Vol 11, No 1, 2019 ISSN: 1309-8063 (Online)

# SPATIAL DISPARTIES AND LOCAL GOVERNANCE FOR IMPLEMENTATION OF BLENDED LEARNING IN SOUTH AFRICA

**Tlou Ramoroka**
University of Limpopo, Development Planning and Management
Millicent.ramoroka@ul.ac.za

**─Abstract ─**

The provision of education is a prerequisite for unlocking potential for modern national development and participation in the global knowledge economy. The former is currently focussed more on the 21st century pedagogic technological transformations that are necessary for the implementation of blended learning. That is, planning and governance of infrastructure that is evenly and justly distributed across the country is a significant requirement for the successful implementation of blended learning for national development and participation in the global knowledge economy. The purpose of this paper is to evaluate the role of local governance in the provision of pedagogic technologies and the reduction of spatial disparities as a result of various developments between rural and urban areas. Therefore, this paper adopts a desktop study to argue that the provision of blended learning in a developing country such as South Africa will only be effective if the local government is the key role player in planning and governance of necessary pedagogic technological transformations. The provision of education in South Africa promotes the implementation of blended learning which is driven by the reliance on the national blue print planning which however, continues to exacerbate the spatial inequalities between rural and urban areas. The paper concludes that, unlike the national blueprint planning that is currently adopted in the country for the implementation of blended learning, local governance in planning of the pedagogic transformations is required to address the spatial disparities mostly associated with the provision of pedagogic Information and Communication Technology (ICT) infrastructure necessary for modern national development and participation in the global knowledge economy.

**Key Words:** Planning, Governance, ICT Infrastructure, Spatiality

**JEL Classification:** I24, R58, O20, O35

## 1. INTRODUCTION

Information and Communication Technology (ICT) has dramatically expanded the information 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; World Bank, 2016). Technology has facilitated effective and efficient "searching, matching, and sharing of information" and contributed to collaboration of various organization and development agents. It influences how "organizations operate, people seek opportunities, and citizens interact" with their governments and other nations (World Bank, 2016: 8). Thus, the number of people using the internet in the world has grown rapidly since 2005, however, 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 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). Evidently, about six billion, four billion and nearly two billion people globally do not have access to high speed broadband, Internet and mobile phones, respectively (Bidarian et al., 2011; Odendaal, 2016; World Bank, 2016).

South Africa, just like other developing countries, is focused 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). According to the Department of Education, 2004, 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). This admirable goal has, however, not yet been achieved five years after the target date. One of the main reasons for not achieving this goal was largely due to the "techno-determinist" view adopted by the

government, which prioritise 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 of infrastructure and online material which is mostly available in urban areas (Murtin, 2013; Farrukh & Singh, 2014; Hart & Laher, 2015, Modai-Snir & van Ham, 2018; Xie, Gong, Lan & Zeng, 2018). Thus, it is necessary for South Africa to consider the preconditions such as the planning approaches, governance models, infrastructure, skills and culture that collectively determine the successful adoption of ICT in education taking into consideration the existing spatial disparities that exist between rural and urban areas. It is against this background that this paper argues that the provision of blended learning in a developing country such as South Africa will only be effective if the local government is the key role player in planning and governance of necessary pedagogic technological transformations. By so doing, the local government will be able to develop and implement plans and strategies that reflect the spatial characteristics of their area of jurisdiction because the implementation of the national plans at the local level seem to perpetuate existing spatial disparities between urban and rural areas (Modai-Snir & van Ham, 2018; Xie et al., 2018). The paper used desktop review to evaluate the role of local governance in the provision of pedagogic technologies and the reduction of spatial disparities as a result of various developments between rural and urban areas.

## 2. GOVERNANCE OF BLENDED PEDAGOGIES FOR MODERN NATIONAL DEVELOPMENT AND PARTICIPATION IN THE GLOBAL KNOWLEDGE ECONOMY

Globally, participation in the knowledge economy is regarded as an effective strategy for advanced modern national development and participation in the knowledge economy (Bidarian et al., 2011; World Bank, 2016). 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; Hart & Laher, 2015; Sangari, 2015). When ICT is integrated with

conventional didactics effectively, blended pedagogies can result in higher test scores, improved writing skills and developed self-efficacy among its users (Hart & Laher, 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 especially at local level. It is therefore important that the implementation of blended pedagogies must take into consideration, the spatial inequalities that exist between urban and rural areas through appropriate local governance.

The integration of e-learning with conventional didactics requires specific planning approaches and governance models in order that the e-learning pedagogies may be blended with, rather than replace, conventional didactics. Ideally, planning for blended pedagogies must involve decision making, policy formulation for the realization of set goals, programmes of action and stakeholder participation with the aim of current and future sustainability (Theron, 2008; Tsheola, 2011). Thus, the norms and standards of blended pedagogies should be established on the grounds of the two broad categories of development planning, namely object-centred and process-centred planning with more emphasis on stakeholder participation. Apart from other stakeholders' participation, planning for blended pedagogies requires the participation of direct beneficiaries, including teachers and learners. Planning for blended pedagogies must take into consideration the context of teaching and learning, digital technology and associated infrastructures, teaching and learning designs and ICT skills, among other factors (Peeraer & Van Petegem, 2015). Accordingly, blended pedagogies require a holistic planning approach, rather than e-planning alone, which supports partnerships, people-centeredness as well as attendant physical, economic and social aspects (Theron, 2008; Tsheola, 2011; Peeraer & Van Petegem, 2015). Besides planning approaches, models of governance are also crucial preconditions for blended pedagogies.

Governance within and beyond the state has focused on non-hierarchical coordination modes and the involvement of non-state stakeholders in the formulation and implementation of public policies and plans for development (van Kersbergen & van Waarden, 2004; Börzel & Risse, 2010; Termeer et al., 2010; Kok & Veldkamp, 2011; Pereira & Ruysenaar, 2012; Stojanovska, Miovska, Jovanovska & Stojanovski, 2014). The participation of both state and non-state stakeholders is supposed to improve the quality of public policies and the effectiveness of their implementation in development (Kok & Veldkamp, 2011; Pereira & Ruysenaar, 2012; Stojanovska et al., 2014). Governance is the various institutionalized modes of social coordination to produce and implement collectively binding rules for the provision of public goods and services (Börzel & Risse, 2010). Furthermore, governance reflects increasing decentralization of power and control to non-state actors who now participate in more complex structures and processes rather than in a system characterized by hierarchical command and control or market-based anarchy (Termeer et al., 2010; Kok & Veldkamp, 2011; Pereira & Ruysenaar, 2012; Stojanovska et al., 2014). That is, local governance should deal with institutional processes and rules for authority decision making, informed by different stakeholders, specifications and norms. Governance literature identifies three broad models, which are: monocentric, multilevel, and, adaptive (Pereira & Ruysenaar, 2012). Whereas monocentric governance “places the state at the heart of political power and authority”, the multilevel version “recognises the three-way displacement of governmental power across scales”, whilst adaptiveness hopes to “handle the inherent complexity and unpredictability of socio-ecological systems” (Pereira & Ruysenaar, 2012: 41-42).

Most often, governance of blended pedagogies deals with the system of rules and institutional processes for authoritative decision making, informed by different stakeholders, specifications and norms (van Kersbergen & van Waarden, 2004; Kok & Veldkamp, 2011). The ability to govern depends on political and/or policy capacity which drives decision making and administrative ability to execute those decisions (Pereira & Ruysenaar, 2012). Thus, the success of blended pedagogies relies on the choice of governance model, inclusive of policy development and administration, as well as their capacity to address inequalities across all levels (Termeer et al., 2010). As part of the identification and selection of such an appropriate governance model, development interventions should be questioned,

prioritised and made relevant to a specific group of people who are in need; and, the assessment should be based on the background of the target group, availability or lack of resources and, most importantly, the management and control styles to be adopted (Kok & Veldkamp, 2011; Pereira & Ruysenaar, 2012; Termeer et al., 2010). Therefore, this paper asserts that an adaptive governance model holds the potential to be suitable for blended pedagogies because it provides for continuous and unexpected changes, with unpredictable consequences as well as co-management with a number of stakeholders at various levels. That is, adaptive governance for blended pedagogies would cater for the involvement of different stakeholders, including direct beneficiaries who have authority over the specified development interventions, as well as a suitable degree of acceptance and preparedness for challenges related to uncertainty in the future. It may be possible that such a governance model could adequately address the uncertainties related to the global knowledge economy and national development at local level.

## 3. SOUTH AFRICA'S NATIONAL BLUEPRINT PLANNING AND GOVERNANCE OF BLENDED PEDAGOGIES

At the 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 (National Planning Commission (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. ICT is an enabler that can speed up delivery, support analysis, build intelligence and create new ways to share information, learn from each other and globally engage with other parties.

For South Africa to be able to participate in the global knowledge economy, the Department of Science and Technology (2007) published the country’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. According to the National Development Plan (NDP) 2030, “science and technology continue to revolutionise the way goods and services are produced and traded” which the former can also “be leveraged to solve some of the biggest challenges in education…” (NPC, 2012: 33). In this way, teaching and learning materials can be delivered electronically to all the areas in South Africa inclusive of remote villages. Although the high cost of broadband Internet connectivity has been identified as a major challenge, all South Africans should be able to “acquire and use knowledge effectively”. To realise the NDP 2030 of a “seamless information infrastructure that by 2030 will underpin a dynamic and connected vibrant information society and a knowledge economy that is more inclusive, equitable and prosperous” (NPC, 2012 cited in Department of Communications, 2014: 3), the Green Paper on National Integrated ICT Policy was developed. The Green Paper is guided by several objectives and principles which include the planning, development and implementation of an "inclusive, transparent, accessible and technology-neutral" policy making as well as regulated process that should promote a knowledge-based society (Department of Communications, 2014).

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 NDP 2030 vision on education states that the "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). To practically realise the vision, partnership across the South African education system and internationally accredited institutions should lead to higher levels of innovation, creativity and collaboration. In Addition, South Africa's investments will be channelled towards people development through education. This will be used as an instrument that will create societies that are better able to respond to the 21st century needs associated with "lifelong learning", "continuous professional development" and "knowledge production" alongside innovation creativity and collaboration which are central to building the capabilities of individuals and the nation as a whole (NPC, 2012). In planning and governance of the adoption and implementation of e-learning and/or 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.

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). 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). With the national government leading the processes of ICT implementation in the country as the principal stakeholder, the local government should be regarded as equally important. 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). A single "cohesive strategy" is needed to ensure the distribution of ICTs in all areas of society and the economy through planning and governance of the local government. However, South Africa's government is mostly misguided by the

focus it places on the implementation of the ICT policy in education. Currently, ICT policy and its implementation and management seem to be on provision of hardware and infrastructure, rather than on collective preconditions which are inclusive of planning, governance, skills and culture necessary for the successful integration of these classroom technologies. It appears as if the officials with the decision-making capacity do not have a clear understanding of the link between the provided infrastructure, teachers' and learners' ICT kills and e-culture as well as its use in the development of appropriate skills for the participation in the global knowledge economy and national development. Public-private partnerships wherein the national and/or provincial governments acts as a bank while private companies that have the necessary skills, expertise and equipment, are tasked with the responsibility to implement the ICT plans on their behalf. Most critically, the role of the local government in these pedagogic development initiatives is ignored.

## 4. BLENDED LEARNING AND SPATIAL DISPARITIES IN A DEMOCTRATIC SOUTH AFRICA: INTEROGATING THE ROLE OF LOCAL GOVERNANCE

The pace of integrating ICT in the basic education "since the White Paper on e-Education has been unsatisfactory; hence provinces are at different levels of ICT integration in education" (Motshekga, 2016: n.p.). The more "affluent provinces" such as the Western Cape and Gauteng provinces have made significant investments in the provision of ICT infrastructure in some of their schools. In some provinces, competing priorities within the Provincial Education Departments and lack of adequate resources, have adverse effects on the provision of ICT infrastructure to their schools (Motshekga, 2016). However, Motshekga (2016: n.p.) asserted that "in the Department of Science & Technology, the support of the private sector and NGOs has been commendable in providing ICT infrastructure to schools, however many of their ICT initiatives have been scattered, uncoordinated, unfocused, and unsustainable, hence limiting their impact on education". Up-to-date, the developments made are mostly due to the partnership between government, private sector, social partners and NGOs which provide schools with ICT infrastructure and required teacher training (Motshekga, 2016). Although the Western Cape and Gauteng provinces have taken the

educational technology centre stage, other provinces are also making efforts to introduce ICT in schools.

Since November 2014, the partnership between the Department of Education and the Eastern Cape Education Development Trust (ECEDT), managed by the National Business Initiative, has initiated the roll-out of 50 "Telematics Centres" specifically in high schools across the province (National Education Collaboration Trust, n.d.; Sangari, 2015). These centres will provide "live, interactive support lessons" to Grade 10, 11 and 12 learners especially in key subjects that include Mathematics, Physical Science and English. (National Education Collaboration Trust, n.d.; Education Southern Africa, 2015). Although the initiative is beneficial for the schools that are involved, transport for both teachers and learners to the centres scattered across districts is the main challenge (National education Collaboration Trust, n.d.). Regardless of the challenge, teachers are currently using the systems for other subjects instead of languages, mathematics and science as initially planned. Moreover, Eastern Cape Province teachers were given an opportunity to be members of a global community which shares best practices and engage with each other whenever a need arises (National Education Collaboration Trust, n.d.; Sangari, 2015). In the Limpopo Province, there are five high schools in Mankweng Circuit where the TV White Space Pilot Project is implemented in addition to other e-learning initiatives. The project involves a partnership of the University of Limpopo, Microsoft South Africa, Centre for Scientific and Industrial Research (CSIR) and Multisource, among others. Additionally, there are institutional collaborators that are involved in the project. They are Independent Communications Authority of South Africa (ICASA), South African Broadcasting Corporation (SABC), Departments of Basic Education and Science and Technology (Lysko, Masonta, & Mfupe, 2013; Ramoroka, 2014; Masonta, Ramoroka & Lysko, 2015). This high-profile collaboration highlights the significance of digital technology to efforts towards revolutionizing South African education. This digital model uses TV White Spaces by exploiting vacant channels in the television spectrum to provide wireless Internet connection (Carlson, Ntlatlapa, King, Mgwili-Sibanda, Hart & Geerdts, 2013; Lysko et al., 2013; Ramoroka, 2014; Masonta et al., 2015). Whereas the TV White Space Model provides low cost wireless internet connections without interfering with the existing spectrum band usage, its

installation involves costly infrastructure resourcing and operations. To be able to use the wireless internet, the five schools were each provided with 33 tablets and a laptop, a projector as well as a projection screen for teaching and learning purposes (Ramoroka, 2014; Masonta et al., 2015). Additionally, principals, teachers and learners were trained on how to use the technology for knowledge transfer and acquisition before the launch of the project.

The North West Provincial government's first step towards the implementation of blended learning is on teachers' professional development specifically based on the development of ICT skills (Surty, 2014). The provincial government believes that for the quality of our education to improve, classroom teaching must be given priority so that learners can receive "quality knowledge" which is at the "requisite level" (Surty, 2014). Accordingly, ICT has become crucial for the improvement of quality and efficiency of the system from a number of aspects, including administration, e-learning and teacher training. Similarly, to deliver the curriculum effectively, the correct teacher and teaching of appropriate subject in a suitable manner is also central to successful implementation of blended learning (Surty, 2014). To ensure that teachers are equipped with appropriate Technological Pedagogical Content Knowledge, the North West Province has launched a variety of initiatives, including "Teacher Training Centres", "Teacher Development Institutes", "Subject Committees" and "Professional Learning Communities (PLCs)" (Surty, 2014). The initiatives were platforms wherein teachers are offered opportunities to develop their ICT skills and further share technological experiences with their peers and the Samsung E-Learning Teachers Centre is one of those established for such opportunities. The centre consists of 41 tablets preloaded with electronic content, learning management system software; Samsung educational content as well as teachers training tools (Surty, 2014). In partnership with the private companies such as Samsung and Vodacom, among others, the North West Provincial Government had established about 40 teacher training centres across the province (Surty, 2014). Moreover, the government, together with the United Nations Children's Fund (UNICEF) South Africa and Mxit, had launched "Ukufunda Virtual School" which provides a variety of free and open CAPS aligned teaching and learning resources, tutors, counsellors, mentors, coaches and librarians accessible on more than 8 000 different mobile devices, from entry mobile phones to smartphones and tablets (Surty, 2014).

Differently from other provinces, the North West Province had prioritised teachers' skills development ahead of the implementation of ICT infrastructure for blended pedagogies.

However, South Africa's investment calls for examining the planning and governance models adopted and the preconditions for the establishment of these educational ICT projects as it is very clear that they exclude local institutions. The costly nature of the investments made by the country, specifically for the mentioned provinces in the lead on e-learning pedagogies, regardless of the inconclusive affirmation of even the success of blended pedagogies, cannot be left unquestioned especially because there is lack of local governance. The transformation towards blended learning in South Africa, however, does not only depend on well-equipped computer and media centres that will ensure that teachers and learners have access to necessary infrastructure, but the planning approaches, governance models, infrastructure as well as the ICT skills and culture of both teachers and learners collectively. Blended learning requires teachers with Technological Pedagogical Content Knowledge and thus, attention should be given to their professional development and the improvement of educational standards (NPC, 2012). The quality of in-service teacher training must be improved, and higher calibre pre-service teachers must be recruited. The need to build the national learning institutions for technology, creativity and innovation to develop "intellectual capital", which is necessary to support economic growth and development, must be nurtured by the government through its local institutions (NPC, 2012). The NDP 2030 confirmed that this is a good system if it is supported by "effective governance" and funding mechanisms to promote "coordination and collaboration" among various stakeholders (NPC, 2012). Although the NDP 2030 highlights planning, governance at national level, infrastructure and skills, nothing was mentioned about governance of such initiatives at local level.

South Africa's pedagogic status quo confirms that the country has not yet achieved its "ambitious" national education development targets and the majority of schools are still without appropriate educational ICT because of the limited and/or lack of local governance. However, there is a lack of a common vision of

what integration of ICT with conventional didactics for transformation of learning really means in practice among various stakeholders in South Africa. Educational ICT also presents a major challenge for the professional growth of teachers. In practice, there is a challenge between what policy, legislation and plans prescribe in terms of the provision of educational ICT and what is happening in the school classrooms. South Africa's policy, legislation and plans recommend provision of ICT infrastructure in all schools without a clear description of the strategy and processes to be followed. For example, the documents do not clearly state as to whether schools should replace conventional didactics with e-learning or if ever they should adopt blended learning. Therefore, at the provincial sphere there is replacement of conventional didactics with e-learning, regardless of the benefits of blended pedagogies. Provinces are working tirelessly to ensure that all schools are equipped with ICT infrastructure that could replace conventional didactics without the involvement of local institutions. The unspecified implementation of multiple policies and plans into educational experiences in South Africa is challenging, and thus allow for implementers to go with what they regard as appropriate in most cases, without the participation of local institutions.

## 5. CONCLUSION

South Africa, like most developing countries, is hoping to have a labour force which will be able to fully participate in the knowledge economy for national development. The successful implementation of blended pedagogies starts with their planning and governance which include local institutions. Thus, South Africa should ensure that its planning and governance translate into successful integration of e-learning with blended pedagogies. Furthermore, governance of blended pedagogies should be characterised by collaboration of multiple stakeholders inclusive of government at all levels, private business, households as well as NGOs, among others. That is, South Africa's aspiration for blended pedagogies and preparation for participation in global knowledge economy cannot be fulfilled through osmosis, rather it requires conscious modernized planning and local governance that support the technological transformation across all geographic and sectors of the population, inclusive of the rural, urban informal and township settlements. Therefore, this paper recommends that unlike the national blueprint planning that is currently adopted in the country for the

implementation of blended learning, planning and local governance of 21st century pedagogic transformations is required to address the spatial disparities mostly associated with the provision of pedagogic ICT infrastructure which is necessary for modern national development and participation in the global knowledge economy.

## 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.

Börzel, T.A. & Risse, T. (2010). Governance without a state: Can it work? *Regulation & Governance*, 4, 113-134.

Carlson, J., Ntlatlapa, N., King, J., Mgwili-Sibanda, F., Hart, A. & Geerdts, C. (2013). *Studies on the Use of Television White Spaces in South Africa: Recommendations and Learnings from the Cape Town Television White Spaces Trial*. https://www.tenet.ac.za/tvws/recommendation-and-learnings-from-the-cape-town-tv-white-spaces-trial. Accessed 2018/02/12.

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 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.

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.

Kok, K. & Veldkamp, T.A. (2011). Scale and governance: conceptual considerations and practical implications. *Ecology and Society*, 16(2), 23.

Lysko, A., Masonta, M. & Mfupe, L. (2013). Field Measurements Done on Operational TVWS Trial Network in Tygerberg. Pretoria: Council for Scientific and Industrial Research.

Masonta, M.T., Ramoroka, T.M., Lysko, A.A. (2015). Using TV White Spaces and e-learning in South African rural schools. In Cunningham, P. & Cunningham, M. (eds.). *IST-Africa 2015 Conference Proceedings*. Ireland: IIMC International Information Management Corporation, pp.1-12.

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.

Modai-Snir, T. & van Ham, M. (2018). Neighbourhood change and spatial polarization: The roles of increasing inequality and divergent urban development. *Cities*, https://doi.org/10.1016/j.cities.2018.05.009. Accessed 2018/07/04.

Motshekga, A. (2016). *Speech by the Minister of Basic Education, Mrs. Angie Motshekga, MP, Delivered on the Occasion of the ICT Workshop Held at Premier Hotel, Midrand, 03 March 2016*.http://www.education.gov.za/Newsroom/Speeches/tabid/298/ctl/Details/mid/3618/ItemID/3679/Default.aspx. Accessed 2018/03/19.

Murtin, F. (2013). Improving education quality in South Africa. *OECD Economics Department Working Papers, No. 1056*. OECD Publishing.

National Education Collaboration Trust. (n.d.). *Eastern Cape Schools Embrace E-learning*. http://nect.org.za/news/eastern-cape-schools-embrace-e-learning. Accessed 2018/03/18.

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.

Peeraer, J. & Van Petegem, P. (2015). Integration or transformation? Looking in the future of Information and Communication Technology in education in Vietnam. *Evaluation and Program Planning*, 48, 47-56.

Pereira, L.M. & Ruysenaar, S. (2012). Moving towards traditional government to new adaptive governance: The changing face of food security responses in South Africa. *Food Security*, 4, 41-48.

Ramoroka, T. (2014). Wireless internet connection for teaching and learning in rural schools of South Africa: The University of Limpopo TV white space trial project. *Mediterranean Journal of Social Sciences*, 5(15), 355-359.

Sangari, B. (2015). Warm-ware: Schools' readiness for education technology. *Education Southern Africa*, 9(2), 28.

Stojanovska, M., Miovska, M., Jovanovska, J. & Stojanovski, V. (2014). The process of forest management plans preparation in the Republic of Macedonia: Does it comprise governance principles of participation, transparency and accountability? *Forest Policy and Economics*, 49, 51-56.

Surty, E. (2014). *Deputy Minister Enver Surty: Launch and Handover of Samsung E-Learning Centre*. South African Government, http://www.gov.za/speech-delivered-basic-educations-deputy-minister-honourable-mr-enver-surty-launch-and-handover. Accessed 2018/03/16.

Termeer, C.J.A.M., Dewulf, A. & Lieshout, M. (2010). Disentangling scale approaches in governance research: Comparing monocentric, multilevel, and adaptive governance. *Ecology and Society*, 15(4), 29-43.

Theron, F. (2008). The change agent-project beneficiary partnership in development planning: theoretical perspectives. In F. Theron (Ed). *The Development Change Agent: A Micro-level Approach to Development.* Pretoria: Van Schaick.

Tsheola, J. (2011). A case for teaching development planning within development studies. *Africanus*, 41(3), 80-94.

van Kersbergen, K. & van Waarden, F. (2004). 'Governance' as a bridge between disciplines: Cross-disciplinary inspiration regarding shifts in governance and problems of governability, accountability and legitimacy. *European Journal of Political Research*, 43, 143-171.

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.

Xie, Y., Gong, H., Lan, H. & Zeng, S. Examining shrinking city of Detroit in the context of socio-spatial inequalities. *Landscape and Urban Planning*, 177, 350-361.