usage because of this lack of training. "There was not much training given in how to use it – I sort of mange it for my department."

Interviewee C was asked if he saw wider use of the MIS in the school, to which he replied that "I am not sure senior management do; they're a bit sceptical." This may be due to the program itself as he mentioned that the school was committed to improving its IT resources: "We have a big drive into IT, more computers into classrooms, more computers into places around the school" but as there was little or no training in the use of an MIS, there is little understanding of its potential to assist in DDDM processes. When questioned about whether he was aware of any training that had taken place, he replied "Nothing, no training on analysis of data" but concluded by stating that "More data, I would hope we would use it, help us to become more analytical and decide the way forward" but he is "unclear as to where it's all going."

In summary, it appears that all three schools have an IT system that supports an MIS. All three interviewees mentioned that their schools have various issues with both hardware and software, but it seemed that only one school is using the MIS in a proactive way to support DDDM processes. Outside of the issues of hardware and software, the key issues and challenges limiting the effective use of the MIS appear to arise from either a lack of understanding of the potential uses of the system, or a lack of clear direction and confidence in its usage from the SMT. Interviewee A specifically mentioned that there is the clear need for a person willing to drive the project forward as being the key element to the successful use of IT within a DDDM process.

4.6   Summary

The questionnaire and interview findings correlate with each other over six key issues that permeate the successful implementation and operation of DDDM processes. The key issues that were supported by both the interview and questionnaire responses are:

- Understanding how DDDM processes can potentially create improvements in schools
- Acceptance of DDDM processes by management, staff and other parties
- Staff attitude and resistance towards changing current practice
- Validity of data being collected and analysed
- Time availability to collect and analyse data
- Barriers and challenges to the use of IT in DDDM processes.

These issues will be discussed in Chapter 5 by considering the literature to theorise the findings.

Chapter 5   Discussion

The discussion in this chapter will focus on the six issues listed in the summary of Chapter 4. The findings from the questionnaire and interviews will be linked to the literature by providing a theoretical base when highlighting commonalities and commenting on differences that may arise.

5.1   Understanding how DDDM processes can potentially create improvements in schools

All responses to the questionnaires and interviews agreed with the literature that making decisions about a student and their educational journey must be done from an informed perspective. All agreed that this informed perspective should be influenced by information obtained from an analysis of data recorded about student performance and circumstances, and that the analysis of the data could be done through IT processes. The literature revealed this with Wayman´s (2005) comment about the centrality of data analysis to school improvement initiatives, and Earl and Katz's (2002) categorical statement that the use of data is "no longer a choice, it is a must." (p. 1005). School 5 acknowledged the importance of data storage and interpretation, and School 8 discussed the objectiveness afforded by the use of data in a decision making process. Hoy and Miskel's (2008) viewpoint of using a process of vigilant and unbiased data assimilation, then evaluating alternative choices before making a decision, is reflected in Interviewee B's comment about using written and numerical data as a reference and basis for decision making. By failing to adopt a form of informed perspective, the decision making processes produce situations and solutions that School 4 described as decision making based on "guesswork and personal beliefs", and by School 3 as making decisions relying on anecdotal evidence created through staffroom gossip.

In terms of how DDDM processes could improve school operation, the respondents and the literature tended to concur DDDM processes help to remove emotional, knee-jerk or ill-considered decisions from being made; decisions that are generally made in a reactionary manner to a situation that requires some immediate response. Shephard´s (2001) comments about the need for the gathering and use of information as an integral part of the learning process were mirrored by the majority (eight out of nine) of respondents to the questionnaire and the personal

views of all three interviewees. School 1 acknowledged that decisions must be based on fact, School 5 mentioned that data usage enabled decisions to be made which are based around the needs of the students, and School 4 stated that the using of data as the basis of a decision making process allows for decisions that are consistent, benefit all parties, are supported by pedagogy, and create collegial support for the decision made. Interviewee C bemoaned the lack of data analysis by his SMT, which he saw as limiting the ability of the SMT to really understand what was happening in the school. He saw the use of data as allowing the SMT to become more analytical and therefore having the potential to move the school forward.

DDDM processes require the potential involvement of several parties in the process, thus allowing for dialogue and ownership of the decision by all involved. The collegial support generated through the collaborative involvement of the parties meeting and constructively discussing the information arising from the data analysis was a feature mentioned by Bower (2009) which Williams (2008) termed as a "democratisation of expertise" (p. 215) and Owens (2004) mentioned as the empowering features of collegial decision making. These concepts were reflected in the questionnaire responses of School 4 and 7, who wrote about DDDM processes occurring within groups of varying types including teachers, counsellors and administrators, whilst Interviewee B mentioned the collegial nature of class setting processes.

It was of note that in a large proportion of questionnaire responses, the parties involved in a decision making process may not be solely compromised of staff members. In four questionnaires, there was the specific mention of parental involvement in differing collaborative decision making processes, although only one school mentioned that these decisions were of a pedagogical nature. Further, three schools mentioned student involvement in some stages of the decision making process, and one school in particular mentioned that they may be missing out on potentially valuable information by not involving students.

Further, the use of DDDM processes may help to make a satisficing decision more efficient by forcing consideration of all factors or data and thus requiring a reasoned response to the issue or problem being faced. Bower (2009) talked about how the use of DDDM processes can create a focus to the decision that eliminates distraction and affords the best use of available resources. School 4 talked about the use of data in the allocation of "resource materials", while School 8 alluded to the issue of resource allocation with a comment that data was used to impact on

decisions about "curriculum, course assignments (and) supplementary teaching needed"; School 6 also mentioned the use of data in allocations of teachers and other school resources. School 3 testified to the strength afforded to a decision with their statement that DDDM gave the school "hard facts" when dealing with parents who are challenging a decision or who needed convincing of some path being taken.

In conclusion, it appears from this study that DDDM processes should form an important feature of the management of schools as there are a myriad of potential improvements available through using them. By undertaking DDDM processes, the decision makers are forced to create a clearer picture and understanding of the issues and background to problems that needs resolving through the information generated from the analysis of data. Further, whilst decision makers are faced with considering many factors before making a decision, they are allowed to remove the influence of subjective or anecdotal evidence from being major considerations, and DDDM processes afford the ability to provide rationality to the allocation of resources, or strength to a decision that has been made. Finally, there are the broader benefits of building collegiality amongst staff, parents and students during the decision making process, generating support from the staff or implementers of the decision by their involvement in the process,s and potentially allowing for more consistency in the decisions that are made by opening them up for peer review.

5.2 Acceptance and support of DDDM processes by management, staff and other parties

A key issue that arose from the findings of this study is the one surrounding the acceptance and perceived value of DDDM processes, and the understanding of what to do with the information that results from the analysis of data.

The involvement of the SMT or equivalent management level body in leading the implementation of DDDM processes was a key component of the literature. Shen and Cooley (2008) and Bower (2009) specifically mention the involvement of school leaders or administrators in DDDM processes. However, several responses, including Interviewees A and C and School 3 and 5, indicated that if the SMT or other involved parties are unable or unwilling to

clearly enunciate support for DDDM processes and visibly act on the information produced, then the parties affected by the decisions such as staff, students or parents will question the value of the process and the decisions reached or directions taken.

Questionnaires submitted by three schools (School 1, 6 and 8) indicated that forms of DDDM used to predict student performances had either fallen into disuse or were only in early developmental stages, suggesting either a lack of support or direction from SMT. Interviewees referred to lack of management support for DDDM processes. Interviewee C mentioned the negative reaction by the SMT to the unexpected reality of poor results in one DDDM process, and then the lack of clear direction given after another process, whilst Interviewee A felt that his SMT didn't value the information produced as it wasn't used in a transparent or obvious manner. Interviewee A also mentioned that the pressure created by the expectation of ensuring that a student passes each year of school prevented innovations or major initiatives from taking place. Thus, using data analysis information to challenge or change this expectation was, in his opinion not usual practice and appeared unlikely to change in the future. Interviewees A and C both wished for more use of data in their school planning processes as they perceived value from the use of data in the decision making process but felt frustrated that their management teams weren't as supportive or aware of the potential uses as they are.

School 2 and School 9 both expressed extremely strong views about how they did not perceive the need for DDDM processes, or only saw a limited use of them. School 9 was the strongest opponent of DDDM processes with the viewpoint that they considered DDDM processes as "Quasi scientific", producing results which were quantitative only and which failed to take into account the student as a "Whole person", a process which could only be done when considering factors that were not able to be reduced to numbers or figures.

Regardless of the actual lack of support or otherwise, an understanding of the value of DDDM processes was seen in the questionnaire responses from all of the other schools. Many wrote about various opportunities that existed for the implementation of DDDM processes or had already used forms of DDDM to assist in improving or developing school programs, resource allocations, decisions about class setting or student placements and student course selection. Wayman's (2005) assertion that data must be central to the school improvement process is clearly being considered in these schools.

The literature and respondents diverged somewhat in their viewpoint on the importance of DDDM being the only tool used to make decisions. It was apparent that the questionnaire respondents were supportive of the concept of the use of data in a decision making process. However, with phrases such as "Data impacts decisions" and "Data obtained helped us to make a decision", it was also clear that the use of DDDM processes in schools was considered as important, but not the sole factor in a decision process. Many respondents argued that as the decisions were being made about students, the human element of teacher experience, understanding and knowledge of the student should also be considered as another influencing factor in any decision process. In particular, School 2 argued that the human instinct must combine with the interpretation of data, and School 7 took the position that if the "Right" data is collected, then its analysis must be done by competent professionals to make "Appropriate use of the data", suggesting that the information produced must then be subjected to another process of deciding on the application of that information, a process which may involve human interpretation as opposed to numerical analysis.

Interviewee B supported this cautious approach to DDDM usage with his comment that a set of numbers does not necessarily tell the complete story about a student, and that one must never forget that a student is an individual with their own set of experiences and personality. He referred to the use of "Fuzzy logic" and "Secondary data" as being important features to be utilised in a decision making process, features that rely on human instinct and experience as opposed to numerical data points or measures.

Several authors confirmed the importance of using information to assist or support the decision making process, rather than relying solely on information to dictate the decision process. Shen and Cooley (2008) warned against relying solely on data analysis to create solutions for issues in schools. They referred to the process of relying solely on data as being similar to sticking a band-aid over the problem and potentially ignoring the root cause or factors involved in an issue, thus implying that data analysis must be combined with other factors if the problem being faced is to be successfully understood and resolved. They clarified this process by writing that data analysis should be used as a "Diagnostic tool" within a "Problem solving mode" (p. 325). Reeves (2004, as cited in Shen & Cooley, 2008), allowed that data is the "Nexus among these dimensions" (p. 320) of decision making in the striving for school improvements. Boyer (2009), Williams (2008),

Shepherd (2001) and Owens (2004) all indicated that effective DDDM processes are processes which involve people coming together to discuss the information, a "gathering around" of people to interact and discuss. The process of data collection and analysis to produce information about an issue is a key and potentially major component of any decision process, but the writers state that it must not be seen as the only stage in the process, and that the information itself should not be the final decision.

Williams' (2008) comment about involving different parties in a DDDM process alluded to potential parental or student involvement. However, there was strong support in the interviews that the influence of the group of parents may need to be tempered. It is noted that the reality of the reliance on parents to pay fees to ensure the economic survival of the institution may often result in a satisficing decision as opposed to the best decision; a fact that was specifically mentioned by Interviewee A and C, and alluded to by Interviewee B. Interviewee A mentioned that the challenge of enforcing a potentially difficult decision reached through a DDDM process may be resolved by presenting the decisions to parents as a choice or recommendation rather than a reasoned and rationale decision. Further, Interviewee B talked about holding "difficult decisions" with parents around issues such as class setting, and Interviewee C mentioned that sometimes data produces results which can't be shared with parents because of the negative implications of them. Whilst there is a theoretical base for parental involvement in the DDDM process, economic reality may hinder the adoption of DDDM processes rather than be a basis for the direct rejection of it because of philosophical reasons.

To summarise the key points around this issue, the support for, and understanding of, the value of DDDM processes must be generated by the SMT, a situation that is developing in some schools but not all. The findings show that whilst there is not universal support for DDDM processes, there appears to be a growing awareness of its potential within schools. However, through all the findings and much of the literature, there was strong support for the concept that in any decision making process, one must also involve a range of affected parties in order to consider the implications of the information, and how that decision may impact on students, staff or others. In order to achieve acceptance and sustainable change through DDDM processes, the balance of information and human instinct is the prerogative of the decision maker, but both aspects must be considered.

5.3   Staff attitude and resistance towards changing current practice

The issue of staff resistance to any change process having a marked impact on any change initiative is one that appears in a lot of literature. The willingness to change and adopt new practices can prove to be a threatening and insecure position for a teacher to find themselves, especially when implementing DDDM processes where there is the potential for in-depth analysis of teacher work product through the recording and analysis of student assessment results. Earl and Katz (2008) state that generally staff are not implementing DDDM processes to improve their teaching practices, whilst Williams (2008), Hargreaves and Fink (2006), Robertson (2007) and Scott (1999) all allude to the difficulties of implementing any change initiative.

Interviewee C proposed that the absence of the use of data analysis in his school was being caused by the fact that teachers were very settled into their methods of teaching and did not value the possibility of change. Whilst Interviewee C stated that he attempted to illustrate the need to adopt other procedures or processes with the combination of an analysis of numerical data of student performance and information gathered from current educational literature, he felt that the teacher's personal interpretation and satisfaction with their performance would override any attempts to change them. Also, Interviewee C stated that staff inertia to change caused the cessation of the use of YELLIS in his previous school because staff deemed it as not only a way to measure student performance, but that it could be construed as a tool to measure staff performance and thus became a threat to their job security.

School 7 gave a clear statement alluding to a potential resolution of this issue when they stated that while systems exist, they are not being used in the manner that they were designed to be used. Interviewee's C position that teachers are loathe to change because it would mean altering their current practices is supported by Robertson's (2007) comment that the "Disengagement with old structures and ways of knowing" (p. 111) is a requirement of implementing change and improving performance. Wayman (2005) suggested that a collaborative group process is perhaps the most supportive and suitable approach to any data analysis because it can remove the feeling of isolationism that may be experienced by staff offering up their work product for analysis. Further, Wayman also makes it clear that there is a responsibility on school leaders to model data use and establish procedures that protect and encourage staff to trust the processes being implemented.

5.4   The validity of the data collected

Ensuring that the data entered into an analysis process is valid and truly reflects current practices and levels of achievement is a challenge in any DDDM process. Kruze (2000) made the point that the most vital step in any data analysis process is the attention that is paid to how the data enters the process and how it informs on the teaching practice. This challenge is related to the issues surrounding a staff member's willingness to expose their work product to analysis as well as the issue of ensuring that the assessment process itself is valid and measures the student's true performance. The process employed to conduct the assessment, and the objective grading of the assessment products, is an area of potential concern raised by both Flowers and Carpenter (2009) and Bowers (2009). Some schools were using external assessments such as IB and Cambridge examination results as databases which would potentially minimise these issues of process and objectivity.

Although there are a myriad of data types (Shen & Cooley, 2008) that could be measured and analysed, it is vital that whatever is recorded presents the truest picture possible of the performance being assessed. Interviewee C mentioned this potential blurring of detail when he expressed concern that it is difficult to get precise and specific information on his students. Although a lot of schools mentioned that they recorded aspects of pastoral or behavioural data, School 4 and School 7 expressed concern that only quantitative data was being used for analysis, while School 7 went on to admit that qualitative data was not considered as important.

5.5   Lack of time or processes to collect and then analyse data

The question of staff having time available to enter data, analyse the data and consider the information resulting from the analysis, was a common issue raised in the literature, the questionnaire and the interviews. Kadel (2010) wrote about the teacher's need for real-time information in order to impact on their teaching practices and Shen and Cooley (2008) mentioned needing "Ample time" when conducting data analysis. Interviewee B mentioned the clash of interest caused between trying to teach at the same time as endeavouring to manipulate data, and Interviewee C indicated that he doesn´t have the time to enter data and run his

department at the same time. Further, five questionnaires mentioned the time required to up-skill staff in the use of IT based DDDM processes was generally non-existent.

The lack of time available to collect and analyse data is a practical issue that may be resolved with a user-friendly data collection system, according to Shen and Cooley (2008) and Robertson (2007). It was acknowledged in all questionnaires and interviews that teachers are very busy and experience many demands on their time, therefore any tasks that they are required to do must be efficient and easily accessible. The issues surrounding the collection of data are very similar and intertwined with the issues and challenges relating to the use of the IT systems, so will be discussed in more depth in Chapter 5.6, but the broader issue of time availability is relevant and can negatively impact on any successful process. In the questionnaires, it was mentioned in three school's responses that the availability of time to reflect on the information produced is not always available and thus is potentially limiting the efficiency and effectiveness of any data analysis process. In Interviewee A's comments, it was mentioned that the YELLIS process of generating data, which gave information about student performance benchmarks, was queried and challenged because it was not a requirement for university and therefore took time away from more specific and targeted activities. Interviewee C was also very clear in his comment that data entry and analysis would consume a lot of his time whilst Interviewee B discussed the time factor needed to undertake the process of decision making around the setting of classes as well as needing to hold "Complex conversations" with parents and staff to explain the rationale supporting the decision made.

As a succinct summary, it is clear that if DDDM processes are to be truly efficient and effective, then time must be allocated to the groups involved their use.

5.6 Barriers and challenges to the use of IT in DDDM processes

The use of IT processes to record data was common practice throughout all schools responding to the research study. Direct access to computers for teachers was also common, as was the use of some form of a MIS in every school. This finding is consistent with the literature which indicated that the ready access to IT technologies should allow teachers the ease of rapidly entering and analysing data generated within their classrooms, potentially creating real-time

information which can impact on their teaching practices; this feature is mentioned by Kadel (2010) as being very important to improving the educational journey of students. Also, Wayman (2005) wrote about the potential efficiencies allowed through use of technologies, and Robertson (2007) stated that her findings indicated that there existed a strong reliance and link between student success and IT systems.

However, the reality exhibited in the questionnaire and interview findings showed that the adoption of IT systems to support DDDM processes presented issues and challenges relating to either the physical challenges of software and hardware, or to the influence of staff willingness (or otherwise) to adapt to new processes and practices.

The initial and overriding challenge to implementation and support of IT use in general appears to be one of budget. School 1 mentioned budget as being an issue to any IT implementation program, and School 7 acknowledged that it was only due to substantial budget allocations that many of the potential issues and challenges were avoided or resolved. Interviewee B spoke about budget implications when discussing existing programs, and summarised it with the comment that although solutions to any issue or challenge exist, the amount of funding available for the solution dictates the level of resolution.

Software issues were focussed on concerns over the requirement that whatever program was implemented to record the data, it needed to be user-friendly. 'User-friendly' could be clarified as ensuring that the program was efficient and easy to use, that it was accurate in the reproducing of data recorded, and that it provided rapid analysis of the data or the production of information based on that analysis. Wayman (2005) wrote that systems need to aid teacher development, and Shen & Cooley (2008) developed the particular aspects of "data warehousing and analysis capabilities" and a "dashboard showing critical 'vital signs' of a school" (p. 323) as being necessary elements to eliminating potential inefficiencies within a system.

An issue related to software was the expression from some respondents that they felt their system wasn't being used to its full potential. This was reflected in comments during the interviews in particular, suggesting that whilst a system was in place, its usage was at best limited due to a lack of training or confidence development in the system for staff; a failure by the software providers to clarify functionalities; and / or a lack of understanding in the possibilities offered by a system

within the SMT. Interviewee A mentioned that while staff buy-in to the system was initially very positive and supportive, the lack of understanding and drive within the SMT of the system's full potential has severely limited its usage. Interviewee C commented on the lack of training as being a limiting factor, and he mirrored Interviewee A's comments that a limited understanding of the potential of the system within the SMT was slowing the implementation and acceptance of a MIS. School 3 mentioned that regular "Gremlins" in the system, as well as users needing good Excel spread sheet skills in order to analyse the data inputted, limited the potential uses of their system. School 7 stated simply that there needed to be better usage of their current system by staff.

Six respondents to the questionnaire highlighted the feature of inefficiency within the system by mentioning features such as the excessive support required to maintain the system's operation, or the stress caused by limited access for users. Wayman (2005) mentioned that IT systems should "Make a teacher's day better, not worse" (p. 301), and Robertson (2007) wrote about "Adequate systems support at all levels of planning" (p. 120). Whether the system was a commercially packaged system or a home grown product, the aspect of immediately available support when the system broke down was a major concern. For home grown products, on-going maintenance usually required large teams of staff whilst commercial packages that were supported at a distance often resulted in support that may take time to be delivered creating frustration and developing a lack of trust in the system.

These findings revealed barriers to the easy use of systems caused by features such as the fixed number of user licences which limited access to the system, or creating levels of access to the data analysis. These limitations created concerns and frustrations and fail to achieve the desired results mentioned by Wayman and Roberts. Capping the number of users was usually related to budget constraints when purchasing a commercial MIS. Often a limited number of user licences were purchased which meant that during high user demand periods such as report writing or end of term grade entry, teachers were not being afforded immediate access to the system, which didn't help with the efficient use of their time. Limiting access to the information generated from data analysis was mentioned in four questionnaires, and generally meant that unless staff were interested in and requested the information from data analysis, it wasn't shared with them. By not seeing the results of the data analysis, teachers are being deprived of the opportunity for

feedback on their teaching practices, and thus feedback is not happening in real-time, as suggested by Kadel (2010). Further, seven out of the nine schools commented that they saw teacher access to the data analysis as being an area of future development and opportunity, with School 4 in particular stating that it would be interesting for staff to have access to this data in order to be able to review their teaching.

Challenges relating to physical matters revolved around ensuring that staff had access to computers that were operational and available when and where the teachers needed them. Further, the reliance of schools upon IT technologies to record and analyse data was seen as an issue. Power outages, lack of bandwidth or internet speed, and the varying capabilities of machines and programs were all mentioned in both questionnaires and interviews as issues or challenges to developing successful DDDM processes. Interviewee C highlighted issues such as lack of bandwidth, and Interviewee B specifically discussed the problems created by having different resources on one site when he mentioned that by having differing operating systems within the one school, some staff were not able to even open documents sent out by the SMT. Five questionnaires also highlighted the reliance on IT technologies and the potential hazards outlined above as being a weakness of IT usage within DDDM processes. However, as two of these schools had also expressed a lack of support for the use of DDDM processes, by making these statements they could be seen as supporting their argument against DDDM rather than outlining a specific issue against the use of IT technologies.

Staff-related issues in this study centred on either the resistance of staff to change, or the digital immigrant scenario where staff members are being required to operate in a medium within which they are potentially not highly skilled and therefore not completely comfortable. The inertia of staff to any change initiative has been covered in Chapter 5.3, but the particular issues of operating in a digital environment were expressed in three questionnaire responses and two interviews. Terms such as "Resistance to change" and "Technophobia" appeared in responses as describing issues with staff using IT systems, mirroring Williams (2008) "digital immigrant" (p. 301) nomenclature, and School 7 specifically mentioned the example of the teachers initially challenging IT usage in DDDM process and querying its relevance in their teaching programme.

The focus of staff development should be targeted at improving instructional practice or bettering student learning according to Matheson and Harris (as cited in Black & Armstrong,

1995). It was mentioned in all nine questionnaires that professional development in the use of IT tools was occurring, with many focussing on developing a base level of ability in IT in all staff and thus raising the skill levels of digital immigrant teachers. However, staff development training in the appropriate use of IT to support DDDM processes was not a feature of any questionnaire or interview response.

In terms of resolving the issues of hardware, software and staff development, School 7 provided a model of school management and corporate support. The response from this school mentioned that having a collaboratively developed ICT strategic plan for all school bodies ensured that adequate funding was allocated for the purchase of hardware, software and staff development which provided for the implementation and on-going support of IT programs, resulting in the solving or elimination of many of the issues experienced at the other schools.

In conclusion, the major challenge facing any IT based DDDM process is one of ensuring that staff have immediate access to, and have developed a level of comfort in, using an IT system that is efficient and accurate and within which users can record data with a high degree of confidence and then be provided with real-time access to analysis information. If this type of MIS system is not available and fails to support the teachers in their data management processes, then the reluctance of staff to change, or lack of comfort in the digital world will potentially overwhelm the use of IT supported DDDM processes.

5.7   Summary

The issues and challenges mentioned in this chapter are not always discrete and can impact on each other. Staff who are reluctant to have their teaching practices measured, challenged and potentially be asked to change, may enter data that is not valid, complain that there is no time to measure and enter accurate data, or state that as the IT system is not efficient, it is therefore not worth using. Another situation that may arise is one where the SMT dislike the information generated or are not comfortable using it to make decisions for fear of negative parental reaction resulting in the possible withdrawal of their children from the school and thus the loss of an income stream. School managers then, in implementing or utilising DDDM processes within a

school environment, may possibly need to face a combination of some or all of the six issues mentioned above, and strive to resolve them.

In the concluding chapter of this thesis, these six issues will be grouped into two broader categories – People Related Issues and Systems Related Issues – from which a set of conclusions will be presented, and recommendations for educational managers who perceive the value of utilising DDDM processes in assisting them to ensure that their decision making reaches higher levels of acceptance and transparency, will be offered.

Chapter 6   Conclusions and Recommendations

The six issues and themes discussed in Chapter 5 can be broadly grouped into two "categories" (Bryman, 2008, p. 544), namely, people related issues and systems related issues. People related issues are the issues and themes discussed in Chapters 5.1 – 5.3, featuring either the lack of understanding about how DDDM processes work and the potential of DDDM processes to positively impact on school operations, or the reluctance of staff and management to incorporate DDDM processes within pedagogical practices. Systems related issues are those issues and themes discussed in Chapters 5.4 – 5.6, and are aligned around the school operation and IT infrastructure available to support DDDM processes. These categories reflect the "The will to do so" (staff adapting to new processes and practices), and the "Empowerment" (relating to hardware, software and school structures) that Wohlstetter et al (2007, p. 240) wrote about when discussing the implementation of DDDM processes within schools.

6.1   People Related Issues

6.1.1   People Related Issues – Conclusions

The focus of any DDDM process must be on making decisions to improve a student's educational journey. Hoy and Miskel's (2008) comment that "Better decisions are likely if the decision makers are vigilant; that is, they search carefully for relevant information, assimilate the information in an unbiased manner, and then evaluate the alternatives before making a reflective choice" (p. 346), supports Hargreaves and Fink's (2006) statement that "Sustainable improvement depends on successful leadership" (p. 1), and summarises the lead role that managers must adopt in the decision making process. Management support and commitment to the implementation of processes of decision making based on data analysis rather than anecdotal evidence, staffroom gossip or teacher experience and mind set, are vital elements of DDDM processes which also require corporate direction and funding if they are to be successfully and sustainably implemented. In order to ensure the formalisation of the adoption of DDDM processes, the creation of a school wide strategic plan outlining why and how DDDDM processes are being applied appears to be a vital step in the implementation of DDDM processes. The success of creating a strategic plan was mentioned by School 7, and its structure could follow the suggestion from the writings of Johnson and Scholes (2002) who defined a school's

Strategic Plan as being "Strategy is the *direction* and *scope* of an organisation over the *long term*, which achieves *advantage* for the organisation through its configuration of *resources* within a changing *environment* and to fulfil *stakeholder* expectations" (p. 10).

Improving a student's educational journey could involve leaders in making decisions on a myriad of areas of teaching or aspects of school operation such as the issues of benchmarking or improving academic results, tracking student achievement or behaviour, reviewing and revising learning units or curriculum etc. As there are so many different aspects or operations involved, there does not appear to be a single common DDDM process that could be applied to all of the issues as they have differing possible data-gathering processes. Thus, the implementation of DDDM processes across a school should be developed as a set of principles or guiding steps as opposed to a single operational process. Based upon Wohlstetter et al's (2008) broad definition of DDDM as "Data-driven decision-making is an effort to capitalize on information available at school level to improve classroom instruction and, ultimately, the educational performance of students" (p. 254), it can be deduced that there are two stages in the DDDM process. The first stage or principle is the "Capitalizing on the information available"; effectively the requirement to ensure that the collection of applicable and valid data is done in a timely and efficient manner so as to allow for the data to be analysed accurately and succinctly. "Improving instruction" is the second stage in which the information produced about the issue or situation is used by those involved to base their transparent decisions on, in their effort to improve the educational journey of the students.

It appeared in the findings from the questionnaires that schools who are open to the implementing or further development of DDDM processes are also schools that already have developed a culture of collaborative working groups and efficient systems of communication between teachers, management, parents and other parties within schools. Bowers (2009) commented that "Data-driven decision making has been defined as teachers, school leaders, and administrators gathering around this data to discuss student-level information" (p. 609). Schools 3, 6 and 7 were three schools who mentioned a large number of working groups and collaborative decision making processes already in existence within their schools. They then proceeded to mention a myriad of opportunities for DDDM usage in the future, a linking feature which was not so apparent in other responses. The researcher suggests that open dialogue

opportunities such as those already existing at these schools are fertile grounds for introducing or developing the concept of DDDM processes within a mutually supportive professional environment.

Further, Scott (1999) was very succinct when writing that people must drive change, and DDDM processes offer strong possibilities of "collective leadership" (Cardno, 1998, p. 108) which could motivate staff to embrace improvement initiatives. School 7 alluded to the use of data in an exercise conducted to review reading and how it led to "sharing of good practice", and six schools gave particular examples in Question 4 of various collaborative groups that have the potential to work together analysing data and implementing change. All nine schools conducted regular scheduled meetings where these conversations and sharing of ideas could be conducted, so it appears that structures are available in most schools to work with DDDM processes, and the challenge seems to be whether there is the willingness of staff to accept and adapt their practices based on these decision processes.

One feature that pervaded many questionnaires and at least one interview was the allowance that the result of any decision impacts the students and their learning. Therefore, decisions that are made need to be tempered by this understanding and therefore doesn't reflect negatively on the student. Whether the participants in a decision making process are cognisant of the impact of that decision on the economic reality of fee-paying parents, the fears of a teacher to expose their teaching habits and student results to scrutiny, or the digital immigrant status of those attempting to analyse and understand the results of a data collection exercise, it is imperative that the decision makers understand that people are impacted by any decision making process. It is desirable that all parties are professional in their actions to ensure that the impact of any decision always results in positive actions towards the student and that it improves their educational journey.

One of the biggest challenges to any change initiative is the reluctance of staff to change their practice. Hargreaves and Fink (2006) wrote that changing teacher practice is extremely difficult, a fact that all three interviewees mentioned. The essential factor of DDDM processes require staff "To view their craft and their students' learning through the information lens" (Wayman, 2005, p. 301) and it is in creating a way for this to occur that management may face resistance from their staff. Professional development is clearly an essential element in minimising this

reluctance, but this provides a variety of challenges as outlined in previous chapters. The key elements of the development appears to be in increasing staff understanding of both how DDDM processes work, and why they can improve school performance.

6.1.2 People Related Issues – Recommendations

Based on the literature and findings from the research there appears to be strong support for the following steps to be taken by senior management if they wish to create the sustainable adoption and use of DDDM within their school.

The foundation appears to be a clearly stated and strongly supported Strategic Plan which has been created by a management team that leads by example in demonstrating an understanding of DDDM processes. The management team must also display a willingness to accept and implement the results of the processes in a transparent manner. Combined with the creation of a Strategic Plan is the aspect of a staff development programme which is aimed at building the why and how of implementing DDDM processes.

Another vital step is the creation of collaborative working groups or the adoption of existing groups across the school, to be involved in both processes of collection and analysis of data, thus endeavouring to ensure that staff and other parties are involved in the discussion and implementation of decisions.

If managers understand the potential value of DDDM processes, then perhaps the best approach to ensuring how these barriers are to be overcome would be to conduct their own data gathering and analysis exercise into the applicability of utilising DDDM processes in their school, modelling DDDM processes even as they are implemented.

6.2   Systems Related Issues

6.2.1   Systems Related Issues – Conclusions

DDDM provides a process for robust and transparent decision making, but for DDDM processes to work successfully there are several factors that must exist to support the processes. An IT based MIS which is efficient and aids a teacher or manager in their data recording and management processes is a required component of DDDM, as is the time available for staff to utilise that system and assess the information produced. The key operational feature of any system is the requirement of ensuring there is ready access into the system, and that it is easy to use for both staff and management. The process of data entry into an MIS is crucial as, if staff members fail to record accurate and complete data, then the initial step in the DDDM process is flawed.

The intangible barrier of encouraging or requiring staff to use IT technologies is huge. Whilst efforts to overcome the barrier of general IT skill levels are being attempted through a myriad of staff development programmes, supported by the development of user-friendly and appropriately relevant resources, there may be an another undermining factor working against successfully removing the barrier of staff reluctance to usage. This factor is the one fuelled by the observation that many staff and management are still to be convinced of the value of DDDM processes and their useful application to teaching programmes. Recognising this factor is supporting the reluctance of staff in using IT resources in any DDDM process, provides some understanding of the issues, and therefore generates potential solutions.

The availability of time is a resource that is a vital element within any DDDM process. Staff require time for data entry; management need time for analysis of the data; and relevant groups need time to consider responses and to make decisions based on the information generated.

There appears to be a direct correlation between management focus on the value of DDDM processes and the budget allocations to support its implementation and integration. It is an unavoidable fact that IT systems form the backbone of school operations in the 21st century. The adoption of existing MIS systems to include the ability to support DDDM processes is technically possible with both locally developed and commercial options that are available for schools. Further, some training opportunities do exist, albeit often limited, to courses run by the

company providing the software or on-site experts. Finally, infrastructure challenges and limitations can be overcome with careful planning and cooperation with the appropriate parties, such as power suppliers and internet access providers, being involved.

6.2.2   Systems Related Issues – Recommendations

The recommendations provided for in this category focus on two matters, namely finance and time allocation. These recommendations are primarily aimed at senior management and school boards as they provide and manage the financial resources of a school, although some of the technical issues may be answered through referring to suitably qualified people within the organisation

If a Strategic Plan has been developed which provides a strong understanding and focus on DDDM processes, then budget allocations should be made to support the process. There is the requirement of financial investment into providing the IT infrastructure needed for DDDM processes, and these allocations are not usually small amounts. When purchasing a commercial MIS package or creating a site-based system, there are both systems and technical issues to consider. Systems issues are those that allow for the ease of data entry and the production of information from the data analysis. Technical issues which need consideration are those relating to the availability of access to hardware for staff, the supporting infrastructure of intranet and internet capabilities (bandwidth, power supply etc), and the ensuring of adequate help and support for the systems operation, be it internal site experts or external commercial help desks and online support. These aspects are all features which must be considered and maximised within budgetary constraints if there are to be suitable and adequate IT tools available to support DDDM processes.

The second issue for budgetary consideration is the aspect of time allocation. Time must be allocated for professional development and for all stages of the DDDM process. Professional development incurs costs in terms of both providing suitable trainers as well as the taking of staff away from their core business of teaching. It has been shown that professional development is a key element to the successful and sustainable implementation of DDDM processes, so it must be budgeted for.

The issue of time allocation for data entry, analysis and discussion is also a factor that the researcher recommends allocation of funds be allotted to. Whether the funding occurs in the form of internal administrative support, timetabled periods for staff to both record data and discuss the information produced, or even sub-contracting an external agency to collect and analyse data on a particular aspect of school planning, the availability of time is a major issue to consider and budget for.

6.3   Limitations of this research

All research suffers from limiting aspects. Miriam (1998) warns that due to the nature of case study research, there are potential shortcomings and "certain limitations in its usage" (p. 246). Three areas are highlighted below could potentially be construed as allowing either simplification or exaggeration to occur, and therefore providing some limitations to the research conducted.

The data collection for this thesis was conducted over the period from April 2011 until March 2012. For reasons of economy, time and functionality, (a problem specifically mentioned by Miriam (1998) that "a researcher may not have the time or money to devote to such an undertaking" (p. 246)), this research processes relied upon the professional integrity of the respondents to ensure that their written and verbal responses truly reflected current practice in their schools. As I was unable to adopt an "auditing approach" (Bryman, 2008, p. 378) by observing procedures and processes within schools, the question is raised as to the whether the responses reflect actual practice, or if the responses reflected the singular viewpoint of one member of the process whose position in the organisation may have biased their understanding. By utilising a triangulation approach of both questionnaire and interview, this question of validity was potentially somewhat mitigated, but as the interviews were conducted with people from schools in one city, there still exists a degree of doubt over the validity and authenticity of the questionnaire responses, especially from the schools outside of that city. As an aside, this point is made from a purely academic viewpoint as there is no desire whatsoever to cast any doubt over the professional integrity of any of the respondents, and indeed, the researcher is extremely grateful for their willingness to expose their views to analysis.

A second potential limitation in the research was the fact that a Case Study approach was used on a comparatively small sample, namely nine schools, or 21% of the 42 schools affiliated to the LAHC. It is almost impossible to determine whether this sample was large enough to reflect actual practice throughout the LAHC, an organisation that contains schools from throughout the length and breadth of South and Latin America. However, Merriam (1998) allows a degree of freedom for the researcher to decide on this issue with the comment "The investigator is left to rely on his or her own instincts and abilities throughout most of this research effort" (p. 246). Based on the researcher's own experiences, observations and conversations with other educators, his instinctive belief is that the responses received do reflect much of the range of current practice in schools throughout this region.

A Literature Review was conducted as part of this research but as already noted in the Chapter 1 Introduction, there is a paucity of academic research into international schools in South and Latin America. Therefore, most of the literature reviewed and quoted from is based on research conducted outside this area, and thus its applicability to the situations that LAHC schools operate under could be questioned. Hart (1998) defines a thesis as being a document which "Must say something that is based on existing knowledge, developing that knowledge using reasoned argument, sound evidence and a critical and reflexive stance" (p. 172). This thesis has developed some knowledge based on sound evidence in a critical and reflexive stance, but the basis of existing knowledge surrounding DDDM as it relates to South and Latin American international schools is almost non-existent. However, the researcher is comfortable with applying externally gathered knowledge to LAHC schools because the mandate for the formation of the LAHC mentioned "A network of schools of British inspiration", thus clearly stating the desire for schools to be modelled on British influences and hence allowing for the infusion of these external influences and practices into their operation.

6.4 Opportunities for future research

Throughout this process, several directions and opportunities were assessed that could serve to provide grounds for future research into DDDM processes. In no particular order, these are as follows.

Adopting a form of mixed methods approach to the research involving some forms of quantitative analysis to gain a measure of exactly how much satisfaction there is with current decision making processes, measures of time spent in these processes, and numbers of people involved etc. Balancing quantitative measures against qualitative research findings may provide leaders with a stronger base of support and specific cost implications for implementing and supporting DDDM processes, as well as assessing how successful and sustainable the decisions made using DDDM processes were.

The thesis researched DDDM processes as they operate within schools, but didn't specifically look at the data sets that DDDM may be applied to. Investigating how the types of data sets mentioned by Shen and Cooley (2008), namely "(a) demographic data; (b) perceptual data; (c) student achievement data (both formal and informal); and (d) school process data" (p. 322), may be analysed, and the interaction between these sets of data is a potential area of future research

Finally, future research could be developed into the areas of appropriate staff development programmes focussing on DDDM processes as well as the analysis of IT systems that support DDDM. These programmes need to build an understanding of the capabilities and potential rewards of DDDM processes, as well as featuring elements of professional development in the areas of IT program usage. The analysis of IT systems is connected with the professional development initiatives as these systems must support the analysis of data, and therefore provides the tools for the professional development training to occur.

6.5   Final conclusion

Creating processes to eliminate poor decision making was the initial focus of this thesis. The existence of data and the ability to record and analyse it is unquestioned. This thesis has endeavoured to show that DDDM processes provide a tool that can be implemented to ensure that robust and transparent decisions are made. However, the wisdom required of a manager appears to be in managing the balance between adopting the course of action suggested by the information generated from DDDM, and its human cost and implications.

This thesis will finish with a Maori proverb, the concept of which must form the background wallpaper to all school managers actions and decision making if they wish to build credibility with their staff, make wise and sustainable decisions, and enjoy the support of those whom they have been given the opportunity to lead.

He aha te mea nui o te ao	*What is the most important thing in the world?*
He tangata	*It is people*
He tangata	*It is people*
He tangata	*It is people.*

(http://www.hetangata.com/what-he-tangata-about, downloaded 1/5/2012)

Losing sight of this simple truth will potentially negate any gains or improvements that school leaders, whose essential role is to lead and manage people, can hope to achieve through utilising DDDM.

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Appendices

Appendix A: Written Questionnaire

Unitec
N E W   Z E A L A N D
Te Whare Wānanga o Wairaka

Questionnaire

Investigating the use of Data Driven Decision Making (DDDM) for pedagogical decisions in Latin American bi-lingual international schools.

Thank you for agreeing to participate in my research project on the above topic. I understand that your time is precious and so appreciate the time you will take to voluntarily complete this questionnaire. Please answer the questions in the text box spaces below each question. If you need more space, then feel free to use extra paper.

In order to preserve the confidentiality and anonymity of your responses, can you please return the completed form to me following either of the two processes outlined below

1. Complete the questionnaire in either hand written form, or electronically and printed in hard copy and then hand the hard copy to my Headmaster, Mr Derek Pringle, at the LAHC Conference in Lima, Peru on May 4 – 7. He will then pass the package of completed responses to me on his return to Buenos Aires, without indicating who had completed which questionnaire.

OR

2. Send the completed questionnaire as a PDF or electronic file to my secretary, Miss Florencia Vulcano at florencia@stgeorge.org.ar She will download and save the file, then send it on to me in a clean email, so I have no track of who sent the original email. After sending me the clean email, Florencia will then delete both the original email and the saved file from her computer.

Questions.

1. What do you understand the term Data Driven Decision Making (DDDM) means?

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2. What types of data relating to students are generated in your school?

3. How is this data used to make pedagogical decisions? Pedagogical decisions are those which relate to the educational processes of students ie setting of classes, choosing of subjects, planning of courses and lessons

4. What collaborative steps or methods are taken in your school to make pedagogical decisions? Please give examples of how these work.

5. How much is data used to direct and predict the student's future? Please explain your answer.

6. Are there any other potential opportunities for data that has been generated relating to students, that you would like to see being used in your school?

7. Please give examples of how staff can record and / or access data that both they and other staff generate on their students

8. How organized and accessible is this assessment data to all staff members who need to use this data to make decisions on student's progress?

9. Does your school have an IT based student data base system in operation? What are its strengths and does it have any weaknesses?

10. How much use is made of IT resources by teachers in the decision making processes? Could more use be made of IT resources in this process? If yes, please explain what you would like to see being done by staff; if not, what strengths do your staff display?

11. Please describe any professional development programs you have undertaken to improve your staff's IT skills and understanding.

12. What are some of the barriers you have experienced in developing IT resources and professional development programmes in using these resources?

13. Why do you consider it important to have a high level of knowledge in using generated and / or assessment data to make pedagogical decisions within the staff body?

Once again, thank you for your time and expertise in assisting me with this research project.

Regards

Chris Gregory

Appendix B   The Interview Schedule

Interview Schedule

Name of Interviewee	
Date of Interview	

Title of Project:

Investigating the use of Data Driven Decision Making (DDDM) for pedagogical decisions in Latin American bi-lingual international schools.

Introduction Blurb.

Thank you for voluntarily giving up your time to assist me in my research project.

Please complete this consent form now for me. *(present consent form)*

Questions	Interviewer Prompts
Wyman (2005, p. 296) suggests that "Schools are data rich … but information poor". Does this statement model your school? Please explain your answer	
How do you make decisions about the best possible educational journey for each student against a back drop of potentially conflicting requirements placed on schools by parental expectations, staff experiences and skills, government initiatives and other externally mandated reforms and requirements?	

How much do you, as a leader and decision maker, allow others to assist you in making decisions that aim to help the students to meet their goals –please give some examples of these decision making processes ie what parties are involved, how much say do they have and much democracy is involved	
How do you use data to make an optimum decision rather than one which is simply "satisficing – that is, finding a satisfactory solution rather than the best one"	
Do all your teachers have classroom access to a computer? How much use is made of assessment data by your teachers to improve classroom practice?	
Please take the time to elaborate on your answer to the previous question discussing strengths, weaknesses, barriers to implementation and any other factors you feel may be relevant.	

Appendix C   Information Sheet for Participants

St George's College

Guido 800, B1878IIP

Quilmes, Buenos Aires

Argentina

25 March, 2011

Information for Participants

Title of Project:

Investigating the use of Data Driven Decision Making (DDDM) for pedagogical decisions in Latin American bi-lingual international schools.

My name is Chris Gregory and I am the Deputy Headmaster – Academic at St Georges College, Quilmes, Buenos Aires, Argentina. I am a New Zealander who is also currently enrolled extramurally in the Master of Educational Leadership and Management degree programme at Unitec Institute of Technology in Auckland, New Zealand. The final, and most substantial, portion of my degree programme involves writing a thesis on a subject of my choice. The topic that I have chosen involves a research project for which I have gained Unitec Research Ethics Committee approval and the approval of your Headmaster to approach you to assist me in my research.

What I am doing.

The aim of this research project is to find out about the use of data within the pedagogical decision making processes in schools. By taking part in this research, you will be helping me gain an understanding of what structured decision making processes are employed, how much use is made of the data available in schools and what are the barriers to more use being made of data to guide the decision making processes in your school and in the broader context of Latin American bi-lingual

international schools. I am more than happy to share my findings with you and will potentially present them at conferences and workshops after I have had my thesis approved.

What it will mean for you

I request your participation by completing a questionnaire that should take around 30 – 45 minutes. If it is suitable and realistically possible, I may then follow up your questionnaire responses with a recorded interview of around 30 minutes where I will ask you to expand on some of your answers and responses. The interview will be transcribed (typing the conversation out) later and a copy will be sent to you for checking. You are free to ask me not to use any of the information you have given. Note that both the questionnaire and interview will be conducted in the language with which you are most comfortable and feel you can best express yourself in.

Confidentiality

Please note that all ethical principles will be observed during my research and were outlined in depth as part of the ethics approval application. These principles are as follows

- informed and voluntary consent
- respect of rights and confidentiality and preservation of anonymity
- minimisation of harm to all participants
- cultural and social sensitivity
- limitation of deception
- respect of intellectual and cultural property ownership
- avoidance of conflict of interest
- research design adequacy

I am more than willing to specifically outline how these principles will be observed should you desire. However, I can reassure you that all responses will be treated in the strictest confidence and any identities and names of schools and participants will be removed during the analysis and reporting of my research findings.

I hope that you will agree to take part and that you will find your involvement interesting and valuable. If you have any concerns about the research, you may contact my principal supervisor at Unitec New Zealand, who is Carol Cardno, ph (++ 64 - 9) 815 4311 or email ccardno@unitec.ac.nz

Yours sincerely

Christopher Gregory

Deputy Headmaster – Academic

St Georges College,

Quilmes,

Buenos Aires,

Argentina

UREC Registration Number # 2011 – 1169

This study has been approved by the UNITEC Research Ethics Committee from 27 April 2011 until 26 April, 2012. If you have any complaints or reservations about the ethical conduct of this research, you may contact the Committee through the UREC Secretary (ph ++ 64-9-815 4321 ext 6162) Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.

Appendix D   Informed Consent Form for Interview Participants

Interview Participants Informed Consent Form

Name of participant:

Date:

Research Project: **Investigating the use of Data Driven Decision Making (DDDM) for pedagogical decisions in Latin American bi-lingual international schools**.

I have been given and have understood an explanation of this research project for the Masters in Educational Leadership and Management Programme.

I have had an opportunity to ask questions about the research project and have had them answered. I understand that I don't have to be a part of this research project if I don't want to be and I may withdraw at any time prior to the completion of it.

I understand that the interview will be taped, transcribed and translated if necessary into English for purposes of analysis. I also understand that all information that I give will be stored securely on a computer at Unitec for a period of 5 years.

I understand that everything I say is confidential and none of the information I give will identify me or my organization and further, that neither my name nor the name of my organization will be used in any public reports. I am aware that I may withdraw myself or any information I have provided for this project without penalty of any sort.

I understand that I can see the finished research document, namely the thesis submitted by the researcher.

I have had time to consider everything and give my informed consent to take part in this project.

Signed:

Name:

Date:

UREC Registration Number #2011 – 1169

This study has been approved by the UNITEC Research Ethics Committee from 27 April 2011 to 26 April 2012. If you have any complaints or reservations about the ethical conduct of this research, you may contact the Committee through the UREC Secretary (ph ++ 64-9-815 4321 ext 6162). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.