Effective Introduction and Adoption of Advanced Technology in Dubai Private Schools

مؤثرة فعالة واعتماد التكنولوجيا المتقدمة في مدارس دبي الخاصة

Raji Mubarak Olatunde

110064

Dissertation submitted in partial fulfilment of the requirements for the degree of MSc in IT Management

Faculty of Engineering and IT

Dissertation Supervisor

Prof. Mohammed Dulaimi & Dr Khalid Shaalan

April, 2013

Abstract

Education the world over has seen widespread, intensive introduction of advanced technology within it. Governments of some countries have spent billions of dollars and have continued spending huge amount of resources towards the use of advanced technology (AT) in educational institutions. AT resources now play a significant role in almost all spheres of educational institutions ranging from the kindergarten, high schools to the universities.

Just as technology has turned around businesses and organisations, making them more profitable and competitive, schools have been seen to be a prospective environment in introducing technology. In this research, a look at the reasons why governments, institutions and stakeholders in the educational sector are clamouring for the use of advanced technologies at places of learning, reasons why schools use AT is explored. AT in schools should not be only about resources or money spent, but rather the way and manner employed by schools in making best use of these resources in bringing out positive results in students.

The research focuses on the reasons why schools use AT and the challenges experienced while using it. How AT can be effectively used, the benefit derived from it and major barriers to effective adoption of AT in school is researched. This research takes an empirical exploration of AT use is some five private secondary schools in the of Emirate of Dubai - UAE. An extensive exploration of previous scholarly work on AT use in education as well as an in-depth case study research of some selected private schools in Dubai was done.

From the literature, factors found to enable effective use of AT in schools, such as availability of resources, onsite technical assistance, support of management and so forth were found. Findings from this research suggest that teachers' continuous professional development such as AT user groups, frequent training of teachers, as well as providing immediate support both technical and pedagogical to teachers play a significant role in ensuring effective AT use in

schools. When different subjects are interwoven such that they are all linked to one another also encourages teachers to use AT. Availability of resources and time to incorporate technology into teaching is required as well for effective AT adoption.

Further research focusing on teachers, which explores teachers' use, problems and challenges they encounter while using AT should be done. This should provide a balanced insight especially if the findings are added to those of this research, in order to draw up a comprehensive understanding on how AT can be effectively adopted in schools.

خلاصة

التعليم في العالم أصبح واسع الانتشار مما ساعد علي أن يكون مقدمة مؤثرة للتكنولوجيا المتقدمة. وقد أنفقت حكومات بعض الدول المليارات من الدولارات واستمرت في إنفاق المزيد من الموارد نحو استخدام التكنولوجيا المتقدمة في المؤسسات التعليمية. موارد التكنولوجيا المتقدمة تلعب الآن دورا هاما في جميع مجالات المؤسسات التعليمية بدءا من رياض الأطفال والمدارس الثانوية إلى الجامعات.

ومثلما دارت التكنولوجيا حول الشركات والمنظمات من أجل جعلها أكثر ربحية وتنافسية، فقد شهدت المدارس بيئة واعده في إدخال التكنولوجيا. في هذا البحث نلقي نظرة على الأسباب التي تجعل الحكومات والمؤسسات وأصحاب المصلحة في القطاع التعليمي يطالبون باستخدام التكنولوجيات المتقدمة في أماكن التعلم. وكذلك الأسباب التي تؤدي الي استخدام المدارس للتكنولوجيا المتقدمة. إن تطبيق التكنولوجيا المتقدمة في المدارس يجب أن لا تقتصر فقط علي الموارد أو الأموال التي تنفق، بل الطريقة والاسلوب التي تستخدمها المدارس في تحقيق أفضل استخدام لهذه الموارد في تحقيق نتائج إيجابية للطلاب.

يركز البحث على الأسباب التي تؤدي إلي استخدام المدارس للتكنولوجيا المتقدمة والتحديات التي واجهتها. البحث يتطرق إلي كيفية استخدام التكنولوجيا المتقدمة بشكل فعال، و الفائدة المستمدة منها والمعوقات التي تواجهه الاستخدام الفعال لها في المدارس. هذا البحث يدرس التنقيب التجريبي من استخدام التكنولوجيا المتقدمة في خمس مدارس الثانوية الخاصة في إمارة دبي – بدولة الإمارات العربية المتحدة. وقد تم اجراء دراسة مرجعية واسعة للأعمال العلمية السابقة بشأن التكنولوجيا المتقدمة واستخدامها في التعليم فضلا عن دراسة حالة متعمقة لبعض المدارس الخاصة المحددة في دبي.

من الأعمال العلمية السابقة وجدت عوامل لتمكين الاستخدام الفعال للتكنولوجيا المتقدمة في المدارس، مثل توافر الموارد والمساعدة التقنية في الموقع وتقديم الدعم للإدارة وهكذا دواليك. النتائج المستخلصة من هذا البحث تشير إلى أن المعلمين يحتاجون إلي التطوير

المهني المستمر مثل تدريب مجموعات المستخدمين علي التكنولوجيا المتقدمة ، والتدريب المتكرر للمعلمين، فضلا عن توفير الدعم الفوري التقني والتربوي للمعلمين الذي يلعب دورا هاما في ضمان الفعالية في استخدام التكنولوجيا المتقدمة في المدارس. عندما تتشابك المواضيع المختلفة بحيث ترتبط جميعها ببعضها البعض فهذا أدعي لتشجيع المعلمين على استخدام التكنولوجيا المتقدمة .إن توافر الموارد والوقت لدمج التكنولوجيا في التدريس مطلوب هو عامل فعال في اختيارها.

البحوث المستقبلية ستركز علي المعلمين أنفسهم. والتي ستدرس مدي استخدام المعلمين للتكنولوجيا المتقدمة والمشاكل والتحديات التي تواجهها أثناء استخدام التكنولوجيا المتقدمة. وينبغي أن توفر هذه البحوث نظرة متوازنة خصوصا إذا تم إضافة نتائج هذا البحث لها من أجل وضع فهم شامل حول كيفية اختيار التكنولوجيا المتقدمة بشكل فعال في المدارس.

Dedication

To my parents and family and to my second family, staff and students of Blue Crescent Schools, Sokoto. Nigeria.

Acknowledgement

First of all I would like to thank the Almighty Allah the creator and sustainer of the worlds for giving me the life and sustaining me throughout my stay at the British University in Dubai. Verily I can never count the bounties of my Lord and maker. It is a great pleasure and relief to be able to complete the master's program.

I have been privileged to work with almost all staff at the different faculties in the universities at one time or the other. It was a very enlightening and humbling experience. I would like to thank all those who have supported me in completing my studies at the university. Thank you all.

I would also like mention my family for their support and prayers all through my stay at the university. My Mother Adama Raji (may her soul rest in peace amin), my Father Murtala Raji, my brothers, sisters, uncles and aunts thanks for your support and care.

Finally, I would like to thank everyone who helped in one way or the other towards my successful completion of my master's program, I sincerely apologise for not mentioning your name but I really appreciate all your effort.

List of Tables

List of Figures

CHAPTER ONE: INTRODUCTION

1.0 INTRODUCTION

Several factors have hindered significant developments relating to learning process this was prior to the introduction of advanced information technology in institutions of learning. Some of these factors were financial such as the need for highly trained and motivated teachers, considerable capital outlay and infrastructure. On the other hand, some of the factors are in the ways and strategies conventional teachings take place. These include: (a) large information gap created as a result of the fact that most teachers work in isolation from one another, (b) syllabus is taught to students with hardly any reference to integrated real-life circumstances which involves the students critical thinking abilities, (c) education was reduced to a regimented routine where students merely drift from one discrete subject to another with few or no efforts to harmonise the different subjects taught. As if these problems are non-existent, after graduation, the students are ultimately expected to take various responsibilities requiring the latest that the information technology has to offer.

Recent advancements in technology and technological gadgets have spread across societies and are gradually replacing the conventional methods used. These advancements have brought about changes in societies requiring them to alter the structure of their educational systems (Aydede et al. 2009; Ozturk et al. 2011). People have experienced how technology has successfully turned around businesses; making them more profitable, sustainable, flexible and competitive in a challenging era they find themselves. The capacity of businesses to thrive in the present competitive environment is greatly enhanced by the use of these technological advancements. This is one of the reasons why policy makers and educators are encouraging schools to adopt the use of technologies in classrooms Meneses et al. (2012). Plausibly, by the utilization

of these advanced technologies, it is hoped that students of these schools where technology is being used would be able to adapt to current changes and challenges and also contribute immensely to the positive development of the society.

The extent of pressure on schools has never been greater (Chu, 2011), with governments trying to enforce higher standards in schools, parents wanting the best for their children and stakeholders calling for quality improvement in schools and a unified standard of education as obtained globally. These have called for the need to have students equipped adequately to face the numerous challenges of the world outside the classroom (Selwyn, 2003). It has been established that advanced technology is providing easier and faster education; granting students the opportunity to gain knowledge through computerized learning environments which was not possible before the introduction of these technologies (Aydede et al. 2009).

There are numerous benefits attributed to the adoption of advanced technology especially, that, it facilitates easy learning by students from teachers who have embraced using it (Meneses et al. 2012). Consequently, students would be able to learn more knowledge when their teachers use these advanced technology, which would be of greater benefit to them and the society at large. AT has been found to encourage student-oriented learning rather than the more common teacher-directed learning. AT encourages students to determine their pace of learning by, motivating them to study more (Yenice 2003 cited in Aydede et al. 2009). School organisation as a whole and teachers in particular, are tasked with the role to effectively and efficiently learn, understand, and teach useful knowledge to students (Wiig, 2000). Making use of AT within school environment makes students to be able to contextualize problems easily. AT has the advantage of presenting a contextualized view of problems to students making it easily assimilate by them. Using AT motivates and engages students capabilities making it easier for them to learn new knowledge (Zhang & Looi, 2011; Chigona & Chigona 2010) .

Project: Effective introduction and adoption of Advanced Technology Dubai Private Schools

The advantages these AT could bring is worth exploring, how it could be effectively used to bring better experience to students is required.

1.1 Research Background

The government of the United Arab Emirate (UAE) in general and that of the Emirate of Dubai in particular, is keen to provide internationally recognised and standardized educational system. The ruler of Dubai and Vice President of UAE puts it thus: "We are adamant in ensuring the highest standards of living for UAE citizens; by raising the standards of education." Mohammed Bin Rashid Al Maktoum (The UAE Government Strategy, 2011-2013, p.2). In ensuring that high standard of education in schools is achieved, the Dubai Emirate has agencies such as the Knowledge and Human Development Agency (KHDA), the Ministry of Education (MOE) which are charged with the responsibilities of providing best quality guidelines and recommendations to be followed by the various schools in the Emirates. This is in other to produce students who would stand high in the midst of other students from other parts of the world such that they are as well-equipped in facing the challenges of the society as their counterparts from other parts of the world. As part of the mission of raising the standard of education in schools, the curricula are aligned to fit with current and future requirements of the market.

1.2 Research Aim

The aim of this research is to explore the extent to which advanced technology (AT) has been adopted and how effectively it has been used in secondary schools. Thus, to reveal the level of use of these AT, we determine the motivating factors, barriers encountered by different schools in effectively adopting AT. How these schools use available AT resources they have, and how best it could be effectively used. The research shed more light on the effective ways schools use AT in their classrooms. The primary research question asked is how to improve on AT use to gain the benefits attached to

using it. That is to examine the ways AT is being used in teaching as a means of improving students' academic performances.

1.3 Research Objectives

To achieve the research aim this research has the following objectives:

1. To examine the key factors motivating the adoption of advanced technology in private secondary schools in Dubai.
2. To explore to what extent are Dubai private secondary schools adopting these advanced technologies and how effective it has been.
3. Investigate the critical factors that promote the effective adoption of advanced technologies in these schools.
4. Develop a set of recommendations that facilitate effective adoption of advanced technology in schools.

1.4 Significance

This research would help schools, policy makers and organisation with an insight into ways of implementing a successful AT project or use in schools. This is necessary to have a successful and efficient use of these technologies that would be of immense benefit to students, schools, organisations and governments. In addition, it will assist teachers to properly use advanced technology as supporting tools to the teaching-learning process. These will help improve on the ways teachers are making use of this technology in teaching which would be reflected on a better performance of students in the long run. Improper channelling of efforts and resources during implementation or use of AT of any magnitude could lead to the underutilisation of resources or wastage of efforts and resources altogether.

1.5 Research problem

The problem this research aims to resolve is the use of advanced technology (AT) in schools. The reasons why school use AT, and the enabling factors that make them use it. Also, is the problem of how AT can be effectively used in schools and the challenges teachers encounter when adopting AT is explored.

1.6 Structure of the Report

The research covered an in-depth literature on AT use in schools. It provided an opportunity to know some types of AT being used in schools and ways schools make use of it. The motivation for using AT in schools, problems encountered while using it amongst others were explored. From the literature, findings was used to define scope to be used for the research, identifying areas that have not being explored previously in AT use in school and using another method of exploration for the problem studied. Findings from the research are expected to provide a clearer picture of the motivational factors to AT adoption in schools. The common problems that schools face and how such problems and challenges could be overcome to have an effective adoption of AT in schools such that students could gain the most knowledge schools could offer them.

The research report is divided into seven chapters (see Figure 1 below) introduction, literature review, preliminary conceptual frame work, research design and methodology, case studies, discussion and analysis, conclusion and recommendations. The following section provides some description into the contents of the different chapters as stated above.

Chapter 1- Introduction

The introductory chapter of the research report provides a background to the research problem, its aims and objectives. It identifies the niche to be filled by the research. How computers and other advanced technologies (AT) have being used in organisations and have proved to be transformational tools in

businesses and organisations. This and other reasons have caused more pressure to be mounted on schools to adopt use of these technologies. Countries and schools have spent and are continuously spending lots of money for the purchase of AT resources in schools. How AT resources are used and how best they can be effectively used in schools are some of the issues raised in the introductory chapter for which answers are sought.

Chapter 2- Literature Review

Chapter two or the literature review explores the research done by prominent scholars in the fields of advanced technology use in schools. The different views and suggestions proffered on how to effectively use AT in schools. Common problems involved in AT use in schools amongst others are discussed in this chapter.

Chapter 3 - Preliminary conceptual frame work

In this chapter, the relationship that exists between the different factors and actors found to influence effective adoption of AT in schools are explored and elaborated on. These are the prominent actors that play major role in AT use in schools.

Chapter 4 – Research design and methodology

Chapter four describes the research method used in the doing the research. The type of research that was carried out, the type of data and how analysis of the data collected was done. It also describes some of the major research methods being used in research of this nature and limitations that exists within them and why the researcher choose the specific research method and accompanying data collection and analysis for the research report.

Chapter 5 – Case studies

This chapter contains detailed and extracted reports generated from interview carried out in the schools explored in the research. Five private schools in all

that use the British curriculum. The reasons behind them adopting AT use, problems encountered and how best they think AT can be effectively used among other questions are posed and reported on.

Chapter 6 – Discussions and analysis

Chapter six was used to analyse findings from the case study schools, grouping the results into useful subheadings in other to provide a clearer view of the problem investigated by the researcher. Comparisons of findings from the literature were done in this part of the research. Findings from literature review include works of earlier researchers as in chapter two and those of prominent players in advanced technology use in schools (as in chapter three) and the description of the case study which is found in chapter five are compared.

Chapter 7– Conclusion and recommendations

The seventh chapter comes as the last chapter of the report. It covers the conclusions that were reached from the findings of the research. Findings based on all the previous chapters, it also provides limits bounded by the research or limitations as well as it provides recommendations and future research opportunities that could be explored by other researchers on effective adoption of AT in schools.

```
┌─────────────────────────────┐
│             1               │
│        Introduction         │
└─────────────────────────────┘

┌──────────────────┐   ┌──────────────────────┐
│        2         │   │          3           │
│ Literature Review│   │ Preliminary Conceptual│
│                  │   │     Framework        │
└──────────────────┘   └──────────────────────┘

        ┌──────────────────────┐
        │          4           │
        │ Research Design and  │
        │     Methodology      │
        └──────────────────────┘

        ┌──────────────────────┐
        │          5           │
        │    Case Studies      │
        └──────────────────────┘

        ┌──────────────────────┐
        │          6           │
        │ Discussion, analysis of Case │
        │       Studies        │
        └──────────────────────┘

        ┌──────────────────────┐
        │          7           │
        │   Conclusion and     │
        │  Recommendations     │
        └──────────────────────┘
```
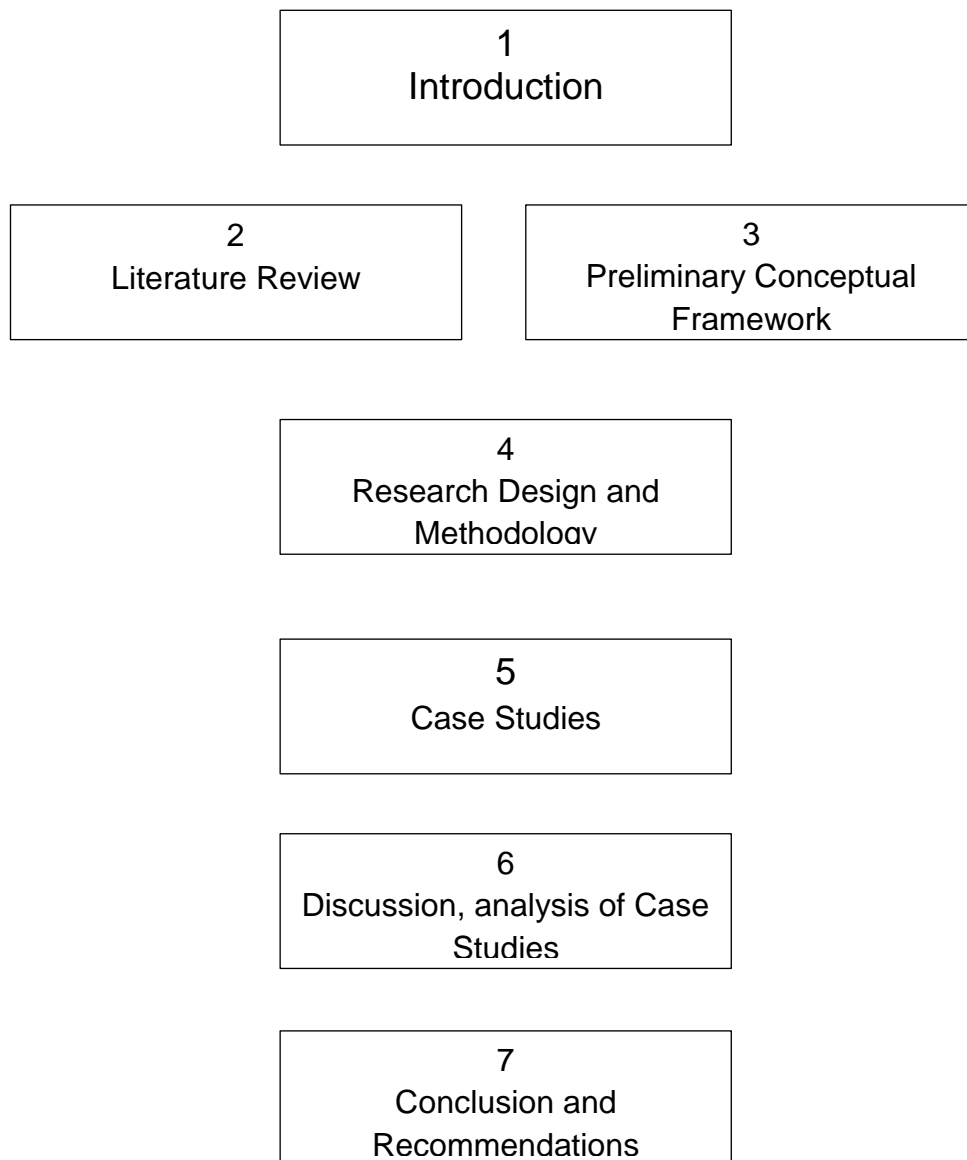
Figure 1: Structure of the research report

Project: Effective introduction and adoption of Advanced Technology Dubai Private Schools

CHAPTER TWO: Literature review

2.0 Literature review

This chapter provides a theoretical guide and background knowledge of works of previous researchers on the topic of discussion. It gives an understanding of the topic "Advanced Technology" (AT) in an educational context, this is because the term AT could be an ambiguous word depending on the scenario in which it is used. Therefore, the chapter begins by providing a contextual definition of advanced technology as used in the research. This is to make the reader conversant and build an appropriate understanding of the term within the context it is used and to avoid diverging thoughts from the milieu meant in this research work.

2.1 Definition of Advanced Technology (AT)

The term advanced technology is a word that could mean different things to different people depending on the organisation, people or scenario in which it is used; it could portray divergent meanings to the term in respect to what is intended to be conveyed if not properly understood from the perspective of the researcher. In this research, the definition encompasses any form of possibilities or combination of possibilities that could involve and not limited to computers, internet, interactive white boards, projectors, simulators, software, iPods, iPads, learning management systems (LMS) , virtual learning environment (VLE), IT and ICT gadgets (Florio, 2005; Hayes, 2007) used for teaching and learning purposes. With this description, this paper encapsulates all the above to mean advanced technology (AT) for this research.

2.2 Advanced technology in schools

Governments, schools, parents and stakeholders in the education sector are spending billions of dollars towards the purchase and introduction of AT in schools (Bonifaz & Zucker, 2004; Desjardins et al. 2001; Gulbahar, 2007;

Project: Effective introduction and adoption of Advanced Technology Dubai Private Schools

Kozma & Anderson, 2002). The ratio of student-to-computer (those who use computers as an AT resource) has increased significantly over the years (Becta, 2004). Previously, one computer without internet connectivity was used for approximately one hundred and twenty students in the 1980's. However, as at 2002, one internet connected computer was used by four students (Inan et al., 2010b). Presently, there is almost no school that does not boast of using at least one of these AT resources in one way or the other. Thus, indicating that there is generally an increase in the use of AT in schools Livingstone (2012). The cost of purchasing AT resources has dropped significantly, from thousands of dollars to a few hundreds of dollars, making it more affordable and also easily purchased (Flanagan, 2003). Sophistication, enhanced capabilities and ease of use are some of the prominent advantages that these AT have been providing over the years. For example, the latest computer could perform far more complex functions and store much more information than what could be thought of computers in the 80's.

With perhaps the indirect and direct pressures exerted on schools to embrace the use of AT, just as businesses and organisations have done; it can be argued that this is as a result of the astronomical improvement and benefit it has brought to business and companies that have used it. These improvements in the form of increased revenues, reduced processing costs, expenditures and wastages and also better services, availability and access to information as witnessed by most organisations were made possible mainly by the proper and efficient utilization of AT as a turnaround tool. Hence, if there could be such tools that bring about the much needed results for improved teaching-learning process, schools should not be left out from such benefits derived from using such resources. Because of the widely supported notion that positive change would occur in education sector such as increased students' performance, reduced duration of courses etc. In other words, students are more likely to

graduate within the stipulated time with higher grades from their studies when AT is used in teaching them.

Challenges facing students outside of school have increased over the years, modern industries nowadays require highly qualified scientists, engineers, think tanks amongst others to keep up with the growing trend of competing technological advancement in the labour market. Technologically competent personnel's in various sectors (health, economic, government, judicial, education) are required. Hence, knowledge and skills based on using AT have become a prerequisite to employment in the 21st Century. In fact, knowledge of some form of technology is needed by citizens in order to exercise their civic rights in most democratic dispensations. Citizens acting as voters will have to operate a form of technological gadget to exercise their civic rights. Payments of bills and social services purchase or sales of personal items require use of some technological knowledge or capabilities which most people are conversant with.

Consequently, it has become necessary for schools to graduate students capable of competing in a dynamic world, a world where there is a lot of information and competition, a fast dynamic world. In the heat of these challenges, this challenge has influenced schools to change the way students are taught, requiring them to adopt different types of AT resources to help in teaching. All these, the ultimate goal are graduating highly knowledgeable students that can successfully cope amongst their peers and endure the challenges of the changing world of the 21st century.

Students nowadays use AT either at school or at home (Chou, et al., 2009) in activities such as surfing the internet for assignments, sending emails and playing games amongst others, they have laptops or desktops, television sets, mobile phones and internet at home. This has helped in acquainting them with the different AT available. AT in schools include IT centres/laboratories which are sometimes called computer rooms which could be dedicated buildings

housing most of schools AT resources. Schools make use of interactive whiteboards or SMART boards in classrooms for teaching purposes Tanner et al. (2005). In addition, overhead projectors, moveable workstations, laptops, cameras could also be provided in teaching. Software's that could be used for drills, simulation and tutorials are available in some schools, registering in educational websites and so on are some examples of AT used in schools.

Of recent is the introduction of ubiquitous computing environments which has opened up numerous learning avenues providing teachers and students the opportunity to interact with experts at their convenience. Students and teachers have access to on-line resources with a combination of different media capabilities that appeal to students' curiosity. This encourages students to learn more by satisfying their curios minds. With internet, schools have access to numerous resources of online media materials. Collaboration amongst students and teachers is increased with the use of live chat and conferences which can be easily set up at very low cost if not freely available. Scanners, printers and photocopiers are some of the most commonly used gadgets which are available in almost all schools. They are used for printing question papers and preparing documents for classroom use etc. Availability of wireless technology for easy internet access and large television sets for watching documentaries have helped significantly in revolutionising the teaching-learning process in classrooms and schools in general.

2.3 Motivating factors and rationale behind adopting advanced technology in schools

Researchers have explored factors influencing the use of advanced technology (AT) in schools (Zakopoulos, 2005; Galanouli et al. 2004) .The 21st century has witnessed the beginning of an era which has never been seen before, a time when you could get information at your fingertips, so much so that you could know of current happenings in different areas around the globe by tapping on

your computer, this era is often called the internet age era. Changes have occurred in almost all aspects of our daily lives. Information technology as part of AT is used by almost every one on a daily basis, from using mobile phones to communicate with family members, friends or business partners, to use of laptop or desktop computers in sending emails or chat messages use of credit cards to purchase groceries in the supermarkets or for online business transactions. These changes have slowly crept into the educational settings and should not come as a surprise to anyone. There is a shift from the industrial revolution age to an information age where information and technology is a necessity for survival. The information age depends almost entirely on the use of technology in almost all aspects of one's life.

Reforms in educational sector are being implemented in most countries around the world; these reforms are spearheaded by ensuring that schools are adopting the use of AT (Wong et al., 2008), this is especially because AT adoption is seen to enhance learning Livingstone (2012) .The focus of these reforms is to have a future generation of citizens who can surpass the challenges of the current age, among which is the ability to search for and get necessary information. Motivation for schools to use of AT could be linked with the increasing economic competitiveness of countries, where by countries are trying to produce highly competitive and knowledgeable citizenry, reducing technology barriers or access to AT to students from less privileged families , improving classroom culture and overall students' engagement amongst others (Bonifaz & Zucker, 2004) .

Some schools use of AT claim to be exploiting the power and complexity of these resources, the ability of AT in providing complex or simple instructional process that helps enrich students' knowledge in lots of different ways (Zakopoulos, 2005). That it helps students gain a better understanding of what they are taught in the school. It is believed that learning in an active,

cooperative , rich and authentic way is fosterd by using AT technologies in the classroom (Smeets , 2005). Also, AT use could make information to be presented from different perspective , making people of different learning types to gain knowledge based on there capabilities. AT helps bridge the gap forming an intersection between the community, school and work (Livingstone, 2012) . These amongst other reasons is why schools use AT.

2.4 Advantages of using advanced technology in schools.

Researchers have explored the advantages that could be gained when schools use of AT. AT is used as a way of improving the overall students' experiences and knowledge gained from school (Salina, 2009). However, not all researchers support this view as some are of the opinion that there is no real evidence to suggest this. Nonetheless, some of the advantages as stated by promoters of AT adoption in schools are listed below;

1. Kehrwald (2010) and Afshari et al. (2008a), highlighted that with the flexibility these technologies provide, it is provides opportunities in delivering individualized learning to students. This is most usefu especially since there are different types of learners with varying abilities that require their specific learning styles to be met.

2. The use of AT like whiteboard and SMART boards makes learning easier and attractive to students as it promotes interaction and inputs from students (Beauchamp & Kennewell, 2008 & 2010). It provides a way of contributing, interacting and learning in class of students giving them the ability to gain knowledge by participation and collaboration amongst one another and with the teachers.

3. It provides a wider participation of students in learning especially students with special needs which enhances skills such as language, reading, coordination and general skills (Jelly Cited in Abbott et al., 2004).

4. In circumstances of shortage of teachers, use of AT could be used to fill the gap created by insufficient teachers (Wang & Chan, 1995). Students could be given drills and practice exercises that occupy them without the teacher being present. A larger audience of students could easily be reached such that instructions and knowledge are easily disseminated via the use of loudspeakers, and projectors.

5. By using the internet, Personal Digital Assistance (PDA), schools have been linked with homes, allowing students and teachers to be able to communicate easily. Further learning resources could be easily obtained and made use of by students and teachers at their convenience (Cox, et al., 2004).

6. The use of computer by teachers is expected to reduce burden on teachers by helping them prepare for lessons and getting up-to-date resources and sharing resources amongst colleagues.

7. By intrinsically arousing students' curiosity, AT motivate students to learn more (Salinas, 2009). It arouses their inert curiosity to learn more rather than feeling bored as it is often the case when AT is not used. AT use in the classroom engages students to transcend their cognitive limitation and helps to stimulate their constructive thinking capabilities and creativity (Loveless et al. 2006; Salomon, 1993 cited in Lim, 2007). Further advantages of AT to students are summarized in appendix C.

These are some of the several advantages or benefits that could be derived by students and schools when AT is used. Nonetheless, these purported benefits could only be enjoined when there is an effective use of these AT resources. Hence, the reason for the research of effective adoption of AT in schools.

2.5 Critical success factors and barriers to effective adoption of advanced technology (AT) in schools.

Critical success factors (CSF) as defined by Rockhart (1979), are dentified limited elements that need to be resolved for there to be a significant improvement to an organisation, department or a project. CSF could be deduced as the "few key areas where things must go right" or critical factors required for success or goal of an organisation to be attained, (Ngai, et al., 2008; Selim, 2007). By identifying the factors necessary for the success of an organisation or project, it gives one a better idea on what should be the focus of attention in the organisation or project being executed. Resources would hence, be accurately channelled to avoid wastage. Identifying the CSF eliminates or reduces to the barest minimum elements that could cause failure or hinder an organisation or project from reaching its optimum potentials. Appropriate solutions could then be easily designed and implemented when CSF are known.

In the research on effective adoption of AT in schools, identifying the CSF is therefore necessary so as to gain the benefits that AT has to offer students. A number of researchers have written on problems encountered by schools while adopting the use of AT. It is hoped that identifying these problems as it relates to schools and noticing those problems that are frequently encountered would be a pointer towards factors that need to be remedied immediately for there to be an effective AT adoption in schools. This is because the benefits to be derived from adopting AT in schools depend on how well the militating problems are identified and resolved in this case AT would be effectively integrated into teaching and learning process (cited by Mosely in Chigona & Chigona, 2010). AT use in schools is not just a matter of purchasing technologies, rather there should be a conducive environment and things working accurately such that it can be put to use effectively.

To determine the necessary factors for effective adoption and use of AT in schools, this research explores cases of previous scholars who have investigated AT adoption processes in school or in learning environments. Problems found to be hindering effective adoption are thus highlighted. Proffering solutions to these identified problems is necessary for effective and successful adoption of AT in schools. Most cases, these identified barriers are critical and need to be resolved or removed for there to be success in the effective adoption of AT in schools.

Some of CSF found to be necessary for effective adoption of AT in schools were reviewed and submitted in a report to the European by Balanskat et al. (2006), in the report, they categorized these critical factors into three levels. They are the teacher-level factor, school level factor and system-level factors. The report revealed the crucial roles teachers, school and the society at large play in having an effective adoption of AT in schools. In a related research, Bitner and Bitner (2002), found and discussed eight factors which include fear or resistance to change by teachers when it comes to implementing new AT in their classrooms, which should be overcome. Likewise, lack of interest in dropping an age long way or habit of doing things which teachers have being used to is a problem encountered in effectively adopting AT. Thus, it also calls for stronger will-power to overcome the inertia to embrace new ways that are now available.

In a related work by Groff and Mouza (2008), identified factors that require proper monitoring or CSF for effective adoption of AT in classrooms. The following factors were outlined: that step to effective AT adoption be included in educational policies of government, support of parents and volunteers are needed with adequate access to AT resources, management or leadership support and commitment to AT use is required. Availability of effective and timely technical and pedagogical support to teachers, provision of immediate

and relevant professional development, availability of community of AT users within the school and AT use plan in schools should be provided. These factors according to Groff and Mouza (2008), should be taken care of or to be given utmost attention and effort to make positive impact on them should be strengthened. In a related development, Lawson and Comber (1999), added commitment of management in both financial and otherwise should be given to AT use in schools. This is because shortage of funds or fund starvation as well as lack of morale has been found to greatly hinder effective AT adoption in schools. Summarising the CSF for effective AT use in schools as related to some major findings of the literature is provided in Table1.

Table 1: Critical success factors to AT use in schools

Critical Success Factors (CSF)	Bitner & Bitner (2002)	Robertson (2002)	Groff & Mouza (2008)	Lawson & Comber (1999)	Hoffman (1996)
Ensure training in basics	●	●		●	
Encourage personal use	●				
Availability of effective and timely technical support	●	●	●	●	●
Availability of effective pedagogical support and staff development	●	●	●	●	●
Access to AT resources		●	●		
Leadership AT competence		●			
Community of AT using teachers		●	●	●	●
Teachers are given enough time to explore, design, use and evaluate AT in classes.				●	
Management support	●				●
Teacher Motivations	●			●	
Ensure learner based enquiry	●				
Commitment and financial support of management for long term basis			●	●	●
Support of parents and volunteers			●		
Availability of AT coordinator				●	●
AT use plan		●	●	●	●

Although, identifying the CSF is very important, especially as it narrows down areas that require to be strictly monitored and given maximum attention by the organization. Identifying barriers that hinder success is also of importance since removing barriers should automatically pave way for success. Starting with Bingimlas (2009), who reviewed barriers to successful integration of technology in schools and came up with school level and teacher level barriers as classified by Meneses et al. (2012) . These barriers are considered to be some of the major factors hindering effective AT use in schools. Some of these factors are the lack of teacher confidence this might develop as a result of inexperience in using AT by teachers (Drent & Meelissen, 2008), fear of failure during use which is when teachers fear that when some technical failure occurs during use and they are not able to rectify it might be disgraceful to teachers. Although, such a technical fault might be small requiring little effort to rectify. Furthermore, school level barriers include insufficiency in time allotted to teachers in which they are required to prepare for lessons, use AT all within a limited approved time, this, some teachers find rather too small as preparation and delivery of lessons incorporated with AT could be time consuming (Bingimlas, 2009; Lau & Sim, 2008).

Balanskat et. al (2006), gave an analysis of some perceived barriers to effective adoption of AT in schools. The teacher- level barriers these are barriers that mostly concern   teachers and can be influenced by them or changed by teachers themselves. These barriers can be surmounted by individual teacher's effort, while the school-level barriers are those encountered within the school community and requires whole school effort or commitment of all members of the school community to be influenced. Becta (2004), explored perceived barriers to effective AT integration and use by school teachers, their research made significant contribution to available body of knowledge it revealed that factors related to each other either directly or indirectly.

Example being lack of skills and lack of pedagogical training which could mean are related to each other. Barriers found in the literature to highly limit the effective adoption of AT in schools are identified in Table 2 below.

Table 2: Barriers to effective AT use in schools

Barriers to effective AT use in schools	Bingimlas (2009)	Lau & Sim (2008)	Balanskat et al. (2006)	Becta (2004)	Mumtaz (2000)
Lack of teacher competence	●			●	
Lack of time	●	●		●	●
Lack or inappropriate training	●	●	●	●	
Lack or limited accessibility	●		●	●	
Resistance to change	●			●	
Negative attitude	●			●	
Lack of skill	●	●	●		
Lack of teacher confidence	●		●	●	
In appropriate teacher training			●		
Lack or poor quality of infrastructure		●	●	●	●
Rigid structure of school examination system			●	●	
Lack of technical support		●		●	
No perception of benefit				●	
Lack of school experience			●	●	●
Availability of technical problems in AT gadgets				●	
Lack of financial support					●
Lack of onsite technical support					●
Lack of teacher support					●

Project: Effective introduction and adoption of Advanced Technology Dubai Private Schools

From table 2 above, it can be seen that skills linked with training of teachers is one of the most common barriers to effective AT uptake in schools. Time given to teachers to incorporate AT into their teaching as well as availability of infrastructure is also some common barriers if not available. Thus from above, it shows that these barriers to be looked into and promptly resolved for effective AT in schools.

2.6 Conclusion

The chapter began by providing some basic definitions and vocabulary on advanced technology (AT) and the types of AT used in the schools. These AT resources include computers, software's, internet and the like. Some of these resources are used in almost all schools nowadays. The reasons why schools choose to use AT and the benefits it brings to schools and students were discovered, such as, the possibility of using AT to provide rich and interactive learning to students of all learning types. Critical success factors to effective AT adoption and use were also uncovered such as the availability of timely technical support to teachers and availability of resources. Also, common barriers encountered in school while adopting AT were discovered such as insufficient time to incorporate AT in teaching and the lack of AT pedagogical skills by teachers amongst other barriers. This chapter is used to provide a deeper and broader understanding of the reasons for using AT and how it could be effectively used in schools.

CHAPTER THREE: Preliminary Conceptual framework

3.0 Preliminary Conceptual framework

Developing a conceptual framework for a study entails different factors or components considered to be important factors or variables that a researcher deems to be influencing, or have some significant impact on the study or problem understudied. Therefore, there may exist factors which may be viewed differently by researchers within same problem domain (Jabareen, 2009), thus, the concept of conceptual framework is a particular view of a certain researcher. This does not discredit a particular framework already developed by some researchers, nor does it promote the new framework as better even though it may be totally different from previous framework. Rather it might be a modification to the one already developed or it could be looking through a different angle at the same problem thus this establishes the difference in frameworks. Hence, every researcher has his own independent judgemental view of the problem studied.

In this research, the conceptual framework takes into account factors impacting effective adoption and use of AT in private secondary schools in Dubai as viewed by the researcher. Trends in the education sector have shown growth in the use of AT in schools. Governments have spent significant amounts of money in providing infrastructure and favourable environment for proper use of AT in their schools. In this study, we explore the present usage of AT within Dubai private schools, drivers, enablers and inhibitors or barriers to effective adoption and use of AT in Dubai schools. It is believed that use of AT in schools could help greatly in improving student performance by developing their critical thinking and, aiding them in preparing for the challenges of the 21st century knowledge economy (refer back to chapter 2.4).

Project: Effective introduction and adoption of Advanced Technology Dubai Private Schools

Research has shown that to achieve effective AT use in schools, interaction of various actors within and outside school environment play a very significant role. Some of the factors found in this research are the school leadership, teachers, support staff, students and the general school culture which is created within the school; all these are contribute towards positively influencing students learning as they are at the receiving end of their interactions. It would be difficult to gain the expected advantages or benefits AT has to offer students' without understanding the interaction of the major factors that are likely to bring the benefits. Looking thoroughly and understanding these factors and their respective influences adequately helps to know how effective AT adoption in schools works.

A framework that helps in knowing current practices in AT use in schools is developed. The framework could be used as a reference to track AT adoption in schools. A framework that takes into account factors within school and interaction between them is required for effective AT adoption projects in schools. Once the framework is in place, describing relationships between these factors and what influences these factors have either positive or negative can be known such that plans to effectively adopt AT in schools can be easily designed and implemented.

These factors are described thus; The society and other external stakeholdersto the school, they impact learning or knowledge acquisition of students within the school. This might be a direct or an indirect relationship between students, academics and the society, which is often insulated by schools. Examples are when government policies and guidelines are to be followed and obeyed by schools operating within them. Changes and challenges facing international economies of countries have caused countries and societies to move from traditional labour intensive societies (that is, one which is mostly dependent on commodities) to a knowledge driven economy of the 21st century (where intellectual know how of the citizenry play a significant role).

This has placed countries in difficult situations encouraging the need for societies to grow the knowledge of its citizens in order to be able to cope favourably in the knowledge intensive competitive world they find themselves. These challenges and more have made government and policy makers to interfere in schools, influencing in one way or the other how students are being taught. Government policies if any guiding private education providers on the effective ways to use AT in schools is explored.

The leadership of school was found to be a major player in the process of adopting AT in schools who should not be overlooked. The leadership is influenced by decisions taken at societal or governmental level on policies that guide the school. The leadership of school is able to influence school cultural settings, cultural settings which are a mixture of acceptable policies and norms common to the school. Teachers look up to school leaders and view them as role models and mentors, who should guide them showing them how best to do their work. School leaders also provide appropriate feedback and rewards based on teachers' performances, hence, correcting and promoting appropriate practices. Thus, school leadership have a controlling figure within the school and should be able to influence strongly and positively AT adoption in their various schools.

Another major player in effective AT adoption in schools are the teachers, they are known to be closest to students in the school. The way and manner they teach students, methods used have direct impact on the students. Thus, for effective adoption of AT in schools, teachers are one of the most crucial factors for success.

3.1 Conceptual Framework

A major thrust of educational and technological research has been on how to effectively use AT in schools. The basic assumption in this research is that when AT are effectively allied and used in schools, the benefits gained shall be tremendous and successfully reaped by students and the society at large. This

research attempts to organize the various variables discovered in past researches to affect AT use in schools in order to develop a comprehensive framework that. This new view of AT in school literature should give the much required insight into the effective use of AT in schools showing it to be a complex and multidimensional phenomenon. From the retrospective analysis of literatures, we proceed to give a multidimensional view of the topic of the research that is effective AT adoption in schools.

A lot of AT resources have being put and are still put into schools. Governments and stakeholders in education sector have channelled lots of resources and money towards purchase and use of AT in schools Wastiau, et al. (2013). Researchers have explored and monitored how these resources and money are used in schools (Bingimlas, 2009; Lau & Sim, 2008). Most schools nowadays more than before have realized benefits of AT in teaching and learning process. This amongst several reasons has led schools to using AT. To fully take advantage of the benefits AT has to offer students and the society at large, all processes that would ensure an effective adoption should be taken by all those concerned. AT should not be taken for granted, that is, it should not be taken that by having AT resources in schools, it would automatically translate into better students' performance. Rather, careful threading the path to academic success should be taken with these resources.

In order to successfully implement and effectively adopt these AT resources in schools, availability of resources how they used should be given a thorough look at view. As stated before, a framework that considers all the different necessary factors, and their various interactions and processes is required. This framework should encapsulate all the different factors with their level of interaction; it will help in setting the link and highlighting the important aspects for an effective AT adoption in schools. Thus, this makes it a unique framework which is built on work of other experts in the field. This framework does not

provide the magic bullet for effective adoption of AT in schools rather, it should be used as a guide to measure the current level of AT adoption in schools and as a guide to control and monitor school AT projects. As stated by Wastiau et al. (2013), there is no 'silver bullet' to effective AT adoption, rather a combination of several factors and policies articulated in a systemic approach should provide the needed result. Various researchers have identified different issues that they deem fit to influence effective adoption of AT in schools. This framework takes a step backwards in order to have a wider view or the overall picture of the process of AT adoption in schools. The various factors found are shown in figure 2 below with their relationships following after the figure.
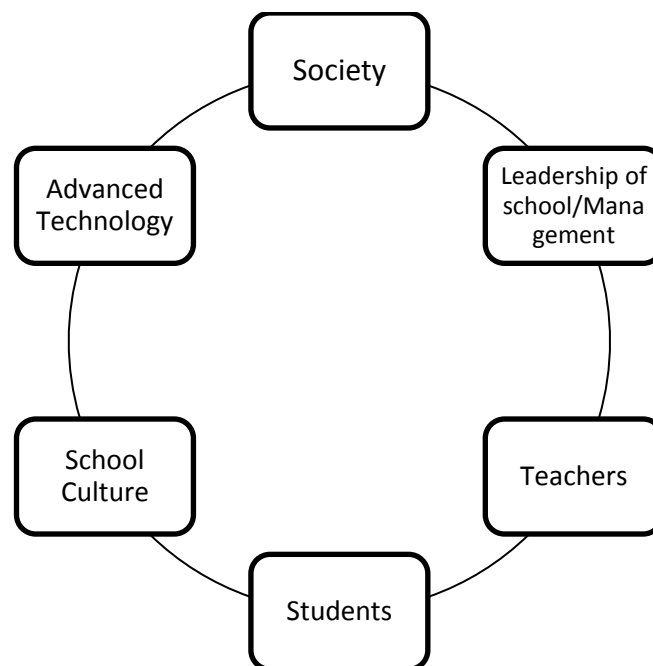

Figure 2: Framework for describing AT use in schools.

3.1.1 The society and Government policy

These are societal and external factors or players to the school with influence in the educational sector. They include stakeholders who create policies for schools to follow. In some countries, external stakeholders are the main reasons why schools make use of AT, as they provide infrastructure and resources to schools. Governments could make policies that require schools to incorporate AT within them, which could be used for accreditation purposes. Thus, requiring schools to use AT even though they may not be planning to do so. Government regulatory and advisory bodies are some of the agencies that check and encourage AT use in schools. Determining type of assessments and how students would be assessed. Parents form part of the driving force that could encourage schools to adopt AT. Which could be inform of promoting it use in schools. Providing schools on best approach to use in incorporating AT are part of expected contributions to effective AT governments can partake in (Wastiau et al. 2013).

3.1.2 The school leadership and management

To a great extent the leadership of an organization shapes the internal function and capabilities of the whole organisation. The leadership should be able lead, control and supervise the activities of the employees in the organisation to achieving its goal and objectives. In a similar way, the school leadership and management play a major role in the teaching and learning processes in a school. The leadership stands as the epitome of the school as he/she is responsible for the performance of staff and students under him/her. Based on the policies and requirements placed on schools, school leadership is charged with managing the affairs of the school. Providing necessary enabling environment for an effective AT adoption in their schools. The school leadership interprets and monitors the implementation of policies or guidelines established by the government and helps in shaping the school processes.

3.1.3 School culture

The cultures of the school are agreed norms that go unchallenged and acceptable by all in the school. These norms are not rebuked rather they are

Project: Effective introduction and adoption of Advanced Technology Dubai Private Schools

encouraged and might be rewarded in the organisation. The school culture goes a long way in shaping the level of interaction and collaboration of the school staff and students. There are concerns as to what are the necessary cultures a school should have that encourage successful adoption of AT. This acknowledges the fact that there exist some school cultures or norms necessary to promote AT adoption as there are those that hinder the effective AT adoption. AT are not a plug and play resources which can be put in schools and benefits reaped immediately, rather, there are cultures which are suitable or favourable for an effective AT adoption. This study explores factors that schools need to promote also identifying school cultures that should be necessarily avoided to promote effective AT adoption. Without having a favourable AT culture in a school, the prospect of effective AT adoption would be lost. School culture is directly linked to the leadership of school, as school leadership can determine what actions or reactions should be accepted or that should go unpunished in his or her school. The culture of the school also mediates interaction amongst staff and students as stated above.

3.1.4 Teachers and other staff

Teachers in schools are individuals in charge of passing knowledge to students, they implement educational policies as designed by the government and directed by the school leadership. Teachers are closest to students in schools as they come in contact with them in their classes. The role of the teachers and other staff in shaping the students view and knowledge capacity cannot be underestimated; they guide students on what knowledge would or would not be beneficial to them to have. They help out in the daily school activities that making school a conducive and beneficial environment. Thus, it is imperative that they be given the opportunity to fully explore the benefit of using AT and to

be able to effectively use AT in transferring knowledge to students. Many researchers have explored the barriers to effective use of AT by teachers in a view to resolving teacher issues such that a greater benefit of AT could be enjoyed. Similarly, school leadership, school culture and government policies

have significant influence on the teacher, they in one way or another influence the way and manner teachers' use AT. This could be in a form of government policies requiring minimum entry level for teachers or the qualities or skill possessed by teachers which school leadership emphasize on when recruiting new staff or the nature of interaction and cooperation amongst the staff in schools as expressed in the school culture. These have some influence on teacher AT adoption in the classroom.

3.1.5 Advanced technology

Advanced technologies in schools are the technological resources being used in schools to help in teaching, learning and record keeping. AT could include computers, SMART boards, subscriptions to educational websites, softwares and other technological resources that could be used by teachers and students as a supplement used for learning and teaching .

3.1.6 Students

Students are at the receiving end of AT in schools, they are reasons why all stakeholders push for the use of AT as it is expected that by using AT in schools, they would be able to develop a higher order thinking , critical thinking amongst other advantages could bring/ (John & Sutherland, 2004) . Figure 2 above presents a framework describing the effective AT use in schools across six dimensions. The society /government – those in charge of making policies, the leadership or management- those at the head of the organisation with power to make change, school culture- the situations of the school influencing activities and processes within the school, teachers- persons involved in executing decisions and policies and students- the individual within schools who are taught using these AT resources and the students who are the main

reasons for establishing schools. In describing AT use in schools, there is no comprehensive understanding which can be done without investigating the relationship between these six dimensions stated above.

Providing relevant factors under the different dimensions of the framework illustrates the vast degree of complexity of the interaction of these variables within the multidimensional phenomenon of effective AT adoption in schools.

3.2 Macro Issues on Advanced Technology Adoption

The 2008 financial crisis has put strain on the growth of major world economies. This coupled with the development of new and sophisticated technologies has encouraged countries to look for better ways of surviving in the 21st century. Rapid advancements in technology have changed ways businesses and countries operate. The world is also known as a global village where knowledge at the right time and place has a far reaching advantage than having it at a later time. The knowledge economy as it is often called has become the prevailing determining factor of economies of countries.

Unlike the normal economies which are driven by sale of goods and services, knowledge economy deals with knowledge that is possessed by citizens of a country. Knowledge unlike commodities can be used multiple of times and by different people or societies without losing its value. Kozma (2005) stated that a highly knowledgeable society is capable of creating a virtuous cycle of economic growth which is the main requirement of countries, especially with the global financial crisis.

In a report by the World Bank and OECD (cited by Kosma, 2005), it says that an improvement in the educational system which is pushed by the use of AT is a way countries can be successful in the challenging global situations they are faced with. This is because AT use helps in improving learners skills, preparing them for the global economy and the information society as a whole (Hohlfeld et al. 2008). In order to improve living conditions of citizens, sustain themselves,

grow and have a globally competitive economy, countries have used the above reasons as a premise for their huge investment in technology for schools (Kosma, 2005). Reducing or eliminating digital divide between the haves and have not (those who have access to AT and does that do not have access) to

AT are some of the reasons given by Selwyn (2003), as why lots of money is spent by governments in providing AT in schools. In pursuit of creating better and more sustainable economies, governments of countries have enacted policies and plans that should help drive some of the above goals. Alongside these policies and plans are huge sums of money spent towards building infrastructure and capacity for an effective use of AT in schools. Examples of countries where AT plans and policies have being implemented are; the USA (the E-rate and the National Education Technology Plan, 2004), the United Kingdom which has its technology literacy challenge; a technology plan in education, Germany ("Schulen ans Netz", meaning Schools online), Singapore (which had in 1997 created a master plan Educational Master plan for ICT or MP1, designed as a framework to be followed in incorporating AT in schools), and the Australian government which introduced a master plan on technology in schools which it called Computers in Schools Plan (Hayes, 2007; Kozma, 2005; Madden et al., 2005; Selwyn 2000). Money spent on these AT projects in schools runs in billions of dollars. With these plans and projects, governments hope that a generation of knowledgeable citizens who would be able to move their countries economy way ahead of other countries would be created. Most strategic plans and policies of governments on the use of AT in schools come as financial and infrastructural support to schools. Although, some government plan include provision of training to schools, monitoring and controlling AT project implementation. But plans on these projects are mostly lacking or insufficient in some processes. A lot of time and resources is spent in designing these policies and frame works while little attention is paid on the progress of these projects after it is executed.

Sometimes after training teachers on how to use these AT, it means that they are ready to implement or apply what they have being taught in the various subjects they teach (Hadjithoma & Karagiorgi, 2009) while , on actual situation, they are not really ready . This practice by those enjoined on making teachers ready for adopting AT stifle the morale of the teachers. As training alone without

monitoring how they are going along with incorporating the received training in their classes could lower results expected. This might as well be in a form of providing some feedbacks and incentives from time to time as a means of encouragement or giving them confidence to use AT (Kumar et al. 2008; Warschauer et al. 2012).

As enjoined by the European Commission in 2003 (cited by Hall & Higgins, 2005), provision of infrastructure should be accompanied by training. Educational policies, laws, curriculum development and provision of state of art infrastructure by governments and stakeholders are not the only things necessary for effective AT use in schools. If AT is used, the way and manner of use in the classrooms should be of importance too (Bransford et al., 2004; Tanner et al. 2005). Provision of continuous professional development for teachers as well as technical support should be provided when implementing AT in schools (John, 2005; Warschauer et al. 2012; Pianfetti, 2001).

3.3 Micro Issues on Advanced Technology Adoption

3.3.1 School Leadership

For effective adoption of AT in schools, the role of the leader or school principal should not be taken for granted, the role holds a very crucial position with lots of responsibilities (Ottestad, 2010). It is a multifaceted role that ensures a peaceful and vibrant learning environment for students as well a positive and productive workplace for teachers (Davis et al, 2005). Some of the complex interrelationships and interdependencies school leadership influence are finances towards purchase of AT resources, location and access to AT in school as well as the curriculum and assessment of students (Younie, 2006).

The head of school, principal or manager is responsible for the works of teachers', which is ensured by observations, monitoring, providing effective plan and feedback for the smooth running of the school and learning process of students in general (Hadjithoma, 2011). Accordingly, ensuring that students are provided with quality education is also one of the responsibilities of the principal. Championing effective use of AT in schools, school leadership should be role

models whose examples are to be emulated by teachers. The leadership of the school should encourage teachers to be open to new ideas, and be facilitators for team work and cooperation within school community (McGarr, 2009 cited in Hadjithoma, 2011).

There are some certain qualities or traits which if possessed by the leadership of school help to effectively and efficiently manoeuvre schools through the challenges of changes linked with a successful adoption and use of AT. According to Afshari et al. (2008b), revealed in their study on roles school leadership play in effective adoption of AT in their respective schools, they stated that leadership of schools should firstly have unwavering believe on the values that AT can bring towards students' academic achievements, this is also strongly emphasised by Baylor and Ritchie (2002). This is because lack of believe in benefit AT could bring by school leadership results in low commitment to AT processes, or unwillingness to experiment with different approaches towards achieving better goals with AT. School leadership should be initiator that is one who has a clear vision on AT adoption in the school, and communicating it to staff members. Leadership of schools should be managers who organize the processes of AT adoption in an efficient and orderly manner ; responders, one who is focused on resolving current problems that might arise during teachers adoption of AT in their classrooms.

Active involvement of school leadership and staff in whole processes and activities of AT adoption is necessary, especially during creating AT policy or AT use plan for schools (Baylor and Ritchie, 2002; Hayes and Harriman, 2007 cited in Neyland, 2011; Tondeur et al. 2007). Policies which establishes and provides clearly the AT competencies that is required of teachers to have before being employed. AT use plan guiding teachers on how to use AT in teachings.

Provision of effective feedback to teachers whenever the need arises is one of the ways school leadership could encourage professional development of its teachers (OECD, 2009 cited in Ottestad, 2010). Having background knowledge on effective ways to use AT by school leadership is a very important and useful

knowledge required by them. This is a booster to the morale of teachers especially when they see that their leaders can effectively use AT. School leaders can provide incentives to staff for using AT which can serves as an encouraging factor to effective AT use by teachers (Baylor & Ritchie, 2002; Fox & Henri 2005; Kumar et al. 2008). Government and stakeholders should not only focus on the provision of AT resources to schools, they should also train school leadership on how to use these AT effectively. Hence, the school leadership role in effective AT role is one role which is of strategic importance.

3.3.2 Supportive Culture

Government policies, laws and infrastructural resources alone cannot bring about improvement needed for effective use of AT in schools. School culture that mediates the combination of skills, resources, individual capabilities and cooperation of school staff is required (Mooij, 2004). School culture includes all its belief and settings that is supported and promoted by it. These include values and attitudes of teachers and the school leadership, reward structures and relevant rules are all part of a school's culture (Zhang, 2002). A school culture in which there is limited interaction amongst school staff, or one which does not give staff the opportunity to discuss amongst themselves matters and issues related to problems and successes they have during integration of AT in their lessons is not likely to encourage effective use of AT. In a research by Dexter et al. (1999), on views of teachers on use of AT for better student success, it found that without a supportive school culture, teachers would not be

able to effectively integrate AT in their teachings. Situations where there is a closed door attitude in a school and restriction on teachers to classes or limiting the staffroom for individual activities or short small group discussions only is bound to be counter-conducive for adopting AT (Hadjithoma & Karagiorgi, 2009). Likewise, a school system which promotes a culture of involving everyone in planning, implementation and evaluation of programs and activities from the leadership down to new staff just joining the school is an example of a cooperative school community where AT could be easily and effectively

adopted (Gulbahar, 2007). According to McPherson and Nunes (2004 cited in Neyland, 2011), the general school culture is a very important factor that determines how effectively AT are used in the school. A collegial culture where there is a sense of belonging to the same goal and objective by teachers should be upheld. When there is a culture of togetherness amongst school staff, knowledge on how to effectively incorporate AT into classrooms can be easily shared within the whole school. Thus, making a general whole school improvement in AT instead of pockets of isolated effective AT use in the school.

Whenever there is limited or shortages in the provision of AT resources within a school, the effective adoption of AT might also be minimized. Although, a contrary opinion is held by Becker (2000), who believes that having a collaborative group activities using AT in classes with the few available resources could have a substantial higher positive effect on students rather than more resources which are inefficiently used.   Similarly, Baylor & Ritchie (2002); Zakopoulos (2005), are of the view that no matter the number, quality   or sophistication of AT resources in schools , without having teachers capable of using these resources effectively, little to no benefit would be derived by students. This once again emphasizes that, provision and access to AT resources as well as teacher effective use are very important issue that schools have to deal with.

Location of AT resources plays a very significant role especially to user teachers (Younie 2006; Meneses et al. 2012), where these resources are located within the school and the access to it is very important. Tondeur et al. (2008b) suggested that making AT resources available in the classroom such that students and teachers could have easy access to it is important, this is quite the same as suggested by La Velle et al. (2004). If students need to be moved from their classrooms to a computer or IT laboratory could create distraction and waste part of the time required for lessons to be taught. Time

would be wasted during the movement and settling of students in a new location for the lessons to be taught. Hence, this again emphasizes the importance of location of AT in the school. School culture can also influence the location of AT in the school.

School culture which encourages teachers to have professional development programs in other to refresh or improve their skills should be promoted in schools (Gorghiu et al. 2012). This can be done by providing in-service teacher training that are aligned to meet curricula needs of schools, encouraging teachers to go on external training courses, providing incentives to attend programs amongst others (Baylor & Ritchie 2002; Becker, 2000; Kumar et al. 2008) . Effective teacher training programs that guide teachers on how to use and manage AT resources is required (Beauchamp, 2004). When there is limited to no maintenance, low to no purchase of new or upgrading of existing AT resources in schools, the probability of having an effective adoption of AT in schools is being reduced as there could be strain on the limited or out-dated resources available.

Developing an AT use plan, road map or vision that guides the school on steps to take for an effective adoption of AT is required in schools. Plans drawn with inputs and views of stakeholders(Parents, teachers, school leadership and students etc) , identifying their different roles and responsibilities as well as

funding and maintenance issues should be done to encourage effective adoption of AT in schools (Baylor & Ritchie, 2002). Tondeur et al. (2008a), recommended that teachers be allowed to contribute and be aware of contents and steps to be taken to reach stated goals in school policy plan or road map for effective adoption of AT in the school. Without teachers contributions and knowledge in school policy planning misplaced priorities and confusion might arise as a result of divergent goals. This could emanate especially during implementation of policies as teacher are not aware of how to reach the stated goals. It is recommended that having a technology coordinator who should be

an expert in effective AT use be made available within the school to provide technical as well as pedagogical guide to teachers (Hadjithoma & Karagiorgi, 2009). All these are some of the supportive culture of schools that promote effective adoption of AT.

3.3.3 Knowledge and Skills of Teachers

Obviously, it is not only the physical and structural facilities or resources that a school has at its disposal that could make it produce excellent students or students who are academically better than their colleagues in other schools; rather, it is the services the school renders to its students by effectively teaching its students (Penrose, 1959; Fox & Henri, 2005). It is acknowledged that a lot of time and resources have been spent in other to provide AT to schools (Fox & Henri, 2005). Such efforts are geared in the education sector to bring about greater student performance and produce students who would be able to drive the knowledge economy of the 21st century.

The success or failure in adapting to change in schools lies mainly at the hands of teachers (Fullan, 1989), they are directly involved in any change initiative in schools and are the executers of change in schools (Losada et al. 2012; Lau & Sim, 2008). Teachers are critical elements in a successful school improvement initiative (Hattam, 2000). Consequently, the assertion by Fullan (1989), further emphasizes the crucial role meant for teachers in any school project adoption or change initiative example which is of an effective AT adoption in the school. Teachers are the closest to students in schools more than any other stakeholder in the education sector. Knowledge to be impacted on students is channelled through teachers as they are the curriculum implementers. Also to note is the link in the educational system from teaching, learning and technology all are connected via teachers to students in schools.

After provision of infrastructure, appropriate policies and guidelines by stakeholders, it is left to teachers to transfer knowledge to students. As stated above, teachers have direct contact with students; hence, their role is of utmost importance to any initiative or project that has to do with students and their

academic achievements. In short, teachers are the champion of students' academic performances.

An effective adoption of AT in schools would therefore require the motivations and support of teachers (Cuban, 1986 Cited in Hu & Webb 2009; Holcomb, 2009). Teachers have to understand or are made to understand the meaning of change that AT brings, what requirements or demands AT places on them and how they are expected to respond to it. Watson (2001), puts it thus; "the teachers have to understand themselves and be understood by others" in bringing in change such as using AT in their classrooms. The fact that teachers are mentors to students makes it imperative for them to realize the importance of acquiring sufficient knowledge on how to best make use of AT to create a higher order thinking in their students (Bebell et al. 2004). Having the pedagogical knowledge of using AT and applying it in the classroom would help bring about the desired goal of having more knowledgeable students. The more knowledge a teacher has and is able to effectively transfer to students, the better it would be for the society in general (Zakopoulos, 2005) and to students in particular as teachers would transfer their knowledge effectively to their students. Knowledge and skills gained through the teacher by students would be used in the society by students. It is therefore necessary that teachers are

up-to-date in their knowledge, such that out-dated or irrelevant knowledge is not transferred to students. Accordingly, one of the potential advantages of using AT in schools is that it helps teacher have most up-to-date information which they can get from the internet and transfer to their students.

The advantages AT could bring to students, teachers and the society at large are unprecedented (2005; Balanskat et al. 2006; Tanner et al. 2005), bringing relevant, updated, useful knowledge to students. It is therefore imperative for schools to ensure that teachers themselves are well-trained in order for their students to gain maximum benefits from using AT (Kozma & Anderson 2002). Over the past years, there has been increase in number of AT gadgets and resources put in schools (Becker, 2000; Kopcha, 2010). However, there is also

an increasing concern that these technologies are not efficiently utilized in schools. AT has brought about more challenges to teachers requiring them to change the way they teach (Hohlfeld et al. 2008). This has affected teachers' previous ways of teaching as new ways or methods have to be adopted (Zhao, 2010; Baylor & Ritchie, 2002). This is why; attention on teachers' use of AT is required. These concerns raise queries as to how teachers are making use of AT (Bebell et al. 2004)? Are the methodologies employed by teachers the best way to make use of AT? These and many other questions ought to be answered for achieving the desired goals of an effective AT adoption in schools.

In a research carried out by Desjardins et al., (2001) determining the competencies required by teachers to effectively use AT, the authors defined the following four orders or levels of competencies:

1. **Competencies of a technical order (T):** this is the possession of adequate knowledge of technicalities of AT resources. This is required to be able to use both hardware and software effectively and efficiently.
2. **Competencies of an information order (I):** the ability to source for knowledge by using AT.
3. **Competencies of a social order (S):** this is the possession of the means of using AT in communicating and interacting with others and being able to convey ideas or knowledge to others.
4. **Competencies of an epistemological order (E):** competency possessed by an individual which allows him/her to explore the power of AT in problem solving or practical applicability to real life problems or situations.

These are some of the knowledge or capabilities required by teachers to effectively deliver their responsibilities with AT. The use of AT could be a challenge to teachers if they are not adequately trained on incorporating its use in respective curriculum. According to Polly et al. (2009), knowledge about relationship of AT with curriculum content, how AT could be used to support

learning and how specific pedagogy match the use of AT use in the curriculum should be fully understood and practiced by teachers . Effective AT use by teachers depends on confidence of teachers which is in turn affected by failure experienced during their earlier use of AT by teachers (Braak et al. 2004). Thus, depending on teacher's feeling of failure and the consequence of failure in the past, a teacher could be adamant in using AT. Teachers belief on use of AT also affects effective adoption (Hermans et al. 2008), if they do not have strong believe in capabilities AT could provide to students, teachers would not like to go extra mile in using AT effectively. When school leadership encourages learning from failure, provides constructive criticism and feedback to teachers boost teachers morale and thus, encourages them to try different innovative ways of using AT in their classrooms.

Using AT for private use is totally different from using it to transfer knowledge to students, but it could be a determining factor to the extent teachers are willing to adopt AT in their classes (Baylor and Ritchie, 2002). This is as private use makes teachers confident and comfortable users of AT for teachings purposes. Students are known to be inquisitive, they tend to be aware of any uneasiness or lack of confidence or shortcoming on the part of teachers when using AT in the class (Smith, 2004 cited in Hall, 2005), therefore, lack of confidence could cause a barrier to teachers in using AT especially when students are more confident and knowledgeable in using AT than their teachers (Madden et al. 2005).

Employing AT as substitute to their normal way of teaching is one of the common ways teachers improperly use AT. An example is when teachers use projected image of a text during teaching, a text which is an electronic version of what the children already have in their textbooks. This is a representation of students' book and does not pose any form of challenge to students' critical thinking it only shows what the already have in their books. Therefore, having an interactive class with students having hands-on experience through independent exercises as well as project based learning is the goal of using AT.

This is better than that of the previous one which is direct instruction where teacher becomes the focus of the class (Lowthera et al. 2008).

Research by Lowthera et al. (2008) in 26 schools exploring the effect of removing key barriers to AT integration in schools, found that teacher's confidence is highly improved when schools provide highly trained full-time technology coach responsible for providing comprehensive AT professional development to teachers . This is similarly supported by Lawson and Comber (1999); Zhao and Bryant (2004) which they say is the provision of a technology coordinator within the school to provide one-on-one mentoring, support and training to teachers. Baylor and Ritchie (2002) similarly believe that lack of, or insufficient provision of training to teachers is one of the biggest obstacles to effective AT adoption in schools. Becker (2000) also added that because teachers spend most of their working time away from other people in the society, it is very important that they have access to experts in using AT such that they can be taught ways and methods of incorporating AT effectively in their lessons.   Developing a community of teacher-learners to share experiences and ideas on using AT is necessary as it gives teachers opportunity to learn from one another (Younie, 2006; Thambi & O'Toole, 2012; Pianfetti 2001). This could be a form of collaborating with one another which is also part of professional development (Bacigalupo & Cachia, 2011) required of teachers. This can be better than enrolling them in a special professional development classes as they might not freely adapt to changed environments and there is the possibility of using very different resources than ones available in the school. Thus, within the school cooperative collaboration amongst teachers could strengthen teacher interaction along with having practical hands on experience with available resources.

Professional development and teacher training has been found to have positive effect on teacher use of AT in teaching (Wastiau et al. 2013; Fredricksson et al,. 2008; Valiente, 2010). There are some key features to be strictly considered

and monitored for effective teacher training programs these are presented in table 3 below:

Table 3: Factors to be considered in teacher-training programmes (La Velle, 2004)

S/No	Effective teacher training	Ineffective teacher training
1	Training of teachers is more successful in schools where AT is a recognised school priority.	When teachers did not complete the training.
2	Schools where staffs were already competent users of AT training would be most beneficial with any further training.	Insufficient time allotted.
3	Support and active interest of senior management or leadership has a strong positive effect towards having an effective teacher training.	Technical and organisational difficulties.
4	When teachers had the confidence to adapt and select training materials for their own ends, rather than work dutifully through them.	Poor support from trainers or mentors.
5	Peer support and collaboration amongst teachers were found to be crucial to the success of teacher AT training programs.	Poor match of training materials to needs.
6	Personal access to AT by teachers, especially at home, created one of the strongest influences on the success of AT training.	requirements to complete exercises or compile portfolios unrelated to current work

In a related longitudinal study on AT use by Zakopoulos (2005), he evaluated use of AT within some UK schools, he found a frequent problems faced by teachers in adopting AT was insufficiency in time. It took teachers lots of time to search, analyse, sort, prepare and incorporate AT based resources and activities within their classes. This shortage of time has frustrated some teachers while discouraging others to use AT, even though, they appreciated the positive effect AT has on students performances. This once again reiterates

Project: Effective introduction and adoption of Advanced Technology Dubai Private Schools

the need for teachers to be time managers and able to incorporate AT within the shortest available time allotted to them. Professional training which includes time management skills training should also be included for teachers.

The spate of technological changes which forces very short AT product life cycle is also a challenge to teachers as they need to quickly adapt to new gadgets and resources available in the market Harris et al. (2009). Some teachers have blamed their ineffective use of AT to limit set by the curriculum which hinders them from fully exploring the vast promises AT could bring to students (La Velle et al. 2004). Knowledge and skills of teachers in effective AT adoption varies greatly , but from the above it shows the different factors which are very useful and need to be developed further or targeted to improve teachers knowledge and skills.

While Lai and Chen (2011), research on factors influencing teachers adoption of AT (with emphasis on teaching blogs) they found that perceived enjoyment in using technology, effort required to use it , compatibility of technology, perceived ease of use and usefulness , school support , personal innovativeness and enjoyment in helping others are major factors that influence teachers usage. These factors when combined and positive were found to motivate teachers to use AT. Hence, with new technology there is the possibility of having a greater teacher motivation to use AT; problem of short product life cycle is thus a major challenge to be lived with.

3.4 Conclusion

The chapter provided the conceptual model for the research, describing the major factors found to influence the effective adoption and use of AT in schools. Factors discovered include the society, school leadership, school culture , staff of schools , Advanced technology (AT) resources and lastly the students who are at the receiving end of the interaction of these processes. It further clarified the different factors explaining how it influences effective AT adoption. Macro

and micro issues were identified and discussed. Macro issues was mainly related to the society while the micro issues was more of internal environment of the school. This include the school leadership , style and capacity required for effective AT adoption were described. The culture of the school, the type that supports and hinders effective AT adoption were described and how it could be influenced and lastly the knowledge and skills of teachers. These are how necessary skills and knowledge of teachers can be developed so that the can effectively use AT in their teaching especially as they have direct contact with students and know benefit to students can successfully reach them without the teachers input. This chapter is a continuation of the previous on AT use as described above (Chapter 2). This is necessary to draw out any shortcomings if any of the different factors influencing effective adoption of AT in schools.

CHAPTER FOUR: Research design and methodology:

4.0 Research design and methodology
This section of the research report describes how the research was carried out and reasons for using the method used in the research.

4.1 Introduction
This study empirically investigates the relationship between different factors and players in the successful implementation and adoption of effective AT use in Dubai private schools. The literature review indicates that six constructs were found to have significant effect on effective AT adoption in schools. These are; society, school leadership, school culture, advanced technology, teachers and lastly the students. In other to establish the link between these constructs, this chapter provides the research strategy used for the research.

4.2 Purpose of Research
The purpose of a research by a researcher could be for different reasons depending on the field of knowledge, topic or research area being studied. Subject to the purpose of a research, there are different ways of obtaining information pertaining to that type of research. Research purposes could be classified into 3 main types which are the exploratory, the descriptive and the explanatory research purposes. Differences between these three research purposes might not be easily distinguishable. And has brought disagreement amongst researchers as to whether or not two or more of the research types can be accommodated within the same study. However, Saunders et al. (2007) believe that incorporating more than one type in the same study is acceptable.

The different ways of approaching research are descriptive, exploratory and explanatory; however, they could be categorically called positivist, interpretive and critical research types or method accordingly. Descriptive or positivist research method is used when researchers assume that what they are researching is dependent on some measurable factors. That is, the reality can be described by some quantifiable measurement or some variables.

Project: Effective introduction and adoption of Advanced Technology Dubai Private Schools

These measurable variables can be tested and be used to reach a specific outcome as a result of the interactions between the factors. Generalization could be inferred from such results as obtained by the researcher as it takes into cognisance existing theories and hypothesis already developed (Yin, 1994). The other type of research is the exploratory or interpretive research; in this type of research the researcher tries to understand the meanings of constructs used by people in the context of the research study. That is to say, understanding the problem from the eyes of the actors or placing the researcher in the context of the research problem. Thus, a researcher is given the opportunity to explore and gain a better understanding and insight knowledge of the research problem. This is generally done in situations where there is limited research or the research problem is ambiguous or when research boundaries are difficult to set (Eisenhardt, 1989).

It is believed that conducting interview with experts in the field, those directly involved within the research context, going through the depth of literature, an understanding of the problem could be gotten (Saunders et al. , 2007). Lastly, the explanatory or critical research type; as the name implies uncovers statements or constructs to describe the relationship which exists if any between the different causes of what is being researched and its effects or consequences (Yin 1994). The current research domain which this work covers is aimed at understanding how effective adoption and use of AT in Dubai private schools could be achieved along with problems and challenges encountered by schools in effectively adopting it. The research explores the reasons why schools use AT resources, and the advantages it could bring to students and schools. The problems encountered or barriers to effective adoption and use of AT in these schools are explored. To understand the rationale and drivers to the adoption of AT in schools, bearing in mind that despite the widespread use of AT in the business world, it is a relatively new phenomenon in the educational system particularly in secondary schools.

Research on AT use is a very vast research area where boundaries or limits are unclear, specifically, as it covers almost all aspect of today's educational system. By exploring literatures widely of scholarly articles which have researched and discussed the use of AT in schools, the different ways it is used and how it should be used, this would then be compared with the AT adoption process in Dubai private schools. It should be of note that same AT resource when used differently could bring about a widely divergent result (Biagi & Loi 2013) or outcome.

Interviews are conducted with decision makers especially, those found to have major influence in implementing AT use projects in Dubai private schools. Through these interviews the researcher should be able to know and establish the current spate of AT adoption in these schools, the problems or challenges if any that are encountered in process of effective adoption of AT within the selected schools . From previous studies done by other researchers, problems found to inhibit or cause of barriers to the effective adoption of AT in schools is detailed. It is believed that identifying these factors and reducing them to the barest minimum would go a long way to prompting effective adoption of AT in Dubai private schools. This would be a form of identifying critical success factors (CSF) necessary towards effective adoption and use of AT in schools. Without identifying these few but necessary factors, resources would not be properly channelled, which might lead to wastage of resources and an ineffective AT adoption.

4.3 Research Approach

There are two major methods commonly used for research, these are the inductive research and the deductive research methodologies (Saunders et al. 2007). In the deductive research methodological approach, a researcher draws from a representative sample of the population understudied, analysing it to draw relationship that may exist within the different variables in it (Saunders et al. 2007). The deductive research methodology is used when a theory is to be developed and tested or verified. One of the difficulties of this approach is in the

selection of a representative sample of the population studied, it is required that the selected sample should be a proper or accurate representation of the real population. Hence, it should have as many characteristics as possibly exhibited by the real population understudy and exhibit the characteristics of the real sample studied. Therefore, researchers have to be very careful during population sampling (collecting sample for use) to reduce bias of influence in the selection of the samples as this might skew the results of the entire research. One very important characteristic of the deductive research methodology is, when the sample is a proper representation of the population, it is possible to generalize the results to the entire population even though the whole population was not sampled. While a limitation to deductive research is when there is no clear understanding of relationships that exists between variables, their causes and effects on each other is not identified or known. This results in having a biased or an un-substantive result being obtained and therefore cannot be generalized to the whole sample population. In light of the above limitation to deductive research methodology, another alternative presents itself, inductive research methodology. In inductive research methodology , a researcher is placed in the context of the research field (Yin, 1981) so as to enable him/her understand the different views, causes and effects of the research problem. Because researchers have to place themselves in the context of the different factors or variables in the study, a limited number of sample are extensively studied.

In this research, first of its kind to explore the effective adoption and use of AT in Dubai schools, the research explores the context of using these AT in schools. The research is done using the inductive research approach with different data collection methods. Literature review was done to explore different AT use in schools, analysing the data collected to extract meaningful results from which conclusion could be reached and recommendations given. Using the inductive approach is of immense benefit to the answering the

research problem as it provides a deeper and broader understanding of the research problem than what could be gained by using deductive research approach.

4.4 Research strategy

There are different strategies employed by researchers in the course of a research project. Some of these strategies are suitable for a particular research type this is not to say that there is one best way or research strategy which is better than others. The most important factor to consider in selecting a research strategy is for a researcher to select one which best meets his/her research objectives, while allowing the research question to be adequately answered (Saunders et al. 2007). Factors which might influence choice of research strategy are the researcher's previous knowledge of the research topic or research problem, time and availability of resources at the disposal of the researcher amongst other factors. According to Sanders (2007), research strategies fall into one of seven different types. These are; survey, experiment, action research, grounded theory, ethnography, archival research and lastly case study research.

Depending on some of the factors stated above, any of the mentioned strategies might be used as long as it could be used to answer the research problem. A combination of these methods is also acceptable; this is because it helps to strengthen the viability of the results reached from the different methods by truncating shortcomings of each of the combined strategies. In this research on the effective adoption and use of AT in schools, a case study research strategy is used. This is because of its ability to answer the research problem and reach the objectives of the research coupled with the limited time available for the research and availability of research participants.

4.5 Research Choices

The two major ways of data collection are the quantitative (which is more of discrete values or numbers) and qualitative (these are mostly in the form of a description or perceptions without a definite discrete value that is, it is non-numeric value) methods. Anyone of these data collection technique used; there is an equivalent data analysis technique that sought to be used to analyse the data collected by that technique. Research choices deals with the way data is collected and analysed for the research.

When a single type of technique is used, it is called a mono method because; it deals with using a single data collecting method and an equivalent data analysis technique. While, multiple method is said to be used when a researcher uses more than one data collection method and its equivalent data analysis technique. The last type of technique is a combination of the two techniques mentioned. Using quantitative and qualitative data collection and their equivalent analysis techniques either one after the other (in this case called sequential mixed method) or using them at the same time (parallel mixed method). Researchers use a combination of these techniques so as to cancel out some of the disadvantages or limitations inherent in each particular technique thus bringing out a refined model where conclusions reached would have a better validity (Saunders et al. 2007). Combining these methods, requires more time, effort and resources and also dual expertise of these methods by a researcher (Collins et al., 2006) .With this in mind, this research proposes to collect qualitative data which implies that a qualitative research approach would be taken. A qualitative data collection process is used in this research this is because of the difficulty in gaining research participant to partake in providing quantitative data.

4.6 Research Time Horizon

From the word "time" it gives a sense of the duration the researcher wishes the study to take. Accordingly, research time horizon is time available to a researcher to perform and conclude a study. Time horizon is the observation of events in a research context over time period. It includes cross-sectional studies which are time constrained, a short period of time is available within which research is done and conclusion reached, under this comes a case study, in which research is concluded within a limited time frame. Another option available to researchers is the longitudinal research time horizon, which allows for ample time for the researcher to carry out a research. In this research on effective adoption of AT in Dubai schools, a cross-sectional study approach is taken because of the insufficient time available to the researcher to do a longitudinal study as time would permit for an in-depth longitudinal study to be carried out.

4.7 Methods of Data collection

These are the methods used by researches to collect data for a study. Methods of data collection determine the type of analysis and processes that would be undertaken on the data when collected as different data collection methods have different approaches for analysing and processing the collected data. This research is done to investigate the factors that motivate schools private schools in Dubai to adopt and use AT in teaching. To carry out this research processes used and steps taken are described below.

4.7.1 Literature review

The study was done by critically exploring works done by other researchers in the field of AT use in schools. Different views were found and critically examined to identify the niche which this study sought to fill. The literature review was used to identify the target research questions that need answers as well as in developing the objectives for the study. Identification of critical success factors for effective adoption of AT was also found in literature.

Project: Effective introduction and adoption of Advanced Technology Dubai Private Schools

4.7.2 Pilot case research

An important part of the research project is to search for and gain expert opinion on the research problem. In this case, to have first-hand knowledge from key players in the field of education on effective adoption of AT in schools. The Emirates of Dubai formed the Knowledge and Human Development Authority (KHDA), a government organisation with the role of monitoring schools to enforce standard. Because of the advantages of AT which has been found in the literature one of which is to promote higher students' performance. It thus suggested that, an executive of KHDA was interviewed to know if AT use was an important criteria used for measuring standards of schools, its rating amongst other measurement if it was used. With the interview process, it provided a useful insight into the use of AT in Dubai private schools from the lens of policy makers.

4.7.3 Survey

Research survey is used to collect data for a research project in other to analyse and extract meaningful information from a given population. Surveys allows researchers to collect data from a sample of a population under study, this is because it might be too expensive in terms of cost and time for a researcher to collect data from each object or entity in a population understudy. In this research, it is done by selecting a few numbers of schools amongst the one hundred and fifty-two private schools (152 registered schools with the KHDA according to the KHDA, 2012 report) in Dubai. Five schools that use the British curriculum were selected such that there is no bias as a result of curriculum covered amongst the schools if schools offering different curriculums are selected.

A survey that examines the extent of AT use in the selected schools and the motivation for such adoption as perceived by school management is done. In this type of survey questions drawn from the literature and the conceptual framework were developed and posed the respondents. From literature, it has shown that teachers and school management have a very critical role in

Project: Effective introduction and adoption of Advanced Technology Dubai Private Schools

effective adoption of AT in schools. Survey also showed that having teachers to partake in the research would be a very difficult to impossible challenge this is because of their very busy schedule. Thus, it gave the opportunity to look at the management side during the research exploration. Interview with top management staff was conducted to reflect a thorough fact finding mission into the research objectives as stated above (Chapter 1.3).

4.8 Conclusion

Research design and methodology provides a explanation to the different ways and choices available to a researcher to successfully undertake a research project. This chapter provides information on the type of research and how it was carried out. Justification for using literature review and qualitative data collection and analysis technique for the research was discussed. Apart from the insufficient time available for the research to be carried out, participation of teachers who are always busy in the school had made the researcher opt for the inductive research approach as well as the capability of using the approach in answering the research problem.

CHAPTER FIVE: Case studies

5.0 Case studies

The study was done with focus on five (5) private secondary schools in Dubai using the British curriculum. The case study revolves round selected areas requiring further research as discovered from the readings of the literature review. By using case studies, useful knowledge can be gained and captured by the researcher from professionals in the schools understudied. Description and explanations to unclear grey areas could be gotten from these experts, they can shed more light to understanding the research problem by the researcher (Yin, 2004). This is why a qualitative data collection approach could prove useful (Eisenhardt, 1989) than the quantitative type, which has some limitation on the amount of understanding that could be drawn from it. Using quantitative data, a lot of important information might be overlooked or not properly explored as a result of limited ability of conveying information in the quantitative approach.

Going along with the objectives of the research, questions were developed (see appendix A) to clarify further the reasons for adopting AT and problems associated with AT use in the case study schools. Going by the information sought in the case study, questions targeted at top management staff of schools who are directly involved in decision making regarding the use of AT in the schools were developed and asked. Understanding their point of view in knowing reasons for adopting AT use in their various schools, enablers and barriers to AT use, their experiences as well as success factors to effective adoption of AT was required.

The schools where chosen from a list of schools in the emirates as provided by the Knowledge and Human Development Authority (KHDA), the government authority established in 2003 to help monitor the quality of education provided to students in the emirate of Dubai. As suggested during pilot interview with some academics and professionals in education, it is better to focus research on a

particular curriculum used by schools for the study. That is, research should be conducted with emphasis on a single curriculum common to all the schools used for the case study. This is useful especially in Dubai where schools have different curriculum being taught and there is no single general curriculum taught across all schools in the emirate. Selecting a particular curriculum would help narrow down and reduce bias as well as focus and give a better understanding of the issues involved in adopting AT in the selected schools. Different curriculum could have different ways suggested in it to implement AT within; hence, the British curriculum was chosen as it has within it an IT subject which requires AT use to be taught to students.

The meaning of AT was explained to the research participants to familiarize them with the vocabulary. Reasons for carrying out the research and why their participation was important were explained to the participants. This was done prior to the start of interview for the case study. Participants' confidence and trust was gained by specifically guaranteeing their privacy and confidentiality of information collected. The extracted responses to interview questions carried out in the case study schools is provided below.

5.1 Case study 1: School A

The interview with the school principal was conducted after an unscheduled visit to seek for participation for the study. The principal was very interested and asked that the interview could take place immediately. The interview took about 2 hours with some breaks as the principal has to attend to some official matters.

A. 1 Introduction: School profile

As stated above, schools used in the research are privately owned and use the British curriculum system. School "A" is one of the schools that meet this requirement. The school serves population of multi-national community present in Dubai with a huge population of students from the

Asian continent and a minority of the indigenous Emirati students are in the school. The school is a recognized Cambridge education provider and uses the UK curriculum. Students from age of 3years in the kindergarten up to 17 years of age in grade 11 are taught in the school. Most of the teachers in the school have received at least a bachelor's degree. The school has recently upgraded its computer laboratory providing it with the latest computers and internet facilities; it also provides a projector to each of its classrooms. There is fast internet access throughout the school with all as good users of computer. Teachers in the school each have a laptop for their use. The principal of the school is able to effectively use the available AT resources in the school.

a.2 Drivers for the adoption of AT in school "A":

The principal at school A was asked about the reasons why the school uses AT, to this question, the principal said "By using AT in the school, it has encouraged students to learn, it motivates them to learn. It also makes learning to be more of student centred, which involves students participation giving them the opportunity to explore information on their own with the guidance of their teachers". The principal further added that using AT encourages research work and collaboration amongst teachers and students. This is in line with Collins (1991) that by using AT, teachers are able to source for and get new and relevant knowledge related to what they teach students. Teachers can easily share idea amongst themselves. AT gives teachers the opportunity to cover more knowledge areas than which is available in textbooks, it also increases the enthusiasm of students. Thus, these are the main drivers for adopting AT in the school as stated by the school principal.

a.3 <u>Distinguishing AT practices in school "A":</u>

From the interview, the principal elaborated that its distinguishing practice that makes the school able to effectively use AT was its well-structured lessons plan and curriculum implementation process. The curriculum is interwoven such that all subjects are related to each other, assignment in one subject is linked to some other subject. All subjects are interrelated and intertwined with each other. With this practice, it encourages teachers to use AT like internet in searching for necessary relevant information that cross across all subjects, it also helps in guiding students to do the same. Teachers are required to incorporate AT in their classes as a supplement.

a.4 <u>Enablers to use of AT in school "A":</u>

Part of the enablers to using AT in school A was the requirement to be familiar with using AT that is emphasized to teachers prior to appointment in the school. Teachers' proficiency in using AT was tested before they were given appointment to teach in the school. There is also regular training given to teachers on how to effectively use AT. Teachers who exhibited some difficulty in using AT were given special training in encouraging them to the effective use of AT. The availability of AT resources within the school and assistance provided by the school IT teacher to teachers has encouraged teachers to use AT.

a.5 <u>Challenges to effective AT use in school A:</u>

The principal made mention that some of the major challenges to the school use of AT was the availability of AT resources in the school. According to the principal, there are some very useful resources which the school would like to have such as the provision of more computers and interactive whiteboards in the classrooms as well as subscription to

---

educational websites. But due to the high cost of these resources and the limited funding available at the schools disposal, the school has to suspend purchasing some of these resources. This is the major challenge facing the school in terms of AT use.

a.6 Availability of AT plan in school "A":

When the principal was asked if there was any AT plan in the school, she noted that currently, the school does not have any written guideline or plan to AT usage in the school. Although, the school is aiming higher in its use of AT, it intends to have more than one computer in each classroom in the near future.

a.7 Funding for the provision of AT resources in school A.

Regarding the level of funding for AT in the school, the principal said that the school was a part of a larger body of international schools; this makes it not autonomous in some of its activities which include funding. For funding, the principal said they receive regular budgetary allocation, guidance and directives from its cooperate headquarters which spear heads all the schools under it. However, when there are some needed resources in the school requiring funds, the school could send its request which would be looked into by the governing body and appropriate action taken.

a.8 Teachers view when taking decision related to AT use in school A.

In school A, the principal said that teachers are involved in decision making especially when it comes to how AT is being used in the school, their views are taken into consideration during decision making and they contribute significantly towards the day to day running of the school. The school management and staff have regular staff meetings and unscheduled meetings are arranged where views and suggestions of

teachers are heard and taken into consideration by the management. The principal further said that teachers do recommend software's , for purchase or subscription to websites which are sent to the governing school body and approval for such if necessary is given and such resources can be used in the school. "We take great value of the contributions of our teachers" said the principal.

a.9 AT practices in School "A":

As regard exceptional AT practices that are in place at school A, the available processes and facilities in the school. The principal said:

1. The school has an IT lab where computers and technology gadgets are kept and could be used by teachers at any time they would like to.
2. There is an IT coordinator in the school in charge of providing technical help to teachers; the IT coordinator is available throughout school timings such that teachers having technical problems are attended to promptly.
3. The school has frequent AT training to teachers as part of their professional training. The training is specially targeted at teachers with difficulties in using AT.
4. Students are encouraged to bring their own devices which they can use in the classroom.
5. The school is subscribed to some educational websites that provide tutorial lessons to students. Teachers and students have access to standardized internationally used materials giving them a wonderful and rewarding experience.
6. The school operates; by interweaving all subjects such that when there is a topic taught in one subject another subject is automatically related to it. Hence, teachers are required to use the internet to source for related materials on topics taught in the different subjects.
7. Further on, some of the school AT practices, the principal said that there is collaboration amongst its sister schools as the school is one

of a consortium or schools with branches abroad. Thus, they share best practices with other schools.

In summary, the use of AT in school A was found to be beneficial to the school and students. The main motivation of the school to using AT was the fact that when teachers use AT in their classes, it motivates students and encourages them to learn. There was a possibility of teachers to cover more knowledge area than those covered in textbooks when AT was used. The interwoven of subjects with each other has also helped encourage teachers to use AT as they would need to source for new materials regularly that are related to the different subjects taught.

5.2 Case study 2: School B.

E-mail was sent to school B as part of request for participation for the research. Follow-up phone calls were made to ensure that the letter was seen and channelled to the appropriate person who should receive the mail. After a week with no reply to the sent e-mail and phone call, a visit to the school was undertaken to schedule a meeting with the school principal. A date was agreed on and the researcher revisited the school to have a one to one interview with one of the top management staff of the school.

b 1 Introduction – School profile

The school accommodates students from several international backgrounds; with a student population of more than seven hundred (700), teaching kids from as young as 3 years of age in kindergarten to student of eighteen years of age at grade 12. The school has a fully functioning computer laboratory with lots of computers connected to the internet. Most of the teachers in school B have at least a bachelor's degree in their various fields of study. Operating the computer

and searching the internet for information was one of the commonest things the teachers are engaged in when using the computer in the school. All the teachers have their own laptop computer which they can freely bring to school

and use. The school provides a projector which can be used in the class by teachers. Most of the AT resources are kept in the IT laboratory and teacher can visit the laboratory with their students whenever the need arises. The school has a website which is always up-to-date to reflect the current school activities at all times.

b. 2 Drivers for the adoption of AT in school "B":

According to the principal of school B when teachers use AT it motivates students and makes them more curious to learn. It engages students and makes them more attentive in the class. There is no pressure on the school to use AT either from government or parents. Rather, the school realized that by using AT students could benefit a lot; it also engages the teachers to have ideas and knowledge about current matters in the various fields they teach. Such that what they are teaching students is very relevant to today's world, they teach with current information available. Adding further, that students themselves are the drivers, their eagerness to learn when taught using AT encourages the teachers and the school to use AT.

b.3 Distinguishing AT practices in school "B":

When the principal was questioned on what practices the school engages in which made it different from other schools, the principal answered that as an independent private school it has no information regarding how other schools use AT. Rather in its school, teacher use computers with projectors in the computer laboratory. The laboratory has all the necessary facilities required and the IT instructor is also available to assist teachers. AT in the school is used as an add-on rather than a replacement to the teacher in the class. Teachers can book the laboratory beforehand, they can also prepare for lessons so that by the time the students come to the laboratory, no time is wasted, and lessons can begin immediately.

b.4 <u>Enablers to use of AT in school "B":</u>

As for the enablers to effective AT use, the principal of school B mentioned that the most important enabler to effective AT use in the school was the availability of AT resources and infrastructures in the school . The state of the art computer laboratory which has fast internet access, projector which enables the whole class to see what teacher is doing on the computer. The computer laboratory has helped quite tremendously; it has enable a student to computer ratio to one to one (1:1) , this encourages hands on experience for the students in the class. This enable is also found in Bitner and Bitner (2002), availability of resources as a major enable to effective adoption of AT. Another enabler mentioned by the principal was the availability of the school IT teacher, who doubles as a teacher and a technical support assistant to the staff. His presence motivates the staff and they are more confident of using the computer when he is around as they are sure of his help whenever there is need. The AT technology also provides basic training to the teacher. Availability of onsite support as an enabler to effective AT adoption was also mentioned by (Groff & Mouza, 2008).

b.5 <u>Challenges to effective AT use in school "B":</u>

While discussing the challenges that limit the effective adoption of AT in school "B", the principal response was that one of the challenges faced by the school is insufficient funds to purchase new AT resources. Although there are many different types of AT resources in the market which could be very useful to the students and school, the shortage of funds to purchase some of them has being the schools major challenge. The school would like to have projectors in each and every classroom and also increase the number of computers in the school. The computer room can only accommodate a number of students hence only a few students can have access to AT resources at a particular time.

b.6. <u>Availability of AT plan in school "B":</u>

According to the school principal, there are goals the school wishes to reach in the near future as regards the use of AT. The school would like to provide all classrooms with computers and projectors. There is currently no written guideline or plan on using AT in the school. Teachers device their own means of using AT in the class and there is cooperation amongst the teachers as they help one another to make the best use of these AT resources.

b. 7 <u>Funding for the provision of AT resources in school "B";</u>

Regarding the extent of funding channelled AT in the school, the principal noted that part of its challenges to successful AT implementation in the school is funding, the school has limited funds to procure AT resources. Due to some on-going projects, the school does not have set aside fund available for procuring AT resources or projects. The principal further stated after completing the on-going projects, it intends to purchase more AT resources for the school.

b.8 <u>Teachers views when taking decision related to AT use in school "B":</u>

The school normally does meetings with its staff and inputs or suggestions are wide open to everyone to contribute. The teachers can make suggestions which is debated and agreed upon by all, such decisions are implemented by the school management. In collaboration with IT teacher, teachers are able to make useful suggestions and get feedback as appropriate.

b.9 <u>AT practices in School "B":</u>

1. The school has a well-equipped AT laboratory where students go to take classes that require individual use of AT resources.
2. Teachers are regularly trained to use AT in the school.
3. There is an AT teacher who helps to maintain AT gadgets and provide assistant to teachers while using AT.
4. Teachers help one another on ways they can improve their use of AT in the class.

5. The teachers are encouraged to try new ways of using AT and they are not rebuked for making mistakes while using AT in the school.
6. Students can also bring their personal laptop to school.
7. The school has wireless internet access throughout which teachers can use with their computers.
8. When considering the responses of the school principal to the case study interview questions, it is evident that the school enjoys the benefit AT brings. This can be observed when the principal was asked about the drivers to using AT of which the principal said "The students themselves are the drivers". Emphasising that students understanding and participation in class was somewhat increased when teachers used AT. Availability of AT resources and AT teacher was found to be major enablers to AT adoption, while limitation in funding was a major barrier.

5.3 Case study 3: School C

To schedule for the interview in school "C", an email was sent (check appendix B) and follow up telephone call was made. Subsequently, the researcher visited the school when there was no reply to the sent email and phone calls. An unscheduled visit was made to the school, where permission was sought from the principal and from the school proprietor. The IT teacher was asked to attend to the researcher. Due to the very busy schedule of the IT teacher, he could only spend some few minutes of his time with the researcher and could not grant any other convenient time, thus the interview proceeded immediately.

c. 1 <u>Introduction: school profile</u>

The school is one of the old schools in Dubai, it has being in existence for over a decade. The school has a student population of more than two thousand students (2000), crossing across ages three(3) to seventeen(17) years. The school has a large, fully equipped computer laboratory connected to the internet and has projector in it. Most of the teachers in the school have at least a

bachelor's degree and are good computer users. The school uses the British curriculum as all other schools used in the research.

c.2 <u>Drivers for the adoption of AT in school "C":</u>

As an old school, which has been in operation for over a decade, the school thrives to adapt to current requirement of the society. "Students nowadays are becoming more techno centric, this has made the school to adopt the use of AT". The IT instructor further said that AT helps motivate students in the class, students are more attentive when the teacher guides them to explore on the internet. The IT instructor added, "There is no pressure on the school from either government or parents to use AT". This emphasizes that use of AT in the school was as a result of the expected benefit it has to offer students and not forced on the school by stakeholders.

c.3 <u>Distinguishing AT practices in school "C":</u>
The school has invested in huge AT technology infrastructure which includes a computer laboratory, the provision of internet access to all its classes and internetworking all computers in the school to be able to share information. Teachers can go to their classes with their laptops and they collaborate with one another in the staffroom. With the availability of laptops and projectors in the classrooms teachers are able to do research in their respective classes. Teachers guide students in searching for information on the internet .

c.4. <u>Enablers to effective use of AT in school "C":</u>

Regarding the question related to the most significant enablers to effective AT use in school C, the IT teacher stated that the availability of AT resources has widely helped the school to effectively use AT. The frequent training of staff on using these technologies has also helped enable teachers to use AT. This is particularly helpful because "old teacher do not feel comfortable using AT". Hence, with the provision of training and onsite support to teachers' has increased their confidence in using AT considerably reiterated the IT teacher.

c.5 <u>Challenges to effective AT use in school "C":</u>

A major challenge to using AT in the school is the reluctance of teachers' especially old teachers who have taught in the school for a long time. The instructor said that some of the old teachers are reluctant to use AT, because some of their students know how to use AT more than they do and also because some of the teachers are scared of it breaking down. Provision of adequate and state of the art facilities is limited in the school which is linked to the shortage of funds to purchase these resources. The IT teacher added that the nature of technology which keeps improving and old ones becoming obsolete in short time after coming to market is one of the challenges the school has to do with. This is because they are not able to purchase new products all the time there is one in the market and they might have to teach how the new technology work to the teachers.

c.6 <u>Availability of AT plan in school "C":</u>

In terms of availability of AT plan in the school, the IT instructor of school C said the school does not currently have an AT use plan. Teachers are encouraged to try ways they find to benefit students in their teaching. The purpose of the school is for the interest of the students affirmed the IT instructor. The school he said is planning on phasing out desktop which are available in the school and encouraging Bring your Own Device (BYOD), students are as well encouraged to do same.

c.7 <u>Funding for the provision of AT resources in the school "C":</u>

Due to the high cost of AT resources, the IT instructor of school C said that the provision of these resources are done on a gradual basis, the school does not have enough fund to purchase the resources at a time. "We purchase based on our current capabilities". When vendors of some of these AT resources come he said, they try to compare prices, take advantages of their products over other

vendors so that they do not purchase what is not required or what might later not be used. "We try as much as possible to go for the best in the market and we consider our budget and the benefit it would have on our students" said the IT instructor.

c. 8 Teachers' view when taking decisions related to AT use in school "C".

From the setting of the school, the proprietor of the school as well as the principal all have offices within the school. Teachers and the school principal have regular meetings and outcome of such meetings which requires the proprietor are made known immediately. Teachers can contribute to the decision making in the school and their views are properly looked into. The IT instructor further said that teachers' contribution in the school are listened to and adequately taken care of.

c.9 AT practices in School "C":

1. The school has state of the art, fully equipped IT laboratory.

2. There is regular AT training for teachers in the school especially those who have difficulties using AT in the class

3. The school has a very fast internet connection which creates ubiquitous environment within the school.

4. Teachers are encouraged to try new ways of using AT to bring out the best in their students.

5. Students in the school are encouraged to bring their own devices to school.

6. The school has an expert AT teacher who provides technical help and instruction to the teachers when the need arises.

The school use of AT has been relatively good with old teacher finding it difficult to change their previous teaching methods. Frequent training and availability of onsite support, teachers have picked up using AT and are more confident in

using it than before. To encourage teachers to use AT the school is planning on introducing "bring your own device" (BYOD) which should boost teachers' confidence when they use same devices as they use at home. Lack of AT use plan and insufficient funding was a major drawback to effective use of AT in school C.

5.4 Case study 4: School D

An invitation letter for request for participation in the study was sent via e-mail and follow up telephone call was made. After some weeks of follow-up via telephone call, the school principal finally agreed to participate, but due to his very busy schedule of his job, he delegated the IT coordinator to participate in the study on his behalf.

d.1 <u>Introduction : school profile</u>

The school is a private, UK curriculum based school in Dubai. The school is one of the private schools that opened its doors less than 10 years ago. The school has a population of more than a thousand pupils comprising more than 50 different nationalities across the globe. As the IT coordinator puts it "This school is a representation of Dubai population, as almost every nationality is represented amongst its students".

d.2 <u>Drivers for the adoption of AT in school "D":</u>

Even though new to the school, the IT coordinator said there was no known pressure external or internal to the school that drove its resolve to incorporate AT in the school. "We felt that by using AT, we were able to better provide quality knowledge to our students". This goes with Beauchamp & Kennewell, (2008), that AT use provides students ability to partake in classroom activities in the course of their learning to gain more knowledge. The main goal of AT in the school was for the students.

d.3 <u>Distinguishing AT practices in school "D":</u>

Further questioning the IT coordinator in the school about some of its practices which it uses while incorporating AT in the school, the coordinator said that with the availability of resources especially the SMART board in every class, teachers are able to use it to teach their pupils and search for information

immediately. Most lessons are taught using the SMART board which might not be available in other schools. The coordinator reiterated that using these AT

Project: Effective introduction and adoption of Advanced Technology Dubai Private Schools

even though there has not been concrete evidence to base on how it helps improve students' academic performance, the school believes that using AT would help motivate the students to learn. Hence, teachers are encouraged to use it in their lessons.

d.4 <u>Enablers to effective use of AT in school "D":</u>

According to the AT coordinator in the school, availability of some of the latest AT resources in the school and the training teachers have received, are some of the enabling factors that encourages teacher to make use of these technology. Availability of technical as well as pedagogical help which is available within the school also helps motivate teachers to using AT. Teachers work in groups where they interact and assist one another to use these resources amongst other team work they do together.

d.5 <u>Challenges to effective AT use in school "D":</u>

According to the IT coordinator in school "D", major challenge to effective use of AT in the school was funding. The school wishes to purchase new devices such as iPads for its students and teachers but shortage of funds is hindering the school from such an expensive project. The short span of AT resources, of which new and better products are being developed and brought to the market after a very short time, changing to new products hence comes at a very huge cost.

d.6 <u>Availability of AT plan in school "D":</u>

The IT coordinator when asked about the availability of an AT plan in the school said that as part of the school growth strategy, it aims at exploring other AT resources apart from SMART board and that it has a three year plan on how to get to where it intends to reach. But he added that the school does not have

written plan on how teachers should use AT in their lessons. Having an AT use plan goes a long way in strategizing and guiding the whole school on goals to

be reached and steps to be taken to reach those goals as advised by Hoffman (1996).

d.7 Funding for the provision of AT resources in school "D":

The AT department has a budget which it is given for purchase and maintenance of its resources. The school provides funds for each of its department which makes the department to be able to prioritize its needs and focus on what really matters and which is also aligned to the school mission.

d.8 Teachers' view when taking decision related to AT use in school "D":

Teachers in the school assist one another and decision making is widely consultative as the teachers contribute immensely to the school decision making process. Regular meeting with school management and teacher take place as a means of bridging any communication barrier or overcoming problems in the school stated the IT coordinator.

d. 9 AT practices in School "D":

When asked about the special AT technology facilities and practices of the school. The IT coordinator gave some of the followings: The school has a specialist AT curriculum instructor and planner who is in charge of providing planning and guidance to the whole school community.

1. The school use a team work strategy, groups of teachers form a team and share ideas.
2. There is continuous training of staff in the school by external professionals and consultants.
3. Teachers are sent on training on how to incorporate the use of AT in their teaching which when they return share with other colleagues what they have learnt.
4. The school has a special budget for funding for AT.

5. The school has partnership with some internationally reputable educational technology providers who inform them on any new ways and strategy they should explore.

By considering the above case study of school "D", the school has a high level of AT use and capability. The school management support use of AT in the school and encourages processes that could facilitate its effective use. It can be concluded that availability of AT coordinator to provide pedagogical and technical assistant to teachers, teacher user groups, as well as availability of partnership with international education providers has facilitated effective AT adoption in the school. Major challenge facing the school is the short life span of AT products and need to be up-to-date and explore the benefit of the latest technology.

5.5 Case study 5: School E

An email was sent to the school similar to the one in the appendix B requesting the participation of the school for the research. Like most other schools, follow-up phone calls were made to confirm that the email gets to the right person. The principal of school E forwarded the message to the IT coordinator of the school and asked the IT personnel to attend to the researcher.

e.1 <u>Introduction: School profile</u>

School E is a private primary and secondary education provider in Dubai. It opened its doors in 2005 and since then has been consistent in improving its standard according to the report provided by KHDA. The school has fully equipped state of the art computer laboratory. It also has in place SMART boards in each and every classroom within it as well as wireless internet access across the whole school. All the teachers are good at using computers and they have all undergone training on using AT. AT use is a priority of the school and it encourages all teaches to incorporate AT use in their lessons.

---

e.2 Drivers for the adoption of AT in school "E":

The IT coordinator in the school said "AT provide another new and exciting avenue to improve student learning, it allows teacher's greater flexibility for student led learning". It also allows for students and teachers to learn together especially with new technologies allowing for a move away from the teacher being seen as the 'fountain of all knowledge' to a helper and director. Thus AT provides a broader way by which students could gain knowledge. AT allows the teachers to cater for an ever increasing number of student learning styles. Both teachers and students can extend their creativity and knowledge when planning for learning and for students when sharing their learning.

e.3 Distinguishing AT practices in school "E":

According to the IT coordinator, all their classrooms have SMART boards, which provide greater opportunities for teachers to prepare notebooks and share planning within departments. Teachers have the freedom to explore and use software that will impact on improved student progress and attitudes to learning, the SMART boards allow all students to access this software, examples of this include: class dojo, edmodo, my maths and espresso. All these softwares could be easily adopted and incorporated into lessons by teachers. The freedom of teacher to choose and use appropriate AT resources contribute to effective AT use (Bitner & Bitner, 2002). These are some of the school AT practices.

e.4 Enablers to effective use of AT in school "E":

When asked about the available enablers to using AT in school E the IT coordinator expressed that the great teacher confidence in using AT's is an enabler. Most of the teachers have received training on using AT. Teacher teams are formed to share practices and resolve challenges encountered in the teaching process, this has enabled the teachers to be good users of AT. The availability of financial backing from the school management, parental support

as well as the visible student successes has been major enablers to AT in school E.

e. 5 <u>Challenges to effective AT use in school "E":</u>

Responding on the challenges faced by the school in using AT, the coordinator said, the initial cost in providing various AT's across the whole school and for teaching staff was a major challenge. As soon as AT's are purchased they soon become out dated. Thus, the short life cycle of these technologies which is beyond the school control is also a challenging problem. Teacher confidence in using and or experimenting with new technologies especially when old technology is faced out is amongst the problems faced by the school.

e.6 <u>Availability of AT plan in school "E":</u>

When asked about the availability of AT plan in the school, the AT coordinator said that the school has a 3 year AT plan which is directly linked to the schools 3 year strategic plan. With this plan, it help to guide the school on steps to take accounted the AT coordinator . Thus, using the 3 year plan the school is focused on what to do and steps needed to reach the set goals of the plan.

e.7 <u>Funding for the provision of AT resources in school "E":</u>

Funding for the purchase of AT resources in school E is tied to the strategic plan of the school. There is budget set aside for this purpose and is in line with the general school plan. The budget is strictly followed and when there are other things that need funding which is not already in the budget, the need for it is discussed with the school management and appropriate decision is taken.

e.8 <u>Teachers' views when taking decisions related to AT use in school "E"</u>

Teachers are given the freedom to identify and use new AT's. When these are identified they are asked to pilot and report on the impact of these programmes and resources to the Senior Management Team. Successful programmes and

the resourcing of this is then included into the school plan. The teachers input in the school decision making is greatly taken into consideration.

e.9 <u>AT practices in School "E":</u>

1. All the teachers in the school have received training on using AT in their classes, and they are all good computer users.
2. The school regularly sends some teachers out to get training from specialist on using AT after which they teach other teachers after their return.
3. The school has provided each and every class a SMART board which the teachers have received training on using.
4. Teachers form group of users that share best practices and discuss on problems faced during AT use in their respective classrooms.
5. The school has special funding for the purchase and maintenance of AT infrastructure in the school.
6. There is an AT coordinator in the school who provides pedagogical guide to teachers on how they can best use AT in their classes.
7. The school has round the clock onsite AT technical specialist that provides teachers with help whenever the need arises.
8. The school has developed strategic plan on the type of AT they would want to use in the future and how they can take it up without problems.

From the answers to the case study questions provided by the IT coordinator, it has shown that AT use in school "E" has gone a long way in usage. The school has used some of these resources and over the years upgraded to the latest technologies available. The school management has also helped considerably in providing special funding and developing school AT and strategic plan of the school. This has shaped the progress experienced in the school. Availability of AT coordinator with expertise in pedagogical use of AT has helped the school a great deal in its effective use of AT. Availability of resources, teacher groups is

also some of the major enablers to the schools' effective AT use. A challenge encountered by the school is the provision of new latest resources.

5.6 Conclusion

To summarize the chapter on the information obtained from the case study questions, a holistic view of how the research was carried out was given. Case study research involves putting the researcher into the research problem scenario in other to be able to have first-hand information and practical experience from the lens of people in the study. The chapter began by describing the steps to get participants for a research and how the case study questions were delivered. From the answers to the case study questions a broader and in-depth understanding of the research question was found. Summarising some of the enablers found in the five different school studied is presented in table 4 below with funding and short life span of AT products or rapid changing of technology being the major barrier found in all the schools.

Table 4: Enablers to effective AT use in schools

Enablers to effective AT use in schools	School A	School B	School C	School D	School E
Availability of AT resources	●	●	●	●	●
Availability of effective and timely technical support	●	●	●	●	●
Professional development and training of teachers	●	●	●	●	●
Management support	●	●	●	●	●
Availability of pedagogical support	●		●	●	●
Availability of funding	●	●	●	●	●
Personal use	●	●	●	●	●
Parental support			●	●	●
Availability of quality of infrastructure	●	●	●	●	●
AT use plan			●	●	
Curricular requirement to use AT	●			●	
Teacher collaboration and AT use group	●	●	●	●	●
Collaboration with other schools	●				
Teacher voice is listened to	●	●	●	●	●
Interwoven of different subjects together	●				

CHAPTER SIX: Discussions and analysis of the case studies

6.0 Discussions and analysis of the case studies:

Different data collection methods have their associated data processing methods suiting the data collected. In this study, the method used to collect data was the qualitative data collection method or approach, hence, a corresponding qualitative data analysis method was used to analyse the data. Method of analysing qualitative data requires discovering differences and identifying patterns in the data collected (Saunders, 2007); these could be achieved by categorising data into meaningful chunks. This section presents detailed analysis and discussion of output to the data collected via the semi structured interviews in the five schools used for the case study. The previous section was used to provide extracted information from the transcribed interviews conducted in the schools. The transcript of the interview has gone through rigorous exploration to uncover useful data which has been expounded above (section 5). Accordingly, this detailed analysis of the transcription is linked to the objectives of the research and the findings of the study.

6.1 Drivers for the adoption and use of AT in these schools

The reasons behind the five school adopting the use of AT was explored; from the interview conducted, most of the schools used one form of AT resources or another which further strengthens the believe that these schools make use of AT. These resources ranged from computers, SMART boards, subscriptions to educational websites and so on. Reasons behind using AT could thus vary from one school to another. Although, findings revealed that all the schools believe that using AT helps students academically, it also revealed that, all the schools had no external pressure to use AT. That is, there is no government guideline requiring or enforcing AT use, nor was there pressure from parents or stakeholders or competition from other schools influencing the schools to use AT as was envisioned by Wong et al. (2008). Thus, this goes along with the

findings of the preliminary pilot interview with one of the representatives of education authority at the KHDA, in which it revealed that schools were not required to use AT as par accreditation or ranking purposes. Thus, schools are free to use AT at their free will as long as they think it could be of benefit to their students.

All the schools recognised the motivation of students to learn when AT is used in teaching was increased. This is a major reason or driver that motivates them to adopt or use AT in the various schools. Adding to this dimension, school E believes that that by using AT in the school, the school intends to reach all students as it gives the opportunity to address students with different learning styles. This is also evident in the literature where it is expressed that part of the advantage of using AT in schools is that it appeals to different learning styles of students which is not available in the teacher centred or traditional teaching method. AT is believed to bring about more creativity in students learning. Hence, all the schools appreciated the benefit of using AT which is in motivating students to learn. This is in line with Loveless et al. (2006), who claim that AT helps develop constructive thinking and creativity of students which makes it a driver for schools to use it. One major enabler to AT use in schools was found in school A, which is when subjects are interwoven with each other, it brings about need for teachers to use AT in searching, preparing and delivering lessons to students as subject materials have to be linked to each other.

6.2 AT use in schools.
A look at the level of AT resources in the schools revealed a wide variety of resources in the schools, it presented ways schools use these AT resources. All the schools in the study had a functional and up-to-date school website which they use to communicate with parents and the public. Some of the school websites have interactive capabilities that enable parents to get feedback on their children's performances in school and update on major events in the school.

In school A, the school has designed a means of using AT by providing each and every classroom in the school with an internet enabled computer system along with a projector. This is to enable teachers to have easy access to up to date information. This, they said, is much better than having to move students to dedicated IT laboratories in the school as advised by La Velle et al. (2004) and Tondeur et al. (2008b). Although the schools have well-furnished and up-to-date computer or IT laboratories, these laboratories are only used when there is need for each student to have direct hands on and immediate access to a computer; otherwise, they use the computer available within their various classrooms.

Availability of computers with projector within the classroom is similar to the provision of SMART boards in each of the classrooms in school "E" and school "D". With these resources present at all times in the classroom, teachers can easily guide students to search for current and useful information, whole class interaction can also be undertaken. In schools "B" and school "C", they had a slightly different method of using AT which is, both schools used their fully furnished and equipped modern IT laboratories which could serve a whole class of students, thus, each student once in the IT laboratory should have access to a computer. Availability as well as access to AT resources are some of the key findings discovered to aid effective AT use in school (Robertson, 2002; Groff & Mouza, 2002). Using the projector and internet facilities which is available in the IT laboratories, teachers and students could explore and do more collaborative work in the laboratory instead of in their respective classrooms where there is no computer. Having a conducive environment where these AT resource could be used has a very advantageous impact on students' learning (Eric, 1997).

Subscription to educational websites is also one of the AT used in this school, students can have interactive classes and progress at their own pace without the teacher present. All the schools surveyed had an IT instructor who provides

immediate support to teachers in case of breakdown of AT gadgets or when the need arises. These instructors are available in the school throughout the school timings. In schools D and E, the IT instructors were trained specialist in providing both curricular and technical help to teachers which is a major recommendation stated by Hadjithoma and Karagiorgi, (2009). While in the remaining schools, the IT instructors do not have any special training on using AT rather, they have developed experiences due to frequent use. They provide technical support to the teachers. Having an onsite technical support staff to provide support to teachers helps in encouraging teachers to use AT. Minor breakdowns of AT and untimely help discourages teachers to use AT which bring about fear of failure as described by Braak et al. (2004). This causes teachers to lose confidence in using AT in their classroom. Thus, reemphasising the need for AT support staff in the school.

6.3 Enablers to effective AT use in schools

Having a goal, target or a central aim to which extra attention is given is necessary to achieve an effective AT use in schools. This is obtained by devoting scarce resources a school has towards the identified areas in which small level improvement could bring about major success. These are the critical success factors (CSF) or areas identified from exploration of the case studies schools as extremely important to devote scarce school resources to. Identifying these areas or factors especially those recurring in the selected schools shows the importance of such a factor towards effective use of AT in the schools in general.

All the schools are in agreement that apart from providing AT resources in schools there are some enablers which helps schools in its drive towards effective adoption of AT. In school "B" for example, the availability of a round-the-clock IT teacher or coordinator was seen to help enable teachers to effectively use AT. Availability of AT resources and easy access to these

resources has been shown to be enabler or critical success factors (section 2.5) to effective use of AT. Most of the schools agree that having sufficient funds to purchase AT resources such that all classrooms and teachers would be able to have access and use AT in their classrooms is necessary. When AT resources are not sufficiently available, it is a barrier to effective AT adoption. Removing this availability barrier should create an enabler for a successful and effective AT adoption in schools (Balanskat et al. 2006). AT projects in schools should be seen as an on-going project, this is because it calls for purchase of new products, training of staff to use the technology, maintenance of AT resources and also upgrade when the need arises.

6.4 Problems and challenges to effective AT use in schools.

In an attempt to understand bottlenecks and problems faced by private schools in Dubai to effectively use AT for teaching in the classrooms. The problems faced by the five schools in the case study are explored. Since these schools are all independent of one another, the problems faced are expected to differ except for some cases where problems could be common amongst the schools. Starting with the common cases or problems associated with each of the five schools being studied is the availability of funding. All the schools expressed reservation put on them by the shortage of funding to purchase AT resources. Funding has being found to be a major challenge to schools as insufficient funding automatically could limit the capabilities of a school in using AT. This is also because funding could be linked to availability as when there is little or no funding making AT available in the school difficult.

Except for school "C" where the IT instructor said that encouraging teachers especially old teachers to use it has being a major challenge which the school tries to overcome. In schools "C" "D" and "E" the very nature of technological development which causes very short life cycle to resources bought is one of the challenges these schools face. This is because after teachers have become

Project: Effective introduction and adoption of Advanced Technology Dubai Private Schools

accustomed to a technology it becomes obsolete in a short period thus, if a new technology is bought, training and retraining has to be done once again. Regaining confidence of teachers to use the new technology becomes a great issue which the school would have to resolve. Quoting the United States Department of Education, Pianfetti, (2001) reports that teachers are now being asked to learn new methods of teaching not realising that there is an ever increasing technological changes especially in AT used in schools. This again poses a major challenge for teachers.

CHAPTER SEVEN: Conclusion and Recommendations

7.0 Conclusion and Recommendations

The results and findings from the research have enabled the following useful conclusions to be reached. Going by the aims of the research which are

- To know reasons or drivers behind use AT in Dubai private schools.
- How these schools are using AT
- The problems and challenges they face which hinder the effective adoption of AT in these schools.

During the course of the research all the above stated aims have been thoroughly investigated both from the literature review (section 2.0) and the case study (section 4.0). The research which used extensive qualitative research approach or case study for its findings as found in section 5.0.

This research is targeted at exploring the effective usage of AT in Dubai private schools. This research used a combination of intensive literature review and case studies of some selected private schools using the British curriculum in Dubai. All the selected schools use one form of AT or a combination of different AT resources. The research explored current status of AT use in these schools, the reasons or motivation behind the schools using AT, how they use it, problems and challenges they face while using these AT resources. It is hoped that having an effective AT use in schools would help maximise the benefit of giving students much better knowledge.

After going through extensive literature about AT use in schools and conducting interviews with major stakeholders in schools it was found out that using AT in schools help motivate students to learn. It brings about intrinsic motivation in them, along with helping teachers disseminate up-to-date knowledge to

students.   Some of the conclusions drawn from the research is that most of the selected schools use AT because of the perceived benefit it could bring to students, that is could provide them with a greater knowledge than the traditional boards and books used in the classroom. This shows to a large extent that students' academic achievement is the reason why these schools use AT. From the research it has also shown that there is no government policy or requirement that emphasizes that AT be used by schools in teaching students.

 the AT enablers and inhibitors existing in these schools that significantly weigh down the effective AT use; the findings from the research showed that there were not many inhibitors limiting the effective AT in the schools. The most obviously significant inhibitor which was found in all the schools was the availability of funding purchase of AT resources and infrastructure. Most of the schools lack some much needed new AT resources which they said would have helped them reach a much higher AT use in the school. Another significant inhibitor or barrier to the effective AT adoption found in these schools is professional development or staff training especially to use new technology. All teachers are not able to be trained when a new technology is to be used in these schools. This is partly due to the cost of training, distance to the training centres and availability of qualified trainers which is lacking as most of the available trainers are vendors of some customized resources which they wish to sell.

A number of good AT practices have been found to be in place in these schools which have being found to encourage effective use of AT in schools. Availability of AT resources in the school as well as having an AT coordinator and support staff to provide pedagogical as well as technical support to teachers are some of the basic but very important players that encourage the effective use of AT in schools. . This has proved to be a major enabler as minor technical glitches

could be easily fixed to allow for continuous and unhindered use of AT throughout the school. Support of school management for funding and development of plan for the use of AT was also found to be an encouraging factor to effective use of AT.

7.1 Limitations of the Research

Case study research is a time consuming type of research, it could also be difficult especially gaining participant to participate in the research. This research is no exception, despite the many school using the British curriculum in Dubai which gives the researcher a large sample space to select schools from, getting schools to participate for the research was a limiting factor for the research. Lots of schools where contacted but with very little success. The research would have being carried out on more schools which would have provided a deeper and wider understanding of the problem. Another limitation of the research is that participating schools could only sacrifice very little time for the interview. This has limited to some extent the amount and quality of information received from these schools as follow up interview to confirm the information gotten in the first interview could not be carried out.

Another major limitation to the research project is the inability of the researcher to combine quantitative data collection approach with the qualitative data used for the case study. Adding a quantitative data to the study would have made a stronger result to be obtained especially as such data could target teachers and other stakeholders.

7.2 Recommendations

Some of the recommendations reached from the research are

- AT use is recommended to be used by school as it is found to some extent to improve students' motivation to learn. This is necessary because the purpose of schools is to help students learn, having technology that encourages them should be explored by schools.

- Provision of an AT use plan in schools is necessary to realize the importance of AT. This should help guide teachers on how to use AT in their classes, use plan and master plan for future use are essential resources which schools should explore. Having AT use plan would help guide teachers especially new teachers and those that reluctant to use AT in their class. It would serve as a reference guide to which they can always look back to. While the AT plan for schools makes a school focus on its current and future needs such that its goals are targeted and easily reached.

- Funding of AT in schools should be critically explored to ensure that only required resources are purchased. This is to ensure funds are channelled to the most required resources.

- Furthermore, AT coordinators to provide curricula guidance to teachers should be maintained in schools. There should also be an AT personnel to provide technical help to teachers at all times during the school hours.

- School principals and leaders should consider the effective use of AT as necessary and not just the provision of resources which only could not boost students performances.

- While hiring teachers in schools, AT use should be emphasised to ensure some level of use before recruitment. This should also be followed with regular professional training to teachers on how to explore some of the vast opportunities provided by AT resources.

- Provision of professional development to teachers in other to increase their confidences and skills in using AT should be encouraged by schools.

- Companies who develop AT resources should give special discounts to schools and academic institutions in other to increase the use of AT in these institutions. This would ultimately lead to a more knowledgeable society.

7.3 Recommendations for future research work

This research explored the effective use or adoption of AT in Dubai private schools, findings are limited to the case study and the literature review done. The researcher examined five (5) private British curriculum based secondary schools out of more than fifty (50) schools using the same curriculum; this gives ample opportunity to explore AT use in more of these schools by other researchers. Additionally, Dubai has more than one hundred and fifty (150) private schools altogether, these schools teach with little over five (5) different curriculums this again gives more opportunity to be explored further. Further research which would use the quantitative method of data collection and one that includes the teachers who are the primary users of AT in the schools should be explored.

References

Al-Bataineh, A., & Brooks, L. (2003). Challenges, advantages, and disadvantages of instructional technology in the community college classroom. *Community College Journal of Research & Practice,* Vol. 27, No 6, pp. 473–485.

Aydede, M. N., Teoman, K. and Sertac, A. (2009). The opinions of students regarding the usage of computer technologies in constructivist learning. *Procedia - Social and Behavioral Sciences,* Vol. 1, No 1. pp. 2763-2767.

Abbott, L., Austin, R. , Mulkeen, A . & Metcalfe, N. (2004). The global classroom: advancing cultural awareness in special schools through collaborative work using ICT, *European Journal of Special Needs Education*, Vol.19, No 2, pp. 225-240.

Afshari, M. , Kamariah, A. B., Bahaman, W.S.L. , Samah, A. & Fooi, F.S. (2008b). School Principal as a Change Facilitator in ICT Integration. *International Conference on the Roles of the Humanities and Social Sciences in Engineering*, (ICOHSE08) pp.645-653.

Afshari, M. , Abu Bakar, K. Luan, W.S., Abu Samah, B. & Fooi, F.S. (2008a). School Leadership And Information Communication Technology .*The Turkish Online Journal of Educational Technology,* Vol. 7 No. 4 pp. 82-91.

Bacigalupo, M. & Cachia, R. (2011). *Teacher Collaboration Networks in 2025.What is the Role of Teacher Networks for Professional Development in Europe?* (Sevilla, JRC-IPTS). *Notes from the Workshops held on the 6th and 7th June 2011 at the Institute for Prospective Technological Studies of the European Commission Joint Research Centre.*

Baylor, A. L. & Ritchie, D. (2002).What factors facilitate teacher skill, teacher morale, and perceived student learning in technology-using. *Computers & Education.* Vol. 39, No. 4, pp. 395–414.

Balanskat, A., Blamire, R. & Kefala, S. (2006). The ICT Impact Report: A Review of Studies of ICT Impact on Schools in Europe. *Insight Team, European Schoolnet* (EUN).

Beauchamp, G. (2004).Teacher Use of the Interactive Whiteboard in Primary *Schools:* towards an effective transition framework Technology, *Pedagogy and Education, Vol. 13, No. 3, pp. 327-248.*

Bebell, D. , Russell, M. & O'Dwyer, L. (2004). Measuring Teachers' Technology uses: Why Multiple-measures are more revealing. *Journal of Research on Technology.* pp. 45-63.

Becker, H.J. (2000). How exemplary computer-using teachers differ from other teachers: Implications for realizing the potential of computers in schools. *Contemporary Issues in Technology and Teacher Education.* Vol. 1. No 2, pp. 274-293.

Beauchamp, G. & Kennewell, S. (2008). The influence of ICT on the interactivity of teaching. *Education Information Technology,* No. 13. pp. 305–315.

Beauchamp, G. & Kennewell, S (2010). Interactivity in the classroom and its impact on learning. *Computers and Education,* No. 54 pp. 759–766.

BECTA. (2004). A Review of the Research Literature on Barriers to the Uptake of ICT by Teachers. *British Educational Communications and Technology Agency,* Vol. 3 No. 8, pp. 9–106.

Bingimlas, K.A. (2009). Barriers to the successful integration of ICT in Teachin and Learning Environment: A review of the literature. *Eurasia Journal of Mathematics, Science and Technology Education,* Vol. 5 No. 3, pp. 235-245.

Bitner, N. & Bitner , J. (2002). Integrating Technology into the Classroom: Eight Keys to Success. Journal of Technology and Teacher Education, Vol. 10 No. 1, pp. 95-100.

Bonifaz, A., & Zucker, A. A. (2004). Lessons learned about providing laptops for all students. Newton, MA: *Education Development Center*.

Braak, J.V. Tondeur, J., & Valcke M. (2004). Explaining different types of computer use among primary school teachers. *European Journal of Psychology of Education*, Vol. 19 No. 4 , pp 407-422.

Chigona, A. & Chigona, W (2010) . Capability approach on pedagogical use of ICT in schools. *The Journal for Transdisciplinary Research in Southern Africa*, Vol. 6 No. 1, pp. 209 – 224.

Chou, C. Yu, S., Chen, C., & Wu, H. (2009). Tool, Toy, Telephone, Territory, or Treasure of Information: Elementary school students' attitudes toward the Internet *Computers & Education*, Vol. 53 No. 2 , pp. 308–316.

Chu, K.W. , Wang M., & Yuen , A.H.K (2011). Implementing Knowledge Management in School Environment: Teachers' Perception. Knowledge Management & E-Learning. *An International Journal,* Vol.3 No. 2 pp. 139-152.

Collins, A. (1991). The role of computer technology in restructuring schools. Phi Delta Kappan, No. 73, pp. 28-36.

Collins, K. M.T. , Onwuegbuzie, A.J & Sutto, I.L. (2006). A Model incorporating the Rationale and Purpose for Conducting Mixed-Methods Research in Special Education and Beyond*. Learning Disabilities: A Contemporary Journal, Vol.* 4 No1, pp. 67–100.

Cox, M., Abbott, C., Webb, M., Blakeley, B., Beauchamp, T., & Rhodes, V. (2004). A review of the research literature relating to ICT and attainment. London: DfES

Davis, S., Darling-Hammond, L., LaPointe, M., & Meyerson, D. (2005). Developing successful principals. *Stanford, CA: Stanford Educational Leadership Institute.*

Desjardins, F.J. , Lacasse, R. , & Bélair, l . M. (2001). Toward a definition of four orders of competency for the use of information and communication technology (ICT) in education. Computers and advanced technology in education: *Proceedings Of The Fourth lasted International Conference.* Calgary: ACTA press, pp. 213-217.

Dexter, S., Anderson, R. E., & Becker, H. J. (1999). Teachers' views of computers as catalysts for changes in their teaching practice. *Journal of Research on Computing in Education, Vol. 31 No.* 3, pp. 221- 239**.**

Drent, M., & Meelissen, M. (2008). Which factors obstruct or stimulate teacher educators to use ICT innovatively? *Computers & Education. Vol.* 51, No. 1, pp 187–199.

Eisenhardt, K.M. (1989) . Building theories from Case Study Research. *Academy of Management Review*, Vol. 14 No. 4,pp 532-550.

Eric, A. H. (1997). Assessing the Effects of Schools Resources on student performance: *An update, Educational Evaluation and Policy Analysis.*

Flanagan, L. (2003). Technology leadership for the twenty-first century principal*. Journal of Educational Administration,* Vol. 41 No. 2 pp 124- 142.

Florio, C. (2005). The Role of Technology in Secondary Education. *Bryn Mawr College Senior Computer Science Thesis.*

Fox, R., & Henri, J. (2005). Understanding Teacher Mindsets: IT and Change in Hong Kong Schools. *Educational Technology & Society,* Vol. 8 No. 2 pp. 161-169.

Fredriksson, U., Jedeskog, G. & Plomb, T. (2008) Innovative use of ICT in schools based on the findings in ELFE project, *Education & Information Technologies*, 13, pp. 83–101.

Galanouli , D., Murphy, C., & Gardner, J. (2004). Teachers perceptions of the effectiveness of ICT-competence training. *Computers & Education*, No. 43 pp. 63–79.

Gorghiu, G., Gorghiu, L.M., Brezeanu , L, Suduc, A. M. & Bizoi, M. (2012).Promoting the effective use of ict in Romanian primary and secondary education - steps made in the frame of edutic project *Procedia - Social and Behavioural Sciences* No.46 .pp. 4136 – 4140.

Groff, J., & Mouza, C. (2008). A framework for addressing challenges to classroom technology use. *AACE Journal,* Vol. 16, No. 1, pp. 21-46.

Gulbahar, Y. (2007). Technology planning: A roadmap to successful technology integration in schools. *Computers & Education* . No. 49 , pp 943–956.

Hadjithoma, C. & Karagiorgi, Y. (2009). The use of ICT in primary schools within emerging communities of implementation. *Computers & Education,* No. 52 pp. 83–91.

Hadjithoma, G.C. (2011). The role of the principal's leadership style in the implementation of ICT policy. *British Journal of Educational Technology*. Vol 42, No 2 ,pp. 311–326.

Hall, I. & Higgins, S. (2005).Primary school students' perceptions of interactive whiteboards Blackwell Publishing Ltd. *Journal of Computer Assisted learning,* No 21, pp. 102–117.

Hattam, R. (2000). Remembering teachers' learning in the devolving school. Professional Magazine, No. *17*, pp. 21-23.

Harris, J. , Mishra, P. & Koehler, M. (2009) Teachers' Technological Pedagogical Content Knowledge and Learning Activity Types: Curriculum-based Technology Integration Reframed *Journal of Research on Technology in Education, Vol. 41 No.* 4, pp 393–416.

Hayes, D.N.A. (2007). ICT and learning: Lessons from Australian classrooms. *Computers & Education. No.* 49 pp. 385–395.

Hermans, R. ,Tondeur,J. , Braak, J. V. & Valcke, M. (2008). The impact of primary school teachers' educational beliefs on the classroom use of computers. *Computers & Education* No. 51 pp.1499–1509.

Hew, K.F., Brush, & T. (2007). Integrating technology into K-12 teaching and learning: current knowledge gaps and recommendations for future research. *Educational Technology Research and Development*, Vol. 55 No.3 pp.223–252.

Hoffman , B (1996).What Drives Successful Technology Planning? Journal of Information Technology for Teacher Education, Vol. 5 No. 1, pp 43-55.

Hohlfeld, T.N, Ritzhaupt, A.D, Barron, A.E., & Kemker, K (2008). Examining the digital divide in K-12 public schools: Four-year trends for supporting ICT literacy in Florida . *Computers & Education,* No. 51 pp.1648–1663.

Holcomb, L.B (2009).Results & Lessons Learned from1:1 Laptop Initiatives: *A Collective Review.* Vol. 53, No. 6. pp. 49-55.

Hu, L. & Webb, M. (2009). Integrating ICT to higher education in China: From the perspective of Activity Theory. *Education Information Technology* No. 14 pp.143–161.

Inan, Fethi A., Lowther, D.L. , Ross, S.M & Strahl, D. (2010a). "Pattern of classroom activities during students' use of computers: Relations between instructional strategies and computer applications." *Teaching and Teacher Education* . Vol. 26 No. 3, pp.540-546.

Inan, F. A. ,.Lowther, D.L (2010b). Factors affecting technology integration in K-12 classrooms: a path model Education Technology Research Development , Vol. 58 pp.137–154.

John, P. (2005). The sacred and the profane: subject sub-culture, pedagogical practice and teachers' perceptions of the classroom uses of ICT. *Educational Review*, Vol. 57, No 4, pp. 469-488.

John. D.P. & Sutherland, R. (2004). Teaching and learning with ICT: new technology, new pedagogy? *Education, Communication & Information.* Vol 4 No1,pp 101-107.

Kehrwald, B. (2010). Being Online: A critical view of identity and subjectivity in new virtual learning spaces. *London review of education.* Vol. 8, No.1 pp. 39-50. Kopcha, T.J (2010). A systems-based approach to technology integration using mentoring and communities of practice Education Technology Research Development, No. 58 pp.175–190.

Kozma, R. & Anderson, R. (2002). Qualitative case studies of innovative pedagogical practices using ICT. *Journal of Computer Assisted Learning*, Vol. 18 No. 4, pp 387-394.

Kozma, R.B. (2005) .National Policies That Connect Ict-Based Education Reform To Economic And Social Development. *An Interdisciplinary Journal on Humans in ICT Environments. Vol.* 1 No. 2, pp. 117-156.

Kumar, N., Rose, R.C.,& D'Silva, J.L. (2008). Teachers' Readiness to Use Technology in the Classroom: An Empirical Study. *European Journal of Scientific Research,* Vol.21 No.4, pp.603-616.

Lai, H. & Chen, C. (2011). Factors influencing secondary school teachers' adoption of teaching blogs. *Computers & Education.* Vol 56 No. 4, pp 948-960.

Lau, B.T & Sim , C.H (2008). Exploring the extent of ICT adoption among Secondary school teachers In Malaysia. *International Journal of Computing and ICT Research*, Vol. 2, No. 2, pp.19-36.

La Velle,L.B. , Mcfarlane,A. , John, P.D & Brawn, R. (2004). According to the promises: the subculture of school science, teachers' pedagogic identity and the challenge of ICT, *Education, Communication & Information*, Vol 4. No1, pp 109-129.

Lawson, T, & Comber C. (1999). Superhighways Technology: personnel factors leading to successful integration of information and communications technology in schools and colleges. *Journal of Information Technology for Teacher Education,* Vol. 8, No. 1.

Lim, C.P. (2007). Effective integration of ICT in Singapore schools: pedagogical and policy implications. *Education Technology Research Development.* No. 55 pp 83–116.

Livingstone, S. (2012). Critical reflections on the benefits of ICT in education, *Oxford Review of Education*,Vol. 38 No1,pp 9-24.

Lowthera, D.L , Inanb,F.A., Strahlc, J.D. & Ross. S.M. (2008). Does technology integration "work" when key barriers are removed? *Educational Media International* Vol. 45, No. 3, pp. 195–213.

Loveless, A. , Burton, J. & Turvey , K. (2006). Developing conceptual frameworks for creativity, ICT and teacher education. *Thinking Skills and Creativity,* No. 1 pp. 3–13.

Losada, I. D. , Karrera, I, J. & Estibaliz, A.A.J. (2012).Factors Facilitating Successful Educational Innovation with ICT in Schools *Revista de Psicodidáctica, Vol 17 No. 1,pp 113-134.*

Madden, A., Ford, N., Miller,D. , & Levy, P. (2005). Using the Internet in teaching: the views of practitioners (A survey of the views of secondary school teachers in Sheffield, UK. *British Journal of Educational Technology Vol. 36 No. 2, pp.*255–280.

Meneses, J. , Fabregues, S., Rodriguez-Gomez, D. ,& Ion, G. (2012). Internet in teachers' professional practice outside the classroom: Examining supportive and management uses in primary and secondary schools. *Computers and Education,* No. 59 pp. 915–924.

Mooij, T. (2004). Optimising ICT effectiveness in instruction and learning: multilevel transformation theory and a pilot project in secondary education. *Computers & Education,* No. 42 pp. 25–44.

Mumtaz, S. (2000). Factors affecting teachers' use of information and communications technology: a review of the literature. *Journal of Information Techology for Teacher Education.* Vol. 9 No. 3, pp 319-342.

Neyland, E. (2011).Integrating online learning in NSW secondary schools: Three schools' perspectives on ICT adoption. *Australasian Journal of Educational Technology, Vol* 27 No1, pp 152-173.

Ngai, E.W.T., Law , C.C.H. & Wat, F.K.T. (2008). Examining the critical success factors in the adoption of enterprise resource planning, *Computers in Industry*, Vol. *59 No.*6, pp 548-564.

Ottestad, G. (2010). Innovative pedagogical practice with ICT in three Nordic countries – differences and similarities. *Journal of Computer Assisted Learning,* No. 26, pp 478–491.

Ozturk, N. , Ramazan, D. & Ilbilge, D. (2011) . The use of technology is gaining importance in the developing world: the problems of primary school teachers encountered about computer technologies and solution suggestions. *Procedia - Social and Behavioral Sciences,* No.15 , pp 2242-2247.

Penrose ,E.T. (1959) .The Theory of the Growth of the Firm , *Wiley, New York.*

Pianfetti, E. S. (2001). Teachers and technology: Digital literacy through professional development. *Language Arts*, Vol. *78 No.* 3, pp. 255-263.

Project: Effective introduction and adoption of Advanced Technology Dubai Private Schools

Polly, D., Mims, C., Shepherd, C. E. & Inan F. (2010). Evidence of impact: Transforming teacher education with preparing tomorrow's teachers to teach with technology (PT3) grants. *Teaching and Teacher Education, Vol.* 26 No 4, pp. 863-870.

Robertson, J. (2002). The ambiguous embrace: twenty years of IT (ICT) in UK primary schools. *British journal of educational technology*, Vol. 33, No. 4, pp. 403–409.

Rockhart, J.F. (1979) . Chief Executives Define Their Own Data Needs, *Harvard Business Review,* Vol. 57, No. 2, pp. 81-93.

Salinas, M. F. 2008. From Dewey to Gates: A model to integrate psychoeducational principles in the selection and use of instructional technology. *Computers & Education*, Vol. 50 No 3, pp.652-660.

Saunders, M. , Lewis, P. , & Thornhill, A. (2007). Research methods for business students (4th Ed), Prentice Hall.

Selim, H. M (2007).Critical success factors for e-learning acceptance: Confirmatory factor models. *Computers & Education*, No. 49, pp. 396–413.

Selwyn, N. (2000). Researching computers and education D glimpses of the wider picture. *Computers & Education,* Vol. 34 pp. 9-101.

Selwyn, N. (2003). Apart from technology: understanding people's non-use of information and communication technologies in everyday life. *Technology in Society,* No. 25, pp. 99–116.

Smeets, E. (2005). Does ICT contribute to powerful learning environments in primary education? *Computers & Education,* No. 44, pp. 343–355.

Tanner, H., Jones, S. , Kennewell, S. & Beauchamp, G. (2005). Interactive whole class teaching and interactive white boards building *connections: Theory research and practice,* pp. 273-280.

Thambi, M. & O'Toole, P. (2012). Applying a knowledge management taxonomy to secondary schools. *School Leadership & Management. Formerly School Organisation*, Vol. 32 No. 1, pp. 91-102.

The United Arab Emirates Government Strategy. (2011-2013). *Highlights of the U.A.E. government strategy putting citizens first an accountable, lean, innovative, and forward-looking government.*

Tondeur, J, Braak, V.J & Valcke , M. (2007). *Curricula and the use of ICT in education: Two worlds apart? British Journal of Educational Technology, Vol. 38 No 6, pp.* 962–976.

Tondeur, J., Valcke, M. & Braak, J. V (2008a). A multidimensional approach to determinants of computer use in primary education: teacher and school characteristics*. Journal of Computer Assisted Learning* .No 24, pp. 494–506.

Tondeur, J., Keer, H.V, Braak, J.V. & Valcke, M (2008b). ICT integration in the classroom: Challenging the potential of a school policy. *Computers & Education.* No. 51, pp. 212–223.

Valiente, O. (2010). 1–1 in Education: Current Practice, International Comparative Research Evidence and Policy Implications. *OECD Education Working Papers, No.44* (Paris, OECD Publishing).

Vanderlinde, R. & Braak, J. V. (2010). The e-capacity of primary schools: Development of a conceptual model and scale construction from a school improvement perspective. *Computers & Education.* No. 55, pp. 541-553.

Wang, P. & Chan, P.S. (1995). Advantages, disadvantages, facilitators, and inhibitors of computer-aided instruction in Singapore's secondary schools. *Computers & Education,* Vol. 25 No. 3 pp. 151-162.

Warschauer, M., Cotton, S.R & Ames, M. G. (2012). One laptop per child Birmingham: Case study of a radical experiment. *International Journal of Learning and Media.* Vol. 3 No. 2, pp 61-76.

Wastiau, P., Blamire, R., Kearney, C., Quittre, V., Van de Gaer, E., & Monseur, C. (2013). The Use of ICT in Education: a survey of schools in Europe. *European Journal of Education*, Vol. *48 No.* 1, pp. 11-27.

Wiig, K. (2000). Knowledge management: An emerging discipline rooted in a long history. Knowledge horizons: the past and the promise of knowledge management, *Butter worth Heinemann, Boston, MA,* pp.3-26. Wong, E. M. L., Li, S. S. C., Choi, T.H., & Lee, T. N. (2008). Insights into Innovative Classroom Practices with ICT: Identifying the Impetus for Change. *Educational Technology & Society*, Vol. *11, No.*1, pp 248-265.

Yasemin, G. (2007). Technology planning: A roadmap to successful technology integration in schools. *Computers & Education.* No. 49 , pp. 943–956.

Yin, R. K. (1981) The Case Study as a Serious Research Strategy. *Science Communication. Vol. 3, No. 97, pp 97-114.*
Younie , S. (2006). Implementing government policy on ICT in education: Lessons learnt Education, *Information Technology* No.11 pp. 385–400.

Zakopoulos, V. (2005). An Evaluation of the Quality of ICT Teaching within an ICT-Rich Environment: The Case of Two Primary Schools*. Education and Information Technologies* , Vol. 10, Iss. 4, pp 323-340.

Zhang, J. (2002). Incorporating ICT into K-12 Schools: China's Perspective in the Global Backgrounds.*TechTrends*. Vol. 46, Iss 4 , pp. 49-57.

Zhang, B. H. & Looi, C. K. (2011). Developing a sustainable education innovation for seamless learning. *Procedia - Social and Behavioral Sciences.* Vol 15, pp. 2148-2154.

Zhao, J. (2010). School knowledge management framework and strategies. The new perspective on teacher professional development. *Computers in Human Behavior*, Vol. 26 pp. 168–175.

Zhao, Y. & Bryant, L. (2004).Can Teacher Technology Integration Training Alone Lead to High Levels of Technology Integration? A Qualitative Look at Teachers' Technology Integration after State Mandated Technology Training. *Electronic Journal for the Integration of Technology in Education, Vol. 5 pp.* 53-62.

Appendices:

Appendix A : Case study questions

Short response questions for school principals or managers

What are your views in relation to using Advanced Technology (AT) in classrooms?

What is the major reason behind using advanced technology in your school?

What are your current AT practices that distinguish your school's use of AT from other schools?

What are major challenges do you face while adopting advanced technology in your school?

How do you intend to overcome these challenges?

Does your school have an AT master plan?

Are teachers' views taken into consideration when developing the plan?

What do you aim for by using AT in your school?

What are the most important enablers for successfully implementing AT in your classrooms?

What should be done to improve or sustain AT use in schools?

Do you have special funding assigned for AT resources in your school?

Any other comment?

Thank you for your time!

Appendix B : Letter of request for participation

Dear Sir,

Research Interview

I am currently undertaking a small scale research project for my dissertation at the British university in Dubai. I was wondering if you (or any of your top management staff) would be willing to be interviewed, at a time and place convenient to you as part of this research. The interview should take no longer than 20 minutes. Your participation would be very much appreciated noting that you have a very tight schedule.

The title of my research project is "Effective adoption of advanced technology in Dubai private schools".

And I hope to explore the way you use technology in your school.

Before you agree to the interview I can confirm that:

- My school has given permission for this research to be carried out.
- With your permission will the interview will be recorded.
- Your anonymity will be maintained at all times and no comments will be ascribed to you by name in any written document or verbal presentation. Nor will any data be used from the interview that might identify you to a third party.
- You will be free to withdraw from the research at anytime.
- A request letter is attached for your information.

I sincerely hope that you will be able to help me with my research. If you have any queries concerning the nature of the research or are unclear about the extent of your involvement in it please contact email me at *110064@student.buid.ac.ae*

Project: Effective introduction and adoption of Advanced Technology Dubai Private Schools

Finally, can I thank you for taking the time to consider my request and I look forward to your reply.

Yours sincerely,

Raji Mubarak

Appendix C: Advantages of AT by Collins, A. (1991)

Table 5: Advantages of AT defined by Collins, A. (1991)

A shift from whole-class to small-group instruction	Using AT in the classroom reduces the level of teacher led activities in the class. There by increasing students independent and cooperative activities. Students are able to go at their own pace and teacher easily notices those struggling.
A shift from lecture and recitation to coaching.	AT use in schools shifts instruction from whole-class to individualized instruction. Using AT, teachers are encouraged to play the role of a coach, or an observer who guides students ensuring that they get beneficial learning opportunity.
A shift from working with better students to working with weaker students.	In normal classrooms, teachers engage with better students especially because they raise their hands and teacher does not want to embarrass the weak ones thus they are not called upon . Working with AT, teachers are naturally drawn to help the weak students who would normally need help all the time.
A shift toward more engaged students.	AT use engages students in activities that are tasking and help students overcome boredom and sleep in class.
A shift from assessment based on test	Instead of relying on test scores as

performance to assessment based on products, progress, and effort.	method of students' performance assessment, AT moves assessment to effort and progress made by students. Thus making assessment more subjective.
A shift from a competitive to a cooperative social structure.	Instead of competing amongst themselves as is usually done in normal classrooms, using AT in the class encourages cooperation, idea discovery and expertise sharing amongst students.
A shift from all students learning the same things to different students learning different things.	AT use provides opportunity for students to exploit their individual differences and use their different expertise extensively.
A shift from the primacy of verbal thinking to the integration of visual and verbal thinking.	Exploring the power of AT in providing visual media to enhance learning. AT provides instant access to the available verbal and visual forms of knowledge to students.