

CHAPTER 2

Exploring the debates in the field

2.1 Introduction

The purpose of this chapter is to provide a review of the literature on ICT (Information and Communication Technology) policy implementation in education from both international and national viewpoints. This review sets out to explore issues that are relevant to my study and to inform policy. The literature review commences by presenting an overview of the debates in the international field and concludes by situating the South African scenario within the context of these debates. Common threads running through both the national and international landscape are macro and meso-micro level policies of ICT on education. At macro level the focus is on initiatives and issues with government (national, provincial and district) ICT in education policy implementation. The meso-micro level draws attention to particular ICT in education policy issues that influence policy implementation at school and classroom levels.

This review of the literature is grounded in research based on comparative studies, NGO, national and international surveys, ICT in education projects, international reports and academic empirical literature that spans both developed and developing countries. The review of research literature does not report on the findings of each country per se, but on ICT in education policy implementation issues that have common threads within the international debates.

2.2 The rationale of governments for an ICT policy in education

Governments, policymakers and administrators of schools have placed ICT in schools, with the intention that ICT is the panacea to all problems in education (Jung, 2005; Selwyn, 2007; Selwyn, Gorard, & Williams, 2001). Most governments hold the expectation that by placing ICT in schools, all will bode well and that the new

technology will naturally enhance teaching and learning. Yet such intentions when exposed to empirical research, prove to be insubstantial and rhetoric. Numerous scholars (Underwood et al., 2007; Cuban, 2001; Selwyn, Gorard & Williams, 2001; Butcher, 2003; Selwyn, 1999; Condie et al, 2007; Thomson, Nixon & Comber, 2006) in the field have questioned this universal quest to place computers in schools, and the policy intentions that accompany this innovation.

To begin to understand ICT policy in education, it is necessary to understand what motivates governments to implement ICT in schools. Hawkrige (1990) outlines four rationales of ICT policy formulation that are generally utilised by countries for the introduction of ICT into schools. First, a social rationale defines the importance of ICT in society and provides impetus for school integration. Second, a vocational rationale calls on the need to equip learners for future workplace employment. Third, a pedagogical rationale expresses the notion that ICT in schools will improve the quality of teaching and learning. And fourth, a catalytic rationale suggests that ICT will enhance the general performance of schools, integrating the functions of teaching and learning, management and administration. Tondeur et al. (2006) suggest that current curriculum developments in developed countries tend to focus mostly on the social and vocational rationales as delineated by Hawkrige (1990). According to Duguet (1990, p. 165) strategies and policies for introducing ICT into schools differ from country to country only by the intention of the policymakers or government. Some countries tend to impose a “restricted” policy that has a primary intention to promote instruction in computer science and computer literacy, as opposed to those countries that impose “comprehensive” policies that are intended to increase the effective use of ICT-based teaching and learning across the curriculum. Duguet (1990) argues that the social and vocational rationales as propounded by Hawkrige (1990) are restrictive policies, while pedagogical and catalytic rationales are comprehensive policies that are generally transformative in nature.

According to Pelgrum and Plomp (1993), it is not one single rationale that guides policy makers or governments, but rather a combination of rationales. The selection of particular rationales does, however, determine to a large extent the nature of the implementation strategies. Both Hawkrige (1990) and Duguet (1990) indicate that

the significant difference is that most developed countries have ICT policies that are comprehensive in nature, while developing countries continue to produce policies that are typically restrictive. They propose that developing countries should transcend this barrier by developing ICT policies that are more holistic in their approach to ICT planning.

Many varied rationales may exist for countries to introduce computer technology in education, but all countries have to respond to factors and challenges that arise beyond education. According to Dugeut (1990, p. 165) national, provincial, local and district policies for introducing ICT into schools are expected to respond to “pressures” that are external to the education sector. Here again the difference between developing and developed countries lies only in the extent to which these pressures influence the ICT in education policy.

2.3 International landscape: Macro level – Are policies implemented as planned?

2.3.1 ICT policy implementation: Trends and strategies

Findings from an international comparative study (Kearns, 2002) on ICT in education policies of ten countries (Australia, Canada, Finland, Ireland, Malaysia, New Zealand, Singapore, Sweden, United Kingdom and United States) indicate that most developed countries pursued particular trends in their phases of policy implementation at the macro level. Three discernible phases of ICT policy were identified: Phase One - ICT policy is characterized by providing access to computers in schools, with emphasis on teacher professional development and the development of online content. Phase Two - the mainstreaming and integrating role of ICT into education in a more strategic way, with emphasis on objectives and links to overall education strategies. Phase Three - the transformation of teaching and learning, principally “transforming the way we learn” (Kearns, 2002, p. 22).

The ten countries researched (mentioned above) have since surpassed these phases (Kearns, 2002, p. 22). Notably, Sweden and the United States of America, both

forerunners in international ICT policy, are currently on their third national plan for ICT in education and on the brink of venturing into the third phase of policy implementation. Furthermore, findings placed emphasis on the fact that none of the countries surveyed had progressed to a stage to fully implement phase three of policy implementation. However, collaboration between countries of the ICT league (Canada, Netherlands and the Nordic countries) are beginning to explore ways to progress to the third phase of policy for ICT in education. Furthermore, most countries are faced with the enormous challenge of how to best deal with the “exponential pace of technological, social, and economic change” Kearns (2002, p. 4).

The key is how countries have responded to this change in developing policy for ICT in education. Kearns (2002, p.14) states that traditional policy approaches to government processes, mechanisms and initiatives tend to be poorly suited to the current requirements of a dynamic knowledge society. There is a need for new approaches that meet the conditions and challenges of the dynamically changing information age. Most of these countries have extended their education ICT policy to develop ICT action plans, which act as policy instruments to promote the effective use of ICT in education and training. Malaysia is one of many developing nations that has taken up the challenge and is fast-tracking its ICT capabilities in an attempt to leapfrog the country into a developed nation (Belawati, 2003; Chan, 2002).

2.3.1.1 Slow pace of change

A number of research studies in this field, indicate that ICT in schools is unfolding at a disappointing “slow pace of change” (Dale et al., 2004; OECD, 2001; Kerns, 2002; Pelgrum & Plomp, 1993; Lee, 2003; Younie, 2006; Murphy & Beggs, 2003; Smolin & Lawless, 2007). The OECD (2001, p. 88) found that “compared with many other sectors, education has been slow to make changes in organizational practice and culture through the use of ICT”. Research findings of a comparative study indicate that the adoption of ICT in schools seemed to follow the same pattern as any other educational innovation (Kerns, 2002). Fluck (2003, p. 1) posits that ICT has had as much “impact as any other innovation”. This clearly suggests that ICT as a relatively new innovation has not necessarily translated into new teaching-learning strategies, as

expected by policymakers. There is a need for research to identify strategies that would accelerate the pace of change and ICT innovation in education systems (Kearns, 2002). Lee (2003) argues that the slow pace of change and the degree to which ICT was utilised in Korean schools was a result of government's haste to promote its educational informatization project without studying its effectiveness in school practice.

Implementing government policy in ICT "is a complex procedure and not a direct translation from government policy to practice" (Younie, 2006, p. 385). Furthermore, Younie (2006) argues that change is either very slow or tends to fail because government policy has to pass through various agencies and systemic levels. The conduit through which policy traverses, from macro to micro levels within the system, impacts on policy effectiveness and delivery. In contrast, Pelgrum and Plomp (1993), suggest that the reason for disappointing progress in integration of ICT in education may be due to simplistic government policies. It is these arguments that raise the challenge to identify policy implementation and policy appropriation issues at micro level that are relevant to my study.

2.3.1.2 Multidimensional approach and systemic change

Policy implementation should be "multidimensional" in its approach. Policy implementation should not only focus on material issues such as infrastructure, funding, and teacher training but also on change management at meso and micro level (Younie, 2006). Accordingly Younie (2006, p.385) claims that policy implementation should be viewed as a dynamic process that is "fluid, reiterative and non-linear". Policy can be materialised into practice by government, if government accepted and remained constantly aware of the complexity of policy implementation, particularly at local levels. Accordingly, a multidimensional approach to policy would yield an understanding of the way teachers interpret policy and engage in the implementation of ICT policy at micro level. The implementation of government policy is a complex process and one that is multifaceted (Plomp et al., 2009; Younie, 2006).

Researchers have advocated for systemic change for the successful integration of ICT in education (Joseph & Reigeluth, 2005; Sutherland et al., 2004; Younie, 2006). The implementation of an ICT policy on its own without complementary changes in the education system as a whole would fail to meet the requirements of the information society. Joseph and Reigeluth (2005) argue that it is only through systemic change, as opposed to piecemeal change, that the education system can meet the challenges posed by the information age. The metaphor of a “jigsaw puzzle” is used to suggest that piecemeal changes are like incremental reform, where one change in reform must invariably impact on other linked changes in reform. Joseph and Reigeluth (2005) strongly advocate a systemic approach where all aspects of the education system (government policy, school governing bodies, district offices, schools and classroom practice) change simultaneously. Sutherland et al. (2004, p. 423) posit that policymakers tend to have a “utopian vision” of their expectations with regard to ICT in schools and should not treat ICT as an “unproblematic innovation that will somehow lead to enhanced learning”.

2.3.1.3 Simplistic policies and competing priorities

Unlike many developed countries, Africa as a continent is experiencing the same invidious challenges and ICT policy implementation problems as most other developing countries. Furthermore, within the African continent many NGOs and trans-national government initiatives (such as NEPAD and EFA), have common policy frameworks that are spread over the entire continent. On the African continent, most countries hold political views that ICT offers great promise of being the universal remedy that will create an opportunity for unprecedented economic growth, control pandemic diseases, create distance education opportunities, give impetus to the democratization process and good governance, and leapfrog countries out of economic stagnation (Butcher, 2003; Selwyn, Gorard & Williams, 2001). These are but a few of the African continent’s “wish list”, but the reality is that Africa is plagued by numerous undesirable inhibiting factors that are unique to third world countries in Africa, as opposed to other developing countries. In this regard Africa has major “competing priorities such as the combat against HIV/AIDS, poverty and illiteracy, and local constraints including poor technology penetration, unaffordability of

equipment and lack of capacity” (Butcher, 2003; James, 2004). Africa has many struggling nations that are plagued by political uncertainty, weak ICT infrastructure, poor policy and regulatory frameworks and limited human resources.

According to van Reijswoud (2006, p. 1) Africa had many national ICT policies, but not many ratified ICT policies, further indicating that “ICT at continental level still has a lot of changes ahead”. Africa needs to pursue the challenge of being placed at the cutting edge of technology or risk further deterioration within the next two decades in its position within global development (Shrestha, 2000). The educational reforms of Africa still need to keep abreast with the relative “faster pace of events on the move around them” to meet the learning needs of learners (Shrestha, 2000, p. 3).

Not all countries prioritize ICT in education as an area of concern. India as a developing country recognised ICT in education as an important policy requirement, but placed other more pressing issues, such as economic prosperity as a greater national objective. Among the list of exigencies were uncoordinated efforts, lack of electricity, poor communication infrastructure and non-sustainability in the use of ICT for education. ICT implementation in India boasts many successes, particularly in rural development, healthcare and transportation but not in the education arena. Furthermore, India aimed to become a world leader in the information society and knowledge economy with education as a focussed priority, but since government policy in ICT has been a ‘solely’ government prerogative it was devoid of public discourse and input (Bajwa, 2003a). Apart from a general lack of political will in the ICT policy arena, political debates in India were at play. Some politicians acknowledged the positive impact that ICT may have on teaching and learning while others claimed that ICT could not be the focus of a nation that still prioritised agricultural and economic development. Thus policymakers in India are facing a dilemma of how to make ICT accessible for economic, social and educational needs. However, without the financial resources to satisfy the most basic needs of housing, schools, hospitals and healthcare ICT in education has weak political and policy preponderance. It was evident that though India had established significant ICT capacity, it had been directed towards strengthening the economy as a priority.

Education ICT policy (or the lack thereof), without government's enabling role seemed to have taken a back seat.

However, in developed countries it would seem that the competing issues deal more with educational rather than socio-cultural concerns. In Europe, the national curriculum frameworks can also be in conflict with the contextual characteristics of the local school system such as school policy, school culture and teacher beliefs. These are the real issues that schools have to contend with and may act as significant barriers to introducing ICT to enhance teaching and learning (Tondeur, Braak & Valcke, 2006).

2.3.1.4 Changes to national curriculum policy

National policy that guides ICT curriculum integration takes on a variety of nuances and occupies centre stage in the global arena. Most developed and developing countries are gradually changing their national curriculum policy to accommodate the integration of ICT in teaching and learning (Cox & Marshall, 2007; Plomp et al., 2009). First world countries such as Canada, Australia, United Kingdom and the USA are strategically planning to simultaneously address ICT issues such as infrastructure, teacher training and computer integration into the curriculum (Fluck, 2001). Fluck (2001) indicates that although economics is the major factor in determining the way countries implement ICT equipment in schools, it is the ICT policy in education that plays a crucial role. He suggests that:

some criteria for assessing the progress of policy decision would have to examine the success of ICT deployment in schools. Such criteria might include quantitative and qualitative comparisons of ICT infrastructure provision. Student learning using this equipment could also be measured similarly... Another level of evaluation would gauge the degree to which the range of relevant policy initiatives had moved the country towards Phase 3.
(Fluck, 2001, p. 149)

In Australia there is an absence of a national ICT curriculum policy but a ratified national schooling framework does exist (Elliot, 2004). A study conducted on the effective use of ICT in the absence of any mandated (policy) role for ICT in teaching and learning found that there still exists a huge gap between rhetoric and reality

(Elliot, 2004). Moyle (2006, p. 32) argues that visions for incorporating ICT into teaching and learning in Australia must be supported by “system and sector ICT visions and plans”. Furthermore, there needs to be an improved educational link between policymakers, technical experts and curriculum experts. System level policies must support the school’s ICT policy, or risk losing credibility among schools (Moyle, 2006).

Norway has taken the lead in changing national curriculum to accommodate ICT in schools. In this regard, the new revised national curriculum which was implemented in the 2006-2007 period placed ICT as one of five basic skills to be embedded in all subjects and at all levels (Pedersen et al., 2006; Erstad & Quale, 2009). The major change in the curriculum relates to ICT integration specifications in different subjects to promote learning. Central government regulates syllabus content, subject combinations and examination requirements. However, schools are free to design their own methods for organising teaching and learning (Erstad & Quale, 2009).

In Cyprus most parents and teachers seemed to favour the introduction of ICT in elementary school (Karagiorgi, 2000). But, there was an ambivalence of opinion whether ICT should be a discrete subject (techno-centric model) or integrated into the entire curriculum (humanistic model). Teachers tended to lean towards an ICT curriculum integration model, which was attributed to their attitude and awareness of the value of ICT application across the curriculum (Papanastasiou & Doratis, 2009). Even though government policy opted for an integrated cross-curricular approach, how the policy would be achieved was not evident (Charalambous, 2001). Furthermore, Karagiorgi and Charalambous (2004) argue that the challenge policymakers encounter is not only in identifying and adopting an appropriate model (whether techno-centric or humanistic) for ICT in the national curriculum, but in creating mechanisms to support the appropriate model. ICT use and application was as a result of individual initiatives, due to an “open-ended” government policy on implementation (Karagiorgi, 2005, p. 31).

The above findings seem to emphasize that the development of an ICT policy in education needs to be people orientated, has a focus on the innovation, and is practical in implementation.

2.3.1.5 Successful ICT policy implementation

Many countries (Finland, Norway, Netherlands, Singapore) and Hong Kong (while Hong Kong is a Special Administrative Region (SAR) and not a separate country, it will be referred to as a “country” in this thesis for the sake of convenience) have made significant progress in integrating ICT into education (Plomp et al., 2009). The Second Information Technology in Education (SITES Module-2) study indicates that Singapore stands above all other countries, developed and developing, in respect of ICT policy in education implementation and ICT integration (Howie, Muller & Paterson, 2005). Singapore is noted to have made substantial progress by developing a macro ICT policy in education that resulted in high levels of implementation at micro level. Consequently, Singapore has made significant policy implementation strides in its quest to use ICT to transform teaching and learning in schools. Pelgrum (2001) argues that with the exception of Singapore, a huge gap exists between the ideal (policy intentions) and the reality (policy in practice) in most other countries.

The Singapore Ministry of Education (MoE) identified four key ICT policy strategies (Lim & Tay, 2003) namely, curriculum and assessment, learning resources, teacher development, physical and technological infrastructure. According to Lim and Tay (2003) lessons learned from the Singapore experience included the following: First, the ICT master plan of Singapore was situated in an education system that is well planned. Second, ICT must be perceived and used as a mediating tool to ensure that the masterplan is education driven and not technology driven (Lim & Tay, 2003, p. 2). Third, the ICT master plan should not be a standalone policy which bears little cohesion or no relation to other educational policies and initiatives. And fourth, the education system should react to the introduction of ICT and therefore teaching, learning and assessment practices need to be modified to accommodate the new technology. A significant finding that emerged from Lim and Tay’s (2003) study was the fact that Singapore’s national ICT policy in education was formulated with the

intention that it could be “operationalised” into goals that could be managed, was realistic and achievable. Lim and Tay (2003) suggest that within the Singapore MoE there was a dedicated division within the systemic hierarchy of the government that was responsible for co-ordinating and implementing the ICT master plan.

Another country that seems to be moving in the direction of successful implementation of ICT policy in education, although not as advanced as Singapore, is Hong Kong (Plomp et al., 2009). Achievements of ICT in education in Hong Kong were not only due to the readiness of schools to embrace new technology and to involve teachers but also underscored the impact of policy initiatives of the Hong Kong department of education. The national ICT policy in education fostered ongoing support to schools that culminated in successful ICT policy implementation (Law, Yuen, Ki, Lee & Chow, 2000).

2.3.2 Responses to ICT policy in education

2.3.2.1 ICT policy focus

Various researchers suggest that governments are often misguided by the focus they place in their ICT policy in education (Dale et al., 2004; Panel on Education Technology, 1997; Plowman & Stephen, 2003; Beastall, 2006; Mulkeen, 2003b). An analysis of policy documents and case study interviews with principals in schools in the United Kingdom indicated that the focus of ICT policy and the management of ICT policy were on provisioning of hardware and infrastructure. The ICT policy neglected to inform schools on *how* ICT might be used in classroom practice (Dale et al., 2004). Beastall (2006) and Dale et al. (2004) claim that ICT integration, teaching and learning should be the focal point of policies defined by supranational, national, local authorities and school management.

Lee’s (2003) comparative study of ICT policy integration initiatives in Germany, Korea and USA schools found that there are policy convergences between these countries. All three countries had a top-down national framework for ICT policies; however, in Korea stronger impetus was exerted from central government in that

every policy objective was delivered effectively and efficiently. All three countries had almost the same spectrum of core policy, namely infrastructure, use of digital content and resources, learner-teacher use of ICT and teacher training. However, where these countries differed was in the focus of their respective ICT in education policies. In Germany the focus was on infrastructure, digital content and resources. In the United States emphasis was on teacher training and performance enhancement of learners. And, in Korea there was an equal emphasis on all of the abovementioned aspects of the policy spectrum. The Chilean “Enlaces” experience contributes to this debate by arguing that designing an ICT policy in education is a far more complex task than merely deploying hardware in the schools (Hepp, 2003; Hinojosa et al., 2003).

2.3.2.2 An inclusive approach to the formulation of policy

Recent policy initiatives illustrate that many governments are adopting an inclusive approach in developing an ICT in education policy. There seems to be an increasing attempt by governments to include all relevant stakeholders in the development of an ICT in education policy (Dale et al., 2004; Beastall, 2006; Hepp, 2003; Mulkeen, 2004). The Irish Department of Education and Science produced a three year strategic policy plan named the ‘Blueprint for the Future of ICT in Irish Education’. This policy plan was gratuitously funded and yielded positive results due to participation from all sectors of education, namely parents, teachers, school management, local communities and government (Mulkeen, 2004).

The Chilean ICT in education project (Enlaces) supported the notion of stakeholder inclusivity (Hepp, 2003). Policymakers at national level clearly defined and communicated the rationale, goals and timeframes for the expected outcomes to all relevant stakeholders (teachers, school leaders, administrators and parents) in the education system. Developing inclusive policies was also evident in Singapore in which national ICT policy in education expected schools to have a clear and shared vision of its ICT integration strategies by all stakeholders (Lim & Tay, 2003). It would seem that countries that encouraged participation by all stakeholders (government,

local government, school leaders, teachers and parents) in policy formulation achieved successful ICT integration into teaching and learning.

2.3.2.3 Policy deficits

The lack of policy guidelines to support schools seems to depict a familiar policy implementation problem that is apparent in most education systems in the international arena. Dale et al. (2004) maintain that the lack of macro-micro level interaction is illustrative of the principle that though policy sets limits to practice, it is also the reality of practice that sets limits to policy. In the United Kingdom, macro level ICT policy in education offered little advice on *how* schools should use ICT (Dale et al., 2004; Pelgrum & Plomp, 1993; Beastall, 2006). The National Grid for Learning (NGfL) as the main policy driver of ICT in education in the United Kingdom, issued

little specific guidance on the ways that ICT might augment or combine with existing approaches to teaching and learning to bring this about, and it was relatively silent about how these changes might be different from other curricular and pedagogic changes.
(Dale et al., 2004, p. 469)

In addressing principals' concern about how computers were to be used for educational purposes, Pelgrum and Plomp (1993) and Beastall (2006) found that in most cases policies had not been formalised and thus there was no written policy documentation to guide school administrators.

This lack of national policy to support ICT in education was also evident within the United States prior to 1997. The government of the USA commissioned the Panel on Educational Technology (1997, p. 6) to determine the state of ICT integration in schools. A number of relevant recommendations regarding policy for the use of ICT in schools were made to the government: First, there should be a policy focus on *learning with technology* and not a techno-centric approach of *learning about technology*. Second, emphasis should be on curriculum content and pedagogy and not on hardware and technical issues. Third, there should be more emphasis placed on the professional development of teachers. Fourth, the education system should be geared for equitable and universal access to ICT. Fifth, greater experimental research

programmes into the use of ICT in schools should be initiated. And sixth, district offices should provide greater support to teachers, particularly in schools where there is an absence of dedicated computer coordinators. This report was consistent with other international research findings on policy deficits of ICT in education.

More recent literature (Kearns, 2002, p. 5) indicates that considerable improvement has been made with respect to most recommendations, but is still concerned whether “technology is outpacing policy”. Kearns (2002) indicates that the United States is on the threshold of the third phase of policy for ICT in education which “goes beyond foundation policies to consider pedagogical innovation in the use of ICT and the major development of e-learning”. The third phase of policy for ICT addresses the first recommendation by transforming the way people learn in a society. A review of progress in 2000 showed substantial progress in achieving the above mentioned recommendations. In 2000, the United States 2000 National Education Technology Plan defined more ambitious policy objectives. These objectives were stated as goals: First, students will have access to ICT in their classrooms, schools, communities and homes. Second, teachers will use technology effectively to help students achieve high academic standards. Third, students will have technology and information literacy skills. Fourth, research and evaluation will improve the next generation of technology applications. Fifth, digital content and network applications will transform teaching and learning.

Similarly, India has policy and technology “know how” to implement ICT intervention in education but “what is missing and what fails is in the translation of policy and technology into good practice” (Reddi & Sinha, 2003, p. 252). Although there is a paucity of government policy documentation and knowledge sharing of interventions of ICT in education, India had made remarkable progress in its ICT development program (Reddi & Sinha, 2003). Bajwa (2003a, p. 59) claims that the progress of India is the result of developing national capacity in the “context of market-orientated globalization” to leapfrog the country into a developed one. However, there is a lack of ICT policy directive in respect of a uniform curriculum that was mandatory for all educational institutions (Bajwa, 2003b; Mallik, 2009). India faced a lack of policy implementation strategies to streamline its education system with respect to ICT.

Like India, the ICT in education policy of Indonesia lacks policy implementation directives. The ICT policy in education focuses on infrastructure, connectivity and capacity building issues (Belawati, 2003). The National Ministry of Education set aside a number of policy initiatives, most pilot project based, for the use of ICT in primary and secondary schools. However, the stark deficit of a policy for implementing ICT into education, combined with unsustainable initiatives, culminated in the slow uptake of ICT in education. Political instability and financial difficulty, which are typical issues in developing countries, delayed the advent of ICT in education in Indonesia.

The Nigerian experience of ICT in education policy demonstrates a major disparity between policy formulation and policy implementation (Jegade and Owolabi, 2003, p. 8). Nigeria's current ICT policies are outdated and "obsolete" and have not been updated to cater for the dynamic changes encountered with new ICT technologies. There is a necessity for new policy that needs to be current and deliverable to teachers, in order to implement the policy philosophy and objectives (Jegade & Owolabi, 2003). There seems to be a clear distinction between those countries that have ICT in education policies which are progressing and working, countries that have ICT policies that are dysfunctional and countries that lack ICT policies directives altogether.

2.3.2.4 Centralised versus decentralised centres of control

In many first world countries governments exercise either centralised or decentralised control in ICT policy in education issues. In Australia the decentralization of education as a state responsibility created challenges for state schools with respect to ICT in education. However, decentralisation has been a boon to private schools that benefit from government's subsidy (Cranston, Kimber, Mulford, Reid, & Keating, 2010). Fluck (2001, p. 146) suggests that there is a "possibility of divergence of philosophy and practice". Each state and territory implemented its own strategic plan for using computers to improve education, administration and to enhance ICT infrastructure in schools. Thus, Australia displays a variety of government policy

positions towards the integration of ICT into classroom practice. States place different emphasis on ICT use in classroom practice (Naidu & Jasen, 2003). Hence, it would seem that Australia seems to follow a more decentralised approach to ICT policy implementation.

In contrast, France as a developed country experienced centralised centres of control. ICT policy in education decision making is mainly in the hands of central government. Rigid hierarchical structures exist with prescriptive policy and educational processes that are communicated via designated pathways from national administration to school. School district and school inspectorate mediate with schools to monitor compliance of national policy initiatives. The process of implementing ICT into primary schools through French national state initiatives had been “neither smooth nor really continuous” (Baron & Harrari, 2005, p.148). Regnier (2009) suggests that the development of ICT policy in education in France is still incomplete and has not culminated in much change in ICT integration into education system. Although France introduced ICT into schools almost two decades ago, the implementation of ICT in schools has remained a challenge. One indicator of ICT implementation difficulty was the national “informatics for all” plan which met with disillusionment only a few years after its inception (Baron & Harrari, 2005). As a first world country, France still encounters huge ICT policy implementation concerns.

Sweden has a successful decentralized education system, with responsibility for implementing and defining the use of ICT shared between central government and local education authorities (municipalities). Central government functions to promote ICT in education, provide in-service professional development to teachers and support school improvement. Municipalities are tasked with equipping schools with ICT and training teachers in the use of ICT as a pedagogical tool. A new national ICT policy (2005) identified several goals for a “sustainable information society” (Karlberg, 2009). The level of ICT penetration in schools for teaching and learning is significantly high, and most schools have ICT-based objectives for access to ICT, teacher and learner ICT-based competencies and ICT integration into curriculum. Even though Sweden is a leading ICT in education country, it still lacks policy initiatives on the use of ICT in education (Karlberg, 2009).

From the above it would seem that there is no single approach to ICT policy implementation and that the implementation of ICT policy is dependent on the social, cultural, historical, political and educational climate of a country.

2.3.3 Summary of macro level findings

Most developed countries have pursued trends in their phases of policy implementation at the macro level. However, none of the countries has reached the stage of transforming teaching and learning. There is a need for new approaches that will meet the conditions and challenges of the dynamically changing information age. A number of research studies in this field, indicate that ICT in schools is unfolding at a disappointingly slow pace of change. Furthermore, it has been argued that policy implementation should have a multidimensional approach that focusses on material issues such as infrastructure, funding, teacher training and changed management at school level. Systemic change for the successful integration of ICT in education is advocated.

Not all countries have prioritized ICT in education as an area of concern and competing priorities outweigh the implementation of ICT in education. Furthermore, in developing countries ICT policy in education has followed a rather simplistic design that does not meet the needs of learners. Most developed and developing countries are changing their National Curriculum policy to accommodate the integration of ICT in teaching and learning. Singapore stands above all other countries, developed and developing, in respect of ICT policy in education implementation and ICT integration.

Responses to ICT policy in education are fourfold, namely varied ICT policy focus, an inclusive approach to the formulation of policy, policy deficits and centralised versus decentralised centres of control. Evidently ICT policy implementation is dependent on the social, cultural, historical, political and educational climate of the country.

2.4 International landscape: Meso and micro level –

Are classroom practices changing?

Policy in practice takes place at the classroom level and it is this level that sets limits to implementation of government policy. The literature review of meso and micro policy in practice focuses on ICT policy issues that influence ICT take-up at school level and ICT practice at classroom level. In particular this review identifies meso and micro level policy issues that impact on ICT policy implementation in schools. The issues of policy burden, curriculum policy, meso level policy understanding, institutional ethos and school leaderships, institutional support, teacher pedagogy, teacher competence and training is presented in the current international debates.

At a meso-micro level the focus shifts to determine what motivates schools to implement ICT. In a study on the impact of ICT on learning and teaching, Newhouse (2002) identifies three factors that determine the implementation of ICT in schools. Firstly, in response to the huge financial investment schools make for access to ICT, was the belief that ICT would improve learner achievement of curricula outcomes. Secondly, computers would provide adequate ICT literacy skills for teachers and learners. And thirdly, ICT would increase the efficiency and effectiveness of schools as organizations. These factors exist as common goals in the national ICT policy of most countries and in ICT objectives of most schools.

In an attempt to explain how schools espouse government policy, DiMaggio and Powell (1983) posit the concept that schools change by virtue of isomorphism, a process which leads schools to adapt in similar ways to similar changes in external conditions. DiMaggio and Powell (1983) define three isomorphic changes that occur in institutional change. First, they suggest that some schools may exhibit “mimic isomorphism” in which they copy or imitate proper or appropriate practice due to their level of uncertainty of conditions, thus legitimising their response to policy. Second, “normative isomorphism” occurs when schools as institutions adhere to norms or educational experiences, through networking or the act of socialization. In this way normative isomorphism is the learned norm experience that guides the school to react to new policy. Third DiMaggio and Powell (1983) posit “coercion isomorphism” as that process in which the school reacts to external pressure due to state regulation or

policy. DiMaggio and Powell (1983) found that mimic isomorphism is the dominant isomorphism that is prevalent in most schools, simply because they tend to opt to follow examples of appropriate practice. It would seem that schools adopt different implementation strategies to accommodate policy imperatives. The unique isomorphic stance that schools assume is of particular interest to my study, as it has a direct bearing and influence on the way in which ICT policy is appropriated in schools.

2.4.1 Social context of ICT policy implementation

2.4.1.1 Systemic support, capacity and competence

Policy in practice is influenced by the support or lack of support schools receive from system level structures in particular district offices. Sustainable systemic support to schools is an important factor for the successful implementation of government policy in schools. In a case study of two districts in China, Hawkrige (1990) noted that districts translate provincial policy to meet district objectives. These policy objectives would then be refined to develop learner and teacher competences. Li (2003), however found that policy mandates without resource support and application methods culminated in a failure of ICT integration into the traditional education setting.

Younie (2006) identified areas of concern at district level that needed to be addressed in the implementation of government ICT policy in the United Kingdom. First, Local Educational Authorities (LEA) lacked professional expertise to make informed decisions and often failed to adequately consult with schools. Second, leadership and management in ICT expertise was absent at LEA, schools and at various government initiative levels. Third, schools lacked ICT expertise from within the school and guidance from external systemic structures to move the national ICT agenda forward. Fourth, unequal funding of ICT provisioning at schools yielded disparities between schools with respect to resources and procurement. Fifth, teachers were still unconfident in the use of ICT and claimed that training was inconsistent, over prescriptive and lacked local context.

Similar issues of the lack of systemic support and capacity of local districts emerged in the United States prior to 1997. The Panel on Educational Technology (1997) found that the introduction of technology in schools will not by itself improve the quality of education. Their findings revealed numerous ICT policy implementation concerns: First, teachers received little technical, pedagogical or administrative support from local districts. Second, school districts focussed most of their funding on the acquisition of hardware and software with little or no funds for the development of teacher ICT competence. And third, a lack of in-depth and sustained assistance to teachers in the use of ICT. The combination of the above factors culminated in a lack of district educational support to schools. However, in 1999 the United States Department of Education funded the Regional Technology in Education Consortia (RTEC) to assist and support teacher professional development and promote the effective use of ICT in education. Many federal states within the United States also set up systems (such as workshops) to provide information and support services for teachers and school districts (Kearns, 2002).

Significantly different, in Chile, schools received appropriate and regular information from districts about ICT policy and how it fitted into the general education plans (Hepp, 2003). In addition the Chilean ICT “Enlaces” project provided support and training to teachers at classroom level, to gradually transform their teaching by adapting ICT as a tool to enhance teaching and learning. Similarly in Hong Kong, ICT in education achievements were not only due to the readiness of schools to embrace the new technology and teacher involvement but underscored the impact of policy initiatives of the Hong Kong Department of Education (Law, Yuen, Ki, Lee & Chow, 2000). In both Chile and Hong Kong it would seem that national ICT policy in education that fostered ongoing support to schools culminated in successful ICT policy implementation.

2.4.1.2 Institutional culture and practice

Schools that are progressive in using ICT for educational and administrative purpose seem to enhance their level of functioning. The most significant benefit of ICT in

school tends to be focussed on meeting the challenges of transforming the institutional culture and practice. The most applicable ICT policy in practice takes place at the school's administrative functioning level (O'Dwyer et al., 2004). In most developed countries as illustrated by the USEIT study conducted by O'Dwyer et al. (2004, p. 4) "teachers are influenced by the level of structure of the system in which they work". Furthermore, teachers were using ICT for non-instructional purposes based on their day-to-day professional needs. Similarly the SITES module-1 study (Doornekamp, 2002) based on developed countries found that most schools progressed to using ICT to monitor learner progress. The administrative use of ICT was one objective of national ICT policy that has been well promoted in most schools across the international spectrum. ICT offers affordances for improved administrative functioning of the school for both teachers and administrators, particularly in reporting to parents and thereby improving parental involvement (Dale et al., 2004; Pelgrum & Plomp, 1993; Becta, 2006).

Singapore seemed to have made the transition from using ICT merely for administrative purposes to effectively integrating ICT to influence teaching and learning. Pedersen et al. (2006, p. 252) note that the implementation of ICT only succeeds when the school organization is able to restructure itself, and "doesn't just overlay ICT on the old organizational structure". Singapore schools were recommended to support the uptake of ICT by teachers, and teachers were required to use ICT as a tool in the teaching and learning environment (Lim & Tay, 2003, p. 22). The ICT policy of the MoE of Singapore was mindful not to prescribe to schools how ICT should be used in the curriculum, but offered guidelines to encourage teachers to be innovative in applying the national policy to their teaching strategies. In this regard, Lim and Tay (2003) posits that Singapore's ICT policy provided schools with significant freedom to implement the national ICT policy. The ICT policy of Singapore allowed schools to make their own internal policy decisions on how to integrate computers in schools, thus creating a supportive institutional culture to promote the effective implementation of ICT.

This decentralised approach gave schools the mandate to implement ICT within its own contextual situation based on school culture, change dynamics, ICT staff

competencies and administrative readiness of the school. Government acknowledged that schools are structurally different and schools were given autonomy to design their own ICT resources needs and computer layout. Singapore schools had only one principal national policy obligation, and that was to adopt ICT to meet the needs of the national policy standards. In this regard ICT practice in Singaporean schools ICT took the following policy provisions into consideration: First, the ICT priorities of staff, learners and curriculum had to be considered. Second, ICT national evaluation standards and benchmarks were observed to identify successful integration. Third, responsible support authorities within the school (ICT committees, administration, teachers and technical support) needed to be established for successful ICT implementation. And, fourth financial resources and time frames for ICT integration had to be considered.

In contrast, in developing country contexts such as Indonesia, ICT use in education was still in its initial stages with computers being used mostly for school administrative purposes. In Malaysia, school leaders are expected to role model the use of ICT through administrative processes and thereby encourage teachers to use ICT in their administrative and teaching repertoire (Lim & Tay, 2003). Although these findings are consistent with the International study in Education Achievement (IEA), most schools used ICT for administrative purposes and did not follow through to curriculum delivery (Pelgrum & Plomp, 1993).

2.4.1.3 School leadership

A pertinent factor that impedes the implementation of government ICT policy is the volume of policy that schools have to implement (Cuban, 2001). Constant policy changes in terms of new curricula and new teaching strategies are imposed on school systems in an attempt to overcome ineffective teaching practices, poor parent involvement, new educational philosophies and now educational technology policy (Cuban, 2001; Dale et al., 2004). Schools are hard pressed to implement policy directives and principals and teachers are challenged to transform “multi-purpose policy” into educational experiences within policy frameworks (Dale et al., 2004). Hence, institutional culture to embrace ICT as a teaching-learning innovation and

institutional leadership are inextricably linked as crucial factors in the successful implementation of government ICT policies at micro level (Moyle, 2006; Mulkeen, 2003a; Pedersen et al., 2006). A study of educational leaders across all states in Australia, found that a “whole school” approach to introducing ICT into teaching and learning and organization improvement requires good leadership (Moyle, 2006, p. 2). These findings also indicate that principals are curriculum and pedagogical leaders, and they support and lead ICT integration into teaching and learning. Evidence from a study conducted in Irish schools found that the “ethos of schools” and the “thinking and beliefs” of principals and “collaborative planning” are likely to yield positive results (Mulkeen, 2003a).

The implementation of ICT in schools brought forth new experiences for principals. Harrison et al. (2002) ImpaCT2 study of school principals, found that ICT in schools presented a very different set of problems for principals. Similarly, Karagiorgi (2005) and Pedersen et al. (2006) found that most principals lacked the experience and expertise to manage the new technology in school. A study conducted by Pedersen et al. (2006) indicate that ICT implementation often occurred in schools in which principals did not have “clear criteria for success and no monitoring of the benefits” (p. 13). In contrast Law et al. (2000) found that some schools in Hong Kong made remarkable ICT implementation progress prior to the government’s announcement of the IT in education (ITEd) strategy. In this regard, principals were instrumental in planning and exploring ICT implementation and indicated the schools’ readiness to encompass the new innovation and change accordingly. School leaders contribute significantly to the success of ICT in schools and therefore they should employ strategies to enhance ICT use in school (Lim & Tay, 2003; Doornekamp, 2002).

School leadership is central to identifying the level of ICT penetration into the teaching learning situation at school (Elmore, 2005; Harrison et al., 2002). The response of principals to the implementation of ICT was threefold in nature. Some principals supported ICT in school and had the “hope” that ICT would produce positive benefits at some time in the future. Other principals were of the view that ICT in education was a necessary investment to make and would have a wider significance

for the ICT in school initiative. Some principals felt trapped by policy, decision makers and external authorities who made decisions for the school irrespective of whether the school had more pressing issues to contend with or not. In each of the three cases, however, principals were dubious whether ICT will really impact positively on teaching and learning (Harrison et al., 2002). Furthermore, it was found that principals of schools had a very simplistic understanding of national and local ICT policy. Evidence indicates that most principals could not explicitly or implicitly identify “policy drivers” at national or local levels (Harrison et al., 2002). However, although school principals were oblivious of the specific targets and objectives of national and local policy documents, they were nevertheless aware of the broad aims and targets of policy initiatives.

2.4.1.4 Teacher professionalism

Teachers are significantly positioned at the crossroads of policy and practice. In this regard teacher professionalism is key to whether ICT is integrated in their teaching and learning repertoire. Reynolds et al. (2003) argue that teachers need to revisit their teaching methodologies to encompass an environment that is conducive to e-learning and to the use of ICT. Fullan’s (1992) case study of ICT implementation in Canadian schools found that ICT is an innovation that presents a major challenge for the professional growth of teachers. In this regard Fullan (1992, p.3) claims that the implementation of ICT in schools is a phenomenon that is uniquely different to minor changes in curriculum content and is not simply a question of re-organising the knowledge base of educators but essentially getting “teachers to start from base zero”.

Elliot (2004) and Pelgrum (2001) suggest that teachers are generally requesting more ICT professional development with a particular focus on the use of ICT in the curriculum. Cuban (2001), Conlon and Simpson (2003) and Baron and Harrari (2005) concur that teachers can and do use computers for their own use. They are not techno-phobic, however they do not know *how* to use computers in their teaching and learning practice. Beastall (2006), Tearle (2003), (Younie, 2006) and Becker (2000) argue that the introduction of ICT in education in United Kingdom schools did not have a complementary effect of increasing the professional development of teachers.

Furthermore, they claim that changing teachers' classroom practice to embrace the new technology did not unfold naturally as expected by policymakers, even in countries with the most developed ICT in education policies. Similarly, findings from experiences of teacher training in Irish schools illustrate that once teachers are taught how to use technology it would not necessarily translate to teachers' using ICT in their pedagogy (Mulkeen, 2003a, p. 292). In the Flemish school experience, Tondeur et al. (2006, p. 13) affirm that ICT teacher competence "does not automatically result in changes in classroom practices". Government should change to a more individualised method of training, such as peer-to-peer training of teachers according to individual needs, as opposed to a "blanket approach" of compulsory training which tends to alienate teachers (Beastall, 2006, p. 108).

Despite the proactive effort of the Malaysian government to positively influence school and learner achievement through the use of ICT in education, one of the major barriers of this initiative was teacher professionalism. The Malaysian ministry of education realised that teacher training was crucial to the successful implementation of ICT in schools and used a successful "cascade model" of training the trainers (Chan, 2002). Pelgrum (2001) argues that teacher training is often neglected by governments in large-scale innovations, and for such innovation to succeed teachers must be equipped with the required skills and knowledge (Pelgrum, 2001).

Although numerous ICT initiatives and policy intentions had been established and supported through government interventions, "the impact of it on the actual practice of teaching and learning has not been significant" (Belawati, 2003, p. 110). According to Chan (2002) there is a need for support from all stakeholders in the education system, a need for teacher capacity building and a need for establishing ICT policy and guidelines that is necessary to promote ICT use in schools. Harrison et al. (2002) found that although learners developed positive attitudes and good skills towards the ICT curriculum use, teachers failed to seize the opportunity to follow through to appreciate the potential of ICT by merely using it as a teaching tool. Dale et al. (2004) concur that no other technology advancement has created the current gap between learners and teachers understanding of the affordances that ICT offers as a teaching method. Watson (2001) and Dale et al. (2004) suggest that teachers' professional

control over their teaching methodology seemed to be threatened with the introduction of ICT.

Practising teachers' failure to embrace ICT and the opportunities it presents may be attributed to their lack of confidence in using the new technology or the inherent technical problems that technology presents in the classroom situation (Condie et al., 2002; Dale et al., 2004; Cuban, 2001). ICT policy implementation in schools was often hampered due to frequent inherent technical faults of technology and the expectation of technical faults that significantly impacts on teachers' confidence within the teaching-learning situation (Becker, 2000; Dale et al., 2004; Cuban, 2001; Hennessy, Ruthven & Brindley, 2005; Fluck, 2003; Condie et al., 2002). Teachers did not use ICT because of factors beyond their control and not because of personal resistance, as one teacher indicates that "the fact is that machines do not deliver what they promise...but we want to use this stuff" (Hennessy et al., 2005, p. 168).

With the advent of ICT as a new innovation to teaching, there is now certainty that teachers are now more important in the teaching learning situation than ever before. The need for ICT competent teachers stems from the need for ICT competent learners and for ICT-rich learning environments that enhance learners' learning across the curriculum. In mandating teacher competence standards for ICT, the United States adopted a policy approach to preparing pre-service teachers with ICT skills as a requirement for teacher certification and licensure (Kearns, 2002). Policy directives in France demanded that new teacher recruits must be certified as competent in ICT before being tenured into the teaching profession. The policy expectation that "new" teachers with ICT training would be more adept to ICT use in classrooms did not materialise as "they do this without bringing dramatic change to the learning process" (Baron & Harrari, 2005, p. 153).

International initiatives on improving teacher professionalism for the successful implementation of ICT in the classroom are varied. Australia's ICT policy has legislated much towards teacher capacity. Teacher qualifications are embedded within "ICT in Education" postgraduate courses at higher education. New educator recruits are equipped with ICT skills before actual employment into teaching. However, the

older cohort of teachers are reluctant to venture into adopting or adapting ICT into education (Naidu & Jasen, 2003, p. 153). In respect of professional capacity building, the Malaysian government requires all teachers to take a basic informatics course at teacher colleges. School principals, administrators and support staff are also targeted for ICT training in management information systems and information literacy.

2.4.1.5 ICT curriculum integration

The introduction of ICT into schools has created the need by most governments to revisit their national curriculum to integrate ICT into teaching and learning. The Becta-Impact 2007 study recognises ICT as a useful tool to enhance teaching and learning. However there is a lack of a common vision between policymakers, school managers, staff and learners in their understanding of what integration of ICT for learning really means in practice (Underwood et al., 2007). Although ICT in schools in the United Kingdom was intensely supported by various government policy interventions and ICT directives, an identifiable gap existed between what policy legislation required and what was actually happening in school classroom (Younie, 2006). “Personalization” as used in the Impact 2007 study implies the tailoring of pedagogy, curriculum and learning support to meet the needs of every learner (Underwood et al., 2007, p. 54). In this regard the Impact 2007 study suggests that the national curriculum tends to constrain personalised ICT learning. Becta (Underwood et al., 2007) suggests that although government should not be the creator of educational learning content for ICT, it should nevertheless extend policies to support the development and use of quality content.

The introduction of ICT is impacting on the development of the new curriculum for education in most developed and developing countries (Tondeur, Braak & Valck, 2006). The Flemish government had identified and designed a framework for learner competencies and expected outcomes that learners should acquire by the end of primary school. These schools were highly autonomous to develop their own policies and to organise their own teaching and learning, as well as to compile quality control policies in response to national curriculum policy requirements. Tondeur et al. (2006) indicate that teachers in Flemish schools focused on the development of ICT technical

skills, whereas the curriculum policy expected teachers to integrate ICT within the teaching learning situation. This gap between the proposed ICT-curriculum policy requirements and the implemented curriculum suggests that there had been little inclusion of ICT into the ‘modern’ curriculum learning areas as a means to improve learning. In Ireland however, Mulkeen (2004) found that ICT was gradually seeping into schools’ curricula learning areas, but not uniformly. These findings are relevant to my proposed study as it tests the waters to determine whether national policy is translated as intended at school and classroom levels.

In Scotland, there was a need for clear and adequate guidance from national and local government for ICT implementation at curricular level (Robertson, 2003). Furthermore, there were limited examples of ICT being used consistently and effectively in teaching and learning to promote learner attainment across the curriculum. Another issue at play in Scotland is the debate as to whether ICT should be a subject in its own right or should be integrated across the curriculum (Condie et al., 2002). Similarly in France, curriculum changes to accommodate for ICT culminated in the inclusion of a stand alone subject namely, “informatics tool” into the school curriculum (Baron & Harari, 2005). Peck, Cuban and Kirkpatrick (2002) suggest that ICT has had little impact on teaching and learning in the United States because of subject compartmentalising within the school curriculum. Many governments have taken the policy initiative to integrate ICT into teaching and learning, it would seem that these initiatives have not translated into practice on the classroom floor. The implementation of ICT still favours a technocentric approach with ICT being viewed as an isolated subject with little understanding of what integration of ICT for learning really means in practice.

2.4.1.6 The influence of ICT policy on learning

The extent, to which ICT in education has improved learning and learner achievement, is a hugely debated issue among techno-promoters, techno-cynics and academic researchers in the field of ICT in education (Peck et al., 2002; Fluck,

2003; Lemke & Coughlin, 1998). The role of ICT in educational attainment had been the focus of researchers and policymakers. For government, ICT implementation in schools that leads to improved learner achievement would vindicate the huge fiscal budgets that have been spent on the new innovation.

Much research has been conducted in first world countries, in particular the United States and the United Kingdom to ascertain the influence of ICT on learner attainment (Reynolds et al., 2003; Harrison et al., 2002; Cox et al., 2003; Becta, 2006; Plomp et al., 2009). Schacter (1999) findings suggest that learners learn more in less time, learners develop positive attitudes towards learning and some achievement was evident. Furthermore, his findings indicate that ICT did not have positive effects in every area in which they studied. Harrison et al. (2002) found that greater ICT experience and use in curriculum could be associated with improved performance in examinations. Extending this debate further, Cox et al. (2003) suggest that there exists a strong relationship between the pedagogical expertise of the teacher, the way in which ICT is used and learner achievement. A longitudinal study conducted by Harrison et al. (2002) on the impact of ICT on learner achievement found that ICT had a positive relationship on learners' learning of mathematical skills, however the results varied in relation to the amount and type of ICT used in the curriculum.

Conversely, many researchers argue that there is insufficient evidence to conclusively prove that ICT improves learning (Becta, 2006; Reynolds et al., 2003; Condie, et al., 2002; Conlon & Simpson, 2003). ICT represents only one factor in the multitude of factors in the learning environment (Newhouse, 2002). Similarly, Harrison et al. (2002, p. 320) found that "it is somewhere between difficult and impossible to relate improvements in school achievement to a single cause". A study conducted by Cuban (2001) revealed that even in the most perfect conditions, ICT access did not contribute to improve learner achievement.

Kozma (2005) draws on a wide range of research evidence to illustrate that placing computers in classrooms is not enough to influence student learning. Numerous studies (Cuban, 2001; Condie et al., 2002; Conlon & Simpson, 2003; Kozma, 2005; Becta, 2006; Sutherland et al., 2004) indicate that there is no consistent and direct relationship between access (and use) of computers and student learning. Although

research evidence indicates a positive relationship, it cannot be concluded that one (computer access and use) causes the other (learner attainment). Most research studies that explore the impact of ICT on learner attainment tend to be mere snapshots of case studies and do not translate into formidable evidence to entrench the belief that ICT will impact on learner attainment. Therefore research methodology and instruments of design have yet to isolate ICT as an innovation factor that does (or does not) impact on learner attainment.

Although the primary focus of ICT in education policy is on improving learner achievement, the advent of ICT in education resulted in unexpected outcomes. The introduction of ICT in schools has culminated in some benefits that were not intended as educational outcomes by policymakers (Reynolds et al., 2003). These serendipitous outcomes took the form of: motivational factors that technology brings to the classroom particularly for underachievers and “problem” learners (Pelgrum, 2001; Becta, 2006; Kozma, 2005; Pittard, 2004); reduction of the number of school drop-outs (Kearns, 2002) and an increase in the motivation and self esteem of diverse learners (for example: gender, disabled, language, socio-economic status) (Harrison et al., 2002; Kerns, 2002; Becta, 2006).

2.4.2 Summary of meso-micro level findings

A review of the voluminous literature revealed a number of pertinent meso-micro level findings regarding the implementation of ICT. ICT policy implementation unfolded within a particular socio-cultural context. Depending on this context, schools adopted one of three isomorphic implementation strategies to accommodate policy imperatives, namely mimic, normative and coercion isomorphism.

Effective implementation of the ICT policy in education at school level is essentially dependent on three factors. First, schools should foster a supportive and nurturing institutional culture and climate. Second, school leadership is crucial for the successful implementation of national ICT policies at micro level. The implementation of ICT in schools brought forth new experiences for principals who responded to this challenge in nuanced ways. It was also found that some principals had a very simplistic

understanding of national and local ICT policy. Third, teacher professionalism is key to whether ICT is integrated in teaching and learning. Fourth, schools have little understanding of what integration of ICT for learning really means in practice. In instances where ICT was successfully integrated into teaching and learning, ICT seemed to influence learning in a positive way. And fifth, policy in practice is influenced by the support or lack of support schools receive from system level structures in particular district offices.

2.5 The South African scenario

Since the introduction of ICT into the South African education arena in 1996, ICT has become commonplace in most schools and in particular public schools (Howie, Muller & Paterson, 2005). ICT in education is a relatively new field of study in schools. It was previously exclusively lodged within the curriculum domain of some privileged secondary schools (as Computer Science) and further only accessible to schools that had access to ICT infrastructure.

This new teaching technology has made its entry into schools, without schools being ready to exploit its usefulness to improve the quality of teaching and learning. Today, political rhetoric and government policy advocate for teachers to use computers regardless of the context within which they find themselves (Surty, 2007; Cronje, 2007; Pandor, 2007; Department of Education, 2002; Department of Education, 2004). Currently, schools are in a state of organizational turbulence in their attempt to implement the White Paper on e-education ICT policy. In most developed and developing countries, schools over the past few years have been subject to an onslaught of legislation and policy that has meant changes in curriculum, assessment, governance and school fiscal control. South Africa as a new democracy has had more policy reforms within a short period than most other countries, beginning from the post apartheid “Curriculum 2005” (1997) to the current “National Curriculum Statement” (2004).

National policymakers have been quite adept in producing policy (White Paper on e-education ICT policy) from a centralized education department that had to be

implemented at provincial education departments (Department of Education, 2004). The use of ICT in schools, its integration into the curriculum and the impact it has on teaching and learning have and continue to enjoy wide political, educational and scholarly attention. Day by day, more and more countries are apportioning larger education fiscal budgets to the acquisition of ICT for schools (Plomp et al., 2009), and South Africa is no exception. The principal question to ask is whether this surge of ICT into schools has resulted in a corresponding return on investment? To date virtually no single study has conclusively determined that ICT in schools has resulted in a significant improvement in learning (Kozma, 2005). Accordingly, this study asks how, whether and to what extent have schools transformed their teaching-learning practice to encompass government policy in ICT?

The review now focuses on research studies of the landscape of the South African ICT in education policy from a macro to micro perspective.

2.5.1 South African scenario: Macro level – Are policies implemented asplanned?

National policy has progressed in leaps and bounds in the understanding of the role of ICT in education. The White Paper on Education and Training (1995) and the South African Schools Act (1996) are the two main policy documents that define and shape the policy environment for the provision and use of ICT in schools. However, analysis of policy trends from 1997 to 2003 indicates that the ICT policy landscape of South Africa lacks policy, legislation and strategic planning (Van Audenhove, 2003). In this context South Africa does not differ significantly from other developing countries in Africa.

In a national survey on the use of ICT in schools, the following findings emerged (Lundall & Howell, 2000): First, there are comprehensive education policies that support the progressive development of ICT in schools, yet there are no specific ICT policies, guidelines or action plans that are particularly structured or developed for ICT implementation in schools. This finding is supported by Van Audenhove (2003, p. 2) who claims that South Africa lacks an “integrated policy or policy document” that would drive the information society forward. Second, policy formulation

initiatives are not assigned to any particular government department. There is a joint responsibility by the Department of Education (DoE) and Provincial Departments of Education for the integration of technology into schools. The National Educational Policy Act (Act 27 of 1996) mandates the DoE to develop policy and lay down norms and standards, whilst Provincial Education Departments are tasked (among others) with the provisioning of education, provincial legislation, funding, information and infrastructure, provision of books and computer services. Lundall and Howell (2000) argue that the translation of national policy to provincial policy needs to be determined. However, provincial governments experienced difficulty in managing rapid changes and policy overload. Similarly the study conducted by Van Audenhove (2003) cites many incidences that identify a strong political will in South Africa to foster ICT within all spheres of government particularly for socio-economic and educational benefit. Third, there were huge inequities in education, namely resource provisioning, infrastructure, funding and teacher capacity and these negatively impacted on the implementation of ICT in schools (Lundall & Howell, 2000).

Czerniewicz and Hodgkinson-Williams (2005) indicate that prior to 2003, South Africa differed from other countries in their top-down approach to ICT policy formulation. In the South African context, the e-education policy was made available for public comment (Czerniewicz & Hodgkinson-Williams, 2005). Although the e-education policy was opened for public comment, it fell short of an inclusive policy formulation process. The policy climate based on political rhetoric, speeches and debates, however, favoured ICT for educational benefit (Surty, 2007; Cronje, 2007; Pandor 2007). South African political leaders were in unison in their belief that ICT will overcome the legacies of apartheid (Van Audenhove, 2003, p. 10). Howie et al. (2005, p. 12) in the SITES (module-2) national survey also found that provincial budgets are under-resourced to supply all public schools with ICT, furthermore basic needs such as water supply, sanitation, electricity, coupled with poor access to computers, are competing priorities that impede the implementation of e-education policy.

In 2004, the white paper on e-education was developed by the department of education (DoE, 2004). Important issues of the e-education policy that are relevant to

my study are: the main principle of the policy, the definition of e-education, e-education policy framework for teaching and learning, the policy framework on teacher capacity building, some policy implementation strategies and phases of policy implementation.

The e-education policy places e-learning within an outcomes based education (OBE) paradigm and further defines it as a learning process that takes teachers and learners through “*learning about ICT*”, “*learning with ICT*” and “*learning through the use of ICT*” (DoE, 2004, p. 19). The main principle of the e-education policy is the achievement of national education goals by “providing modern technologies to schools in order to enhance the quality of learning and teaching” (DoE, 2004, p. 6). ICT should be used as a resource for whole school development to improve productivity, management and administration; curriculum integration and delivery, communication and teacher and learner collaboration. Furthermore, this principle identifies ICT as a resource to accommodate different learning styles, apply and produce knowledge for the “real world”, promote achievement for learners, remove learning barriers for learners with special educational needs, provide “expanded opportunities and individualized learning experience” (DoE, 2004, p. 16).

The e-education policy framework acknowledges the importance of ICT as integral to teaching and learning. The policy promotes an OBE philosophy focussing on learner centred learning. Central to the successful implementation of the e-education policy is the issue of teacher competence and the need for teacher development at both in-service and pre-service levels. The policy advocates for a programme to address the lack of teacher ICT competencies to use ICT in their administrative and classroom practice.

In response to this need for teacher development and support, the national department of education (DoE) developed a national framework for teacher development as advocated in the policy “Guidelines for Teacher Training and Professional Development in ICT” (DoE, 2007). This policy outlines an approach to teacher development in ICT; e-education and the implementation of the national curriculum statement (NCS) and teacher ICT knowledge, skills, attitudes and values. Of particular relevance of the DoE policy on “Guidelines for Teacher Training and

Professional Development in ICT” is the reference to ICT literacy, ICT curriculum integration, e-education policy implementation principles and teacher developmental levels (entry, adoption, adaptation, appropriation and innovation).

Implementation strategies of the e-education policy include a system-wide approach, co-ordination and collaboration, monitoring and evaluation of the implementation process and planning cycles. This system-wide approach suggests numerous national initiatives (not described) of the education system; universal excellence for teachers, learners and managers of institutions; and a multi-pronged strategy for the integration of ICT at all levels of the education system. Furthermore, co-ordination and collaboration within and between government departments, provincial and other government departments, NGO’s, business and industry, higher education, general and further education institutions and the involvement of local communities is advocated in the e-education policy.

To monitor the implementation of the e-education policy, the policy advocates for regular reviews and periodic evaluations. Significantly the policy requires districts, provinces and national DoE to collect planned monitoring and evaluation data. The e-education policy identifies three phases of policy implementation: Phase one (2004 to 2007): focuses on institutional *readiness* to use ICT for teaching, learning and administrative purposes. Phase two (2007 to 2010): *integration* of ICT into teaching and learning. And, phase three (2010 to 2013): ICT integrated at all levels of the education system (teaching, learning, management and administration).

Drawing on the debates in the field, it would seem that South Africa has a rich and thorough policy base from which to draw, although the contextual issues and realities at micro level impact negatively on ICT policy implementation in classrooms. According to Czerniewicz and Hodgkinson-Williams (2005, p. vii) the “uneven policy terrain” in South Africa did not stop the advent of ICT in schools, but impeded the introduction and integration of ICT in schools. The uptake of ICT in schools continued regardless of the lack of policy support on ICT. There is however, limited research on ICT integration in teaching and learning in South African schools

and even less on how ICT policy influences teaching and learning in South African schools.

2.5.2 South African scenario: Meso and micro level – Are classroom practices changing?

The SITES (module-2) international survey set out to compare developments in ICT in education of 27 countries (Howie et al., 2005; Muller, 2003). A number of findings emerged with regard to the South African experience: First, a fair number of schools had ICT policies in place, but in many cases these were not being implemented. Second, principals indicated that the lack of teacher ICT competency poses a major obstacle to implementation of ICT in schools. Third, teachers experienced insufficient preparation time and excessive workload that contributed to inhibiting ICT integration in schools. Fourth, inadequate and insufficient teacher training regarding the integration of ICT into different learning areas and the absence of a properly developed curriculum for teaching computer skills exacerbated the huge list of ICT policy implementation issues. Fifth, most schools in South Africa used ICT extensively for administrative purposes and as a tool to monitor learner progress. And sixth, the reluctance of teachers to use technology to enhance their teaching resulted in the lack of exposure of learners to ICT.

The research concurred with international data that ‘other’ contextual issues impacted on ICT policy implementation at schools (Howie et al., 2005; Muller, 2003). Firstly, time exigencies discouraged teachers in the use of ICT. The use of technology required much preparation time, and teachers felt that they were already burdened by the routine of lesson planning, assessment of large number of learners and their extra and co-curricular duties. Consequently, teachers resorted to traditional teaching methods that served them well in the past. Second, technology faults also dissuaded teachers from utilising ICT. Teachers claimed that technological glitches resulted in foiled lessons and thus they often had to resort to backup plans.

2.5.3 Summary of findings - South African scenario

A number of ICT initiatives (Blignaut & Howie, 2009) are currently being implemented across South Africa. However, many of these initiatives do not directly align with the e-education policy and have not yet reached every school and district (Holcroft, 2003; Howie et al., 2005). In a developing country like South Africa, emphasis is placed on access to ICT and capacity building initiatives. The integration of ICT into the curriculum and effective management strategies for the successful implementation of ICT in all schools have yet to occur.

The policy document on “Guidelines for teacher training and professional development in ICT” is one of the initiatives by the DoE to implement the e-education policy (DoE, 2007). This policy document identifies the need for ICT integration into curriculum delivery, with specific ICT guidelines and goals particularly structured for ICT implementation in schools (DoE, 2007). However, the translation of national policies to provincial policy still needs to be determined. In contrast with the international top down policy approach, South Africa attempted to develop an inclusive (participation by all stakeholders) ICT policy. It would seem that South Africa has a healthy policy base from which to draw, but the contextual issues and realities at micro level impact negatively on ICT policy implementation in classrooms.

Academic research into ICT policy in education from a South African perspective has escaped the focus of researchers. Czerniewicz and Hodgkinson-Williams (2005, p. ix) argue that within the South African context local research in ICT is “undertheorised” and acknowledge that there is a “paucity of research regarding relevant ICT policy”, particularly how schools have taken up this challenge remains scarce. The apparent silence in the literature in South Africa, coupled with a dire lack of research on how schools appropriate education policy on ICT establishes a justification and relevance for this study (Mulkeen, 2003b; Tondeur et al., 2006; Plowman & Stephen, 2003; Thomson, Nixon & Comber, 2006).

2.6 Comparison of findings between international and South African landscapes

This section attempts to draw a comparison of findings between the international perspective and the South African scenario to ICT policy in education. Fig 2.1 illustrates macro level findings and Fig 2.2 illustrates meso-micro level findings. The concept maps draws attention to literature similarities, differences and silences within South Africa and internationally.

Findings from the literature at macro level (Fig 2.1) indicate there is a dearth of literature on: bottom-up policy implementation studies, research on ICT policy guidelines to schools and research on ICT pedagogical guidelines. There are significant differences in the nature of ICT policies between South Africa and the international communities, for example; in South Africa the policies are defined by simplistic goals while international ICT policies have achievable goals; internationally curriculum was revised to include ICT, while in South Africa ICT integration is only superficially mentioned. The concept map also reveals numerous similarities (policy deficits, overloaded curricular, focus on infrastructure, lack of systemic support etc.) on ICT policy implementation between South Africa and other countries.

At the meso-micro level (Figure 2.2), there are silences in the South African context with respect to the manner in which schools take up national ICT policy particularly according to DiMaggio and Powell's (1983) isomorphic changes that occur in institutions. Silences in the literature at the international level are also evident with respect to bottom-up implementation of policy. The concept map illustrates significant differences between schools in South Africa and other countries. Internationally schools are supported by specific guidelines and encouraged to implement ICT policy and encouraged to become autonomous. Literature similarities suggest that South African schools experience the same inhibiting issues that impede ICT policy implementation such as: the huge volume of policies, the lack of systemic support and lack of enabling policies. Also evident from the literature is the lack of bottom-up ICT policy studies in the international arena at the meso-micro level.

2.7 Conclusion

A review of the extant literature in the field yielded numerous findings. From the foregoing literature it is evident that there is huge interest to explore the use of ICT by teachers in classrooms. There is also plenty of research based on the top-down approach to policy implementation. However, there is a dearth of literature that explores how teachers take up education policy on ICT in their teaching practice. It is in this regard that my study is positioned to fill this gap in the literature which is apparently lacking at both national and international levels, with a view to discovering how teachers appropriate education ICT policy in their teaching and learning repertoire. I positioned my study and designed research methods to determine the day-to-day classroom experiences of teachers as they negotiate policy.

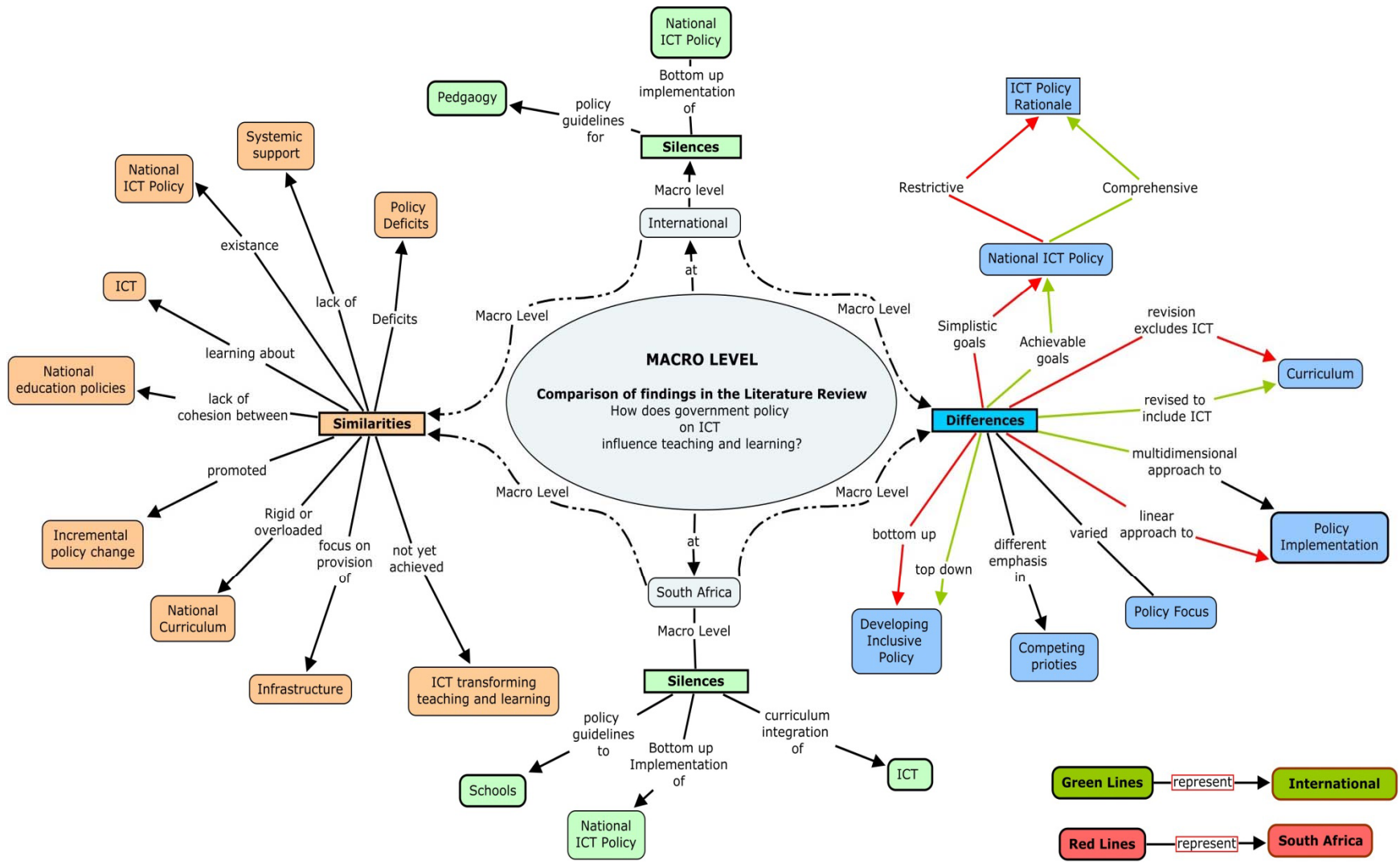


Fig 2.1: Macro level findings
Comparison of the literature in the international and South African landscape

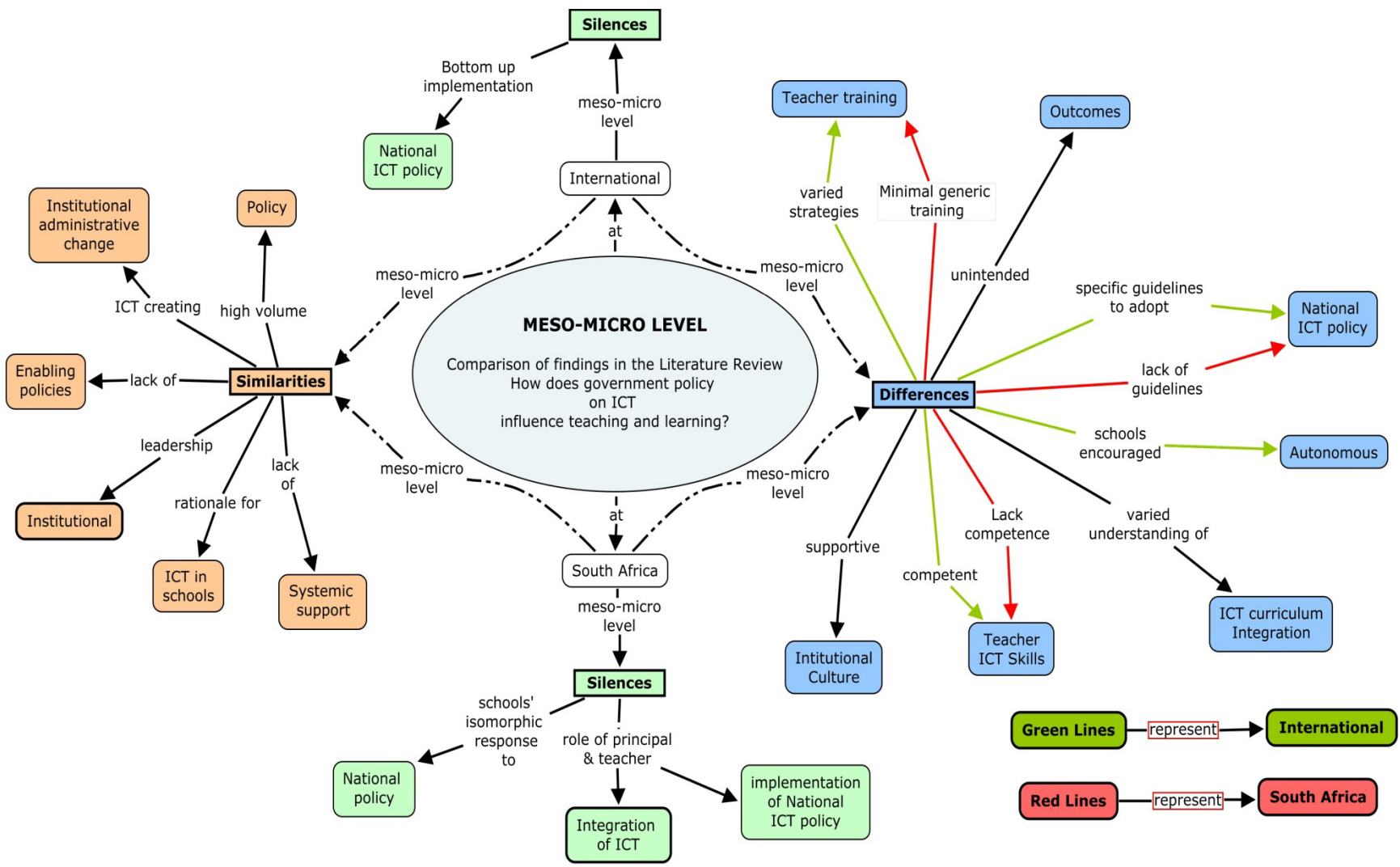


Fig 2.2: Meso-micro level findings
Comparison of the literature in the international and South African landscape