

PLANNING AND GOVERNANCE OF BLENDED PEDAGOGIES FOR NATIONAL DEVELOPMENT IN SOUTH AFRICA: IS THE PUZZLE COMPLETE WITHOUT THE LOCAL GOVERNMENT?

T.M. Ramoroka, J.P. Tsheola and M.P. Sebola
University of Limpopo

ABSTRACT

Development in the world is mostly knowledge-based and thus, largely depends on the exchange of information through modern technology. Countries that are equipped with technology and knowledge find it easy to participate in the knowledge economy and tend to be the main players in its socio-economic associated developments. However, participation in the knowledge economy starts with the adoption and implementation of blended pedagogies which have the capacity to positively transform national development. Blended pedagogies support and encourage collaborative, creative, innovative, adaptable and flexible teaching and learning that is necessary to develop skills that are crucial for participation in the knowledge economy and national development. In South Africa, evidence suggests that the integration of educational Information and Communication Technology (ICT) with conventional didactics is to a large extent, determined and driven by national and provincial governments. That is, planning approaches and governance models that are assumed to be a necessary precondition for the successful implementation of blended learning are determined at the national and provincial governments. This paper therefore, theoretically argues that integration of ICT with conventional didactics should be grounded at and be implemented by the local government as is done with services such as water, electricity and housing, among others. The paper concludes that the silence of local government in the planning, governance and implementation of blended pedagogies could be a spice for failure and a missing puzzle for the success of this transformation. Thus, the paper recommends that planning and governance of blended pedagogies should be the core responsibility of the local government.

Keywords: Blended Pedagogies, Planning, Local Government, Governance, National Development.

1. INTRODUCTION

Information and Communication Technology (ICT) has dramatically expanded the knowledge base, reduced information costs, and created information goods which makes participation in the global knowledge economy among different nations a reality (Bidarian, Bidarian & Davoudi, 2011; Greef, 2015; World Bank, 2016). Technology has facilitated effective and efficient "searching, matching, and sharing of information" and contributed to collaboration of various organizations and development agents as it influences how "organizations operate, people seek opportunities, and citizens interact" with their governments and other nations as well as within themselves (World Bank, 2016:8). Although the number of people using the Internet in the world has grown rapidly since 2005, more jobs and the provision of public services have fallen short of technological expectations (Odendaal, 2016; World Bank, 2016). The effects of technology on global productivity, opportunities for poverty eradication and the adoption of accountable governance has been less than what ICT can actually do (Bidarian *et al.*, 2011; Odendaal, 2016; World Bank, 2016). Ironically, the global digital divide is still growing regardless of the rapid growth of the technological gadgets and infrastructure such as the Internet, computers and mobile phone, among others (Odendaal, 2016; World Bank, 2016). In developing countries, more than half of the world's population are still without access to ICT and, as such, are unable to participate in the global knowledge economy (Bidarian *et al.*, 2011; Odendaal, 2016; World Bank, 2016). The situation calls for countries to create favourable environments for

all their citizens by technologically enhancing and investing in education, promoting good planning and governance and, most importantly, ensuring that the Internet is affordable, open and safe for all (Odendaal, 2016; World Bank, 2016).

South Africa, just like other developing countries, also focuses on reducing the digital divide among its population by using ICT in ways that will empower and transform the country (Mayisela, 2013; Murtin, 2013; Xiao, Califf, Sarker & Sarker, 2013; Farrukh & Singh, 2014; Hart & Laher, 2015; Odendaal, 2016). To realize its dream, South Africa outlined in the White Paper on e-Education that all teachers and learners must be ICT capable by 2013 (Department of Education, 2004). This admirable goal has, however, not yet been achieved three years after the target date. One of the main reasons for not achieving this goal is largely due to the "techno-determinist" view adopted by the government, which prioritises the provision of physical access to ICT infrastructure and consider it to be sufficient for creating, encouraging and supporting the development of ICT capable learners and teachers (Mayisela, 2013; Murtin, 2013; Xiao *et al.*, 2013; Hart & Laher, 2015). Theoretically, it is very clear that the adoption of educational ICT goes beyond access to infrastructure and online material (Fu, 2013; Murtin, 2013; Farrukh & Singh, 2014; Hart & Laher, 2015). Thus, it is necessary for South Africa to consider the active participation of the local government in planning, governance and implementation of blended pedagogies as it is the sphere of government that is responsible for service delivery. The involvement of the local government should assist in the facilitation of successful implementation of blended pedagogies.

ICT does have the capacity to transform education positively through its support of collaborative, creative, innovative, adaptable and flexible teaching and learning that develops 21st century skills (Mayisela, 2013; Murtin, 2013; Xiao *et al.*, 2013; Farrukh & Singh, 2014; Ramnarain, 2014; Greef, 2015; Hart & Laher, 2015; Sangari, 2015). The adoption and implementation of blended learning also enables teachers to effectively deliver lessons to a large number of learners at the same time (Mayisela, 2013; Murtin, 2013; Xiao *et al.*, 2013; Farrukh & Singh, 2014; Hart & Laher, 2015), which should particularly be helpful in a South African context, where teacher-learner ratios are very high (Murtin, 2013). Blended learning in South Africa, however, cannot be achieved without the adoption of appropriate planning approaches and governance

models specifically at the local government level as well as the implementation of necessary infrastructure and required skills and culture from both teachers and learners. Therefore, this paper theoretically evaluates planning and governance of blended pedagogies which excludes the local government from participating in the realization of the educational technologies. The paper consists of five sections including the introduction and the conclusion. The second section provides a synopsis of the national and provincial planning approaches towards the implementation of blended pedagogies. In the third section, the governance models which are adopted for the integration of e-learning with conventional didactics are discussed. The fourth section evaluates the silence of the local government and its expected roles in the planning and governance of the implementation of blended pedagogies whereas the last section provides the conclusion of the paper.

2. SOUTH AFRICA'S NATIONAL AND PROVINCIAL PLANNING FOR IMPLEMENTATION OF BLENDED PEDAGOGIES

Over the past ten years, transformation has resulted in changing landscapes and citizens who rely heavily on the Internet as the main medium of communication for development (Department of Communications, 2014). However, the major challenge for South Africa has been the successful participation in the "global systems and communities" while the needs and aspirations of South Africans at local level should be satisfied (Department of Arts, Culture, Science and Technology, 1994). The country should also ensure that its citizens have access to an affordable and fast ICT infrastructure that is able to create "internationally competitive knowledge economy, improve productivity and expand access to new markets" (Department of Communications, 2014:14). Thus, South Africa's ability to participate in the global knowledge economy depends on the state of its ICT sector in relation to planning and governance of the implementation of infrastructure, skills and culture towards the desired transformation. Appropriate planning approaches and governance models at local government are needed to enable a country like South Africa to use ICT to liberate itself from poverty and inequality and under-development. However, the national ICT hierarchy support system in the country is decentralised through planning and policy implementing structures mostly at provincial and district levels (Department of Education,

2012; Vandeyar, 2013). ICT policy and planning is the responsibility of the national government whereas implementation powers are supposed to be with the provincial and local government (Department of Education, 2012; Vandeyar, 2013). Pragmatic evidence however, suggests that the local government is silent in the planning and governance of the implementation of blended pedagogies. Thus, the concern remains if ever blended pedagogies implementation puzzle is complete without the participation of the local government. The succeeding two subsections discuss the country's ICT planning approaches at national and provincial levels, respectively, for implementation of blended learning.

2.1 National Planning Approaches

The growth of wealth in the world's largest and successful economies is created by knowledge-based industries that rely heavily on human capital with 21st century skills and technological innovation (Department of Education, 2004; Department of Science & Technology, 2007; National Planning Commission (NPC), 2012). The White Paper on e-Education (2004) guides South Africa's approach towards the integration of ICT in pedagogy so as to increase access to learning opportunities by redressing inequalities, improving the quality of teaching and learning as well as providing personalised and real world learning experiences. Accordingly, the use of ICT in South Africa's schools should encourage "improved inventive thinking skills, such as creativity, problem solving, higher-order thinking skills and reasoning, along with improved effective communication. Benefits to the broader society include increased opportunities for lifelong learning, communication and exchange essential to democratic living, and the creation of a pool of globally competitive human resources" (Department of Education, 2004:16). For South Africa to be able to participate in the global knowledge economy, the Department of Science and Technology (2007) published South Africa's ten-year innovation plan. The plan, in support of various sector departments, hopes to transform South Africa into a knowledge-based economy, in which its economic growth is led by the production and dissemination of knowledge to enrich all fields of human endeavour. A society that effectively uses its knowledge systems and human capital to address development challenges and problems in their country while exploiting economic opportunities in a sustainable way is what South Africa needs to compete with developed nations in the knowledge-based economy (Department of Science and Technology, 2007).

South Africa's national focus on ICT as a catalyst for participation in the global knowledge economy has provoked the initiation of ICT integration in education. The National Development Plan (NDP) 2030 vision states that education, training and innovation system should cater for different needs and produce highly skilled individuals. The graduates of South Africa's universities and colleges should have the skills and knowledge to meet the present and future needs of the economy and society (NPC, 2012). For practical realisation of the vision, partnership across the South Africa's education system and internationally accredited institutions should lead to higher levels of innovation, creativity and collaboration. Additionally, South Africa's investments should be channelled towards the development of people through education which can be used as an instrument to create societies that are better able to respond to the 21st century needs. These needs are associated with "lifelong learning", "continuous professional development" and "knowledge production" together with innovation, creativity and collaboration which are central to building the capabilities of individuals and the nation as a whole (NPC, 2012). Planning and governance of blended pedagogies however, must always be considered for a developing country like South Africa. The NDP 2030 asserts that, for successful planning and governance of the adoption and implementation of blended learning, the interests of all stakeholders in education should be integrated and aligned to support the goal of achieving effective educational goals that addresses community needs and national development.

2.2 Provincial Planning Approaches

The operationalization of the ICT national plans and aspirations in South Africa requires the development and implementation of provincial plans. Although the Presidency is leading the ICT revolution in education through its "Operation Phakisa", most provinces are still without educational technology plans. For the purpose of this subsection, the provincial ICT planning approaches of the Gauteng and Western Cape Provinces, which decided to take the lead in the implementation of e-learning, are evaluated as follows:

2.2.1 Gauteng Province

Informed by the New Growth Path's and NDP 2030 vision's rapid extension of access to and use of ICT for participation in the global knowledge economy,

the Gauteng Provincial Government developed the ICT Development Strategy (n.d.). The strategy is driven by a number of objectives which include the provision of universal access to broadband for citizens, business as well as government institutions; building the network infrastructure and information super-highway to encourage the development of advanced workforce with better ICT skills; increasing ICT skills capacity within the public and the private sectors to create a pool of ICT practitioners and entrepreneurs; and, improving of service delivery by providing high quality ICT services through e-government, among others (Gauteng Department of Economic Development, n.d.). Ultimately, the Gauteng ICT Development Strategy hopes to bridge the digital gap, strengthen economic productivity and competitiveness as well as enable government service delivery in areas such as health, education, safety and security and social development, in the province (Gauteng Department of Economic Development, n.d.; Pasensie, 2010; Sukazi & Ntshingila, n.d.). The strategy locates the role of ICT within three interrelated goals, namely, "productivity, connectivity networks and lastly, ICT skills capacity" (Gauteng Department of Economic Development, n.d.). Accordingly, the achievement of the three goals should lead the province into experiencing the "development of new businesses", participatory and effective e-governance as well as new ways of educating its society (Gauteng Department of Economic Development, n.d.; Pasensie, 2010; Sukazi & Ntshingila, n.d.). Palmer & Graham, 2013). To create a knowledge society from citizens, businesses and government, the province aims to exploit the use of the Internet, telecommunications and mobile technologies as well as computer software and applications.

Effective participation in the knowledge economy and its sustainability requires the development of ICT capabilities, skills and appropriate culture. Accordingly, the Gauteng ICT Development Strategy identified three levels at which skills should be developed, namely: "skills needed for modern life outside the workplace; skills needed in the work place to respond to changes in business processes and industry structures; and technical skills for the ICT specialists needed in ICT and related industries" (Gauteng Department of Economic Development, n.d.: 41). As a response to the skills needed, the provincial government planned to implement wireless Internet in classrooms in order to connect all teachers and over 1.8 million learners in Gauteng Province to digital technologies

(Gauteng Department of Economic Development, n.d.; Pasensie, 2010; Sukazi & Ntshingila, n.d.). Palmer & Graham, 2013). To supplement school-based ICT development, Internet connection will be taken to households for both teacher and learner use. Investments in ICT education should focus on introducing computers in classrooms, giving schools the flexibility to utilise the Internet for teaching and learning within budget constraints, as well as encouraging the buying and use of appropriate software based on institutional requirements (Gauteng Department of Economic Development, n.d.). The development of technical skills for ICT specialists required the government to plan to support institutions of higher learning in taking an active role in developing the needed experts in this field (Gauteng Department of Economic Development, n.d.). This approach will therefore, ensure increasing ICT skilled labour at all the three levels that the provincial government identified. Although Gauteng seems not to have a formal educational ICT plan for integrating e-learning with conventional didactics, it has taken a lead in the implementation of blended pedagogies in South Africa.

2.2.2 Western Cape Province

The ability to stimulate economic growth, support government functions and public services, and promote the private sector, is more easily achieved with ICT. The availability and accessibility of a strong and reliable ICT infrastructure inclusive of broadband network is central to "efficient" communications and Internet connections which play a key role in achieving the provincial objectives of technology (Palmer & Graham, 2013; Mawson, 2015; Phakathi, 2015; South Africa. Info, 2015; Western Cape Department of Education, 2015; Mzekandaba, 2016). Thus, infrastructure is considered as a requirement for addressing existing backlogs in technological coverage by increasing the "speed and functionality" of current networks and supplying new ICT as it is introduced (Palmer & Graham, 2013). For the Western Cape, ICT is expected to "provide the necessary infrastructure to integrate various government departments and offices and improve public services, such as public safety, disaster management and communications; improve Internet access at a household level; reduce the cost of international bandwidth; improve connection to businesses" and most importantly to promote e-learning (Palmer & Graham, 2013:61). To respond to the NDP 2030 vision and the provincial goals in relation to ICT, the former Premier Helen

Zille and Education MEC Debbie Schafer in the Western Cape outlined the details of the e-learning project that the Provincial Department of Education was implementing across the province. According to Schafer "this is a very exciting initiative that has taken years of planning and has the potential to make a major contribution towards improving the quality of teaching and learning in the province" (South Africa. Info, 2015b: n.p.). Among others, the objective of the project is to refresh existing computer laboratories and provide new laboratories as well as technology-rich classrooms which are called "smart classrooms" (Palmer & Graham, 2013; Mawson, 2015; Phakathi, 2015; South Africa. Info, 2015; Western Cape Department of Education, 2015; Mzekandaba, 2016). The former Premier emphasized that "e-learning will assist us in tackling some of the problems we face, including increasing access to quality education in disadvantaged communities, providing support for struggling learners, contributing towards teachers' training and professional development and improving management and administration at schools. It will also provide learners with the skills to participate in our increasingly technology-based economy in the future" (South Africa. Info, 2015b: n.p.). Even though the Western Cape's Department of Education does not have an ICT implementation plan for schools, it directly responds to the national plans and aspirations.

Drawing from the planning experiences of the Gauteng and Western Cape provinces, the country seems to have adopted the policy and analysis planning approach for the implementation of educational technology. The provincial planning approaches in question are derived from the national plans which hope to technologically transform South Africa for national development and participation in the global knowledge economy. However, South Africa is characterised by good plans which are hardly implemented (Bonnett, 2016; James, 2016; Wilkinson, 2016). The lack of implementation of plans is apparently mostly due to limited "capital availability and planning", especially at local government (James, 2016). In other words, South Africa has plans towards the implementation of what it considers effective and sustainable ICT infrastructure for development of skills that are necessary for the country's participation in the global knowledge economy, but the challenge remains that related to their implementation and lack thereof at the local government.

3. GOVERNANCE MODELS FOR THE INTEGRATION OF E-LEARNING WITH CONVENTIONAL DIDACTICS IN SOUTH AFRICA

In a knowledge society, "individuals, groups, organizations and government" must work as partners, rather than opponents in the provision of quality life (Department of Arts, Culture, Science and Technology, 1994; NPC, 2012; Bonnett, 2016; James, 2016; Wilkinson, 2016). Community networking, stakeholders' collaboration and common purpose and understanding of "healthy competition, openness and accountability" should be the guiding principles for building a sustainable knowledge economy (Department of Arts, Culture, Science and Technology, 1994). Accordingly, ICT must "build and sustain social, legal and economic structures and processes that support innovation", collaboration and creativity; be "competitive while sustaining the natural environment and leading to wellbeing for the greatest number of people" (Department of Arts, Culture, Science and Technology, 1994:n.p.). Most importantly, the sustainability of the 21st century skill for participation in the global knowledge economy requires citizens to develop and frequently update their "knowledge, competencies, abilities and skills" that are necessary for the production of innovative products and services. For a country to be able to "envision a desired future, examine its possibilities, select preferred results, and pursue its choices vigorously", collaboration of various stakeholders in the process of concern is crucial (Department of Arts, Culture, Science and Technology, 1994:n.p.). With the national government leading the processes of ICT implementation in the country as the principal stakeholder, a number of its departments play a crucial role in ensuring that South Africa participates in the knowledge economy, such as the central policy departments, agencies, science, engineering and technology institutions and state corporations. Moreover, the involvement and participation of the private and education sectors as well as the non-government organizations are regarded as equally important (Department of Arts, Culture, Science and Technology, 1994; Bonnett, 2016; James, 2016; Wilkinson, 2016).

At a national level, a policy goal is to ensure that ICT infrastructure and systems adequately support the needs of the economy and allow for parties beyond the public sector to participate in the provision processes (NPC, 2012). Over the last decade,

the government, private sector, parastatals, and non-governmental organisations have responded positively to the challenge of bridging the digital divide in South Africa (NPC, 2012; Department of Communications, 2014). According to the NPC (2012:190) "the ecosystem of digital networks, services, applications, content and devices, firmly integrated in the economic and social fabric, will connect public administration and the active citizen; promote economic growth, development and competitiveness; drive the creation of decent work; underpin nation building and strengthen social cohesion; and support local, national and regional integration". In South Africa, ICT should reduce the spatial exclusions and enable unified participation by the majority of citizens in the global ICT system (Department of Arts, Culture, Science and Technology, 1994; NPC, 2012; Department of Communications, 2014). ICT is an enabler which speeds up delivery, develops intelligence, creates ways to share, learn and engage knowledge and thus, an all-inclusive strategy is needed to diffuse it in all areas of society and economy (Department of Arts, Culture, Science and Technology, 1994; NPC, 2012). A single cohesive strategy is needed to ensure the distribution of ICTs in all areas of society and the economy. Like energy and transport, ICT is an enabler that can speed up service delivery, support analysis, build intelligence and create new ways to share information, learn from each other and globally engage with other parties. Additionally, South Africa's policies revealed that the "ICT revolution had a major impact on the way in which societies are organised and managed, resulting in fundamental and far-reaching" changes that are key to wealth creation and social and economic development (OECD, 2008:330 cited in Vandeyar, 2013).

In Gauteng Province, ICT infrastructure is dominated by both the government and private sector. The former is inclusive of the provincial government and state-owned enterprises whereas the latter is divided into two categories namely; "fixed line and mobile companies" (Gauteng Department of Economic Development, n.d.). Fixed line companies dominating the province include Telkom, Neotel and Dark Fibre Africa, among others, while the mobile sector is dominated by MTN, Vodacom and Cell C. These companies, in partnership with the government, have invested in massive ICT infrastructure across Gauteng Province in various institutions (Gauteng Department of Economic Development, n.d.). Although planning of ICT in Gauteng is informed by government objectives, its governance takes into

consideration various stakeholders. The Western Cape provincial government, in partnership with private institutions such as Telkom and Broadband InfraCo, are providing the "fibre optic cabling" for mobile networks as well as faster, cheaper and more reliable communication networks and Internet connectivity (Palmer & Graham, 2013). The private sector, which has a large financial stake in the system, dominates the provision of ICT through mobile phones and Internet connectivity (Palmer & Graham, 2013). However, South Africa's government is mostly misguided by the focus it places on the implementation of the ICT policy in education specifically looking at implementers. Currently, ICT planning, implementation and governance seem to be the responsibility of the national and provincial governments whereas the custodians of service delivery are left out. Generally, South Africa faces a demand for economic growth where, in this case, participation in the global knowledge economy is key. Therefore, collaboration between the state and the private sector which should start at the local government is important to yield economic growth, especially the Gross Domestic Product (GDP) (James, 2016; Wilkinson, 2016). Public-private partnerships wherein the state acts as a bank while private companies that have the necessary skills, expertise and equipment, should give the local government the responsibility to implement the ICT plans (Wilkinson, 2016). As the custodians of service delivery, local government should be driving the governance, planning and implementation of blended pedagogies.

4. SOUTH AFRICA'S BLENDED PEDAGOGIES PUZZLE WITHOUT LOCAL GOVERNMENT

South Africa's national and provincial ICT plans demonstrate the country's ambition and interest towards the implementation and adoption of educational technology. The country accepts and realises that the growth of wealth and level of development in the world's largest and most successful economies is created by "knowledge-based industries" that rely heavily on human capital that possess the 21st century skills characterised by technological innovation and creativity (Department of Education, 2004; Department of Science & Technology, 2007; NPC, 2012). Therefore, for a country like South Africa, pedagogy is key to the modern technological transformation that is critical for its participation in the global knowledge economy. Guided by the White Paper on e-Education (2004), South Africa's approach towards the integration

of ICT in pedagogy focuses on increasing access to learning opportunities by redressing inequalities, improving the quality of teaching and learning as well as providing personalised and real world learning experiences. Generally, the country's educational ICT planning recommends that schools that implement "e-Education" must use technology to improve teaching and knowledge acquisition and transfer, support the curriculum, access information that increases knowledge, inquiry and depth of investigation as well as for planning and management of various school activities (Department of Education, 2004). Although South Africa's national and ICT plans clearly support educational technology, the question remains if ever planning of blended pedagogies which excludes local government is appropriate in South Africa given the hierarchy of provision of service delivery in the country.

For effective participation in the knowledge economy, "individuals, groups, organizations and government" inclusive of the local government need to work as partners (Department of Arts, Culture, Science and Technology, 1994). Accordingly, ICT must be planned and governed in a manner that guarantees the building and sustaining of social, legal and economic structures and processes that are in support of "innovation, collaboration and creativity" (Department of Arts, Culture, Science and Technology, 1994). Therefore, for South Africa to be able to effectively participate in the knowledge economy, collaboration of various stakeholders in the processes of planning and governing the implementation of educational ICT is crucial (Department of Arts, Culture, Science and Technology, 1994). Although the national government is the principal stakeholder in the processes of educational ICT implementation, it should recognise the involvement and participation of the private, education sectors, local government as well as non-government organizations as equally important. South Africa seems to promote the multilevel model of governance in the implementation of blended pedagogies through the inclusion of various stakeholders at different levels however, excluding the local government. The exclusion of the primary custodian of service delivery is questionable especially when issues of sustainability, effectiveness and efficiency as well as coordination of implementation of blended pedagogies are concerned.

5. CONCLUSION

This paper discussed the national and provincial planning approaches that South Africa adopted

for the implementation of blended pedagogies in preparation for participation in the knowledge economy and national development. Gauteng and Western Cape Provinces' planning approaches were discussed because of their lead in the implementation of blended pedagogies. Additionally, South Africa's governance model for implementation of blended pedagogies was also discussed. Both the discussions revealed that the local government is not actively involved in the planning and governance of blended pedagogies. Therefore, this paper recommends that for sustainability reasons, local government must be one of the main role players in the planning, governance implementation of blended pedagogies.

REFERENCES

- Bidarian, S., Bidarian, S. & Davoudi, A.M. 2011. A model for application of ICT in the process of teaching and learning. *Procedia –Social and Behavioral Sciences*. 29:1032-1041.
- Bonnett, D. 2016. Upscaled infrastructure and regional integration needed in Africa. *Engineering News*. 36(22):48,52.
- Department of Arts, Culture, Science and Technology. 1994. *White Paper on Science and Technology: Preparing for the 21st Century*. Pretoria: Department of Arts, Culture, Science and Technology.
- Department of Communications. 2014. *Green Paper on National Integrated ICT Policy*. Pretoria: Department of Communications.
- Department of Education (DoE). 2004. *White Paper on e-Education*. Pretoria: Department of Education.
- Department of Basic Education (DBE). 2012. *Organisation Roles and Responsibilities of Education Districts*. Pretoria: Department of Basic Education.
- Department of Science and Technology. 2007. *Innovation Towards a Knowledge-Based Economy: Ten-Year Plan for South Africa (2008-2018)*. Pretoria: Department of Science and Technology.
- Farrukh, S. & Singh, S.P. 2014. Teachers' attitude towards use of ICT in technical and non-technical institutes. *Journal of Educational and Social Research*. 4(7):153-160.
- Fu, J.S. 2013. ICT in education: A critical literature review and its implications. *International Journal of Education and Development using Information and Communication Technology*. 9(1):112-125.
- Greef, A. 2015. Code word for the future. *Education Southern Africa*. 9(6):20-21.
- Gauteng Department of Economic Development. n.d. *Gauteng ICT Development Strategy Draft*. Johannesburg, Gauteng Department of Economic Development.
- Hart, S.A. & Laher, S. 2015. Perceived usefulness and culture as predictors of teachers attitudes towards educational technology in South Africa. *South African Journal of Education*. 35(4):1-13.
- James, N. 2016. Wireless connectivity fundamental to infrastructure development. *Engineering News, Engineering News*. 36 (22):50.
- Mawson, N. 2015. *W Cape Pulls Ahead in Broadband Race*. ITWeb Wireless, http://www.itweb.co.za/index.php?option=com_content&view=article&id=141361. (Accessed: March 9, 2016).

- Mayisela, T. 2013. The potential use of mobile technology: Enhancing accessibility and communication in a blended learning course. *South African Journal of Education*. 33(1):1-18.
- Murtin, F. 2013. *Improving education quality in South Africa*. OECD Economics Department Working Papers, No. 1056. OECD Publishing.
- Mzekandaba, S. 2016. *Paperless Classroom Hotspot for Thieves*. ITWeb Security, http://www.itweb.co.za/index.php?option=com_content&view=article&id=145049. (Accessed: March 9, 2016).
- National Planning Commission (NPC). 2012. *National Development Plan 2030: Our Future-Make it Work*. Pretoria: Government Printers.
- Odendaal, N. 2016. Digital dividend of technological advances falls short of expectations. *Engineering News*. 36(3):16.
- Palmer, I. & Graham, N. 2013. *Western Cape Infrastructure Framework*. Cape Town: Ubunye House.
- Pasensie, K. 2010. *e-Education: How Far Down the Information Superhighway is SA's Education?* Southern African Catholic Bishops' Conference, Briefing Paper 45.
- Phakathi, B. 2015. *Western Cape Rolls Out E-learning to Improve Schooling*. BDlive, <http://www.bdlive.co.za/national/education/2015/02/23/western-cape-rolls-out-e-learning-to-improve-schooling>. (Accessed: March 5, 2015).
- Ramnarain, U.D. 2014. Teachers' perceptions of inquiry-based learning in urban, suburban, township and rural high schools: The context-specificity of science curriculum implementation in South Africa. *Teaching and Teacher Education*. 38:65-75.
- Sangari, B. 2015. Warm-ware: Schools' readiness for education technology. *Education Southern Africa*. 9(2):28.
- South Africa. Info. 2015. *South Africa's Western Cape invests in E-learning*. South Africa.Info, <http://www.southafrica.info/about/education/elearning-230215.htm>. (Accessed: March 05, 2015).
- Sukazi, J. & Ntshingila, D. n.d. *Gauteng Online Media Briefing Statement*. Gauteng Provincial Government, <http://www.gautengonline.gov.za/GPGICTSummit/Pages/GautengOnlineMediaBriefingStatement.aspx>. (Accessed: March 3, 2016).
- Vandeyar, T. 2013. Practice as policy in ICT for education: Catalysing communities of practice in education in South Africa. *Technology in Society*. 35:248-257.
- Western Cape Department of Education. 2015. *WCED Announces Details on E-learning "Smart Schools" Project*. Cape Town: Western Cape Department of Education.
- Wilkinson, R. 2016. Improved project implementation will drive infrastructure growth. *Engineering News*. 36(22):53.
- World Bank. 2016. *World Development Report 2016: Digital Dividends*. Washington DC: World Bank.
- Xiao, X., Califf, C.B., Sarker, S. & Sarker, S. 2013. ICT Innovation in emerging economies: A review of the existing literature and a framework for future research. *Journal of Information Technology*. 28:264-278.