

# Challenges of Online Pedagogies During Covid-19 Lockdown: Reflections from Teaching Geospatial Technology for Development Planning at the University of Limpopo

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**Abstract:** During the academic year 2020, the COVID-19 pandemic has forced institutions of higher education, especially face-to-face institutions, to adopt alternatives to conventional teaching and learning instructions and methods. As a result, online pedagogies have been unexpectedly adopted by both academics and students in these institutions, with the hope of saving the 2020 academic year. Regardless of being a desirable option compared to no teaching and learning, the abrupt change from face-to-face instruction to online pedagogies came with challenges which affected both lecturers and students in these institutions. Therefore, the purpose of this paper is to explore the implementation challenges of online pedagogies at an honours level of study (postgraduate) during COVID-19 lockdown with specific reflections from GeoSpatial Technology for Development Planning curriculum at the University of Limpopo (UL). The challenges include limited or lack thereof, of stable internet connectivity, Information and Communication Technology (ICT) infrastructure and gadgets and, basic ICT skills among some lecturers and students to support online teaching and learning. To achieve its purpose, qualitative research approach was adopted wherein observations and weekly teaching reports were used to solicit data. The paper revealed that "lack of institutional and curriculum support" and, "operational challenges" are the most common experienced at UL. The paper concluded that the successful implementation of online pedagogies depends on well-established ICT resources and infrastructure as well as both lecturers' and students' technological knowledge and skills.

**Keywords:** COVID-19, Information and Communication Technology, GeoSpatial Technology, Lockdown

## 1. Introduction

Globalization, knowledge economy, and the fourth industrial revolution, among others, resulted in economic structural changes as well as technological innovation and advancement which informs the skills needed in the labour markets (Mok, 2010; Chan, Fong, Luk & Ho, 2017; Ojo, Booth & Woollacott, 2019). The current and modern "digital and interconnected world requires addressing the training of students from a global perspective, aspiring to train them as global professionals, with skills for lifelong learning and their global employability" (Aponte & Jordan, 2019, 419). In response, there have been drastic changes in the character of higher education worldwide (Mok, 2010). Higher education curriculum design should align with the current and rapidly changing labor market needs and modern development by producing "global citizens and effective members of modern-day society" (Chan *et al.*, 2017). The curriculum should focus on the shift from a lecturer-oriented to a student-oriented approach taking into consideration lifelong learning

and personal development. Accordingly, "a knowledge-based economy relies primarily on the use of ideas rather than physical abilities and the application of technology rather than the transformation of raw materials or the exploitation of cheap labor" (World Bank, 2003).

To participate in the global knowledge economy, the higher education system must be transformed by "replacing the information-based, teacher-directed rote learning with more emphasis on creating, applying, analyzing and synthesizing knowledge and engaging in collaborative learning throughout the lifespan" (World Bank, 2003, xviii). Additionally, the development of problem-solving and decision-making skills is crucial for students who have to survive internationalization and multiculturalism in higher education (Ojo *et al.*, 2019). Given the global COVID-19 pandemic, there is a need to review the higher education curriculum in line with the response measures and regulations to the pandemic (Cao, Fang, Hou, Han, Xu, Dong & Zheng, 2020; Crawford, Butler-Henderson, Rudolph & Glowatz, 2020).

As a result of the pandemic, online pedagogy has become a preference from conventional didactics as a modern approach of teaching and learning in higher education from lecture halls to Learning Management Systems (LMS) and Zoom; personal to virtual; and, seminars to webinars, among others. To curb the spread of COVID-19, online pedagogy avoids face-to-face contact and provides both lecturers and students with the feeling of physical and psychological safety (Cao *et al.*, 2020).

## 2. Aim, Objectives and Research Methods of the Study

It is against this background that the aim of this paper is to explore and discuss the implementation challenges of online pedagogy at honours level of study (postgraduate) during COVID-19 pandemic with specific reflections from GeoSpatial Technology for Development Planning curriculum at the University of Limpopo. Qualitative research approach was adopted wherein observations and weekly teaching reports which presented both lectures' and students' teaching and learning experiences were used to solicit data. To achieve its aim, the objectives of the paper were as follows which are presented as sections of the paper:

- To discuss the nature of curriculum conceptions and design in higher education (section 3);
- To outline online pedagogies in face-to-face universities during COVID-19 pandemic (section 4);
- To discuss the transition from conventional didactics to online pedagogy during the COVID-19 pandemic with a focus on prospects and challenges (section 5) wherein GeoSpatial Technology Module at honours level of study at the University of Limpopo is used as a case.

The sixth and seventh sections of the paper are the conclusion and recommendations, respectively relation to the findings of the study.

## 3. The Nature of Curriculum Conceptions and Design in Higher Education

Curriculum is "construed in terms of societal, policy, programmatic, and classroom curricula that give social meaning, normative and operational frameworks, and educational quality to the practice of

teaching" (Deng, 2017, 2). According to Garcia-Huidobro (2017, 2), curriculum is understood "as the social agreement about what should be learned in schools, and the structures which have to be put in place for this learning to happen". That is, curriculum is more than organized study plans within a discipline which is regarded as the community's future vision and aspiration. Therefore, it is assumed that curricula are "more than study plans organized around disciplines. They include the ends of education and should be understood as an expression of a community's aspirations and vision for its future" (Tedesco, Operti & Amadio, 2014, 531). Whereas, curriculum design is described as "all educational experiences that learners have in an educational program, the purpose of which is to achieve goals and objectives that have been developed within a framework of theory and research, past and present professional practice and the changing needs of society" (Parkay *et al.*, 2014 cited in Chan, Cheng, Fong, Fung, Ki, Li, Wong, Wong, Tsoi, 2019, 41). For Mohanasundaram (2018, 54), curriculum design refers to "how we position the curriculum components". Curriculum design, therefore, consists of four main components which include the aim and objectives of the curriculum; knowledge content to realize the aim and objectives; integration of target learning experiences; and, pedagogical approach(es) which is directly related to the instructional program, students, and lecturers (Tedesco *et al.*, 2014; Mohanasundaram, 2018).

According to Deng (2018), the higher education curriculum is traditionally informed by three factors which include educational policies, the institutional programs as well as the classroom environments. Firstly, the policy informed curriculum uses educational discourse and policies to define the relationship between higher education as well as society and culture (Deng, 2018). The curriculum outlines all that should be in the academic system in line with the purposes, objectives, and generic approaches to teaching and learning. Secondly, the program informed the curriculum embodies programs, curricular structures, and higher education subjects by translating the policy curriculum into an effective academic program (Deng, 2018). Together, the policy and program curricula make up the institutional curriculum which consists of "curriculum guidelines, syllabi, and related instructional materials provided to an academic system that gives meaning to, and seeks to direct and support, the practice of teaching and learning in a classroom" (Westbury, 2008; Deng,

2018:158). Lastly, the institutional classroom curriculum is largely dependent on lecturers' delivery of the policy and program curricula in the classroom (Deng, 2018). The lecturer is regarded as the curriculum maker who must convert the institutional curriculum into the classroom curriculum through teaching and learning events and assessment tasks informed by the policy and program curricula (Deng, 2018). That is, the institutional curriculum is an important frame of reference for lecturers' conceptualisation in terms of the knowledge they must possess and how it shall be delivered in the classroom in line with students' prior knowledge and experiences.

The concept of "internationalisation of the curriculum with a connectivism approach", was proposed by Aponte and Peña (2018) and Aponte & Jordan (2019:413) as "a new paradigm to manage the internationalisation process at the institutional level, of academic programs and learning environments, from internal nodes to outside networks where communities, knowledge, experiences, subjects, and learning can connect globally". This conceptualisation considers universities as systems with objectives, strategies, and methods that must be redefined to develop communication and learning networks within itself and the global society (Aponte & Jordan, 2019; Ojo *et al.*, 2019). Therefore, the curriculum must respond to internationalisation through various ways of accessing knowledge, promoting active, collaborative, and interactive learning mainly through the online pedagogy to create international connections in higher education (Mohanasundaram, 2018; Aponte & Jordan, 2019). The approach consists of 50 criteria that are spread across, institutional dimensions, a dimension of the academic programs, and the dimension of the learning environments (Aponte & Jordan, 2019). The criteria are meant to diagnose, plan, manage, and evaluate the curriculum by taking into consideration the context and reality in universities are located.

#### **4. Online Pedagogies in Face-To-Face Universities During Covid-19 Pandemic**

Accordingly, curriculum and pedagogy are regarded as conceptually and practically distinct. That is, the curriculum is the totality of all components that are required to successfully ensure that students are learning inclusive of pedagogy which is regarded as the method of delivery of both the theoretical and practical knowledge content (Tedesco *et al.*, 2014). With the world currently facing a health crisis due

to the spread of COVID-19, higher education also had to respond accordingly. In reducing the transmission of the COVID-19, many countries developed responsive measures to control and prevent infection by mainly limiting physical contact between people (World Health Organization, 2020). Given that governments enforced movement restrictions mostly through lockdowns, the higher education also responded accordingly by ensuring a safe and healthy environment through the protection of its staff and students by allowing them to work from home (Cao *et al.*, 2020; Crawford *et al.*, 2020). Therefore, higher education face-to-face institutions had to move from conventional and blended teaching and learning methods to online pedagogies to deliver courses and save the 2020 academic year by adjusting their curricula (Ali, 2020; Daniel, 2020; Murphy, 2020; Patricia, 2020). The majority of institutions adjusted their curricula where possible by adopting the online pedagogy which allows for teaching and learning to continue remotely (Ali, 2020; Cao *et al.*, 2020; Crawford *et al.*, 2020; Daniel, 2020; Murphy, 2020; Patricia, 2020). According to Wang *et al.*, (2013) and Wilde & Hsu (2019, both cited in Patricia, 2020), online or remote teaching and learning implies that students and lecturers are physically distant from each other and therefore, require adjustments in the curriculum. That is, an appropriate delivery method for their teaching and learning interactions facilitated through technology as well as the redesign of learning environments are important adjustments to be made in the curriculum.

These remote online pedagogies are either asynchronous classes or synchronous teaching and learning platforms depending on both lecturers' and students' access to information and communication technology (ICT) resources (Crawford *et al.*, 2020; Daniel, 2020; Murphy, 2020; Patricia, 2020). Asynchronous classes require lecturers to record lectures and prepare online assessments which students can complete at their own time and pace whereas synchronous teaching and learning occurs through a specified medium such as LMS and Zoom, among others, during a specific arranged time (Crawford *et al.*, 2020; Patricia, 2020). Evidently, during the COVID-19 pandemic, online pedagogies had borne prosperous benefits related to improved students' performance as well as the continuation of the academic programs. Gonzalez, de la Rubia, Hincz, Lopez, Subirats, Fort and Sacha (2020) observed that during COVID-19, students' performance has improved compared to the previous year's cohort.

Accordingly, the observation was based on the analysis of both online and face-to-face conducted assessments during COVID-19 and there has been a noteworthy improvement in students' scores. Regardless of the sudden change from face-to-face to an online teaching and learning environment, most students managed to academically perform well mainly because of their knowledge and skills of the and confidence they have in the technology (Cao *et al.*, 2020; Crawford *et al.*, 2020; Gonzalez *et al.*, 2020). Technology and acceptance of the users allowed students and lecturers to effectively and mutually engage and collaborate for teaching and learning purposes (Bower, 2019; Patricia, 2020). However, if students do not have skills and knowledge of and lack confidence in technology, their academic performance will be adversely affected (Bower, 2019). On the other hand, some lecturers and students have indicated difficulties related to online pedagogies and completing academic work (Gonzalez *et al.*, 2020; Patricia, 2020). Therefore, understanding both lecturers' and students' preferences and challenges can assist in higher education institutions in developing curricula that are fit for both face-to-face and online pedagogies.

## 5. Prospects and Challenges of Online Pedagogy During Covid-19 Lockdown for Geospatial Technology for Development Curriculum at UI

Generally, there are two categories of curriculum design-related challenges which are inclusive of "lack of institutional and curriculum support" and "operational challenges" regarding conceptualisation, teaching pedagogy, and assessment (Chan *et al.*, 2017; Tomczyk, 2020). In the first category of "lack of institutional and curriculum support", two main challenges have been identified as "lack of curriculum considerations and alignments" as well as "limited professional development provided to academic staff" (Chan *et al.*, 2017; Palvia, Aeron, Gupta, Mahapatra, Parida, Rosner & Sindhi, 2018; Tomczyk, 2020). Firstly, lack of curriculum considerations and alignments is concerned with the swiftly altering of the labor market skills requirements which force higher education curriculum designs to keep up with the modern labor needs by providing students with appropriate knowledge and training (Tomczyk, 2020). However, more often, higher education practices hardly match employers' expectations and needs from graduates. Due to technological advancements, curriculum and academic training

become outdated leaving higher education with alignment challenges between curriculum design and the labor market (Chan *et al.*, 2017; Tomczyk, 2020). Secondly, limited professional development that is provided to academic staff compromises the planning and delivery of curriculum in higher education (Chan *et al.*, 2017; Palvia *et al.*, 2018). Given globalization and massification effects, there is a need for academic staff to be constantly trained to ensure that they deliver the correct curriculum at the appropriate time. However, the majority of academic staff in most institutions of higher learning remain with limited and sometimes without professional development.

Operational challenges, conceptualisation, teaching pedagogy, and assessment seem to be the most challenging aspects of the curriculum design. The lack of clarity about the conceptualisation of the curriculum is one of the major challenges of the design and implementation of the curriculum in higher education. Barrie (2005) and Chan *et al.* (2017) urgently called for explanation of the conceptualisation of curriculum that is needed as a conceptual base on which teaching and learning could be built. In addition to lack of clarification of the curriculum, lack of consensus on the translation of precise abilities that often appear in the curriculum's outcomes statements and objectives is also a challenge to achieve through teaching and learning. Therefore, these lead to inconsistency in teaching and learning modes and strategies which results in curriculum variations. Traditionally, teaching pedagogy seems to have adopted the culture of a lecturer-centred approach wherein students are mostly unwilling to take an active role in their learning (Chan *et al.*, 2017; Palvia *et al.*, 2018; Tomczyk, 2020). Therefore, it is challenging to convince academics that curriculum should be delivered through a student-centered as well as a process-focused approach (Chan, 2012; Tomczyk, 2020). Even when academics try to integrate extra activities to activate students' participation in their learning, mostly their efforts go unrecognized as students are reluctant to the changes (Tomczyk, 2020). Therefore, it is important to ensure that students' active learning and tasks are well and structured in the course' curriculum. Although traditional methods of assessment which include tests, assignments, presentations, and exams cannot effectively assess all competencies, there is still limited assessment innovation in higher education. That is the development of academics' understanding and expertise in the assessment that is directly reflected in students'



learning in response to the curriculum objectives and outcomes.

Curricula across global universities have been subjected to change given that online pedagogies have been adopted to save the 2020 academic year and Geography Information Systems (GIS) is not an exception. According to Dempsey (2012, as cited in Acquah, Asamoah & Konadu, 2017, 209) GIS is a "technological field that incorporates geographical features with tabular data to map, analyze, and assess real-world problems". Its power lies in the integration of both spatial and attribute of geographical data that are represented to support decision making in various organisations, educational, governments, educational, and research institutions (Acquah *et al.*, 2017). Given its nature, GIS is taught in various professional disciplines including built and natural environment; town and regional planning; tourism; engineering, creative arts, and technology; applied sciences as well as development planning and management, among others. At the University of Limpopo, GIS as a module is offered across various disciplines inclusive of development planning and management. The module is called GeoSpatial Technology for Development Planning and is offered at an honours level of study. To honor the COVID-19 related regulations, the module's curriculum was adjusted and online pedagogies were adopted. In the process, there were several challenges which were experienced related to implementation, unavailability of GIS resources and infrastructure, unstable network connections, lack of access to digital updated geographic data, and, limited or lack of ICT knowledge and skills in students (Acquah *et al.*, 2017; Palvia *et al.*, 2018; König, Jäger-Biela & Glutsch, 2020; Rapanta, Botturi, Goodyear, Guàrdia & Koole, 2020).

The GIS implementation challenge experienced globally is mainly due to practical and conceptual requirements. Practical challenges include unsustainable funding and lack of or poor maintenance of the required software, hardware as well as other infrastructure (Acquah *et al.*, 2017; Palvia *et al.*, 2018). Conceptually, the challenge revolves around the unapproved reorganising of the curriculum including the adoption of new teaching and learning methods (Acquah *et al.*, 2017). At the University of Limpopo, purchasing and maintains GIS software is the responsibility of departments that have GIS modules. Generally, the GIS software packages are very costly and need substantial investments for procurement

as well as maintenance. Unlike any other software which are purchased and facilitated by the ICT section of the university, departments must have budgets to be able to buy and maintain the GIS software. The software is usually installed on university hardware in selected campus computer laboratories and not on students' computers or laptops. Therefore, during the higher levels of lockdown, teaching and learning could not continue online as students did not have access to the software. Conceptually, GeoSpatial Technology for Development Planning is initially delivered through face-to-face contact sessions, and therefore, the curriculum was revised to suit the adoption of the online pedagogies. The challenge is that the revisions were not approved through the formal structures and processes of the university.

The unavailability, limited and the low level of adequacy of GIS resources and infrastructure in higher education institutions determine the success or failure of teaching and learning (Acquah *et al.*, 2017; Rapanta *et al.*, 2020). These resources and infrastructure include computer laboratory spaces, hardware and software availability as well as geospatial data which are all necessary for successful teaching and learning (Acquah *et al.*, 2017). Although the departments within the University of Limpopo have limited access to these resources and infrastructure, they were not available for teaching and learning during the COVID-19 lockdown. As a result, GIS teaching and learning had to be put on hold until students return to campus for either face-to-face or online pedagogies. In addition to the online platform used for teaching and learning, GIS software also requires a stable and ongoing network connection (Acquah *et al.*, 2017; Rapanta *et al.*, 2020). Stable and ongoing network connectivity is one of the elements that determine the success or failure of the GIS online pedagogies. For the University of Limpopo, unstable network connectivity was one of the major challenges during the lockdown. In most cases, students complained of poor network which eventually locks them off the classes. Therefore, given that GIS requires stable network connectivity, it was impossible to successfully implement the adopted online pedagogies as indicated in the revised GeoSpatial Technology for Development Planning curriculum.

In addition to the implementation, unavailability of GIS resources and infrastructure, unstable network connections challenges, lack of access to and outdated digital geographic data is also one of the

major challenges (Acquah *et al.*, 2017; König *et al.*, 2020; Rapanta *et al.*, 2020). Access and availability of updated digital geographical data and teaching materials for teaching and learning adversely affect teaching and learning in higher education institutions (Acquah *et al.*, 2017). The purchasing and allocation of digital geographic data necessary for academic purposes is a difficult and expensive task (Acquah *et al.*, 2017). Moreover, most of the available data is in printed maps and not up to date whereas required electronic resources and infrastructures such as digitizers and scanners for converting prints into the digital formats and data are also not easily and conveniently available (Acquah *et al.*, 2017; König *et al.*, 2020). Additionally, most of these data have compatibility related issues since they are developed from different projection systems. In some countries, some organisations provide GIS data for academic purposes at a low cost or for free, however, in South Africa such do not exist where students and lecturers can easily access data. The Department of Development Planning and Management is also faced with similar challenges and as a result, relies on outdated geographic digital data for teaching and learning of GeoSpatial Technology for Development Planning. Ideally, the mapping of the spread of the COVID-19 is key to development but unfortunately getting access to the geographic digital data in that regard is difficult. That is, lack of updated spatial data prevents teaching and learning to focus on current issues. Another factor that contributes to the failure of online pedagogies is the limited or lack of ICT knowledge and skills in students at universities (Acquah *et al.*, 2017; Palvia *et al.*, 2018; König *et al.*, 2020; Rapanta *et al.*, 2020). Given that GIS is a computer-based application, basic ICT knowledge and skills are necessary for its successful teaching and learning and GeoSpatial Technology for Development Planning is not an exception. Therefore, basic computer literacy is a prerequisite for the GIS modules. Accordingly, students who hold high levels of computer literacy seem to better understand the concepts and application thereof and are also able to effectively manipulate the system compared to those with low levels of knowledge and skills. Online pedagogies could not succeed because the majority of students still lack the necessary computer knowledge and skills.

## 6. Conclusion and Recommendations

This paper discussed the implementation challenges of online pedagogy for GeoSpatial Technology for

Development Planning during COVID-19 pandemic. Accordingly, the nature of curriculum conceptions and design in higher education, as well as online pedagogies in face-to-face universities during COVID-19 pandemic, were discussed. Additionally, the transition from conventional didactics to online pedagogy during the COVID-19 pandemic with a focus on prospects and challenges is discussed. The discussion used GeoSpatial Technology Module at honours level of study at the University of Limpopo as a case. The paper concludes that the successful implementation of online pedagogies at an honours level of study during COVID-19 pandemic with specific reflections from GeoSpatial Technology for Development Curriculum at the University of Limpopo depends on well-established ICT resources and infrastructure as well as students' knowledge and skills.

In responding to the identified challenges to ensure successful implementation of online pedagogies in GeoSpatial Technology for Development Curriculum at the University of Limpopo during COVID-19 pandemic and beyond, the following are the recommended measures:

### 6.1 Implementation Challenges

Both practical and conceptual challenges experienced at the University of Limpopo must be adequately addressed. For practical challenges, sustainable funding and maintenance of the required software, hardware as well as other infrastructural needs must be ensured. That is, purchasing and maintenance of GIS software should be centralised. The software must be installed on university hardware in all campus computer laboratories and while temporary licences must be installed on all GIS registered students' laptops and computers. Conceptually, reorganising the curriculum including the adoption of new teaching and learning methods must be formally addressed through the university's formal processes and structures. Revised curriculum to suit the adoption of the online pedagogies must be approved through the formal structures and processes of the university.

### 6.2 Unavailability of GIS Resources and Infrastructure

The unavailability, limited, and the low level of adequacy of GIS resources and infrastructure at the University of Limpopo leads to failure of teaching and learning. Therefore, the university must provide

adequate and efficient resources and infrastructure which include computer laboratory spaces, hardware, and software availability as well as geospatial data which are all necessary for successful teaching and learning.

### 6.3 Unstable Network Connections

Stable and ongoing network connectivity is a requirement for the success of the implementation of GIS online pedagogies. Therefore, technical challenges that lead to unstable network connectivity must be attended to by the university. The unstable network connection is in some cases, due to students' geographic locations. Given the spatial disparities across South Africa, there are areas, mostly rural areas which still experience connectivity challenges as a result of lack of and/or limited required infrastructure. In such cases, students must be allowed to return to the university campus where they will be able to access the internet network.

### 6.4 Lack of Access to Digital Updated Geographic Data

Access and availability of updated digital geographic data and instructional materials for online pedagogies are one of the major requirements for successful teaching and learning of GIS. Therefore, the purchasing and allocation of digital geographic data necessary for academic purposes should be simplified and be less expensive. Scanners and digitizers for converting prints into the digital formats and data must be readily and conveniently available within the University of Limpopo. A common projection system must be adopted globally to ensure the compatibility of data across the world, that the university can also benefit from. South Africa like other few countries, must establish organisations that will provide updated GIS data for academic purposes at a low cost or even for free.

### 6.5 Limited or Lack of Students' ICT Knowledge and Skills

Because GIS is a computer-based application, University of Limpopo students must be trained on basic computer knowledge and skills. Seemingly, students who never received any form of computer training struggled with the module. Therefore, a mandatory basic computer training or module should be provided to students who are registered for this module.

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