POLICY ISSUES IN ICT EDUCATION TOWARDS EFFECTIVE TEACHING AND MEANINGFUL LEARNING

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ABSTRACT–The aim of the study introduced in this paper is to investigate research questions around e-schools across Africa. To promote applicable objectives, the study is located within a conceptual framework clarifying issues around Information and Communication Technology (ICT) and learning about, with and through the use of ICT. The paper proceeds to a literature review regarding research results available, covering applicable aspects related to South African contexts; perspectives regarding literature from further afield, presenting opportunities for further investigation, are also offered. The following section describes the methodology used, including the data collection instrument and sampling technique, and issues regarding reliability and validity for the mainly quantitative research design. A methodology applicable to the policy processes of analysis and implementation is also outlined. A discussion of results provides demographic details regarding the sample of seventeen respondents from different African countries. The author then provides details on the extent to which sample schools qualify to be labelled as e-schools and engage with their communities. The results' value is illustrated regarding filling gaps identified, to make a contribution to the field, and being of use to teachers and principals at e-schools across Africa. Conclusions regarding further work and a results summary are provided.

Keywords: Policy Issues in ICT Education.

1. INTRODUCTION

The White Paper on e-Education for transforming towards effective teaching and meaningful learning through Information and Communication Technology (ICT) responded to the forces and questions posed by the information revolution on behalf of the education and training system in South Africa (SA), when the then Department of Education (DoE, 2004:17) set out the following ICT goal: "Every South African learner in the General and Further Education and Training bands will be ICT capable" by 2013.

Research questions were identified in this regard, with the study reported on in this paper aiming to make a contribution to the field:

- The 'due date' for achieving the ICT policy goal (2013) has come and gone - to what extent had this goal been achieved?
- More than ten years have passed since the publication of the White Paper on e-Education. Donner and Escobari (2010) commented on the issue of working in areas of fast-moving change. As assumptions and claims made in such an old document in the field of ICT may very well be time-contingent, to what extent are these still valid, and do they have continued relevance?

According to the DoE (2004:18), e-schools are characterised as institutions that exhibit:

- learners utilising ICTs for meaningful learning;
- qualified, competent principals "who use ICTs for planning, management and administration";
- qualified, "competent teachers who use ICTs" for effective teaching;
- "access to ICT resources that support curriculum delivery; and
- connections to ICT infrastructure". An e-school also connects with the community.

The aim of the study introduced in this paper is to investigate research questions around e-schools across South Africa and Africa, including aspects of the New Partnership for Africa's Development (NEPAD) linked to supporting communities. In order to promote the objectives that this paper reports on, the study is located within theoretical/conceptual frameworks clarifying issues around ICT, learning about, with and through the use of ICT, and Open and Distance Learning (ODL).

The paper proceeds to a critical review of the literature in terms of the latest, most relevant research results available, covering applicable aspects related to South African and African contexts; pertinent perspectives with regard to related literature from further afield, which present opportunities for further investigation, are also offered. The literature study likewise investigates e-schools in terms of challenges with regard to the implementation of the policy goal.

This is followed by a section that describes how the empirical research was undertaken: the research methodology that was used is described, including the data collection instrument and sampling technique implemented, and consideration of issues related to reliability and validity for the mainly quantitative research design. A methodology applicable to the policy processes of analysis and implementation is also briefly outlined.

A discussion of the results starts with some demographic details in terms of the characteristics for the sample of seventeen respondents from different African countries. The author then specifically provides details on the extent to which schools represented by the sample adhere to the characteristics of e-schools; issues in this regard are also discussed.

Donner and Escobari (2010) also mentioned the continued paucity of the associated research base. The next sections, describing the details of this study, will supply additional information in terms of discussions within the framework of the theory and line of enquiry underpinning the study - specifically, the value of the results provided in this research study is illustrated in terms of filling a major gap in knowledge identified in the literature. These results could therefore be of use to teachers and principals at (aspiring) e-schools across South Africa, the rest of the continent and even further afield. Finally, conclusions regarding possible further work, together with a concise summary of the results, are made available.

2. THEORETICAL/CONCEPTUAL FRAMEWORKS

Evoh (2007:64) examined "the prospects and challenges of the" NEPAD e-schools initiative using "the policy network theoretical framework" to examine the transformation of secondary education through ICTs in Africa. Regarding progress on the NEPAD e-schools demonstration project, Farrell, Isaacs and Trucano (2007:1) produced a public report: "The NEPAD e-Schools Initiative is a multi-country, multi- stakeholder, continental project to teach ICT skills to young Africans in primary and secondary schools and improve the provision of education in schools through the use of ICT applications and the Internet."

Africa adopted the NEPAD renewal framework, identifying "ICTs as central in the struggle to reduce poverty on the continent. ICTs provide hope for overcoming barriers of social and geographical isolation, increase access to information and education, and enable the poor to participate in the making of decisions that have an impact on their lives. … Within education and training specifically, NEPAD recognises the pivotal role of ICTs in the establishment of regional" open and "distance learning and health education programmes to improve the situation in the health and education sectors" (DoE, 2004:9)

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Illustrating the connections that could be built in this regard, Iluyemi and Briggs (2008:1) focused on the policy and change management implications of building and ensuring "the sustainability of an African-wide eHealth Network as envisioned by" the "Africa Union Commission in its development strategic plans" by learning from the NEPAD e-schools programme. In this way, evaluation results from extant NEPAD e-schools can be "employed for devising African-derived lessons for influencing the sustainability of" such initiatives.

2.1 Information and Communication Technology
Nzimande (2010) extended the definition of ICT beyond internet-based systems to include "educational television, radio, multimedia and" a range of technological devices that are "now widely available at relatively low cost"; he also mentioned the example of CD-ROMs and other software, media and telecommunications that can provide "access to databases and electronic libraries" (DoE, 2004:15).

2.2. Learning about, with and through the use of ICT
According to the DoE (2004:19), the "use of ICTs is a continuum … that takes learners and teachers through learning about ICTs (exploring what can be done with ICTs), learning with ICTs (using ICTs to supplement normal processes or resources), and learning through the use of ICTs (using ICTs to support new ways of" effective teaching and meaningful learning).

2.3. Open and Distance Learning
In an address to a "gathering of leaders of open" and distance learning institutions around the world, Nzimande (2010) recognised that ODL "could be a key ingredient in a long-term governmental strategy for development" by playing a role in addressing national transformational challenges. He believes the link between modern electronically-based approaches such as e-learning, which promote effective teaching, meaningful learning and academic management, and ODL is "key to the success of this mode".

As learners' experiences can be enhanced by implementing "the most favourable and feasible mixture of technology applications" (Park & Van der Merwe, 2009:356), ODL is increasingly being seen as presenting "a promising and practical strategy to address" challenges related to expanding educational opportunities and establishing alternative access routes to improving quality of education.

Nzimande (2010) also indicated that the combination of ODL "approaches and the application of" ICTs "present opportunities to widen access to quality education and ensure" learner success "for the youth coming up through the schooling system at present." According to the Minister (Nzimande, 2010), this is "the only feasible approach to meeting the needs of the vast numbers of the South African people who were systematically deprived of educational opportunity in the past". In order to achieve the goals of 'Education for All', especially when taking institutional contexts within African settings into account, ICT may be the most viable and cost effective way of developing and introducing e-learning as a flexible educational delivery model (Evoh, 2007).

3. LITERATURE REVIEW
The best way to meaningful learn about, and understand how to improve, practice is through research, evaluation and collaboration. To this end, the South African government aims to bring together teachers, researchers and the ICT industry in action-oriented research, to evaluate and develop leading-edge applications for e-learning. Since Nzimande (2010) called attention to the fact that the past decade provided evidence that universities "and research has a significant return on investment", the research and development communities, as specifically represented by universities,

can support Education Departments by sharing ICT in education knowledge and research produced at (South) African universities.

A gap in literature becomes apparent when one starts an investigation in this field: not a single hit for e-school* could be obtained in SA e-publications, nor a single applicable hit in the ACM Digital Library. Even via Google Scholar, only 28 applicable hits could be found. It should be noted that only one of these (Farrell, Isaacs & Trucano, 2007) even refer to South African e-schools (with-in the NEPAD initiative), and this particular source was published only three years after the release of the White Paper on e-education.

Unfortunately, the situation described thus far specifically pertains to the South African milieu, mainly from a South African viewpoint. What about the rest of Africa?

Mulwa and Kyalo (2013:191) reported on the influence of principals', teachers' and learners' attitudes on their readiness to adopt e-learning in secondary schools in the Kitui District, Kenya. Their research showed that "schools with teachers who understand and value the benefits associated with e-Learning will be more ready to adopt e-learning, since teachers are the key implementers of the e-learning program". Associated "benefits include access to extra information and enhancement of skills in ICT. Schools, whose teachers neither understand, nor value the benefits of e-Learning, will have difficulties in adopting e-Learning in curriculum implementation." Although teachers and learners "have enjoyed adequate access to an assortment of ICTs such as computers, laptops, projectors printers, e-blackboards, mobile phones for use" in integration for effective teaching and meaningful "learning in schools, the level of utilization of the ICTs by teachers and" learners "in Kitui District is still minimal" (Mulwa & Kyalo, 2013:183).

Aboderin and Kumuy (2013:90) investigated the problems and prospects of e-learning in curriculum implementation in secondary schools in Ondo State, Nigeria. Although their findings "revealed that the few available" computers, scanners and printers "are not utilized because the teachers lack" knowledge and skills related to computer applications, e-learning does enable "the learner to learn at his own pace", encourage individual learning, and "makes teaching and learning effective".

The purpose of research carried out by Karangwa (2012:ii) was "to investigate how the Rwanda NEPAD e-schools project is achieving its objectives". "The analysis of the position in these e-schools offers lessons for policy and practice in Rwanda and with regard to the NEPAD e-schools programme on the continent." This research "found that greater support is required to overcome the barriers, including lack of policy, … training and professional development, curriculum content, technical support, time and attitudes towards ICTs."

3.1. Challenges Regarding the Implementation of ICT in Education

Sesemane (2007:643) indicated that the process of implementing an ICT policy "is a topical and relatively challenging experience worldwide" at universities. "The growing phenomenon of integrating" ICT into "education, with the aim of enhancing" open and "distance learning, has proven to be a significant challenge" towards effective teaching and meaningful learning in an ODL context. Park and Van der Merwe (2009) join the ICT policy in highlighting the numerous challenges that ICTs continue "to pose for education and training systems around the world", having already had an impact on curriculum design, development and delivery (DoE, 2004:8).

The ICT policy also mentioned challenges related to the significant investment required, which "need to be overcome before ICT can be introduced system wide and in institutions" (DoE, 2004:13). The Ministry was "determined to direct the implementation of a progressive programme for change"

with regard to especially challenges restricting the integration of ICT in order to enhance the effectiveness of teaching, meaningful learning and the quality of management (DoE, 2004:11).

4. RESEARCH METHODOLOGY
4.1. Research Design
Like Mulwa and Kyalo (2013), a cross–sectional survey research design was adopted, compared to Evoh (2007) and Karangwa (2012:ii), who used a qualitative research approach, with the latter conducting case "studies of three NEPAD e-schools … to explore the integration of ICT in schools."

4.2. Sample and Sampling Technique
The sample in this paper represented mainly primary and secondary schools across South Africa, but schools in other African countries, like Lesotho and Zimbabwe, were also involved; unlike Mulwa and Kyalo (2013), who adopted a multi-phase sampling procedure for their study.

4.3. Data Collection Instrument
Like Mulwa and Kyalo (2013) and Aboderin and Kumuyi (2013:90), data were collected using a "self-structured questionnaire on the availability and use of e-learning tools" as a collection instrument. Karangwa (2012:ii) conducted "semi-structured interviews with Ministry of Education staff, school personnel and" learners and "a review of policy documents."

4.4. Validity and Reliability
The use of multi-method strategies could produce diverse insights regarding topics of interest and augment results' credibility. These strategies also allow for data triangulation across inquiry techniques and provide the mechanisms for mutual support between qualitative and quantitative research - enabling researchers to verify the degree to which assumptions based on qualitative information are reinforced by quantitative perspectives, or the other way around. McMillan and Schumacher (2010) indicated such triangulation as being critical for the facilitation of interpretive validity. Such validity relates to data, interpretations and/or the conclusions arrived at by using a particular research method in a specific environment for a certain reason (Maree & Van der Westhuizen, 2007).

The use a variety of strategies to enhance validity is required in especially qualitative research, since the validity of such designs include the extent to which perceptions and interpretations made had shared meaning between respondents and the researchers. Several resources ought to be employed for comparing results with each other, for ensuring the internal validity of qualitative research. As suggested by McMillan and Schumacher (2010), decisions were therefore made on how to ensure that the data collected was valid, by obtaining advice from expert researchers on the questions used, to ensure internal validity in terms of causal inferences, and by obtaining detailed descriptions of respondents and their environments for the facilitation of external validation and generalizability.

In terms of qualitative data collection, Maree and Van der Westhuizen (2007) raised the argument that the intensely personal participation and comprehensive replies from respondents capture adequate levels in terms of validity and reliability. McMillan and Schumacher (2010) established that validity in quantitative research can also include issues of reliability. Reliability with regard to qualitative studies can be regarded as results being consistent with data collected (Maree & Van der Westhuizen, 2007). Reliability was therefore also ensured by triangulating data and paying attention to dimensions towards establishing and increasing data trustworthiness in qualitative studies, including how credible, transferable, dependable and confirmable such as comments on maintaining rigor and **data** and the **analysis** thereof, is.

4.5. Policy Analysis

The particular stages of the policy process that are relevant to this research project include analysis and implementation (Brynard, 2003). According to that author, it is possible to define policy analysis as a methodical investigation into policy opportunities. In this research project, such analysis will be focused on an explicit attempt towards improving policy implementation by indicating a descriptive set of concerns related to policy process, outputs and evaluation measures.

It was further pointed out that public officials are typically the ones who are directly involved with the implementation of policy, and they should be considered to be the principal role players in activities related to policy analysis. In this research project, applicable public officials could therefore be directly quoted on a number of occasions on their perceptions of implementation progress on the ICT policy in South Africa. It could, however, also be argued that those who have the assignment to investigate policy issues in a more scientific way, in order to consider a policy analytically and objectively, should be further removed - this research project offers such an analysis.

According to Brynard (2003), a formal policy statement is usually presented in the form of a White Paper. In the case of ICTs, the policy document was published as the White Paper on e-Education, aimed at transforming learning and teaching through ICTs (DoE, 2004). Sesemane (2007) is of the opinion that this policy can be expressed as strategies and procedures for governing implementation.

5. DISCUSSION OF RESULTS

Table 1. Respondents' genders

	Respondents	Percentage
Female	11	64.7%
Male	6	35.3%

Almost two-thirds of respondents were female.

Table 2. This school is located in …

	Respondents	Percentage
an urban area	15	88.2%
a township area	1	5.9%
a rural area	1	5.9%

The overwhelming majority of schools represented were from an urban area.

Table 3. This is a …

	Respondents	Percentage
primary school	6	35.2%
high/secondary school	9	52.9%

The two (11.8%) respondents not represented in Table 3 were from a university and College of Education respectively.

None of the respondents indicated that they were 60 years and above (see Table 4).

Table 4. Respondents' ages

	Respondents	Percentage
20-29 years	2	11.8%
30-39 years	3	17.6%
40-49 years	7	41.2%
50-59 years	5	29.4%

Table 5. Number of years teaching experience

	Respondents	Percentage
0-5 years	5	29.4%
6-10 years	1	5.9%
11-15 years	2	11.8%
16-20 years	4	23.5%
More than 20 years	5	29.4%

Almost a third each of respondents had very little or a lot of years' teaching experience.

Table 6. Number of computers at the school

	Respondents	Percentage
1-10	4	25%
11-20	2	12.5%
More than 20	10	62.5%

None of the schools covered by this survey had no (0) computers.

Table 7. Frequency of ICT-integrated lessons

	Respondents	Percentage
More than once a month	9	52.9%
About once a month	5	29.4%
Less than once a month	3	17.6%

None of the schools covered by this survey **never** had any such ICT-integrated lessons.

Table 8. Regularity of computer laboratory use

	Respondents	Percentage
More than once a month	10	62.5%
About once a month	2	12.5%
Less than once a month	4	25%

None of the schools covered by this survey never used the computer laboratory.

No principals or deputy principals took part in the run of the survey reported on in this paper. Members of School Governing Bodies (SGB's) were, however, represented (see Table 9).

Table 9. I am participating in my role as a/the

	Respondents	Percentage
Head of Department	1	5.9%
Teacher	4	23.5%
Parent	7	41.2%
Member of the SGB	2	11.8%
Community member	3	17.6%

Table 10. This institution has learners who utilise ICTs for meaningful learning

	Strongly agree	Agree	Disagree	Strongly disagree
Learners at this institution respond to ICT-integrated lessons by helping each other	4 (23.5%)	10 (58.8%)	1 (5.9%)	2 (11.8%)
Learners at this institution respond to ICT-integrated lessons by producing work that is more creative	3 (17.6%)	9 (52.9%)	2 (11.8%)	3 (17.6%)
Learners at this institution respond to ICT-integrated lessons by working together	1 (5.9%)	12 (70.6%)	2 (11.8%)	2 (11.8%)
Learners at this institution respond to ICT-integrated lessons by becoming actively involved	1 (5.9%)	13 (76.5%)	1 (5.9%)	2 (11.8%)
Learner activities at this institution are changing towards increasingly working on group projects	4 (23.5%)	9 (52.9%)	2 (11.8%)	2 (11.8%)
Learner activities at this institution are changing towards increasingly presenting their work to the class	3 (17.6%)	9 (52.9%)	2 (11.8%)	3 (17.6%)
Learners at this institution are learning about ICTs (exploring what can be done with ICTs)	2 (11.8%)	11 (64.7%)	2 (11.8%)	2 (11.8%)
Learners at this institution are learning with ICTs (using ICTs to supplement normal processes or resources)	2 (11.8%)	10 (58.8%)	3 (17.6%)	2 (11.8%)
Learners at this institution are meaningfully learning through the use of ICTs (using ICTs to support new ways of effective teaching and meaningful learning)	3 (17.6%)	9 (52.9%)	2 (11.8%)	3 (17.6%)
All learners are ICT capable (that is, use ICT confidently and creatively to help develop the skills and knowledge they need to achieve personal goals and to be full participants in the global community)	1 (5.9%)	9 (52.9%)	5 (29.4%)	2 (11.8%)

More than three-quarters of respondents agreed or strongly agreed that learners at their institutions responded to ICT-integrated lessons by helping each other. Almost two-thirds of respondents agreed or strongly agreed that learners at their institutions responded to ICT-integrated lessons by producing work that is more creative, with more than half of them agreeing with this statement. Almost three-quarters half of respondents agreed that learners at their institutions responded to ICT-integrated lessons by working together. In the study reported here, more than three-quarters of respondents agreed with a statement relating to learners at their institutions responding to ICT-integrated lessons by becoming actively involved. Respondents' opinions regarding learner activities at their institutions changing towards increasingly working on group projects show that more than three-quarters of them agreed or strongly agreed. Although more than half of respondents agreed that learner activities at their institutions were changing towards increasingly presenting their work to the class, almost a quarter of them either disagreed or strongly disagreed with this statement. In line with the progression regarding e-education indicated in the White Paper (DoE, 2004), more than three-quarters of respondents agreed or strongly agreed that learners at these institutions are learning about ICTs (exploring what can be done with ICTs), while just less than three-quarters agreed or strongly agreed that learners at these institutions are learning with ICTs (using ICTs to supplement normal processes or resources), and agreed strongly agreed that learners at these

institutions are learning through the use of ICTs (using ICTs to support new ways of teaching and learning). Regarding achievement of the ICT policy goal, more than half of respondents in this study agreed that all learners are ICT capable (that is, use ICT confidently and creatively to help develop the skills and knowledge they need to achieve personal goals and to be full participants in the global community).

Table 11.
This institution has qualified, competent principals who use ICTs for planning and administration

	Strongly agree	Agree	Disagree	Strongly disagree
On-going support to principals is provided at different levels of the system	3 (18.8%)	7 (43.8%)	5 (31.3%)	1 (6.3%)
Every principal has the means to obtain a personal computer for personal use, administration and preparation of lessons	2 (12.5%)	10 (62.5%)	2 (12.5%)	2 (12.5%)
Every principal has access to basic training in the use of ICTs	3 (18.8%)	8 (50.0%)	4 (25.0%)	1 (6.3%)
A set of case studies and examples is available to principals on how to integrate ICTs in management, effective teaching and meaningful learning	2 (12.5%)	5 (31.3%)	8 (50.0%)	1 (6.3%)
Institutional principals have access to in-service training on how to integrate ICTs in management and administration	1 (6.3%)	9 (56.3%)	6 (37.5%)	0
All of the institutional principals integrate ICTs in management and administration	1 (6.3%)	8 (50.0%)	6 (37.5%)	0
The department of education uses ICTs seamlessly in planning, management, communication and monitoring and evaluation.	1 (6.3%)	5 (31.3%)	8 (50.0%)	1 (6.3%)
Provincial managers are trained in ICT integration to offer support to institutions	1 (6.3%)	6 (37.5%)	5 (31.3%)	1 (6.3%)

The largest sections of respondents agreed that on-going support to principals is provided at different levels of the system, that every principal has the means to obtain a personal computer for personal use, administration and preparation of lessons and access to basic training in the use of ICTs. This was also the case with regard to statements on institutional principals having access to in-service training on how to integrate ICTs in management and administration, all of the institutional principals integrating ICTs in management and administration, and provincial managers being trained in ICT integration to offer support to institutions. The majority of respondents, however, disagreed that a set of case studies and examples is available to principals on how to integrate ICTs in management, effective teaching and meaningful learning, and that the department of education uses ICTs seamlessly in planning, management, communication and monitoring and evaluation.

The largest sections of respondents agreed that every teacher has the means to obtain a personal computer for personal use, administration and preparation of lessons and access to basic training in the use of ICTs, in-service training on how to integrate ICTs into teaching and learning and ICT technical support training, while technology incentives for institutions and teachers to use ICTs are installed through the "Most Improved Schools Award" programme and other schemes (see Table 12). The majority of respondents, however, disagreed that their institutions have a dedicated teacher to manage the facility and to champion the use of ICTs in the institution, that all teachers are trained in basic ICT integration into teaching and learning and integrate ICTs into the curriculum, that a set of case studies and examples is available to teachers on how to integrate ICTs in management, teaching and learning, and that all teachers are ICT capable.

Table 12. This institution has qualified, "competent teachers who use ICTs" for teaching and learning

	Strongly agree	Agree	Disagree	Strongly disagree
Every teacher has the means to obtain a personal computer for personal use, administration and preparation of lessons.	2 (12.5%)	10 (62.5%)	4 (25.0%)	0
Every teacher has access to basic training in the use of ICTs	3 (18.8%)	8 (50.0%)	5 (31.3%)	0
The institution has a dedicated teacher to manage the facility and to champion the use of ICTs in the institution	5 (31.3%)	5 (31.3%)	6 (37.5%)	0
Teachers have access to in-service training on how to integrate ICTs into teaching and learning	1 (6.3%)	8 (50.0%)	7 (43.8%)	0
All teachers are trained in basic ICT integration into teaching and learning	2 (12.5%)	5 (31.3%)	9 (56.3%)	0
All teachers integrate ICTs into the curriculum	1 (6.7%)	4 (26.7%)	6 (40.0%)	4 (26.7%)
A set of case studies and examples is available to teachers on how to integrate ICTs in management, teaching and learning	1 (6.3%)	6 (37.5%)	9 (56.3%)	0
All teachers are ICT capable	0	5 (31.3%)	7 (43.8%)	4 (25.0%)
Technology incentives for institutions and teachers to use ICTs are installed through the "Most Improved Schools Award" programme and other schemes	1 (6.7%)	7 (46.7%)	6 (40.0%)	1 (6.7%)
Teachers have access to ICT technical support training	2 (12.5%)	9 (56.3%)	4 (25.0%)	1 (6.3%)

Table 13. This institution has access to ICT resources that support curriculum delivery

	Strongly agree	Agree	Disagree	Strongly disagree
The institution has access to an updated database of evaluated content resources and is able to select content for their usage	1 (6.3%)	7 (43.8%)	8 (50%)	0
The institution has access to digital libraries	2 (12.5%)	8 (50%)	5 (31.3%)	1 (6.3%)
The institution has access to educational content on the Educational Portal "Thutong"	1 (7.7%)	9 (69.2%)	3 (23.1%)	0
The Educational Portal "Thutong" provides access to resources in all learning areas in GET and all subjects in FET	0	7 (63.6%)	4 (36.4%)	0
Teachers are producing digital content of high quality and making it available to other teachers	1 (6.3%)	4 (25%)	11 (68.8%)	0
The institution uses the Educational Portal to communicate, collaborate and access content	1 (7.7%)	6 (46.2%)	6 (46.2%)	0
The institution uses the Educational Portal for teaching and learning in an outcomes-based education fashion	2 (13.3%)	6 (40%)	7 (46.7%)	0
The institution is using educational content that was developed according to set national norms and standards	1 (6.7%)	9 (60%)	4 (26.7%)	1 (6.7%)
The institution uses educational software of high quality	2 (12.5%)	9 (56.3%)	4 (25%)	1 (6.3%)
The province is collaborating and pools ICT resources where appropriate	1 (7.1%)	5 (35.7%)	8 (57.1%)	0

The majority of respondents agreed with statements relating to these institutions having access to digital libraries, educational content on the Educational Portal "Thutong" and that the Educational

Portal "Thutong" provides access to resources in all learning areas in General Education and Training (GET) and all subjects in Further Education and Training (FET), using educational content that was developed according to set national norms and standards and using educational software of high quality (see Table 13). The majority of respondents, however, disagreed with statements relating to these institutions having access to an updated database of evaluated content resources and being able to select content for their usage, and using the Educational Portal for teaching and learning in an outcomes-based education fashion, that teachers are producing digital content of high quality and making it available to other teachers and the province collaborating and pooling ICT resources where appropriate. An equal number of respondents agreed and disagreed that these institutions use the Educational Portal to communicate, collaborate and access content.

Table 14. These institutions have connections to ICT infrastructure

	Strongly agree	Agree	Disagree	Strongly disagree
The institution has a computer and software for administrative purposes	5 (31.3%)	10 (62.5%)	1 (6.3%)	0
The institution has access to a networked computer facility for teaching and learning	3 (18.8%)	11 (68.8%)	2 (12.5%)	0
The institution has legal software and uses the software	5 (31.3%)	9 (56.3%)	2 (12.5%)	0
ICT facilities are safe	3 (18.8%)	10 (62.5%)	2 (12.5%)	1 (6.3%)
ICT facilities are being used effectively to facilitate ICT integration into teaching and learning	2 (12.5%)	7 (43.8%)	7 (43.8%)	0
ICT facilities are safe, effective, designed to facilitate ICT integration into teaching and learning, and in working condition	2 (12.5%)	10 (62.5%)	4 (25%)	0
The institution has access to a networked computer facility for teaching and learning that is safe, effective, designed to facilitate ICT integration into teaching and learning, and in working condition	2 (12.5%)	10 (62.5%)	3 (18.8%)	1 (6.3%)
The institution is connected to the Educational Network	2 (12.5%)	8 (50%)	6 (37.5%)	0
Networks are safe and information security is monitored	2 (14.3%)	10 (71.4%)	2 (14.3%)	0
This institution uses electronic means to communicate with provincial offices	2 (14.3%)	11 (78.6%)	1 (7.1%)	0
This institution has access to an e-Rate	1 (10%)	6 (60%)	3 (30%)	0

Although the majority of respondents agreed with all statements relating to these institutions having connections to ICT infrastructure, an equal number of respondents agreed and disagreed that ICT facilities are being used effectively to facilitate ICT integration into teaching and learning.

The majority of respondents disagreed with all statements relating to these institutions connecting with their communities (see Table 15).

6. CONCLUSIONS
The results' value is illustrated regarding filling gaps identified, to make a contribution to the field, and can thus be of use to teachers and principals at e-schools across Africa.

Table 15. These institutions connect with their communities

	Strongly agree	Agree	Disagree	Strongly disagree
Communities have access to computer facilities and services after hours	0	4 (25%)	11 (68.8%)	1 (6.3%)
Community involvement supports this institution to sustain ICT facilities	1 (6.7%)	5 (33.3%)	7 (46.7%)	2 (13.3%)
Local Small, Medium and Micro Enterprises (SMMEs) have been developed and trained to provide technical support to this institution	0	5 (31.3%)	9 (56.3%)	2 (12.5%)
SMMEs provide technical support to institutions	0	4 (26.7%)	8 (53.3%)	3 (20%)
Communities are integrally involved in this e-school	0	5 (35.7%)	7 (50%)	2 (14.3%)
This institution serves as a venue for business advisory services and training for community-based small computer and repair businesses	0	4 (26.7%)	8 (53.3%)	3 (20%)

In light of respondents' disagreement with some statements related to teachers being ICT capable, along with Aboderin and Kumuy (2013:90), it is recommended that African governments "should embark on a massive computer training program for teachers. Teachers should be trained and retrained through in-service training, seminars, workshops and conferences for acquisition of the knowledge and skills needed for e-learning".

Despite results showing that the majority of respondents agreed with all statements relating to these institutions having connections to ICT infrastructure, the author agrees with Mulwa and Kyalo (2013:183-184) on the importance of addressing "the issue of e-learning infrastructure by availing e-learning equipment, enhancing connection to reliable sources of power, improving connectivity to various internet services and augmenting Human Resource capacity by organizing training programmes for" principals, teachers and learners.

Evoh (2007:64) emphasised "that a responsive ICT in education policy in each country is key to the success of e-school projects across Africa." In agreement with Karangwa (2012:ii), "Ministries of Education in African countries should align ICT in education policy with other education strategic and operational policies to ensure that ICT initiatives are in line with national developmental goals and objectives."

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