

Implementation Of E-Learning: A Case Study Of Three Schools

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Abstract: As Western Australian schools move to implement technology into the classroom, there appears to be prevalence in combining e-learning with face to face traditional classroom practice. This has been accompanied by a shift toward a digital curriculum that incorporates re-usable learning objects. Essential to any teacher contemplating the use of a digital curriculum resource is not only the knowledge of learning theories but models of best practice to create online curriculum for students to use in every day classrooms. This paper explores the e-learning practices in three case study schools (n=3) in Western Australia. Data were collected by observation and interviews (n=11) conducted with the teachers and the ICT co-ordinators, to ascertain their perceptions and experiences with regard to the e-learning environment. There were challenges associated with the implementation of e-learning by teachers into their classroom such as skill development, changes in their role and the pedagogies they employ. The case study schools were pilot schools breaking new ground in order to test a new portal technology. Findings indicated that successful implementation of the e-learning environment was dependent on the four key factors of ICT infrastructure, ICT leadership, support and training initiatives and the teachers' ICT capacity.

Introduction

Constant changes in technology can have a profound effect on education (Brent, 2005). With technology evolving at such a rapid rate, it is imperative that educational institutions equip students with technological skills that are essential for coping in the wider community. These skills are most effectively gained by learning *with* technology, rather than *about* technology (Albon & Trinidad, 2002; Trinidad, MacNish, Aldridge, Fraser & Wood, 2001). Through the use of the e-learning environment, there is potential to establish a collaborative teaching and learning community (Bates, 2005; Bonk, Wisner & Lee, 2004). Bowles (2005) suggests the existence of a cultural change within schools, and proposes the need for teachers to identify the benefits of e-learning. In 2001, the Department of Education, Training and Youth Affairs (DETYA) commissioned one of the largest educational research projects ever undertaken in Australia, to focus on innovation in schools. The Innovation and Best Practice Project (IBPP) consisted of research into 107 schools throughout Australia in relation to teaching and learning toward a 'knowledge society'. Through the innovation of e-learning environments, teachers found they were more able to cater to individual student differences than previously attempted in the conventional classroom.

Fox and Trinidad (2006) developed a structural framework to assist educationalists implementing e-learning or as they refer to "technology-enhanced learning". This framework was based on the work of Herrington, Herrington, Oliver, Stoney and Willis (2001) and describes three components of importance when developing new resources and providing professional development for staff. These components are resources, pedagogies and delivery strategies. The resources are the learning content and forms of information that are provided to the learner. These resources are best provided as a variety of forms, which need not be all online. Pedagogies are the activities used to engage the learner. This underpins the manner in which the environment is structured and should include opportunities for the learner to construct their own meaning through collaboration and a learner-centred environment. The delivery strategies element refers to the reliability and accessibility to the e-learning environment. The ability to design inclusively and for learners who may be geographically located from the teacher is critical to this component (Oliver & Herrington, 2001).

Current literature indicates the terminology attributed to technological education is elusive and used inconsistently (Bowles, 2004; Alonso, Lopez, Manrique & Vines, 2005). The terms

e-learning and online learning are often used interchangeably when discussing the delivery of education through a technological medium. E-learning refers to a variety of learning experiences that use technology to support and enhance learning (McCombs & Vakili, 2005). However to refine the terminology, Bates (2005) disagrees with this use of interchangeable terminology and believes that online learning is not merely technology, but more specifically related to the Internet and the world wide web. For the purpose of this study, e-learning was specifically defined as a technology that allowed for the delivery of educational resources to support teaching and learning through the use of ICT.

The study of the e-learning environment discussed in this paper was considered to be technology-enhanced learning. As a result, the study was expected to be shaped by the resources, pedagogies and delivery strategies components illustrated in Figure 1. As shown in the Venn diagram in Figure 1, the e-learning environment, in this case ILN, can bring together the elements necessary for learning through the technology. The components of resources, pedagogies and delivery are integral to transformation of staff teaching and student learning (Fox & Trinidad, 2006).

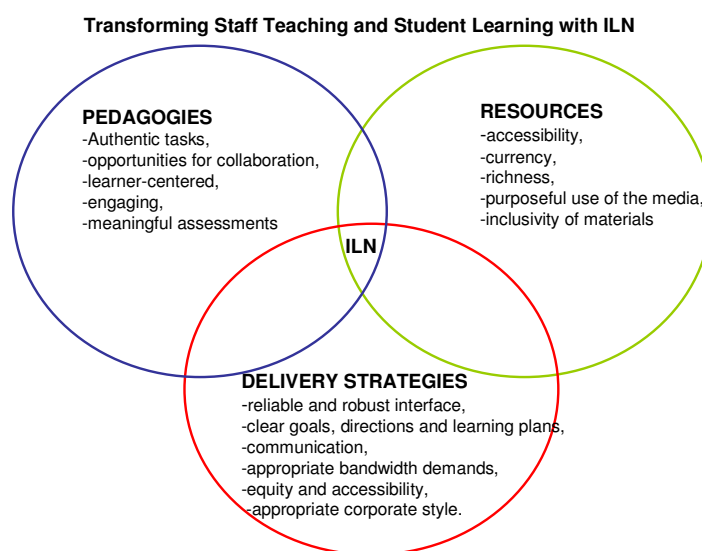


Figure 1: Fox and Trinidad (2006) Structural Framework

A review of e-learning literature indicates that growth in technological education is increasing on both a global and national level (Bates, 2005; CERI, 2005; Holmes & Gardner, 2006). Since DETYA (2000) released their *Learning for the Knowledge Society* action plan, many other government initiatives have impacted on the future direction of ICT in the school curriculum. In essence, successful implementation of e-learning brings forth implications such as a whole school approach to ICT, financial expenditure to ensure adequate infrastructure of technology and professional development for teachers, which must be considered.

Contextualising the Study

In Western Australia there are commonly three educational bodies; that of government, independent and catholic schools. Each sector is currently planning and implementing strategies to provide e-learning solutions to its respective members. This research was conducted on three case study schools from one educational sector that had recently participated in a trial phase of an e-learning portal technology. This paper reports on the research findings that were derived from a number of interviews with three ICT co-ordinators, three secondary teachers and observations of two secondary classroom teachers who were

using the e-learning environment in their teaching and learning practice. In order to appreciate the intricacy of the research findings, it is important to elucidate upon the relationship between the key players of each case study school and their approach to managing the implementation of the e-learning environment. Each school employed an ICT Management level position that was responsible for the ICT strategic planning and implementation within the school. Although these positions possessed significantly different titles, the incumbents appeared to hold similar responsibilities. The ICT Co-ordination level was the second tier of the structure. At School A and B, both of these roles were possessed by a teacher employed within the school who performed the ICT Co-ordinator duties on a fractional basis. The ICT Facilitation level, included the teachers who were at the coalface of teaching within the e-learning environment. Figure 2 illustrates the relationships within each case study school and how they structured the management, co-ordination and facilitation levels of their employees involved in the implementation.

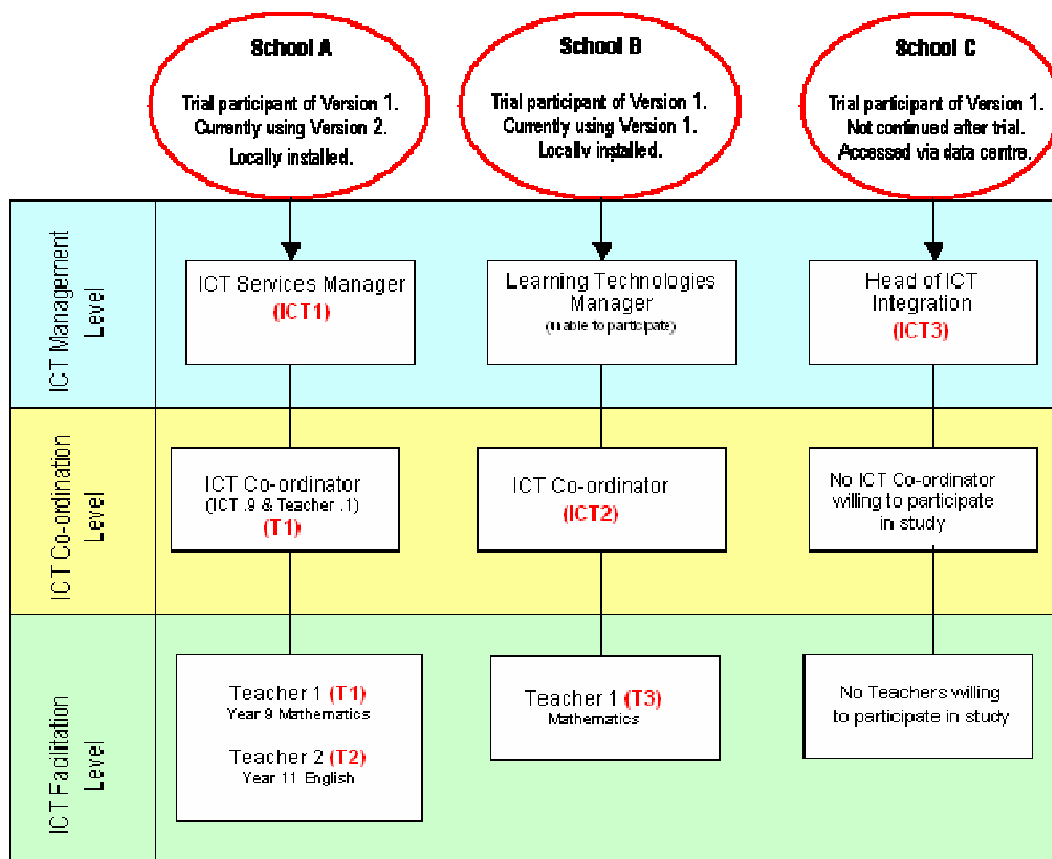


Figure 2: A Model of Relationships between School Context and E-Learning Environment

Research Methods

A qualitative research approach was used in this interpretive study to investigate e-learning practices in three case study schools. Data were collected by observation and interviews conducted with the teachers and the ICT co-ordinators, to ascertain their perceptions and experiences with regard to the e-learning environment. The data were examined and categories and recurring themes that emerged from the transcripts were identified. These themes were highlighted and became the major areas of interest in the study. The following

research questions served as a framework for the interpretation of the data discussed in this study.

1. What support and training has been provided prior to and during the implementation phase of the e-learning environment?
2. How have teachers used the e-learning portal technology to achieve educational outcomes for students?

Findings and Discussion

The purpose of this study was to ascertain how educationalists were using an e-learning environment and what factors affected successful implementation of e-learning in a secondary school environment. More specifically, this study sought to examine advantages and disadvantages of e-learning, the attitudes and perceptions of teachers toward using the e-learning environment and their view of support and training requirements. While this paper does not allow for a detailed account of all of the data, several key factors have been chosen that are important in the implementation of an e-learning environment. These key factors emerged as recurring themes within the data.

ICT Leadership

Leadership and a whole-school approach are important in planning and implementing any e-learning environment (Pearson, 2005). According to CERI (2005) there are numerous barriers to overcome when implementing e-learning. Under the realm of staff issues, a lack of vision and leadership from senior ICT management can greatly affect the ability to successfully implement an e-learning environment. This study highlights the importance of a vision from the ICT managers to the success of implementation.

All three schools from the study had employed people in ICT management positions to strategically lead their schools through the change process. The incumbents of these positions not only possessed extensive ICT knowledge, they held qualifications in education and had previously experienced careers in teaching. An understanding of the use of ICT in schools and the pedagogy underpinning their strategic planning decisions for the e-learning environment were significant factors in a successful implementation.

Two schools exhibited similarities in organisational structure, which resulted in the successful implementation of the e-learning environment. These schools employed a key player in the organisational structure, a middle management tier of ICT co-ordination. These employees undertook fractional duties of ICT co-ordination and teaching within the school. As a result, they appeared to be the link between the strategic planners at the ICT management level and the teachers who were to deploy the e-learning environment at the facilitation level. The ICT co-ordinators at these schools were regarded as highly instrumental in the implementation, were considered as adopters of the environment, had participated in leadership decision-making processes and attended numerous professional development sessions.

There was no evidence in the research findings to suggest a middle management link or a noteworthy vision of the ICT leader from the school that displayed least progression with implementation.

Trinidad (2005) suggests many teachers hesitate to implement ICT in their teaching practices for many reasons. These reasons vary from inability to recognise the benefits of implementing technology into their existing curriculum to incompatibility with their own teaching philosophy. In the researcher's opinion, the ICT leader at one school was a transformational ICT leader who understood the importance of identifying staff members who

would become early adopters of the e-learning environment and exude a positive attitude toward the change process:

Identify some staff who would be quality adopters of it. They don't necessarily have to be technically literate, but they have to be keen. It's the willingness to try things and the willingness to use the technology. (School A, ICT 1)

To proactively address resistance of change from the teaching staff, this ICT manager had also employed several key strategies such as mandated authentication to the e-learning environment for all users of the school network and removal of the editing rights to the existing Intranet:

There's a number of teachers who wanted to transfer what was on the intranet to the portal. Currently it's a link to the intranet and they can still go to those areas. We've pretty much removed Front Page from everyone so they can't edit the old intranet. We are forcing a movement. Well you know, you've got to do these things in such a way that. Rather than people going into the old system, they will actually turn around and make something new. (School A, T1)

What we did was, we set it up so that when you opened Internet explorer the default home page is the portal. (School A, ICT 1)

ICT Infrastructure

According to Jacobsen (2005), the technological infrastructure of the school is fundamental to the integration of the e-learning environment. For teachers and students alike, the ability to gain reliable access to computers and the e-learning environment is a key issue (Gebhart, 2005; Salmon, 2004). Two of the case study schools that did not mandate laptop programmes for their students, accessed the e-learning environment through computer laboratories or portable laptop trolleys. All teachers who participated in the study expressed differing opinions regarding the reliability of access to computers for their classroom teaching practices. The research findings indicate that the accessibility of computers can impact on a teacher's purpose for using the technology. One teacher did not have permanent access to computers in her classroom and appeared to utilise the portal for predominantly administrative purposes as seen in this extract:

Because I don't have access to it in my classroom at all times. I actually use it more as a resource area for my students. (School A, T1)

Another teacher from the same school accessed computers in her classroom on a regular basis but considered that not all teachers were as fortunate:

For me it's quite good, because I have a classroom that has a computer pod attached to it. So I can tend to have access not only to computers but I can go and pick up a few laptops and bring them in if need be. So it's all right for me. The other times though you need to book into the library or to the computing labs and oh that's so hard to get them. A lot of people have permanent bookings and you've got to try and find spaces and that's the difficulty, finding time to access our computers. (School A, T2)

In an ideal scenario, all schools implementing the same e-learning system would do so using the same ICT infrastructure (Jacobsen, 2005). However, in reality, schools differ greatly in their technological requirements and the finances to support those requirements. From the three case study schools, there were several differences in the ICT infrastructure supporting the e-learning portal technology. Two of the schools had conducted local installations of the portal technology to their servers. The research showed both of these schools held some reservations about accessing the portal environment at the data centre for security reasons, and as a result, they considered local installation a strategic advantage in the management of the environment:

We had looked at having it hosted, but at the moment we've stuck with the local installation. It's given us a little bit more latitude in some of the management side. Not too much but seems to work fairly well that way. We have some reservations to going to a hosted environment. (School B, ICT 2)

One of the case study schools had decided to access the e-learning portal hosted through an outsourced data centre, located at an interstate location. At the completion of the trial phase

the relationship with the data centre was discontinued and as a result the school had no access to the data centre and the e-learning environment. The results of this study indicated the local installation of the e-learning was fundamental to two of the case study schools experiencing a successful implementation of the e-learning environment.

The research showed the development of the existing Intranet within the school and the extent it had been utilised by teachers appeared to affect the successful implementation of the e-learning environment. The school that appeared to have progressed the least with implementation of the e-learning environment (School C), initially had an extensively developed intranet solution:

Actually a problem that I've had with the staff who have been working on the portal here, is that we've got a fairly extensive intranet. So staff are used to putting their resources on the intranet. (School C, ICT 3)

Funding remains a prominent attribute of successful e-learning development in the school context. CERI (2005) suggests although e-learning is educationally advantageous to learning institutions, a clear sustainable business model is critical to the implementation process. Sustainability is an important issue that can be affected by funding implications. Prior to implementation, schools must consider the ongoing cost of providing flexible pedagogy and personalised materials to students. Practical issues such as hardware (accessibility to computers), connectivity (hosted data centre environment) and networking (access to the Internet) will often influence a teacher's decision to use ICT resources in their teaching and learning practices. Ultimately, this can only be resolved at the school level, which exemplifies the need for a whole-school ICT approach that needs to be deployed by a significant ICT leader.

Support and Training Initiatives

A range of methods should be utilised to support the initial and ongoing use of e-learning environments for both staff and students (Catherall, 2005). The first method should be through the development of a policy or procedural document that outlines the standard practices for activity on the system. There was no evidence of this document in relation to the implementation of the e-learning environment at any of the three case study schools. However, the research findings showed two of the three case study schools implementing the e-learning environment had in fact developed a document that was referred to as a "handout" at one school and a "guide" at another school. These documents were an integral support mechanism for staff and students at both of these schools in keeping with Catherall's (2005) study.

A user support group had been developed by a number of schools implementing the e-learning environment in the Perth metropolitan area. The participants of this study from the ICT management and co-ordination levels of the schools were all members of this group. The contextual understanding of others working within the same ICT environment and toward the same educational outcomes appeared to benefit the development of the group.

Which is another reason we want to develop a users group. On a school basis solve some questions, we're likely to have come across them implementing the portal. We have the same here with network issues, often we'll go to the staff that are involved a lot more in IT rather than the technicians because they're likely to have encountered the problems more so because they're in the same environment as you work in. (School B, ICT 2)

According to Salmon (2004) focusing training on the technological features of the e-learning system is only the first step to success; the real challenge is training for changes to pedagogy. Teachers from the study were generally satisfied with the level of support and training they had received prior to and during the implementation phase of the e-learning environment, however access to time to implement pedagogical change and develop their e-learning environments was a key issue. The research findings from all levels of the organisational structure reinforced this key issue.

One disadvantage with teachers is always going to be the time. Time to set things up like that, because if they don't perceive that they have the time to do things like that then they won't. Then it's either a half hearted attempt at doing something which would tend to have more of a negative impact. Or they don't do it at all. (School B, T3)

Basically over the Christmas holidays I spent a lot of time putting information in and getting it ready to go for the portal. Right from the organisation, from the beginning? Oh that's quite a lot of time because you have to go and get your resources first of all, it would have been a LONG time, a LONG time. So I spent a large part of the Christmas holidays and also the end of last term so it was weeks. It was weeks possibly two months, organising that stuff. (School A, ICT 2)

Fundamentally, far more time is required for professional development than was available to the teachers involved in the study.

Teachers ICT Capacity

The current literature shows the initial stages of implementing the e-learning environment are dependent on the teacher's attitudes toward computers and their access to effective help (Salmon, 2004). The purpose at this stage is to expose or immerse the participants, rather than train them formally. This enables them to understand the benefits of the system. From the study, one school had implemented both formal training and the immersion strategy by mandating authentication to the e-learning environment. This meant that every time a teacher or student accessed the Internet Explorer software, they were required to login to the portal environment.

Further analysis of the data revealed one case study school had a key purpose for implementing the e-learning environment that no other school in the study had. This school was utilising the e-learning environment to offer a fully online curriculum to external learners, whereas others were using it to create a blended learning environment.

Some are at the other schools that are too small to offer certain subjects so we offer them online. Others are a home schooling group, where some of the parents wanted to access other information and they are tied into that and they access some science or maths. Its mainly year 8's at the moment, but we've got some year 11's and 12's that use the content too. (School B, T3)

In terms of teacher's attitudes toward implementing an e-learning environment, a considerable amount of time and personal interest in using the technology is required (Trinidad, 2005). All three teachers from the study demonstrated a personal interest in incorporating the e-learning environment into their teaching practice and had developed a vision about what could be achieved with the technology. All three teachers were members of the ICT Committee at their respective schools, had studied units in computer education or information technology at a university level and had participated in self initiated professional development.

Teachers Perceptions of Educational Advantages

The purpose for implementing e-learning, according to Holmes & Gardner (2006), is predominantly to enhance educational outcomes for students. From analysis of the teachers' data, the perceived educational advantages were immediate feedback, self-paced learning, increased communication, extension of learning and an individualised curriculum:

The advantages have been significant because of that one to one contact I have had with those students. Because it was an immediate feedback and I could do it in my spare time. Looking at their work. It gave me a point of contact for each lesson, for each student I could actually make comments to each student so I could treat them more individually and more personally in that sense. I knew straight away what they were doing. Also it means that their resources are much richer because I don't have to worry about printing things, so you can give them a lot of information that's always there. The other advantage is for something like English. Because their learning is so self directed now under outcomes that they can work independently with the portal. Especially when you give them a wide variety of resources, they don't have to use them, but they are there to give them jumping off points or things to think about or things they can use as well. And also of course another real advantage with outcomes is a student who wishes to extend their level and thinks how can I do that in reading or viewing has things on the portal right at hand that they could use to do extra work if they wish to and submit it in their reading journal. And say, "look I've done this, would you like to mark it". So they can actually take it in hand to lift their levels themselves. So it's giving them a wider opportunity to improve. (School A, T2)

Catering for particular students educational requirements, some students are a lot more adept to learning in that environment, so you can make use of that as well as the normal classroom environment. I have students who will still avoid the computers, and others who tend to only learn on the computers or only be manageable in their learning on the computers. It does cater for particular needs, especially in one class where I have a lot of weaker students. They can do things a lot quicker and get feed back quicker. (School A, T1)

We've managed to start one staff discussion group and we've got four student discussion groups. We have at least two hundred posts in each now. Which is from quite a broad spectrum of students too. Those who don't actually talk as much in class may in this medium, and it's caused a lot of interaction between year groups too. Its good because they get to bounce ideas, and years 8's respond to year 12's. Probably without even knowing unless they go and click on their name. (School B, T3)

A number of teachers proposed that the e-learning environment was enriching, rather than replacing their pedagogical practices:

Well I wouldn't take something on totally and devote myself to it alone. So anything that adds to your teaching or varies your teaching has to be an advantage. So no, I would not do every single thing through the portal. I've seen things other people have done and thought I can do that as well. And that's another way of enriching my teaching and doing things that are different. Just stops me being boring. But also everything has to be an adjunct to everything else. I'll never throw out textbooks or anything like that. It all adds dimensions and whatever can improve the teaching I do it, if its not going to improve anything I don't do it. (School A, T2)

Conclusion

There are challenges associated with the implementation of e-learning by teachers into their classroom such as skill development, changes in their role and the pedagogies they employ. Within this study each school had its own challenges and solutions; however the staff interviewed in the study approached these issues and solved problems when implementing e-learning based on their purpose for using e-learning. From these findings a revised framework has been specifically developed for the implementation of the e-learning environment that was used in the school setting in this study.

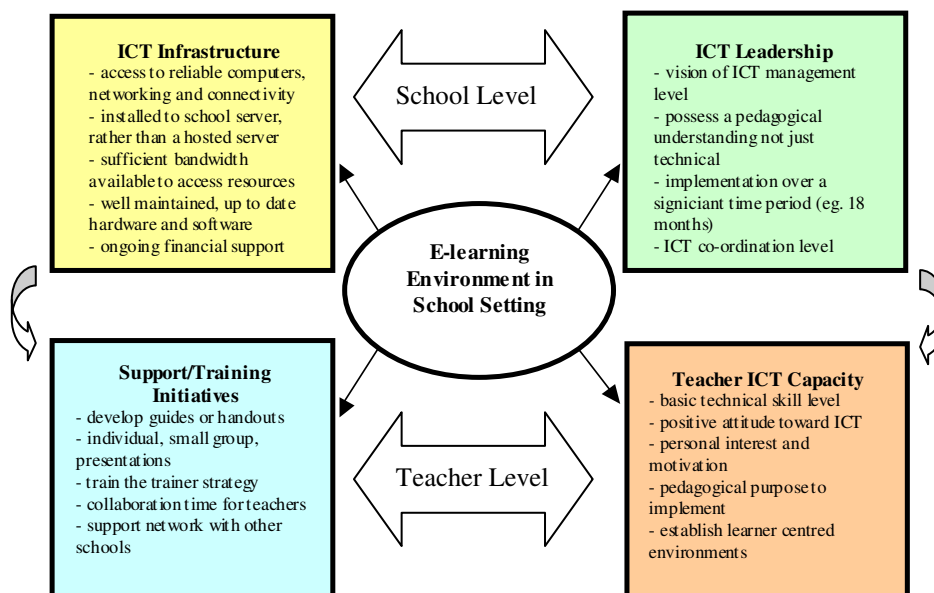


Figure 3: Revised Structural Framework for e-learning implementation

For teachers considering implementing e-learning into their classrooms they must consider these factors from a school level and an individual teacher level. Teachers must be mindful of

the ICT infrastructure and leadership needed to support their pedagogy, provide the resources and delivery strategies necessary.

This paper has aimed to provide a snapshot of the implementation of an e-learning environment used in three case study schools. The purpose for using the e-learning environment was individualised to each teacher within each school, and as a result greatly affected the extent to which it was being used. The findings of the study established that successful implementation of an e-learning environment was dependent on four key factors of ICT infrastructure, ICT leadership, the ICT capacity of the teachers and the support and training initiatives implemented. These four factors are not hierarchical in nature, but are all equally important.

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