Chapter 4

Findings and discussion of results

What are the e-education policy implementation practices in teaching and learning?

4.1 Introduction

In this chapter I present and illustrate the findings that emerged from the data collection process outlined in chapter three. I elaborate on the themes that emerged from data analysis after interviewing teachers. The purpose of interviewing teachers and observing them in their classroom practice was to explore how they appropriate nationale-education policy on ICT in their teaching and learning repertoire. The themes that emerged from the data analysis led me to analyse the findings according to three categories. In the first category, I noted how teachers interpret policy. Second I report on the voices of teachers' experiences as they implement the e-education policy in practice. The third category describes the narratives of teachers' practice on how ICT influences learning in classrooms. Responses of teachers to the e-education policy and their actual classroom experiences represent my primary focus. Although I interviewed teachers at three different schools, the significant themes are presented collectively. I present the utterances of respondents as verbatim quotations in text boxes to underpin the themes and sub-themes. I used inclusion and exclusion criteria to define each category as unique from other categories.

4.2 How do teachers interpret policy?

I approached teachers' interpretation of policy from two different coding dimensions. The coding was done to elucidate responses of teachers when they applied policy in either a "readerly" context or in a "writerly" context (Bathes, 1975). Whether the teacher is "readerly" or "writerly" is not inherent within the policy text, but is vested in the interactions between the policy text and the teacher. In simple terms according to Helsby (1995) the teacher may opt to be unquestioning and accept policy

regulations and thus demonstrate "readerly" texts, or (s)he can resist and attempt to challenge and reinterpret policy and thereby demonstrate a "writerly" characteristic.

4.2.1 National curriculum policy: "readerly" or "writerly"?

"It is prescribed. I cannot, what I can do is collect little bit, and broader little bit, but I have to stick to my, the policy" ; "Putting it on paper and saying you have to do this"

Inclusion Criteria	National Curriculum Policy; Teachers and principals as re-interpreters of policy; Teachers and principals applying policy as mandated.
Exclusion Criteria	National e-education policy.

In the context of this study, principals and teachers applied the National Curriculum policy by adopting a "readerly"or "writerly"position. Teachers responded to implementation of the national curriculum policy unquestioningly and seemed to accept policy as it is intended. This "readerly" stance seems to emerge as a result of focussed support, policy workshops, policy directives and sustained school visits from the district office.

Two teachers, one in a well resourced independent school and the other in a poorly resourced township school, suggested that they do not have much say in the manner in which the National Curriculum policy is applied. Although teachers applied the National Curriculum policy, they saw it as being restrictive and thus it limited the integration of ICT into the curriculum. Both teachers indicated that they were obligated to follow the National Curriculum policy as required, with little or no freedom to interpret it from their own perspective. This township school teacher explained his obligation to work within the confines of the National Curriculum policy.

> *Well with regard to our learning area policy, technology policy, I don't have much say. It is prescribed. I cannot, what I can do is collect little bit, and broader little bit, but I have to stick to my, the policy, the core content they even give us the core content…We don't have freedom because we have set content which is prescribed so youcan't do your own thing. But I'd like to have more freedom because I have a lot of ideas that I want to utilise.*
> *(P 2: School A - Teacher 2.txt - 2:26 (181:183)*

The township school technology teacher narrated how he adheres to the requirement of meeting the learning outcomes as delineated in the National Curriculum policy, before venturing into ICT integration.

> *Well obviously you will be looking at the learning outcomes [referring to the policy document on NCS], it has to meet the expectations of the curriculum. So I try to, and of course you have to do it at their [learners] level. There are some interesting things that you can download that is way above their level and it doesn't benefit the child. Especially looking at the junior phase that we're in and ja through experience. You'll test something, you'll try something it might work it might not work. And then you have to adapt.*
> *P2: School A - Teacher 2.txt - 5:60 (479:485)*

This teacher at the township school voicedhis dissatisfaction with the National Curriculum policy that was prescribed. He seemed to be of the opinion that this prescription of policy did not address local needs and inhibitedICT implementation. He narrated his concerns:

> *Yes... yes I'd like to move away from that 'passed-on' content which is prescribed. It doesn't correlate and neither does it satisfy my needs nor the learners' needs. They need an environment that they can learn more.*
> *P 2: School A - Teacher 2.txt - 2:23 (171:176)*

In the one instance the principal of theformer model C school was unaware of the existence of the national e-education policy. He had an expectation that policy was in the process of being developed by government, and would eventually reach schools. However, this principal appeared to exercise his leadership role to promote the ICT vision of the school in the absence of any guiding policy. The principal also suggested that though the National Curriculum policy was unclear on ICT integration, he interpreted the national curriculum to be more adaptable to ICT integration in teaching and learning situation, hence he demonstrated a 'writerly' stance. He suggested that the National Curriculum policy was subject to his interpretation and thus viewed the policy as being adaptable to the use of ICT in teaching and learning, he explained:

4.2.2 E-education policy: "readerly" or "writerly"?

"We're making it up as we go along. We're using our own stuff"

Inclusion Criteria	The e-education policy. Teachers exercising agency, interpreters and constructors of policy. Teachers as appropriators of policy.
Exclusion Criteria	Policy as prescriptive and less open to interpretation.

Most teachers in this study were aware that a national e-education policy existed, however, they were ignorant of the contents of the policy. Consequently teachers did not interpret the policy and thus, it was difficult to conclude whether they were "readerly' or "writerly" in their approach to policy interpretation. A maths teacher at the former model C school expressed the view of most teachers in this study with regard to her knowledge of the e-education policy:

> *I haven't seen it [e-Education policy] [laughs], I haven't seen it haven't been through it but know about it that there's a white paper on e-learning, that's at National [level]. At district level, I don't think there's any, I haven't seen it.*
> *P3: School B, teacher 2.txt*

Another teacher at the township school claimed that he heard about the e-educationpolicy at a workshop "Yes, the White Paper isn't familiar to all educators. I heard of the White Paper when I went to e-learning exhibition station", however, he too was unaware of the contents of the e-education policy.Most teachers seemed to desire some policy implementation support and expressed the need to be guided by policy requirements. Hence, they adopteda "readerly" stance. The concern expressed by a teacher at the former model C school was that he would like to have had access to more structured guidelines on how to implement the e-education policy.

> *Look we've got that White paper [e-education policy], but something more better and more…that explains it better and more structured.*
> *P 3: School B - Teacher 1.txt - 3:59 (714:722)*

A maths teacher at the former model C school responded to policy implementation by suggesting that she preferred to apply policy as it was intended and thus represented a policy "readerly" stance. This teacher also suggested that the district office should be

forthcoming in mandating how the policy should be implemented, with appropriate guidelines to schools in general and teachers in particular.

> *Putting it on paper and saying you have to do this. Ja, just like the way they do with textbooks. Or give a list of open source websites that's accessible to the teachers, that they[district]actually went through and say we've put our stamp of approval on it.*
> *P 4: School B - Teacher 2.txt - 4:126 (1039:1041)*

In the absence of their knowledge of the e-education policy it would seem that teachers still integrated ICT into their teaching practice. Teachers were instrumental in developing and designing their schemes, curriculum or policy documents to suit their own pedagogy, institutional needs and local ICT context. Although there was an expressed desire to have access to more tangible policy, teachers nevertheless relied on their own professionalism in developing an unwritten policy that integrated ICT into their teaching and learning practice. Whilst the national curriculum policy seemed to be "cast in stone", teachers appeared to be developing a school e-education policy according to their own understanding and professional experience.

All teachers in this study developed their own learning programmes (schemes of work) to incorporate ICT into the curriculum and developed ICT literacy attainment levels for each grade. Of the sample of six teachers, only one teacher at the former model C schoolappeared to be knowledgeable of the content of the e-education policy. He indicated that he "browsed" through the e-education policy. This teacher adopted a "writerly" stance to policy interpretation as evident from the following:

> *We used it [e-Education policy] when we drew up our schemes…We try and fit it [ICT] into the curriculum…er..so that it's got to be part of the curriculum.. ja…ja what they[teachers] busy doing…ja*
> *P 3: School B - Teacher 1.txt - 3:25 (300:301); 3:59 (714:722)*

At all three schools in this study, teachers appeared to prioritise achieving the learning outcomes as prescribed by the National Curriculum policy. However, once this was accomplished these teachers expressed their freedom to incorporate ICT into their teaching practice by virtue of their own understanding. These teachers seem to act

professionally by determining their own teaching methods and strategies for ICT integration. Two teachers, one from the independent school and the other from the inner city school, expressed their views in this regard:

> *100% total freedom [emphatic]. There's no prescription there's no, er I can use anything I want. So it's not er, in our school we focus on just being able to reach the outcomes, but how you get there it's totally up to you.*
> *P 5: School C - Teacher 1.txt - 5:22 (195:197)*

> *Well we don't use text books... so for me I like I said, it is very open I decide...there is no limit here…you have to do it this way you have to do it that way. We have our work schemes we have our lesson plans we have to cover our LO's [learning outcomes] and that's it and oh the assessment standards have to be met and they have certain guidelines…you want to use a PowerPoint presentation…that's up to you.*
> *(P 4: School B - Teacher 2.txt - 4:47 (362:369)*

Some teachers, due to their level of frustration at the lack of policy support and policy directives, initiated their own need to develop policyas is evident from the voice of the maths teacher at the former model C school "We're using our own stuff. They [district] don't give guidelines, I don't think it's fair". Thus, the non-existence of clear policy guidelines seemed to have led teachers to be guided by their professionalism to define their own policy implementation goals. The mathsteacher of theinner city school responded to how the district's policy vision and goals could be appropriated and implemented. The protest by this teacher serves as an exemplar of concern expressed by all teachers in this study.

> *There needs to be a link. We don't know what they [district]want, we're making it up as we go along. We're using our own stuff… It's not like they [district] have it all lined out like the portfolios, you have to have this, this and this in your portfolio. They don't say we want this kind of teaching, and…*
> *P 4: School B - Teacher 2.txt - 4:136 (1075:1080)*

A maths teacher at the independent school suggested that because there appeared to be no specific policy, guidelines or directives on how to integrate ICT into the

curriculum, he had initiated his own approach to integrate ICT into his teaching practice. He had found a way to overcome systemic constraints in the use of ICT in his teaching and learning through his own initiatives and classroom practice.

> *It [ICT use] can't take time away from the schedule [teaching]so experience what I can do. As for the content, I can choose what I want... I have become a renegade I'd rather rush in the week ... so that we can incorporate [ICT] ... it's nice for learning and also fun. It [ICT] helps them understand that maths isn't war. Kids are kids so I make it fun to learn.*
> *P 6: School C - Teacher 2.txt - 6:22 (333:337)*

Principals at the identified research sites, however, were ignorant of the e-education policy and expressed the need for district and provincial guidelines on how ICT should be incorporated into the school's teaching-learning environment. All three principals in this study explicitly indicated that there is no guiding policy. The principal of the inner city school argued that it was the internal policy of the school that determined the extent to which ICT is used in teaching and administration practice.

> *And the usage of it and why this and why that and the training and government policy. Because there's no I don't think there's official GDE [Gauteng Department of Education] policy for that. Schools develop what they have and they usage of that and the why. With your policy[holds his hand in a fist position]you also got a hold on what's happening in the classroom, if the policy says marks must be e-mailed, assessments must be done in the computer centre and things like that.*
> *P 8: School B - Principal.txt - 8:26 (344:346)*

The principal of the independent school echoed the same sentiments as that of the above public school principal in his account of the schools' internal policy that guides the use of ICT in curriculum delivery.

> *Yes, we encourage it. I don't think there's policy that says we must use it but it does make learning more exciting and improves learners' attention. There is a section in the policy [schools' ICT policy] that deals with use of information technology in your classes and teachers can use that as base to ask for ... a projector or whatever may be the case.*
> *P 9: School C - Deputy Principal.txt - 9:17 (98:103)*

In all three schools the principals seemed unaware of the national e-education policy. They made no direct or indirect reference to it, not even when prompted to indicate which policy guides their ICT institutional teaching and learning practice. The principal of the former model C school offered the following account of his understanding of the National Curriculum policy and the role of ICT. He seemed to portray a 'writerly' stance to interpretation of the National Curriculum policy.

> *No it's [how to integrate ICT in the curriculum] not spelled out, it's not there [in policy]. But I think the way we do it and how we use it, when I think back now definitely more than ever before. Ja, the previous things were all referred back to a specific text book, it's [policy] open now. But the answer we get lately is that you must do is right for your school. And do what's best for your learners…You mustn't do it because policy says so. What is the reality, if this is the reality, then policy must change. The reality is we need this [ICT]. So the policy can't say you must work with the text book, then the policy [holds hands in a fist like manner, referring to it as policy] must change, so that is room for us.*
> *P 8: School B - Principal.txt - 8:62 (728:732); 8:47 (573:575*

The independent school did not appear to face the same curriculum implementation policy demands as experienced by public schools. The principal stated his case in this regard "in independent schools we can forge ahead [with] what the government has prescribed as a periphery. We get more leeway in terms of what is best for the learners". Although the independent school principal acknowledged that there is no official e-education policy that guidedhis decisions, he suggestedthat the independent school had the privilege of changing the curriculum policy to suit the best interest of their learners by observing national education policy only at the 'periphery'. The township school, however, seemed to be confined to more stringent policy control. The principal of thetownship school suggestedthat district requirements must first be met in applying the national curriculum policy, after whichteachers took the liberty to incorporate ICT in the way they deemed fit. He explained:

> *What they [teachers] normally do is they get the guidelines [national curriculum] from the facilitator [district official], in terms of what should be in the learning programme and work schedules and do their planning from that. They [teachers] can also change to suite our own specific needs.*
> *P 7: School A - Principal.txt - 7:25 (175:178)*

In the interest of fostering the integration of ICT into the school curriculum, teachers (through the leadership of their principals) apparently initiated and created their own policy by adapting curricula to incorporate ICT. This response was in accordance their contextual experience and their ability to foster the local context in which ICT was integrated into the curriculum. In a bid to challenge policy directives the principal of the inner city school changed policy to suit ICT issues relevant to teaching and learning. This principal portrays a 'writerly' stance and gives an explanation of his well reasoned argument of how the writing policy of the school had changed to accommodate the inclusion of ICT to cater for the socio-cultural context of the school.

> *We just changed our writing policy as well, doing print only. Why cursive? [cursive writing] the juniors [meaning Foundation phase] say ja well it's fine motor skills, gross motor skills all that cursive. The teachers now prefer print. Because they say they spend three months, six months in grade three to four, teaching them to write cursive and then a year later the teacher in grade five says read the writing in print. Theonly thing our children see when they open a magazine, newspaper anything, textbook it's print. When they work now they work here [shows a textbook], its print. So why waste 6 months of a person's life if the print is a neaterprint. And we see a lot of our children, that is again our embassy children, a lot of our embassy children arriving only write print, ja [emphatic].*
> *P 8: School B - Principal.txt - 8:177(996:998)*

4.3 Teachers implementinge-educationpolicy inpractice

Against the background of the former category, I turn my focus to the teachers' narratives on how they knowingly or unknowingly implemented the e-education policy in their actual classroom practice. The analysis of the data results indicates that the whole sample of teachers in this study was implementing the e-education policy in their day-to-day teaching practice unknowingly. These teachers displayed huge interest in the use of ICT in their teaching practice and their voices revealed numerous ways in which they seemed to implement the e-education policy. The data suggests that teachers appear to be acutely in tune with integrating ICT into the curriculum and the numerous pedagogical issues at play. The following eight sub-categories became apparent and form the framework for thediscussion in this section. First, teachers

displayed a teaching philosophy that demonstrated positive attitudes to the use of ICT. Second, teachers established emergent pedagogies. Third, they tended to be innovators and trendsetters in the manner in which they exploited new ICT. Fourth, teachers used ICT to collaborate, learn and share information. Fifth, teachers recognised the important role they played as professional drivers of ICT integration. Sixth, teachers hadthe strong will and determination to improve themselves. Seventh, teachersused ICT for administrative purposes;and eight, teachers developed learners as independent knowledge seekers.

4.3.1 Teachers' beliefs and attitudes on the role of ICT

"And if you don't use or stay up with technology we will miss certain learners"

Inclusion Criteria	Teacher's identity, personal beliefs and attitudes, vision and philosophy of teaching, professional conviction.
Exclusion Criteria	Institutional and policy influences, socio-cultural influences.

At all three schools teachers displayed a positive attitude to the use of ICT in their teaching and learning practice. Participating teachers seemingly realised the value of ICT as a tool to re-invigorate their teaching practice, and acknowledged that ICT could open new opportunities to enhance learning. These teachers also appeared to recognise that the use of ICT as a tool needs to be executed responsibly in the school environment. Above all, these teachers do not want to be coerced by policy to use ICT, they want to use it on their own terms and in their own pedagogical way.

One teacher at the township school reflected on the manner in which ICT could be used to stay abreast of current technology which learners are familiar with. He seemed to suggest that it is imperative for teachers to meet the challenges that technology brings to the classroom, particularly since learners seem to be engaging uninhibited with technology.

> *And if you don't use or stay up with technology we will miss certain learners, there are other learners that are acquainted with technology and they learn through this medium of electronics.*
> *P 1: School A - Teacher 1.txt - 1:12 (149:151)*

> *So for us to grow, for us to give meaning to teaching is very important. Teaching in itself is a tool, so I see ICT computers as a tool for other tools.*
> *P 1: School A - Teacher 1.txt - 1:11 (147:148)*

The same teacher reflected on his attitude as a professional user of ICT and felt that it should be used as a tool for curriculum integration that supports teaching and learning with relevant information and not merely as a novelty tool.

> *You must evaluate your content, how they respond and you must also evaluate your content with regard to your assessment and your policy and your learning outcomes and your assessment standards. I mean you cannot let your ICT run away with you [laughs] and you just fly away with irrelevant information, you know, checks and balances all the time.*
> *P 1: School A - Teacher 1.txt - 1:90 (554:561)*

The participants in this study appeared to desire some form of motivation to teach. They all seemed to suggest that the traditional approach to teaching had lost its lustre. However, with the introduction of ICT into the teaching-learning situation there is an opportunity to redeem their rightful place in the classroom. In both public schools, the voices of the teachers seemed to be in unison and reflected the need for creating new motivational methods and tools for teaching.

> *We need something to boost our energy …yes…ja. And I think it's[ICT] giving fun to teachers if they know how to use it.*
> *P 4: School B - Teacher 2.txt - 4:19 (152:153)*

Participant teachers in this study appeared to reflect sound professional attitudes towards the manner in which ICT could be used to enhance teaching. This township school teacher reflected on his understanding that the use of ICT brings forth a need for professional commitment and thorough preparedness for curriculum delivery. This teacher also seemed to suggest that ICT use could effectively address the need for different learning styles.

> *But you need to be prepared, and you need to be well prepared, when you design your lesson to see how you can cater for all those learning styles into the lesson. You need to be prepared. To know where to find the stuff and to use your tool [ICT].*
> *P 1: School A - Teacher 1.txt - 1:87 (526:533)*

The voice of a teacher from the independent school seemed to explicate his beliefs on the impact of ICT on teaching and learning. He saw the incorporation of ICT into the teaching environment as an eventuality that would occur irrespective of whether teachers accepted it or not. However, he suggested that teachers needed to 'evolve' with the process to give the advantage to the learner who is already adept with using ICT.

> *I think the days of black and white on a text book are limited. I can feel part of the evolution. And we can move to a stage where someone can better ourselves using IT… Just to use it for its potential. If this thing sits here and gathers dust then I'll be doing both myself and the kids a disservice. Perhaps me more than the kidsbecause they go home and play with their internet, play their video games with a pen pal from Germany at the same time while I go home and read a book. It's a goal toincorporate it [ICT] and it's a goal to evolve with it.*
> *P 6: School C - Teacher 2.txt - 6:4 (137:141)*

4.3.2 Teachers' emerging pedagogies

"It's [ICT] actually taken me back to re-evaluate how I teach the subject and material that I use in teaching the subject. Ja, so it has, it's taken me back revisited and re-evaluated, ja."

Inclusion Criteria	Teachers revising their original position on teaching and learning; Teachers subject and pedagogic knowledge; Teachers viewing ICT as integral.
Exclusion Criteria	Teachers using ICT with traditional teaching methods. Reluctance to adopt change.

Most teachers in this study indicated that ICT created an opportunity and a challenge for them to revisit their teaching styles and methodology in order to enhance their teaching practice. These teachers seemed to be enthusiastic about the opportunity that ICT offers to change or modify their teaching from a traditional approach to an ICT based teaching practice. All teachers in this study appeared to support the notion that

an ICT integrated approach has value in catering for different types of learners. Furthermore, the teacher participants in this sample also appeared to demonstrate their professionalism as negotiators and designers of curriculum content and acknowledged that ICT has the potential to bring the real world into the classroom environment. The remarks of a teacher at the township school reflect the sentiments of many participants in this study.

> *But the greatest advantage of ICT is that learners must experience the real world in the class. The class mustn't be a place where it is 'kunsmatig'[artificial] you know…And then from the learner's point of view it makes them see and the first time I tried I showed them bridges, different types of bridges, and there's a nice slide show on bridges you can see the unstable, there's the one hanging bridge that's moving before it finally collapses, the children like to see that. But, it's not animated, it's a film, a real snapshot or something like that. So that I usually show them.*
> *P 1: School A - Teacher 1.txt - 1:37 (248:250), (235:239)*

Jo, a technology teacher at the township school offered various examples of how ICT had changed his teaching pedagogy. He elaborated on numerous specific instances in which ICT had impacted and changed his teaching methods. This was also evident in my classroom observation[27] of his teaching practice. In one instance he effectively increased the font size to cater for learners seated at the back of the class. In his narratives, he described how ICT had impacted on his teaching practice. However, in his teaching practice he immediately requested to illustrate his point by demonstrating the effectiveness of ICT in the presence of his learners, allowing them to interact with him and the smart-board (see Figure 4.1, below).

[27] See Video clip: DVD-School A, lesson 2.mpg

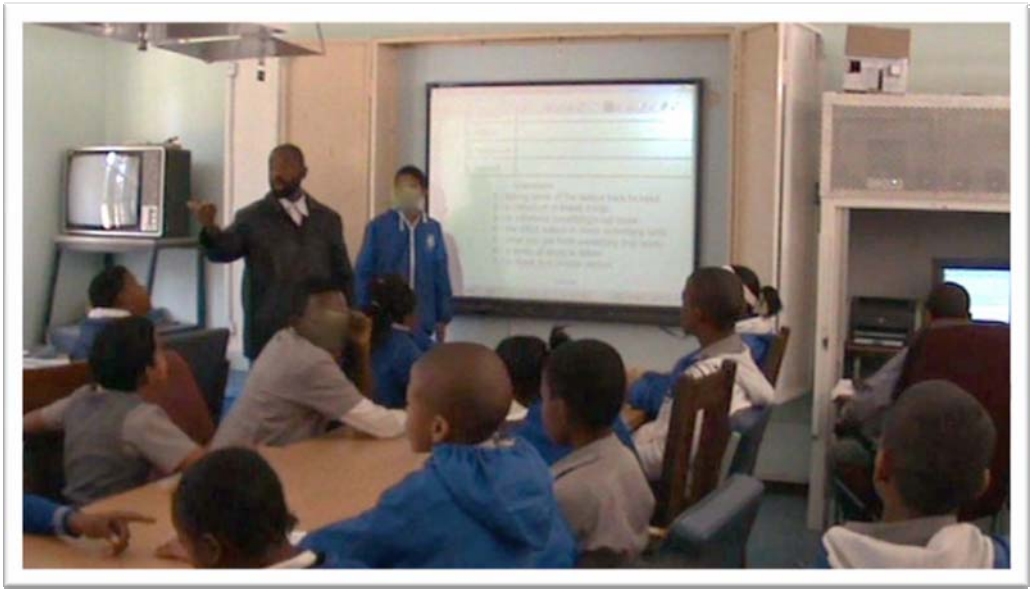


Figure 4.1: Teacher changed pedagogy
A learner demonstrates to the class using the interactive whiteboard, a learner (seated on right) at the teacher's PC loads the appropriate lesson, and the teacher explains to the class.

> *It [ICT] also gives us the opportunity to use different strategies, teaching strategies you know. Learners that are more mathematically orientated, you can quickly take a drawing and put it in a mathematical form that is access that a computer gives you. Also what I love about the Smart board you can very easily go into depth with 3-dimensions, different dimensions with drawings, it give you colour, you can play with colour. It gives you access to different pens, you can draw using a paintbrush, the creative aspect.*
> *P 1: School A - Teacher 1.txt - 1:26 (206:211)*

This teacher also seemed to change his teaching technique in order to realise real value and innovation which he clearly expresses in his narrative of his experience.

> *And what I also like about ICT is the shows motion and sound at the same time. Something that I like to show them is a working, what do you call that?[simulation] I give them a questionnaire on that, the test is also based on the excursion and that is how I bring in the working of the engines and then I show them that slide show, and it has sound and they understand motion, pressure and compression and all that. So that was good…With regard to social science I did the rivers, I did the maps, er, er. Even History is nice, History yes, even the Koi-Koi, music and sounds you can use. The language, I played that for the children.P 1: School A - Teacher 1.txt - 1:52 (332:334);(215:216)*

All teachers in this study seem to be unanimous about new affordances that ICT brings to their teaching practice. One of the teachers at the independent school explained the manner in which ICT made him re-examine his traditional teaching methods. He appeared to have made a radical change from his conventional 'textbook' approach to one that encompasses and embraces ICT.

> *You know, you get in a comfort zone when you get into teaching the same subject area for year after year. Especially, when you do it with textbooks. And by doing that it's actually taken me back to re-evaluate how I teach the subject and material that I use in teaching the subject. Ja, so it has, it's taken me back revisited and re-evaluated, ja.*
> *P 5: School C - Teacher 1.txt - 5:50 (415:419)*

Although most teachers in this sample seemed to accept that the use of ICT in their teaching practice had culminated in a change in teaching methods employed, one teacher in theformer model C school issued a caveat. She believed that developing a sound pedagogy was a prerequisite to using ICT and explained that the use of ICT does not necessarily translate into good pedagogical practice.

> *ICT can't fix bad teaching you know it's not gonna help. If you're a bad teacher its[ICT] not gonna fix it.*
> *P 4: School B - Teacher 2.txt - 4:35 (285:286)*

An experienced grade six participating teacher at the township public schoolacknowledged that although his teaching pedagogy had changed because of his use of ICT, his basic teaching principles remained unaltered "Well the fundamentals remain the same I would say". He substantiatedhis claim by alluding to the need for teachers to be ICT competent as a requirement to apply the fundamental principles of teaching (see Figure 4.2, below).

> *Well the fundamentals remain the same I would say. The fundamentals remained, you move from the known to the unknown. From big to small, dynamic movement for you as a teacher. The fundamentals remain. But funny enough but you can only get to that stage, when you are acquainted with the thing [ICT], with the tool.*
> *P 1: School A - Teacher 1.txt - 1:69 441:445)*

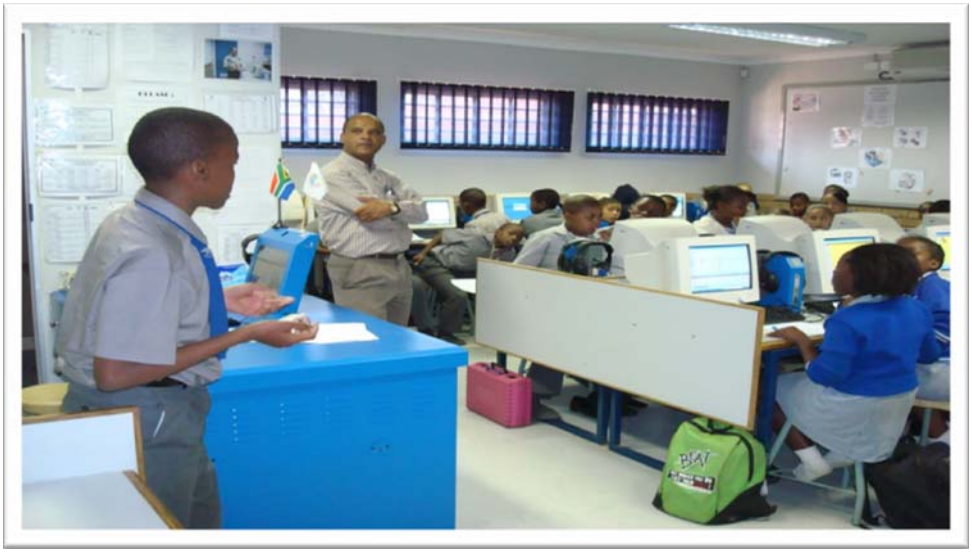


Figure 4.2: Teachers' emerging pedagogies
Teachers change pedagogy to a learner centred approach.

4.3.3 Teachers as innovators and trendsetters in the use of ICT

"You know as soon as we give canned solutions to everybody, we're back at where were ten years ago."

Inclusion Criteria	Teachers as technological leaders; Creative thinkers, futuristic in outlook, initiators, experimenters, designers, risk takers and agents of change.
Exclusion Criteria	Teachers uninspired by ICT; teachers as technophobes and resistant to ICT use. Teachers as uninitiated individuals

The voices of participant teachers seem to suggest that they are eager and willing to experiment with the possibilities that ICT brings to the classroom. Teachers appear to push the boundaries in using ICT in their classroom practice, by employing innovative means to change their teaching practice as reflected by a mathematics teacher in the inner city school.

> *I think in terms of ICT its me…I've trained myself also…I've looked and I got ideas from the internet as well how people are using ICT. And I come and apply it and I do it. There's no such thing as listen this week you must use a web-cam video thing or this week you have to use I pods or whatever or you have to use a pod cast or PowerPoint. The PowerPoint thing I made it myself because I really didn't know how to do it.*
> *P 4: School B - Teacher 2.txt - 4:49 (387:394)*

Here a teacher at the independent school narrates how he employed ICT as a new pedagogical practice in his classroom. Prior to this comment, he tells the story of his

transition from using overhead projectors to ICT and how this new technology has opened new teaching possibilities.

> *And then when I found PowerPoint a whole new world the opened, because now you can do it visually…I used programs, where if I had a student that had fallen behind, instead of wasting other students' time, I would put them on computers to practice and revise.*
> *P5:School C-Teacher 2.txt*

In all three schools participant teachers appeared to exhibit a sense of adventure in trying out different teaching strategies to incorporate ICT in their teaching practice as indicated by the narrative of a teacher at the independent school. He explained how he utilises propriety software to teach second language children, tenses in Afrikaans[28].

> *As a teaching [meaning opportunities for teaching] I use my interactive boards quite comprehensively, and with PowerPoint again to bring over specific concepts to the children visually. And one of the things I'm doing quite [does not complete], I feel is very successful is 'tenses in Afrikaans', especially with the English child that its a bit of a problem, but using PowerPoint and animation in PowerPoint you can actually show them where and how it changes, so they enjoy it. So for your visual learner it makes it more interesting and easier to learn.*
> *P5: School C - Teacher1.txt :*

The same teacher described an open-source software program that allows teachers to develop their own learning objects (lessons) for learning management systems. He protested against schools and teachers that used learning activities designed by other teachers or institutions, and remained steadfast in his belief that it should cater for local context and needs.

> *Ja, but the problem with that is some want it because they [other teachers] don't want to develop it themselves. As eXe-learning [referring to open source software], it's a tool that there but you still have to develop it for your needs and your contexts, and that's the way it should be. You know as soon as we give canned solutions to everybody, we're back at where were ten years ago.P 5: School C - Teacher 1.txt - 5:73 (611:615)*

This teacher also seemed to suggest that teachers have to be ICT pace-setters for the purpose of improving the teaching-learning process. The teacher was of the opinion

[28] Afrikaans is one of eleven official languages in South Africa

that the new technology innovation should be used to facilitate curriculum delivery and promote learner understanding and not be used merely as new a teaching tool without purpose.

> *You know, education when you look from the days when we were at school, we thought that the overhead projector was 'bees knees' and er, but technology is changing and if we don't em …use the technology and give our children the benefit of what is out there we doing them a disfavour. So it's not the sake of just using technology for the sake of using technology, but it must have a further purpose of helping the child understand what is happening out there…, but ja, I really enjoy bringing that into the classroom.*
> *P 5: School C - Teacher 1.txt - 5:19 (163:170)*

The voices of teachers from all three schools seemed to suggest that teachers realise the important role ICT plays in developing learners that are competent for life beyond school. Of significance is the observation that teachers appeared to place high relevance to the use of ICT and the skills that learners will require as they venture into the workplace beyond their school years. A principal of the inner city school seemed quite moved by his commitment to provide optimum opportunity for his learners.

> *So that made us start thinking about the children in the school today what will they do one day? And that just triggered our minds all the time to say we have a school like this, now we go to keep it up. You can't have a school like this and take steps backwards, you've got to take it forward with what you have on the table now.*
> *P 8: School B - Principal.txt - 8:17 (229:233)*

The narratives of both principals and teachers apparently exhibit strong images of their vision of the role that ICT could play in a local context, national and international arena. Both teacher and principal seemed to recognise that ICT in education could also develop learners to be internationally competitive. A principal of one of the public schools(inner city) explained:

> *Principal: Ja, it was not long ago that we spoke about the year 2000, when we got to 2000, we spoke about 2010 it's next year, I mean 10 years [clicks his fingers, for emphasis]. They guys are already talking about 2020 I mean it's there [clicks his fingers again, for emphasis]. But you must move on with the time, because there's different expectations from 2010, there's different expectations from 2020.*
> *P 8: School B - Principal.txt - 8:174 (959:962)*

> *Teacher 1: But the greatest advantage of ICT is that learners must experience the real world in the class…The classroom must be made as real as possible to what the learner's experience home, and eventually greatest is preparing them for the workplace... But to make them realise that this thing will be a part of their working life in a big way. Office, factory, even if you clean floors you know, it's an electronic gadgets.*
> *P2: School A Teacher 1.txt.*

The same principal narrated his concerns that schools need to look to the future and schools need to be proactive to provide an education for the "learner of tomorrow". He talked about teachers and principals seeing the "big picture" and that that "The bigger picture is not the school's premise, we not teaching for today, we teaching for life."

> *So ja, I dare say those children are on old school desk at the moment, and the world is opening it's a global environment. You can't say don't worry we just at the bottom of Africa. Lets solve our problems, for these children it's globalization, they might not even work here they might work in another country. Or they might work here, but they might work world-wide, because they got a cell phone and a laptop, they are preparing for that…Principal:(continued) Like I say children in primary schools now, don't even know what they going to do one day. There will be jobs that do not even exist at the moment that they will be doing. So, who must equip them, we must equip them.…And off course is to power and equip the present generation,because the article I read the other day that says that "80% of these children at school today are preparing themselves for jobs that do not yet exist" [phone rings] So what are preparing themselves for? [phone rings again] We need to gear them and give them the tools and equipment and opportunity to do that for later life. Ja to empower them and to equip them for life. Ja, not to teach for today but to teach for life.*
> *P 8: School B - Principal.txt - 8:174 (959:962)*

The township school teacher had the same vision of what is expected of schools and teachers in particular. Here he described his expectations of the goals of teaching ICT.

4.3.4 ICT initiating teachers as collaborative learners

"The other day, the Social Science teacher came to me and wanted to know something about the earth. We went to Google Earth and we found interesting facts about the earth."

Inclusion Criteria	Teachers working together over time; Sharing knowledge, skills, pedagogy, understanding, values, goals; Sustained partnerships and contact; joint activities. Various nuances of teacher collaborations.
Exclusion Criteria	Teachers as independent individuals; self learners. Student learning across disciplines.

In all the schools in which data was collected, diverse collaborative learning experiences were evident. Teachers received capacity and support in respect of ICT integration from numerous self-initiated collaborative learning experiences. Such collaborative learning seemed to exist in a number of forms. First, teacher-teacher collaboration existed between two or more teachers in the same school. Second, teacher-teacher collaboration between teachers from different schools was evident. Third,school-school collaboration occurred between two schools. Fourth, teacher-learner collaborative learning experience manifested. Fifth, schools and teachers did not see the schools' physical location as a limitation to collaboration and had aspirations to collaborate between local, national and international schools. Sixth, teachers expected the local education district to serve as an e-learning resource hub for all schools to collaborate as well as share resources and teaching expertise.

Teachers within the same school seem to find that the use of ICT culminates in the need to collaborate with each other more often in the same learning area fields. Teachers also appeared to interact with each other across curricula fields of specialization, which was different to their previous experience. Through the use of ICT the sharing of experiences, resources and pedagogy seemed to move teachers to new collaborative levels as professionals within the same institution. A science teacher at the former model school narrated how she cooperated with another science teacher in sharing resources and pedagogy.

> *I do collaborate, we are two teachers teaching science she has one class, I have one class. We sharing science. I would go and find information, we did a water cycle, I would say listen you can take your class to the media room you can show it to them. They go in and show it. I've done it when we did the lab, when we had safety rules, I did a PowerPoint presentation about safety rules andworking in the laboratory, each on took our classes there and we showed it to them. Like I said the excel work I got it from another, teacher she showed me how to use that and I trained another teacher. So we passing it on.*
> *P 4: School B - Teacher 2.txt - 4:78 (713:720)*

At the township school, a science teacher explained how the social science teacher sought his help in the teaching of geography.

> *Yes! Each and every learning area, we can actually utilise it. The other day, the social science teacher came to me and wanted to know something about the earth. We went to Google Earth and we found interesting facts about the earth.*
> *P 2: School A - Teacher 2.txt - 2:28 (198:200)*

A newly recruited teacher at the inner city school told his story of how he works in partnership with teachers from other schools. Although the nature of the district cluster meeting is for particular learning areas, informal sharing of ICT teaching ideas and methods would take place between teachers.

> *When we have an EMS [Economic and Management Sciences] meeting we will talk about the computer centre or when we have an athletics meeting I'll know that that guy there runs the computer centre so I'll sit with him and chat to him and say how do you do this and how do you do that. So it is not formal about ICT.*
> P3: School B – Teacher 1.txt

Theprogressive principal of the former model C school narrated how ICT technology can be used to share human resources such as teacher expertise between schools. He explained how the use of the internet could facilitate this collaboration concept.

> *If you come on a Friday or Thursday and you will see a virtual lesson. That's what we are trying to do through KAD is to have a virtual teacher, where my math teacher will teach math one morning for Brooklyn and Waterkloof. While she is doing her lesson in her class via skype she will do the same lesson for Brooklyn Primary and Waterkloof. Next week, that technology in that very school, so when that teacher does structures there, four schools will link up with skype, and that top teacher there on structures will teach that lesson to four other schools as well.*
> *School B – Principal.txt*

The same desire to collaborate with other schools is expressed by a teacher in the township school. This teacher envisions the rich nature of school-school partnership through the use of the ICT technology. The idea of sharing of teacher pedagogical expertise, resources and lessons is a central thread that seems evident from all teachers in this sample.

> *A challenge I would say that I would really love us to take on is to have learners via the internet, via the Smart Board to communicate, to have live lessons. And with internet and with technology available, with a camera, you can have a camera, not a data projector, connected to the lesson , it records and immediately another school can see what we are doing, we can share.*
> *P 1: School A - Teacher 1.txt - 1:62 (392:396)*

In addition, the use of ICT in schools appeared to create opportunities for schools to explore collaboration with other schools across various socio-cultural, socio-economic and geographical boundaries. Principals and teachers seem to identify benefits of sharing resources, skills and expertise between schools. ICT resource scarce schools appear to be open to the idea of using ICT to communicate and share with other schools perceived to have fewer resources then themselves. The independent school teacher talked about his experience and collaboration with a poorly resourced public school.

> *I am involved with Irene Middle School, and we [school] trying toget a computer lab for them, because the Gauteng-on-Linelab is not working. And even the new one they put in is notworking, so they are sitting without those technologies andtheir children are not getting the benefit of being able tousing those technologies.*
> *P 5: School C - Teacher 1.txt - 5:12 (132:136)*

In the township school, the technology teacher elaborated on the collaborative experience of his school with an independent school. Initially the collaboration was based on technical support and eventually developed into curriculum support. This township school exploited many avenues to foster collaboration between other schools. Situated in a low socio-economic environment, the school sought partnerships as a means to uplift and improve its ICT practice.

> *We are in partnership with the German school…Yes, it's a private school. We met once a month to discuss computers as well as ways to move forward but that has stopped. We wanted to know to how to set up a computer centre andhow to manage it. At that time, we had computers but we needed them to tutor us and show us how to get the network running. Later on, they helped us with lessons for the whole syllabus starting from grade 1 to grade 7.*
> *P 2: School A - Teacher 2.txt - 2:39 (284:297)*

A teacher and the principal of the inner city school expressed their desire to take collaboration between schools beyond local, provincial and national boundaries. This maths teacher expresses her envisaged ideas with respect to creating international collaborative experiences.

> *There's so many things if you think about skype, you don't have to go out of this classroom, you can skype someone and say listen I have this problem or did you receive the test? So the first step I thought was getting the school connected and then connecting you know…and I was always thinking outside, like I said at the seminar…and I said about the NEPAD schools in Africa…and how amazing itwould be if you could sit here and you link to a classroom in Uganda or Kenya..we are not connected to schools so we must still get connected to each other, and then go to a higher level and now we connect to other schools and now we go on further and connect to other countries.*
> P 4: School B - Teacher 2.txt - 4:29 (221:228)

The principal of the same former model C school narrated his vision of collaborating with other schools in an attempt to share teacher expertise and best practices. He also envisaged ultimately international collaboration between schools.

> *Using skype, I want to use the best math teacher in Pretoria to present a lesson here in my school, and my excellent technology teacher can do lesson for those children again. And to have communication with other schools nationally and internationally, where we can communicate and share ideas.*
> *P 8: School B - Principal.txt - 8:5 (141:147)*

The general perception from teacher responses in the sample is that teachers are not technophobic, but rather teachers seemed to be invariably concerned with being embarrassed in class due to the lack of confidence in the use of ICT in classroom teaching. However, in this study most teachers indicated that they are comfortable with collaborating with learners. In fact teachers acknowledged learners as resourced individuals, apparently accepting that many learners may be better equipped in the use of ICT than they are. This teacher-learner collaboration has emerged from the use of ICT and has culminated in promoting the teaching-learning process.

A grade six maths teacher at the independent school, indicated that he is comfortable with the collaborative assistance he obtains from his learners. He described his classroom ICT experience as one of mutual learning that enriches both himself and his learners.

> *Sometimes when I am stuck, they [learners] are the ones to help. I think it's exciting for them and they can enjoy maths so I don't see it as a barrier…I can relate to that. Whenever I get stuck, all I hear is, 'Sir! Click on the control panel ...'' and then I am sorted. They empower me and I empower them... itbecomes a good relationship.*
> *P 6: School C - Teacher 2.txt - 6:29 (416:418)*

From the excerpt above it seems as though teachers are comfortable with enlisting ICT technical help from learners. The narratives of both the teacher and principal at the independent school seemed to represent the voices of all teachers in this study. In

the first excerpt below, the deputy principal expressed his collaborative learning experiences with learners in his class.

> *It has opened up a situation whereby you can ask 'who knows how to do this?' and take the opportunity to learn. I have also had to enlist the help of my learners whenever I got stuck using the computer.*
> *P 9: School C - Deputy Principal.txt - 9:41 (207:211)*

4.3.5 Teachers as drivers of ICT implementation

"There's also the fear that it [ICT] might replace teaching, and I'm totally against that, I don't believe that it's ever going to happen. We still need the human factor wherever you go."

Inclusion Criteria	Teachers acknowledging their pivotal role as professionals; Past experience with policy; Teacher as a critical component of the didactic triad; ICT pedagogues; Teacher as an essential component of ICT-curriculum delivery; facilitators and mediators of learning; human and social actors; Blended learning.
Exclusion Criteria	Teachers as technocentric promoters; Teachers promoting online learning or virtual teaching and learning

Participant teachers from all schools in the data collection sample, both public and private schools appeared to be resolute that their roles as professionals will not be compromised nor diminished by the introduction of ICT into the school environment. In fact teachers apparently recognised their importance as professional drivers of ICT, bringing in the 'human element' in the teaching-learning environment. In his narration, this grade six language teacher at the independent school echoed the attitude of all teachers in this study.

> *You know, my problem with ICT, especially coming from that background, some teachers actually see it as something that it should actually take over teaching, it should replace teaching. There's also the fear that it might replace teaching, and I'm totally against that, I don't believe that it's ever going to happen. We still need the human factor wherever you go. I've being seeing that even in home schooling that they have the computer programs, it's not 100% successful because you still need the interaction. Er'm, I see it as something that's going to grow and it has to grow with the teacher wanting to be involved with it and not being forced to be involved with it.*
> *P5: School C – Teacher 1.txt*

Participant teachers reported that with the introduction of ICT into classrooms there seemed to be an enhanced need for teacher intervention and teacher presence. If ICT enriched classrooms are to cater for the personal needs of the diverse range of learners; slow, mediocre, gifted, orlearners with special educational needs, then human intervention to create didactically sound teaching-learning environments is a necessary. A grade six technology teacher at the township school expressed his thoughts on ICT enriched classrooms.

> *So that was a challenge to use it and remind myself that I'm still a teacher, I need to be aware of what's happening in the class. The slow learner and all that, so the human factor you need to blend it in with the tool[ICT], with the tool. But it has definitely enhanced the human aspect.*
> *P 1: School A - Teacher 1.txt - 1:70 (445:452)*

A participant teacher in a private school expressed his concern that student teachers do not seem to be ICT competent and suggested that new teachers entering the teaching profession could be leaders in driving ICT transformation in schools.

> *So that when a student [meaning newly qualified teachers] comes in they should actually be the drivers, and say we want this technology because we know how to use it, that we expect it. And if you have that expectation you will make it work.*
> *P 5: School C - Teacher 1.txt - 5:70 (586:591)*

4.3.6 Teachers' will to develop ICT competence and pedagogical skills

"I've trained myself", "as teachers there's many of us we want more"

Inclusion Criteria	Teacher's willingness to learn and improve; lifelong learners; personal commitment and interest; ICT skills and pedagogic knowledge.
Exclusion Criteria	Teachers improving for personal, monetary gain or promotion. Institutional capacity building; District and province capacity building.

All teachers in the data collection sample seemed to demonstrate a strong inclination to develop themselves so that they can use ICT more effectively in the classroom situation. Teachers appeared to take the initiative (and used their own available resources) to develop their ICT competence. Most teachers in this study, like the

maths teacher at theformer model C school used the internet resources to build personal and professional capacity.

> *I think in terms of ICT it's me. I think how I use it it's by my own discretion. I've trained myself also…I've looked and I got ideas from the internet as well how people are using ICT. And I come and apply it and I do it…(cont)There's nothing from the top [Government]… The PowerPoint thing I made it myself because I really didn't know how to do it…I love going on the internet and finding new things and so I started with that just going using it for worksheet purposes. And then I saw video clips and stuff like that you can use. I went to "teacher tube" and those things. So I saw there are things you can show in class.*
> *P 4: School B - Teacher 2.txt - 4:3 (24:29) ;(387:394)*

In some instances (the independent school and the inner city school), the principal and school governing body created opportunities for teacher development in subsidising training cost.

> *At the moment, nothing much because I haven't learnt something new in terms of learning a course but they are very open to new suggestions. In fact, they [principal and SGB] will sign the necessary forms and pay for you to get training if you request.*
> *P6: School C - Teacher 2.txt - 4:69 (637:641)*

However, in the case of the township school, teachers can improve their ICT competence, provided they do it at their own cost, or wait for the district office to react to the needs of teachers in the school improvement plan. All teachers in this sample seemed to demonstrate a significant enthusiasm to up-skill themselves in ICT. This teacher at the township school has also taught himself through internet resources and collegial support.

> *Since I started using ICT has made me think to myself that I have missed a lot, really! If I knew what I know now- I'd be very far. ICT works wonders for me and I have also shared the knowledge that I gained with my colleagues…Yes, I am also learning more & more... I learn something new about computers each day. It doesn't stop; the learning curve is steep…Yes. It's a progressive learning process from one stage to another stage. I am half way climbing the mountain*
> *P 2: School A - Teacher 2.txt - 2:40 (313:323); (133:134)*

The mathematics teacher at the inner city school articulated her desire to improve her knowledge on ICT. She narrated her story of how she improved her own ICT skills and her need to develop her ICT pedagogical practice.

> *You know work on WORD, as teachers there's many of us we want more. We want to be trained on how to design our own website. One of the things I learned, either through my ICT, that I done in university, and myself on pod-casting and these things I taught myself…I think they underestimate what there is and what teachers can do already…Ja just give us more information about it even. Even if it's offering us how to operate ICTs like multimedia in your class and ideas. But I want even more information…*
> *P 4: School B - Teacher 2.txt - 4:69 (637:641), (649:661)*

A teacher at a well resourced independent school expressed his enthusiasm to develop sound pedagogical skills. He described his eagerness to learn and use ICT in his teaching practice as a natural impulse.

> *I have always been opened minded. It a natural evolution, come next year at a time like this and I'll have discovered something else new. It started in high school as teachers would encourage us to take computer classes to gain the skill. We were just learning how to type. I am very glad, it been a snow balling effect since then.*
> *P 6: School C - Teacher 2.txt - 6:30 (421:427)*

At the same school another teacher explained the interest teachers demonstrate to use ICT in their classroom practice once they are given an opportunity to experience this first hand.

> *What is interesting is if you look at the, our school setup, in our preschool we do not have a turnaround of teachers, minimum turnaround…and when they started using the technology they grab it. And they saw the benefits. I must say to see what they doing in Afrikaans on those interactive boards are wonderful. Math as well, I think it's more suited to mathematics because you can visually stimulate them and show them. And drill and practice is brilliant on them [interactive white boards], one of the lessons you'll see tomorrow is specifically geared towards maths and how they use it in the classroom.*
> *P 5: School C - Teacher 1.txt - 5:46 (374:392)*

4.3.7 ICT defining teachers as administrative agents

"I just thought I could do better because, in the past, I would write my notes and put them in a file and the things got lost. Now, using the computer…"

Inclusion Criteria	Includes teacher's using ICT for administrative practices such as: curriculum planning and design, preparation of work, recording and reporting of assessment, managing of learner databases, tracking learner assessment, communicating, and procurement of learning materials.
Exclusion Criteria	Teachers using ICT for teaching and learning, or using ICT for personal use. Institutional administrative practices.

Teachers appeared to gainfully use ICT to transform their administrative practices. All schools in this maximum variation sample indicate that the initial motivation to use ICT was to alleviate the administrative burden of teachers and the school. Most teachers began using ICT in their administrative tasks to reduce the need for paper based assessment record keeping. Teachers developed skills to use ICT for a range of administrative tasks such as curriculum planning, lesson preparation, record learner assessment marks, creating reports, recording and balancing attendance registers and communicating with parents.

The technology teacher at the township school narrated his transition from a paper-based lesson planning approach to an electronic system. He also explained how using ICT has simplified his filing system that allowed him to simply edit his lessons when he did his planning for teaching.

> *It was something that came into my mind. I just thought I could do better because, in the past, I would write my notes and put them in a file and the things got lost. Now, using the computer and memory stick... I chose to make my life easier. You can easily edit your lessons with ease*
> *P4: School B. Teacher 2.txt*

This mathematics teacher at theformer model C school described various administrative tasks she had to perform with the aid of ICT. Some of the administrative duties that are obligatory are primarily achieved through the use of ICT.

> *Like I said letters that I type to parents, e-mail communications. Obviously all the worksheets I type on the computer, photos I download from the internet, video clips and stuff. For administrative purposes in terms of what we doing inschool, your filing you do all your filing on the computer putting pictures and things for my interleaves. Then also I said the internet, I also do the Arcadian, the school's newspaper. That helps a lot I do it electronically. The school's physical document that we hand out, that I do also on the computer.*
> *P4: School B – Teacher 2.txt*

An experienced language teacher at the independent school narrated his experience in changing his administrative burden by resorting to ICT as a means to modify and reduce the excessive paperwork. The ICT solution also served to reduce time on task.

> *Absolutely.We er, er. When I started at Golden Thread our report [meaning learner progress report] was between 17 and 20 pages long. And it was a lot of work, compiling it, writing it because it was done by hand. So I eventually went to the principal and said 'this is not on'. So I developed an access database that we've been running our reports on now, instead of taking two weeks to do our reports we do our reports in two days.*
> *P5: School C: Teacher 1.txt*

A teacher from theformer model C school offered an account of how he accomplished his administrative tasks through the use of ICT. This teacher was particularly employed because of his ICT competence. He wasalso tasked with managing the official website of the school.

> *Yes we do the extra mural time table and I do my own marks, like you said yesterday I use the excel spreadsheet where it works out the OBE [Outcome Based Assessment] codes for the marks.*
> *P3:School B: Teacher .txt*

Teachers apparently also recognised the benefits of using ICT to reduce their paper based planning. The teacher at the township school explained how the use of ICT has facilitated and reduced his paper work.

> *Using paper work was being a burden; sitting there and piling up papers then my friend who is also a teacher showed up how to use a computer... how to do this and how to do that... even marks schedules.*
> *P 2: School A - Teacher 2.txt - 2:33 (234:236)*

The principal of the same school explained the purpose for which ICT is used by teachers in executing their administrative duties.

> *Well, mainly admin e.g. drawing up work schedules, learning programmes, lessons plans, management plans, assessments and recordings but I had mentioned earlier there are teachers using it in the classroom.*
> *P 7: School A - Principal.txt - 7:15 (122:128)*

4.3.8 ICT developing learners as researchers and independent knowledgeseekers

"It's a very powerful tool and we also teach children how to do research so that it's not just a matter of copying and pasting but utilising the information."

Inclusion Criteria	Constructivist approach to teaching and learning; Teachers as guides to knowledge creation; Teachers as initiators and mediators of learning;Altering traditional paradigms of the teacher providing wisdom; Supporting learners to find their own knowledge needs, search for and evaluate information for themselves.
Exclusion Criteria	Teachers as sole providers of knowledge. Teachers' perceptions as 'Sages';Learners as knowledge consumers.

The use of ICT in their classroom practice, suggestedthat teachers apparently accepted their role as facilitators of learning rather thanthe traditional perception of the teacher as an expert. In allowing learners to perform research using ICT, teachers may change their pedagogical positions from being the 'sage on the stage' and accept being the 'guide on the side.' Furthermore, teachers seemed to acknowledge that ICT offers research opportunities to learners, which leads learners to independent discovery and knowledge construction (See Figure 4.3, below). A science teacher from the township school explained,

> *The opportunities for the learners is- they can you use the computer to do research or they can use the knowledge they have gained to develop themselves even further. Everything is about development. From my point of view, they get a chance to improve their computer skills as well. The learners also give me freedom, I actually see that they use the internet and I can see their weakness and their strengths.*
> *P 2: School A - Teacher 2.txt - 2:10 (84:89*

The deputy principal at the independent school described the use of ICT by learners to conduct research and the introduction of a new subject in the curriculum that enhanced ethical research.

> *It's a very powerful tool and we also teach children how to do research so that it's not just a matter of copying and pasting but utilising the information for their projects. In fact, we have introduced a subject in our curriculum called information skills which teaches them how extract data and avoid plagiarism.*
> *P 9: School C - Deputy Principal.txt - 9:6 (52:56)*

Figure 4.3: **Developing learners as researchers and independent knowledge seekers**
In this lesson, learners had to do research based on their hospital experiences, create online surveys and present their findings using spread sheets and presentation software.

4.4 How does teachers' practice influence learning?

This theme describes the experiences of teachers in relation to their implementation of the school e-education policy. In this theme the focus is on teachers' experiences in relation to how ICT improved learning. Once again various sub categories emerged on how teachers report on the effect that ICT has on learners and learning. The various sub categories range from catering for multiple learning styles, improving learner

participation, integrative and interdisciplinary learning, improved curriculum delivery using ICT and enhancing ICT literacy skills.

4.4.1 ICT catering for multiple learning styles

"But I think that is the challenge to get to the slow learner. And another challenge is to use the tool [ICT] to stimulate the fast learner. And I think in education in broad, those two gaps we fail as teachers"

Inclusion Criteria	Teaching to individual learner needs characterised by their particular learning styles such as visual learners, kinaesthetic learners and auditory learners. I also included slow, gifted and special educational needs learners. Diversity in learning styles.
Exclusion Criteria	Ignoring individual difference between learners. Teachers acknowledging all learners as equal in learning ability.

According to the views expressed by the participant teachers, traditional classroom practice sans ICT had not adequately addressed the needs of learners with learning difficulties. Neither had it catered for advanced or gifted learners. All participant teachers emphasized that an ICT enriched classroom could favourably benefit learners with learning difficulties. Teachers in this sample uniformly reported that ICT offers teachers an opportunity to cater for a spectrum of visually, aurally and kinaesthetically challenged learners. Participant teachers also recognised the pedagogical potential that ICT has for learners with visually or auditory challenges. A technology teacher at thetownship school described how ICT could be used as a tool to cater for learners of differing learning styles.

> *But I think that is the challenge to get to the slow learner. And another challenge is to use the tool to stimulate the fast learner. And I think in education in broad, those two gaps we fail as teachers. There is still a lot of development in us as educators to enter those areas of two extremes. We cater for the average. And the sad thing with OBE the educator does not see the approach of OBE is so broad. Every learner can learn, that is the principle of outcomes based [education]. And we don't see how we can use a variety of tools like ICT as one, to make that learner to understand that he can learn. That he can learn and grow.*
> *P 1: School A - Teacher 1.txt - 1:89 (541:548)*

The same teacher of the township school mentioned that the use of ICT in his teaching repertoire could cater for learners in terms of Gardner's "multiple intelligences" (Gardner, 1995). The use of ICT in the classroom practice of teachers suggests that teachers were also able to appeal to various sensory experiences of learners. Teachers were able to teach using ICT by capturing the attention of a diverse group of learners as delineated by Gardner's 'multiple intelligences theory'. The technology teacher at the township school explained how ICT caters for different learning styles.

> *For example, with children that are more audio orientated, they have the opportunity to play things over and over. The children that are body-kinaesthetically they can play music and form their own triangles with their bodies, so you can incorporate different learning styles. Children that are Rembrandts you can make them draw, come and do their own art and things.*
> *P 1: School A - Teacher 1.txt - 1:84 (522:523)*

A grade six former model C teacher put forward the notion that the use of ICT in her classroom has facilitated the manner in which she conducts her lessons. She now has the means to revisit her lesson presentation in the event that a learner needs additional support, or as a means for revising her lesson.

> *Well For me…When you use ICT. Something like ICT in math the opportunities there for learning is you have your fast worker that em..you know..got the opportunity to go..if you have like a PowerPoint presentation like my fraction presentation is the child can either do it by himself or as an introduction in class. So the fast workers can go and work on their own…For the slow learners you can you can say Ok lets go back to that slide so when you are busy talking in class and busy explaining the worksheet like this [clicks her fingers rapidly], and he says madam I don't understand that concept. Now he says wait I don't understand that slide…go back to that slide. So there's a learning opportunity …You can go back and actually say "there it is".*
> *P 4: School B - Teacher 2.txt - 4:6 (37:46)*

A teacher at the township school reported on his experiences of using ICT in his teaching practice. He comparedlearners' reactions to his current ICT teaching method as compared to his previous 'textbook' approach. He suggested that ICT is the medium of instruction that facilitates learning.

> *Yes, I think so. Making use of ICT, I have noticed that learners tend to learn more. They tend to learn very quickly. The reason why I am saying that is it because it's a different environment. It's a different way of doing things. They were used to textbooks and writing down notes but looking at a computer helps them to visualise the information. They see more colour, they see more shapes. It actually helps them to remember more. They are also very eager to learn more at least that is what I have observed. I hope I am not talking too much.*
> *P 2: School A - Teacher 2.txt - 2:9 (70:77)*

The voices of teachers at two different schools, theformer model C and the independent school, seemed to be in agreement about the manner in which ICT caters for different learning styles. In the two excerpts that follow, teachers explicated how ICT fosters learning. They also supported the above teacher's notion that it is a different learning experience from the traditional "chalk and talk" approach (See Figure 4.4, below).

> *It [ICT] makes it more interesting..It makes it different it's not just the teacher writing on the chalkboard…telling them this and this and these...they write the questions in their books and answer them. Its something they can see it they can hear it…they experience it differently...they excited when they come to the lesson. They do it totally different from the way they do it in the class… and yet they learning without realizing it…they playing games and they don't realize that they learning.*
> *School B – Teacher 2.txt*

> *I think it makes it more interesting for the learners. It is definitely they enjoy it more and they learn better and faster. Because they not just reading now and listening they seeing as well and they experiencing… They taking the one and putting it with another apple and there's two apples there and they…they live it. You know it makes it much better.*
> *School C – Teacher .txt*

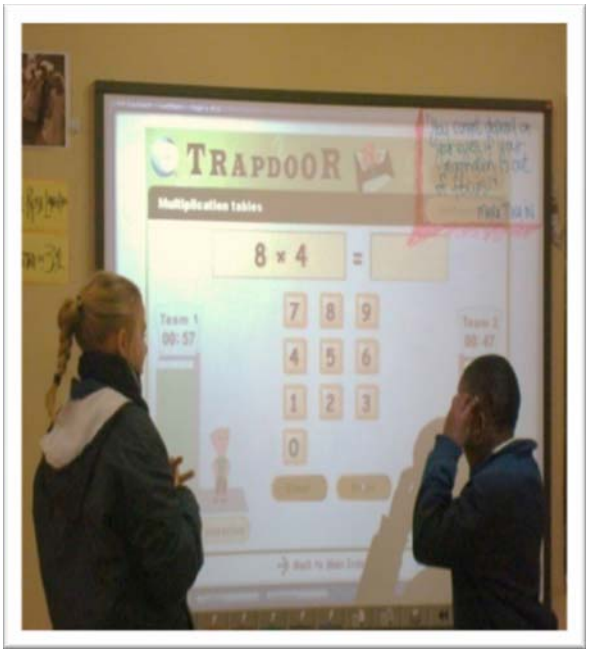


Figure 4.4: **ICT catering for multiple learning styles**
In this lesson, the teacher uses various strategies to challenge each learner's learning style. While some learners are engaged with the interactive smartboard, other learners are engrossed in the physical manipulation of 3-D objects.

4.4.2 ICT improvinglearnerattitudes

"There are certain classes in the school where the children will run to get to that class. Because the moment they walk in there, it's a new world. It's a new world."

Inclusion Criteria	Improved learner attitudes;learner enthusiasm;learner motivation to learn; enhanced teacher-learner communication and report; improved learner attendance and discipline; Learners as active participants
Exclusion Criteria	Learners as passive participants/recipients of knowledge. Teacher's motivating learners without ICT intervention.

All teachers in this sample indicated that the use of ICT in their teaching practice culminated in significant improvement in the participation level of learners. A grade five teacher at the inner city school reported that the use of ICT in her classroom improved her relationship with learners. She also suggested that the use of familiar ICT language improved her communication with learners. She tried to engage with her learners through the use of ICT as a common area of interest, yet maintained learner discipline and respect.

> *I think you connect more with the children on a level, different level. I mean when I explain the project to them and I speak about ipods and mp3's you can see they are on a different level in connecting to you. You don't talk about stuff that they are not interested in. And having this project with them in the afternoons I get to know them better and on a different level as well. They more comfortable, and they also share their ideas with me, I learn a lot from them.*
> *P 4: School B - Teacher 2.txt - 4:85 (747:753)*

An innovative mathematics teacher at the independent school reflected on how ICT seemed to elicit enhanced learner enthusiasm in certain areas of mathematics that would appear to be uninteresting under traditional teaching methods. He related his experience of how ICT has contributed to the motivation of a learning disabled learner.

> *Yes, they wanted to do it. What are we doing? Numbers and tables the most boring thing in maths. The building blocks in mathematics so we have to do it and knowit by heart. That Indian boy, for example, who was born weeks prematurely and suffers from various ailments. He's very behind and when we look at his marks on black andwhite, on a book and pen...disastrous! But bring him up on the board [electronic white board], he's so different. You can't even recognise him.*
> *P 6: School C - Teacher 2.txt - 6:8 (156:162)*

Within this sample of participants, principals and teachers seemedimpressed by the change in the attitude of learners to learn. Teachers in this study attributed this experience to various stimuli created by the use of ICT in their classrooms, particularly auditory and visual. A teacher at the township school explained how the use of appropriate technology enhances learner participation.

> *Another girl brought a CD last year so. Mandela's voice there's one clip, on Encarta, the sound they know that voice, it's nice it really stimulates them, really stimulates them.*
> *P 1: School A - Teacher 1.txt - 1:53 (336:338)*

4.4.3 ICT promoting integrative and interdisciplinary learning

"Based on the excursion and that is how I bring in the working of the engines and then I show them that slide show, and it has sound and they understand motion, pressure and compression and all that"

Inclusion Criteria	Cross curricular integration and interdisciplinary learning. Curriculum integrated learning areas and learning. Learning to OBE principles.
Exclusion Criteria	Learning restricted to subject specific criteria. Learning viewed as isolated pockets of knowledge defined exclusively by the subject. Teachers as collaborative learners.

The integration of ICT in the curriculum apparently created opportunities for interdisciplinary learning. In the narrative of a teacher from the township school, he explained the integration of ICT into the teaching of the social science. He also described how ICT is used to integrate other learning areas, in this case Geography and History. Furthermore, he indicated that he used ICT to expose learners to the disciplines of music and indigenous language.

> *With regard to social science I did the rivers, I did themaps, er, er. Even History is nice, History yes, even the Koi-Koi, music and sounds you can use. The language, I played that for the children.*
> *P 1: School A - Teacher 1.txt - 1:52 (332:334)*

A technology teacher at the township school narrated how his technology lesson that integrated ICT was extended to include an out of classroom real-life experience of

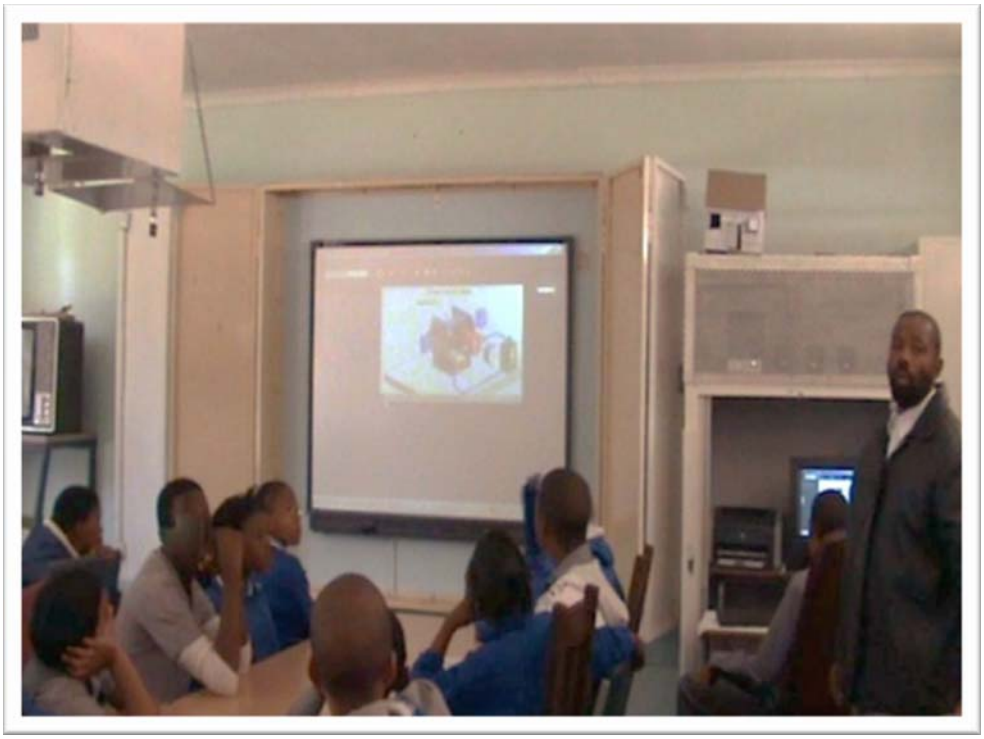
anexcursion[29] to a motor manufacturing plant (see Figure 4.5; Appendix D2, School A).

> *I give them a questionnaire on that, the test is also based on the excursion and that is how I bring in the working of the engines and then I show them that slide show, and it has sound and they understand motion, pressure and compression and all that. So that was good.*
> *P 1: School A - Teacher 1.txt - 1:32 (227:230)*

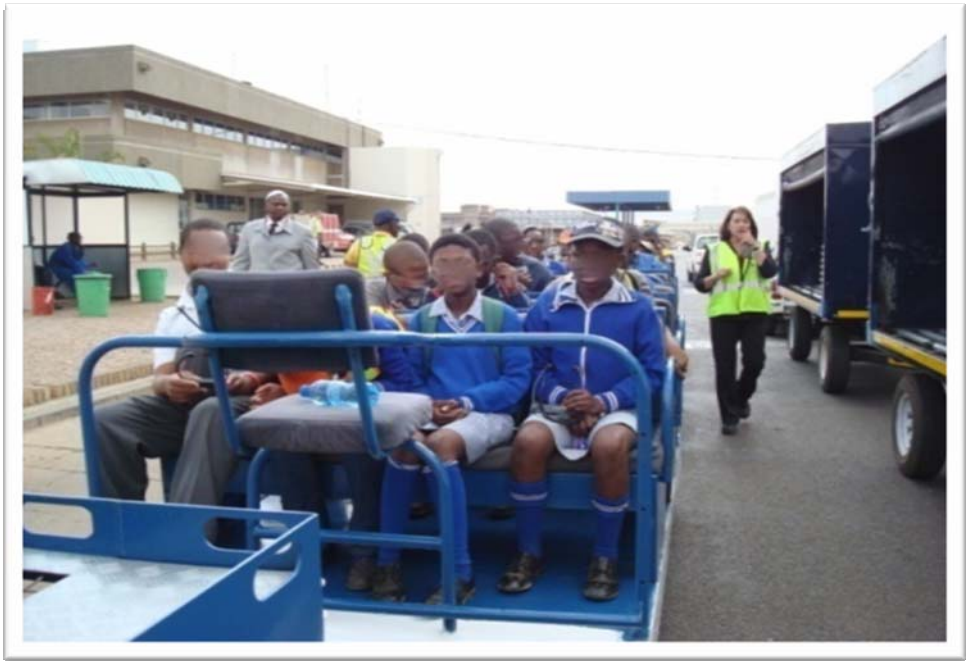
A maths teacher at the inner city school described how an ICT problem based project[30] incorporated the various curriculum learning areas of Language, Economic and Management Science and Social Science (See Appendix D7, School B,Apple project).

> *Ja, This is now in EMS… I linked to this "Apple Mac" project with what I am currently busy with in EMS. So I had to go and design something for the rest of the children, because it's only ten kids that are taking part. I had to make it in such a way that it relates…links, now our kids don't have access to Apple and all those software, so I instead we'll do a PowerPoint, so the kids will have to hand in a PowerPoint and about the 'Development in South Africa', but they will use it like a documentary, make a documentary. Images, their opinions their views, also like the Apple thing so that it aligns.So they will do their, still their PowerPoint, for their marks to submit for their assessment. Then this is something extra they are going top make like a little movie as well.*
> *P 4: School B - Teacher 2.txt - 4:56 (497:509)*

[29] See CD – School A, Video_Lesson 2.mpg; Video_Excursion.mpg
[30] See CD – School B, Video_Project.mpg



Picture 1



Picture 2

Figure 4.5:ICT promoting integrative and interdisciplinary learning

In picture 1 (above), ICT is used to simulate the workings of the motor. In picture 2 (above), learners are on excursion to a motor manufacturing plant, to integrate classroom learning with real life experiences.

4.4.4 Learning about ICT and learning with ICT

"At the moment we still do computer literacy, and then we use [ICT] for teaching"

Inclusion Criteria	ICT as a distinct but informal learning area (learning about ICT); ICT as an instructional and cognitive tool to deliver the curriculum more effectively (learning with ICT).
Exclusion Criteria	Learning without ICT.

All school principals and teachers in this study identified the need to develop the basic ICT literacy skills of learners and teachers, as a crucial baselinefor the successful delivery of an ICT integrated curriculum. School principals structured the curriculum to cater for a dual purpose in the use of ICT. Teachers realised that an ICT literate learner potentially facilitates curriculum delivery and theintegration of ICT into the teaching and learning environment of the school. On the other hand, schools and teachers realised the need to develop the ICT literacy skills of learners for future employment. This dual focus had allowed teachers to integrate[31] ICT into their teaching practice almost seamlesslypending learners'possession of the necessary ICT skills (see Appendix D, D1-D7). In all schools in this sample learners attended scheduled ICT literacy classes as an independent skills development learning area.

In the independent school, learners were formally taught computer literacy at the primary school stage and from grade seven onwards they were expected to complete specific modules of the International Computer Drivers Licence (ICDL) programme (See Appendix E8, Document analysis – ICT literacy standards). Teachers were also encouraged to complete the ICDL course as a subsidised school programme.

> *Oh absolutely. One of our goals is to get all the teachers ICDL standard, the four core modules proficient, because as soon as you do that, it makes it easier for them to do their policies, to do their exam papers. I'm at the point where I am trying to get a teacher not to do cutting and pasting a paper, because some of them still physically cut a page before they go and copy it. So yes, I do believe it has value. Again it's also for their own self esteem. And ja, a lot of them are using it in their own private capacity because they wouldn't have done it before.*
> *P 5: School C - Teacher 1.txt - 5:51 (421:427)*

[31] See CD, School C, Lesson_1.mpg

At both public schools in this study, computer literacy is taught from foundation phase to grade seven(See Appendix E8, School A and School B) ICT literacy standards).Teachers found this dual approach to be imperative to the successful delivery of the curriculum using ICT, since they did not have to teach ICT skills in the delivery of their lessons. The principal of theinner city schools explained how ICT is employed at his school.

> *At the moment we still do computer literacy, and then we use for teaching, weteach mostly English and math…The 'now' generation is computer literate so we move that slightly to the back and we use more e-learning at the moment.*
> *P7:School B – Principal.txt*

A teacher at the inner city school that was tasked with supporting teachers to integrate ICT into the curriculum reported on the way he interacted with other teachers. Using a curriculum content management system he advised teachers on how to use the software based content to integrate ICT the curriculum.

> *They don't normally, they come to me and say we doing this, this…and I see how we can fit it in with doing word or doing a PowerPoint presentation or how can we do an excel spreadsheet on the work that they doing and where will it fit in. So we their things and then I'll say we doing excel now, religion won't work here come back in thefourth term...can you do that work with them in the forth term...or is there something in the forth term that…so we try to incorporate their work into our.*
> *P 3: School B - Teacher 1.txt - 3:23 (232:238)*

4.5 Summary: Main results

The teachers' initiative to use ICT occurred in an environment that was devoid ofthe national e-education policy and absent of any support from the district and provincial systemic structures.The National Curriculum Statement appearedto be stringently pursued by school principals and teachers, while the national e-education policy was absent as a policy to teachers and principals. Teachers in this study indicated their need for greater policy intervention as well as curriculum and pedagogic support as they tried to make sense of how to integrate ICT into their daily teaching practice. The

narratives of teachers in this sample seem to suggest that they are adept at changing their situational conditions to incorporate ICT in their teaching and learning practice.

It is also evident from teachers and principals in this study that the systemic structures (district and province) were not perceived by schools as sources of policy support. Schools sought affiliations with other schools and private sector companies to make sense of the way ICT was to be integrated into the teaching-learning environment. Most school principals indicated that schools appear to be left to their own devices in determining how best to integrate ICT into their institutional practice of teaching and learning. Teachers formed collaborations with other teachers and other schools as a human capital resource for support, knowledge sharing and skills development. Teachers also desireddistrict teacher clusters, not merely as a means for formal meetings, but as a forum to share pedagogic methods and develop their ICT competence. In this regard, schools expected greater involvement from the district office to act as a focal point for linking schools, sharing resources (human and physical) and developing ICT based curriculum content.

4.6 Literature reflection

4.6.1 Introduction

The e-education policy mandate to schools was to develop learners and teachers in the use of ICT (Blignaut & Howie, 2009). The policy is also explicit in its attempt to enhance teaching and learning through curriculum delivery. This study produced findings that are pertinent to such policy implementation outcomes. I attempt to lodge the results of my findings against the literature in the field, with a particular focus to define supporting evidence for existing knowledge on ICT policy in education. I also ground new insights that emerged from the current study against the backdrop of existing knowledge.

A review of the voluminous literature in this field of study revealed how teachers translate national ICT policy intent into classroom practice. In stark contrast,the current study revealed that South African teachers were ignorant of the national e-education policy and had developed their own school based ICT policy that mandated

their classroom practice. Thus for the purpose of this literature control, supportive evidence from the current study emanates from teachers' experiences of their school based ICT policy, while existing knowledge in the field is based on national policy directives.

4.6.2 Echoing existing knowledge on ICT policy in transformingteaching and learning

4.6.2.1 ICT policy transforming teaching

The role of ICT policy in transforming teaching will be discussed under the headings teachers' interpretation of policy; teachers' beliefs and attitudes;emerging pedagogies; teachers as innovators; teachers as collaborative learners;and teachers as drivers of ICT in classroom practice.

Interpretation and implementation of ICT policy

Interpretation and implementation of ICT policyin education was a specific area of interest in the current study. A review of the international literature reveals thatteachers are viewed as implementers of policy(Croll et al., 1994). Findings in the literature (Lasky, 2005; Clune, 1990) particularly in developed and developing countries suggests that teachers tend to be 'readerly' in their mediatory approach to policy implementation. In this regard teachers are thus viewed as conduits for policy implementation by interpreting policy as it was intended. The 'readerly' stance of teachers in developed and developing countries may be attributed to systemic policy that is well articulated at various system hierarchical levels. Findings from the current study are consistent with those of the literature, in that all teachers also applied a 'readerly' stance but only in response to the national curriculum policy. However, one principal exhibited a 'writerly' position. Proudford (1998) argues that a 'readerly' approach to policy text is unlikely to succeed because teacher's prior understandings, experiences, codes, beliefs and knowledge mediate what they make of it.

Teachers' beliefs and attitudes

Teachers' beliefs and attitudes about the role of ICT and education in general are critical to policy mediation (Cuban, 2001). Significant research supports the notion that teachers' beliefs and attitudes towards the use of ICT are crucial to the successful integration of ICT into schools (Stevenson, 2004; Spillane, 2000; McLaughlin, 1987; Fullan, 1996a). These studies also suggest that teachers' knowledge and belief systems act as a filter through which teachers view and interpret their teaching practices. In the current study participant teacher' beliefs, attitudes and professional disposition were central to their appropriation of school policy on the use of ICT in teaching practice. This finding concurs with that of Stevenson (2004) in the United Kingdom with regard to the teachers' attitudes, beliefs and practices relating ICT use in their classrooms. According to McLaughlin (1987), implementation of policy involves a process of sense making. This sense making is associated with the implementer's 'knowledge base, prior understanding and beliefs about the best course of action'.Galloway (2010) claimsthat teachers' beliefs guide their teaching, and thus they do not use ICT in their classrooms for self-gratification but rather for enhancing teaching and learning.

Teachers' emerging pedagogies

Findings in the current study reflecting teachers' emerging pedagogieswere consistent with literature. Research on classroom practices of teachers (Sandholtz, Ringstaff, & Dwyer, 1997; Schofield & Davidson, 2002; Means & Olsen, 1997; Means, Penuel, & Padilla, 2001) found that some teachers had changed their pedagogy because of using ICT. In this study most teachers also experienced a change in their teaching styles because of ICT use. Teachers in this study acknowledge that ICT brought forth new challenges that demanded a change in their teaching pedagogy. One teacher in this study however, (a negative instance in analysis) suggested that his pedagogy did not change, he explained this by stating that the principles of teaching remained the same. This finding is consistent with the literature (Swaminathan & Yelland, 2003; Zhong & Shen, 2002) which indicates that teachers may use ICT with traditional methods of the past.The findings from the current study support the idea that teachers' pedagogy had changed from the teaching methods they employed prior to teaching with ICT.

Teachers as innovators and trendsetters

Teachers in the current study acted as innovators and trendsetters in the use of ICT in their classroom practice. Participant teachers in this study acted as change agents or 'voortrekkers'[32] by experimenting with the use of ICT in their teaching repertoire. Cuban (2001) poses a range of constraints under which teachers work and notes that the essence of teachers as innovators is their ability to take risk in the adoption of ICT in their classrooms.Galloway (2010, p. 4) identifiesvarious pedagogical methods that is associated with using new approaches to the use of ICT and distinguishes these methods from the previous methods of teaching. Similarly, teachers in this study were engaged in new innovative practices that challenged their previous teaching methods.Rogers' (1995) defines innovators as teachersthat are early adopters of ICT, tend to have higher aspirations, have greater empathy, display a better ability to cope with uncertainty and risk, and have a more favourable attitude towards change. Teachers in the current study are consistent with Rogers' (1995) definition as it aptly described teachers in this study as innovators and change agents.Watson and Tinsley (1995) and Watson (2001) found that ICT use as innovationremained with a minority of teachers and was only apparent in practices of teachers who could relate the use of ICT to their pedagogical method for their own subject. Within the context ofthe current study, it was evident that not all teachers in the schools were using ICT. The innovators were a few teachers who were at the heart of determining the success or failure of the e-education policy.

Teachers as collaborative learners

In the current study ICT was the catalyst that fostered teachers as collaborative learners. Numerous types of affiliations were also evident in the literature. According to Schrimshaw's (2004, p. 21) findings teachers acknowledged ICT as an area of constant change and teachers adopted an attitude of 'in it together' and that no one teacher is better than the other. The consequence of this view is that teachers exercised a willingness to learn from each other and to support each other (Smeets, 2005; Scrimshaw, 2004). The findings in the literature concur with the current study, in which teachers shared knowledge, experiences, resources and pedagogical ideas through their own desire to do so. Teachers seemed to develop themselves through interaction with enthusiastic and committed colleagues (Andrew, 1999). Peer support

[32] Voortrekkers – an Afrikaans term for pioneers

and collaboration were also found to be one of the strongest influences on the success of ICT training as just-in-time collaborative learning that occurred allowed for the transference of learned skills to classroom practice (Galanouli et al., 2004). In the current study collaborative learning took place within the context of teachers' immediate curiosity and need-to-know approach to constructing ICT curriculum-integration knowledge. Krumsvik's (2006) findings were concurrent with the current study in that teachers within a school through collaboration efforts created space for staff cohesion and new recruited teachers were able to adopt the school's educational ethos.

Teachers as drivers of ICT

Teachers in the current study were steadfast in their belief that ICT implementation in classrooms required "human" intervention and teachers are the responsible drivers of ICT in classrooms. Studies conducted by Zepp (2005) are similar to my findings in that teachers focussed on their concerns about the importance of human qualities such as 'human touch', 'motivation and care' in an ICT teaching-learning environment.The current study also found that teachers understand that their professional position in the classroom will not be compromised because of ICT.In this regard, research that suggestedthat teachers were techno-phobic, unwilling to venture into the use of ICT in their teaching practice or simply distance themselves from using ICT, did not concur with teachers' experiences in this study.

In foregrounding the current study against the body of literature a number of findings have emerged, which areconsistent with the literature. Evidently, ICT policy transformed the teaching practice of teachers in this study in many significant ways. First, teachers were 'readerly' in their interpretation of the National Curriculum policy, demonstrating practices prescribed in the policy. Second, teachers' beliefs, attitudes and professionalismtowards ICT were crucial drivers in policy implementation. Third, teachers (in the main) modified or changed their teaching methods from a traditional approach to one that encompasses ICT as a teaching-learning tool. Fourth, teachers engaged in experimentation with ICT in their classroom practice, acting as early adopters of ICT and innovative leaders. Fifth, the use of ICT in their classroom practice enhanced collaboration between teachers within

the school context. Sixth, teachers were resolute in their belief that the innovation demanded their presence as human professionals to guide teaching and learning.

4.6.2.2 ICT policy transforming learning

I noted various aspects of ICT policy transforming learning. I discuss each of the following categories that emerged from the study in relation to the existing body of knowledge:ICT catered for multiple learning styles, ICT enhanced learnerparticipation and motivation, ICT promoted integrative and interdisciplinary learning, and learners were engaged in developing ICT skills as well as using ICT for curriculum learning.

ICT catering for multiple learning styles

Teachers in this study acknowledged the use of ICT to cater for multiple learning styles. Teachers clearly emphasized the benefits of ICT to support learners across the spectrum, from learners with special education needs to gifted learners. Individual learning styles differ from person to person, and these individual differences become even more apparent in the classroom teaching-learning situation. Thus, a real challenge in using ICT for learning, is keeping the learners it is designed for in mind (Canavan, 2004). Although participant teachers in this study are convinced that ICT will promote delivery of the curriculum to the individual needs of their learners, their main concern seemed to be that of learners with special educational needs. Smeets and Mooij (2001) and Prain and Hand (2003) argue that ICT may serve as a tool for curriculum differentiation, providing opportunities to teachers for adapting the learning content and task according to the needs and capabilities of each individual learner. Teachers in this study also acknowledged that ICT allows for a shift towards learner-centred learning environments (Department of Education, 2004; Smeets, 2005). This conclusion is consistent with observations made by Pisapia (1994a;1994b). Galanouli (2004, p. 66), suggest that teachers must recognise the different ‘learning styles’ of their learners, and in so doing, understand and challenge their attitudes to ICT.

ICT improving learnerattitudes

Gaining and maintaining attention of learners was key to promoting improved learner participation and in this regard ICT use in classrooms can enhance the quality of education by increasing learner motivation. 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 (Harrison et al., 2002). Many studies(Jonassen, 2000; Webb, 2005; Reynolds, Trehane & Tripp, 2003) suggest that the use of ICT in education improveslearner motivation to learn. The findings in this study were consistent with the literature in that all teachers and principals had no doubt about motivational factor that ICT brings to the teaching-learning situation.

ICT promoted integrative and interdisciplinary learning

Teachers in this study found that ICT promoted integrative and interdisciplinary learning. Teachers also realised that using ICT provides opportunities for access to an abundance of real-life resources for teaching and learning. Similarly, researchers (Bransford, Brown & Cocking, 2004; Roschelle, Pea, Hoadley, Gordin& Means, 2000) suggest that ICT can bring exciting curricula based on real-world issues into the classroom. ICT can also provide scaffolds and tools to enhance learning.

Learning about ICT and learning with ICT

Most schools in this study followed a dual approach in learning about ICT and learning with ICT. First, all schools in this study were teaching ICT as a standalone informal learning area (not a National Curriculum subject) to develop learner's ICT skills. Secondly teachers in schools were also using ICT to teach their specific learning areas of the National Curriculum.Some research (Chalkley & Nicholas, 1997; Richardson, 1997; Smeets & Mooij, 2001; Williams, Coles, Wilson, Richardson & Tuson, 2000) showed that the focus in most schools was on traditional, skills-based ICT use. Loveless (2003) also found that teachers insisted that ICT skills be taught as a prerequisite skill for curriculum integration. The findings in the literature (Reynolds, Trehane & Tripp, 2003; Watson, 2001) were similar to the current study, which indicated that there was a need for a dual purpose for ICT in all schools.

In immersing my findings in existing literature in the field, it was apparent that the similar learning experiences were unfolding with regard to the use of ICT in schools. These learning experiences reflect the classroom practices of teachers as they implement policy.

4.6.2.3 New insights

In foregrounding the findings of the current study against existing knowledge in the field, several pertinent findings emerged that were unique to this study. New insights on the role of ICT policy in transforming teaching and learning are discussed in this section under the following topics: teachers as formulators of policy; teachers changed beliefs; teachers changed pedagogy; teachers innovative practices; teacherscollaborative practices; negotiating learning through ICT; teachers will to learn and develop; improved learner-teacher relationships; motivation to learn;and ICT promoting integrative learning.

Teachers as formulators of policy

Teachers in the current study demonstrated their ability to transcend the notion of being conduits of policy. Schmidt (2000) suggests that with little in the way of training or informed dialogue, teachers may experience frustration.Accordingly Schmidt (2000, p. 831) claims that "when individuals are left to interpret new situations independently confusion can result". Schmidt and Datnow (2005) found that when teachers became frustrated and were uncertain about how the reform fits into the school they withdrew from the implementation of policy. Significantly different, althoughteachers and principals in the current studyhad limited (or no understanding) of the tenets of national e-education policy,they moved beyond uncertainly and developed ICT policy for their school,using their own interpretations of what was necessary for teaching and learning within their context.

Teachers' changed beliefs

Teacher beliefs and attitudes about the role of ICT also played out differently as compared to the literature. In the current study two teachers and a principal seemed to have changed their attitudes to teaching and learning with ICT after their work

experiences in the corporate world. Fullan (1988) indicates that teachers' beliefs sometimes follow from their actions. This was also evident from findings in the current study in which aprincipal and two teachers had some prior corporate ICT experience. Their corporate practice seemingly acted as a catalyst for their belief system and propelled their use of ICT in teaching and learning. These beliefs led them to be more enlightened about the vocational (Hawkridge, 1990) value of ICT to their learners. Schmidt and Datnow (2005) found in their study that teachers are positively biased towards policy interpretations that fit their prior beliefs and values. Furthermore, they found that teachers and principals tend to be reactive and affiliate to policy ideals if policy is convincing. In the current study teachers were apparently not aware of the details of the e-educationpolicy document, and principals were ignorant of the e-education policy. Significantly different to existing knowledge in the literature, teachers in this study were not reacting to national policy regarding ICT in education. Guided by their beliefs, attitudes and professional instinct were driving ICT implementation in their schools.

Teachers' changed pedagogy

According to Kozma (2003a; 2003b) teachers change their pedagogy within the context of school improvement or reform. In contrast, teachers in the current study were changing their pedagogical practice through their own desire to improve teaching and learning coupled with a positive institutional culture and principal support. Thus, teachers in the current study were not responding to policy mandates to change their pedagogy as indicated in the literature (Pelgrum & Anderson, 1999; Kozma, 2003b). Furthermore, the experiences of teachers in the current study suggest that they changed their pedagogy mainly for the purpose of learner improvement.

Teachers' innovative practices

Teachers' innovative classroom practices in this study were found to be different from the literature. Law et al. (2001) found that teachers' use of ICT depended on its usability and perceived usefulness. However, in the current study teachers seemed to be convinced that ICT had value for teaching and learning and they were willing to venture and experiment with the technology.Demetriades et al. (2003) found that teachers ignored innovative practices in order to meet school curriculum delivery

targets. These findings differfrom those of the current studywhere teachers pursued innovative and challenging pedagogic practices in their curriculum delivery despite curriculum demands, and without compromising curriculum policy outcomes.

Teachers' collaborative practices

Collaborative practices emerged as a construct that was pivotal to the experiences of teachers in this study. It was evident that teachers relied on other teachers for ICT skills and curriculum support. Fox and Henri (2005) found in their study that Hong Kong teachers bonded only within subject specific areas or between teachers with similar responsibilities. Furthermore this study found no evidence of a culture of sharing. Kozma (2003a) and Mumtaz (2000) also suggest that teachers' collaborative experiences were within the confines of school boundaries. In the current studyvarious collaboration practices were established including teacher-teacher collaboration within school and across disciplines, teacher-teacher collaborations beyond the boundary of the school, and school-school collaborations (see chapter 5) were actively pursued by teachers as a source of mutual support. This collaborative experience promoted a culture of sharing across teaching disciplines, schools and districts. Furthermore teachers and schools formed collaborative support networks between schools that were socio-culturally and socio-economically diverse. In this way schools seemed to foster their socio-cultural responsibilities to poorer schools.

Negotiating learning through ICT

With the advent of ICT in classrooms, research suggests that teachers tend to experience a sense of concern that ICT in education would culminate in their jobs becoming redundant in the teaching learning situation (Cuban, 2001). In contrast, Fullan (1996b) and Pedretti et al. (1999) support the notion that ICT as a teaching tool has created a demand for good teachers, and teachers in technology driven classrooms are now more important in the teaching learning situation. Evidence from the current study indicate that teachers have positive attitudes and beliefs about the learning possibilities that ICT brings to their classrooms. Teachers were convinced that ICT had entrenched their professional roles more than ever before. Furthermore most of the critical roles of the teacher, (for example pastoral role of teacher, teacher as a life-long learner, teacher as researcher etc.) as delineated by the norms and standards

policy document (Department of Education, 1998) became more significant and relevant, now that teachers were using ICT in their teaching and learning practice. Teachers in this study acknowledged the significant role they play in ICT-curriculum mediated environments, noting the 'human element' as vital in the classroom context. According to Zepp (2005) 'humanistic qualities' refer to those qualities that serve learners' personal needs such as motivation, humour, interaction, explaining and answering questions.

Teachers' will to learn and develop

Policy success is critically dependent on the will and local capacity of teachers as implementers of policy (McLaughlin, 1987; Sutton & Levinson, 2001). McLaughlin (2005) indicates teachers' will, attitude, motivation, and beliefs are central to teacher's response to policy's goals or strategies, and these characteristics of teachers are less influenced by policy intervention. Furthermore McLaughlin (2005) argues that local capacity can be addressed by policy initiatives for teacher training, allocation of financial resources and engaging consultants to provide absent expertise. Evident from the current study is that teachers displayed the will, positive attitudes and determination to try the innovation in integrating ICT into their practice.

A lack of time to learn to work and experiment with technology, to rethink learning and teaching and develop personalized methods and planning are challenges frequently reported in research (Butler & Sellborn, 2002; Earle, 2002; Harasim et al., 1997; Jackson et al., 1999; Pelgrum, 2001). With these and other challenges, Cuban (1986) suggests that we should not expect many teachers to make this effort to change to using ICT in their classrooms. Preston et al. (2000) and Cox et al. (1999) also found teachers in their study were not willing to take the initiative to improve their pedagogy and develop new skills. The teachers in the current study faced the same challenges as those teachers mentioned in the literature (Becker, 2000). However, teachers in the current study were eager to develop their ICT knowledge as well as skills and pedagogic know-how and to apply it within the classroom context.

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Improved learner-teacher relationship

Learners may lack the motivation to learn if ICT as tool is not integrated into the curriculum, and is used by learners with the expectation that learning would "just happen" (Lim & Chai, 2004). In the current study, observations were based on teachers' use of ICT in curriculum delivery, and in this regard teachers planned their lessons which were mediated through ICT to improve learning. One particular finding which surfaced in the current study, that does not seem evident in the literature, was that the use of ICT led to an improvement in the relationship between teacher and learner. This finding based on a teacher's experience indicated that the use of ICT in her classroom opened new avenues for communication with learners and improved learner confidence. Furthermore, the use of 'ICT language' created means to motivate learners to engage in discussion with her.

ICT promoting integrative learning

Teacher experiences in this study suggest that ICT promoted integrative and interdisciplinary learning. Although all teachers advocated for the use of ICT in curriculum delivery, learners were also learning across subject disciplines. Loveless' (2003) finding is contrary to the argument presented in the current study. Loveless (2003) study found that teachers viewed ICT as a cross curricular tool that could be used in all subjects. Andrews (1999) found that schools in the United Kingdom made very little cross-curricular use of ICT. In the current study the use of ICT in classrooms allowed learners to understand that particular subjects did not exist as isolated compartments but were integrated with other subjects.

4.6.3 Conclusion

Within the context of this study a number of new insights emerged with regard to ICT policy transforming teaching and learning. Firstly teachers' beliefs, attitudes and professional instinct catalyzed them to become activators of local policy formulation and policy implementation. Teachers (though ignorant of the e-education policy mandates) were initiators of school ICT policy. Teachers changed their pedagogy not in response to policy directives, but guided by their beliefs and attitudes that ICT can enhance teaching and learning. Despite curriculum demands and curriculum overload, teachers engaged in innovative practices in their classrooms, demonstrating their professional calling. Teachers' will to learn and develop culminated in their engagement in professional collaborative communities of practice. Weaving all the threads from this summary, it is evident that teacher beliefs, attitudes and professional identity are the core tenets that determine the success or failure policy implementation at classroom level.