



COMMONWEALTH *of* LEARNING

**Establishing Online
Learning for
Emlalatini
Development
Centre (EDC): A
desktop research
study**

Establishing Online Learning for
Emlalatini Development Centre (EDC):
A desktop research study



COMMONWEALTH *of* LEARNING

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Acknowledgements

This report was prepared by Simon S. Maseko, Dr Chandraiah Esampally, Dr Khetsiwe E. Mthethwa-Kunene and Dr Nkhululeko Dlamini-Nxumalo. Thanks to Dr Tony Mays, Education Specialist: Open Schooling, Commonwealth of Learning, Canada for his support and help in taking up this project and completing it and to the authorities of the EDC, particularly the Principal, Mr. Glen Mazibuko and Vice Principal, Mr. Simon Maseko, for their constant support in coordinating the project and providing required information as and when necessary.

Published by:

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Definition of ODL terms

Blended learning can be defined as a teaching and learning approach that uses Web-based teaching and learning modes and face-to-face interaction. In areas with low connectivity access or high cost, thereof, it is important that learners are able to complete a lot of the work offline such as download resources and work through it, draft an assignment offline, and then upload online when ready.

Community of Inquiry is described as an educational community of inquiry whereby a group of people who work collaboratively engaged in purposeful critical discourse and reflection to construct personal meaning and confirm mutual understanding.

Interaction: Increased student-to-teacher and student-to-student interaction and discussion; a more student-centred learning environment; less passive listening and more active learning; a greater sense of connectedness, synergy.

Online Collaborative Learning (OCL) is a new theory of learning that focuses on collaborative learning, knowledge building, and Internet use as a means to reshape formal, non-formal, and informal education for the Knowledge Age.

Online Learning (eLearning) is education that takes place over the Internet. It is often referred to as “e-learning” among other terms. Online learning uses the internet as a delivery modality to offer thoughtfully designed, quality, student-focused learning experiences, built on proven best practices that create effective interactions between learners, peers, instructors, and content.

Open and Distance Learning (ODL): an approach to learning that focuses on freeing learners from the constraints of time, cost, space and place whilst offering flexible learning opportunities. It allows learners to combine work and family responsibilities with study.

Open Schooling is a supplementary or complementary model of schooling, which uses a range of flexible approaches, based on open and distance learning, to provide structured teaching and learning opportunities. It has emerged as a viable alternative to supplement and complement primary and secondary education and can be provided by standalone, independent distance education institutions, or be managed as part of the education ministry within a specific directorate.

Teaching and learning processes, Information and material content, Presentation product and format, and System technical and technology (TIPS) is used to offer suggestions to teacher-practitioners as creators and authors of their own OER. The key dimension for quality of OER is thus Fitness for Purpose, and this indicates that the purpose needs to be defined, and this depends on whose perspective we adopt.

Technological Pedagogical Content Knowledge (TPACK): The model postulate that students will use engaging technologies in collaborative, inquiry-based learning environments with teachers who are willing and able to use technology’s power to assist them in transforming knowledge and skills into products, solutions and new information.

Technology Acceptance Model (TAM) is a descriptive tool that is used to analyse the level of instruction and technology in a primary or secondary classroom.

Acronyms

AEC	:	Annual Education Census
AU	:	African Union
CBTLS	:	Competency Based Teaching-Learning System
CEMCA:		Commonwealth Educational Media Centre for Asia
CHE	:	Council of Higher Education
Col	:	Community of Inquiry
COL	:	Commonwealth of Learning
DHET	:	Department of Higher Education and Training
ECCD	:	Early Childhood Care and Development
ECESWA:		Examination Council of Eswatini
EDC	:	Emlalatini Development Centre
EMIS	:	Education Management Information System
EPC	:	Eswatini Primary Certificate
HE	:	Higher Education
HoTEL	:	Holistic Approach to Technology Enhanced Learning
ICDE	:	International Council for Open and Distance Education
ICT	:	Information Communication Technology
ICTs	:	Information Communications Technologies
IGCSE	:	International General Certificate in Secondary Education
IT	:	Information Technology
JC	:	Junior Certificate
M&E	:	Monitoring and Evaluation
MoET	:	Ministry of Education and Training
MOOCs:		Massive Open Online Courses
NADEOSA:		National Association of Distance Education Organizations of South Africa

NCC	:	National Curriculum Centre
LMS	:	Learning Management System
OCL	:	Online Collaborative Learning
OBE	:	Outcomes-Based Education
ODL	:	Open and Distance Learning
ODeL	:	Open Distance and eLearning
OER	:	Open Educational Resources
OLE	:	Online Learning Environment
OIS	:	Open/Innovative Schooling
OOSC	:	Out Of School Children
OS	:	Open Schooling
PCK	:	Pedagogical Content Knowledge
PDA	:	Personal Digital Assistant
QA	:	Quality Assurance
RECs	:	Regional Education Centres
SADC	:	Southern African Development Community
SAIDE	:	Formerly: South Africa Institute of Distance Education but currently simply using the names Saide to reflect the broadened scope of its activities.
SIEC	:	Swaziland International Education Centre
SDGs	:	Sustainable Development Goals
SGCSE:		Eswatini General Certificate of Secondary Education
TAM	:	Technology Acceptance Model
TEL	:	Technology-Enabled Learning
TIM	:	Technology Integration Matrix
TIPS	:	Teaching and learning processes, Information and material content, Presentation product and format, and System technical and technology

TPACK : Technological Pedagogical Content Knowledge
UIS : UNESCO Institute for Statistics
UK : United Kingdom
UN : United Nations Africa
UNESCO: United Nations Educational, Scientific and Cultural Organization
TV : Television

Abstract

The benefits and facilities of online learning at school level all over the world were not fully realised until the COVID-19 pandemic forced educational institutions to explore the possibilities of teaching-learning through online measures. During the lockdown due to the Covid-19 outbreak, Open Schooling (OS) using online learning as a method of education has become prevalent in many developing countries. However, there was an absence of a long-term strategy or financial support for online learning in general and Open Distance and eLearning in particular for many educational institutions, especially for schools, for establishing online learning platforms. Emlalatini Development Centre (EDC) in Eswatini is no exception.

Further, EDC has experienced declining student enrolment over the past five years. The declining enrolment seems contrary to the needs of the country and hence, prompted EDC to contact the Commonwealth of Learning (COL) through the Ministry of Education and Training for advice and support. As a result, the Ministry of Education and Training, Eswatini held meetings with COL's Education Specialist: Open Schooling, Dr Tony Mays in June 2019 to explore the ongoing development of the Open Schooling model in Eswatini where COL is supporting the implementation. Later, in collaboration with the COL, the EDC constituted a research committee to develop an **Online Learning Model for Emlalatini Development Centre** and submitted this report by end of April 2020. The Research Team conducted desktop research on developing an online learning model for EDC and submitted a report to the Commonwealth of Learning on 30-04-2020.

The literature survey showed that online learning is a growing and exciting new way of learning in the digital era. EDC currently offers its services by means of print-based open and distance learning (ODL), with occasional face-to-face contact sessions. The administration at EDC is also largely manual and paper-based. The administration system would need to be digitalised if EDC is to operate at scale.

Based on the conclusions of the online desktop research, declining enrolment numbers at EDC and the impact of the COVID-19 pandemic it is recommended that:

1. EDC needs to move from the print to blended online learning as per the proposed model which facilitates the students to continue learning from anywhere and anytime at their own pace. Furthermore, online learning implementation is likely to increase student enrolment resulting in the majority of youth and adults completing their secondary education and ultimately improve the economy of the country.
2. Based on the COL's theory of change, EDC needs to develop an online learning platform that is unique to the needs of the institution and is based on the local context.
3. The following things should be put in place to support the successful establishment and implementation of Online Learning for EDC:
 - An IT Department needs to be established at EDC to provide the necessary technical expertise and maintenance of the system.
 - A Quality Assurance Department should also be established at EDC to assure quality provision of education at all stages.
 - There is need to build ICT Infrastructure for an Online Learning Environment.
 - There is need to train teachers to support learning online and to develop or use existing OER to provide quality education through online learning.

Further, it is suggested that after consultation with the Ministry of Education and Training and Commonwealth of Learning, EDC should identify an appropriate online learning platform by calling for proposals from service providers. The successful service provider should set up an online learning platform as per the proposed model and guidelines.

Contents

About the authors	iii
Definition of ODL terms	v
Acronyms	vi
Abstract	ix
1. Introduction	1
1.1 Need for and Importance of the Study	1
1.2 Concept of Online Learning	5
1.3 Objectives of the Study	6
1.4 Research Methodology	6
1.5 Limitations	7
1.6 Plan of the Study	8
2. Profile of Eswatini and Emlalatini Development Centre	8
2.1 Profile of Eswatini (Formerly Swaziland)	8
2.2 Profile of Emlalatini Development Centre (EDC)	12
2.3 Reinventing Emlalatini Development Centre	20
3. Literature review	20
3.1 Introduction	20
3.2 Factors influencing the adoption of eLearning	25
3.3 The effectiveness of e-learning for imparting quality education to learners	27
3.4 Designing Online Learning Models based on Education Learning Theories	28
3.5 Advantages and disadvantages of eLearning	32
3.6 Guidelines for establishing online learning	33
3.7 Standards needed for High School Online Learning	34
4. Online learning ICT frameworks and guidelines for EDC	37
4.1 Theories/models of online learning environment	37
4.2 Theory of change and the online ICT frameworks that inform the formulation of the online learning model and guidelines for EDC	52
4.3 Proposed Model for Blended Online Learning for EDC	55
5. Conclusions and recommendations	57
5.1 Overview	57
5.2 Delivery modes and technologies	57
5.3 Motivation to support EDC's move online	58

5.4 Accessibility and Availability	58
5.5 Teacher training	59
5.6 Summary of Conclusions	59
5.7 Recommendations	60
5.8 ICT guidelines for online learning for EDC	60
5.9 Suggested process for developing a blended online learning platform for EDC	62
References	63
Appendices:	67
Appendix 1: The TIPS Framework of QA Criteria for Teachers as Creators of OER	67
Appendix 2: Proposed timelines and short term outcomes.....	70

Table of figures

Figure 1: Flow rates grade 1-7, 2014-2017 (Source: MoET, 2017 Report, p. 10.)	2
Figure 2: Enrolments at EDC by level and year, 2013-2017 (Source: MoET Netip, 2018, p. 56.)	2
Figure 3: Geographic location of Eswatini	9
Figure 4: Location of EDC	14
Figure 5: Learner enrolment since 2017(Data source: EDC, 2018).....	15
Figure 6: Community of Inquiry model.....	38
Figure 7: Anderson's model of online learning.....	41
Figure 8: Grid illustrating a range of provision (Glennie & Mays, 2013, p. 134)	42
Figure 9: Continua of modes of provision.....	44
Figure 10: Design framework for online learning environments.....	46
Figure 11: TPACK framework (Image from http://tpack.org)	49
Figure 12: The results chain and causality	52
Figure 13: Theory of change	53
Figure 14: Structure for online learning.....	55
Figure 15: Proposed Online Learning Model for EDC	56

Table of tables

Table 1: Eswatini internet usage and population growth 2000-2014	10
Table 2: Eswatini youth unemployment rate from 2015 to 2019	11
Table 3: Characteristics of the current educational model that is used by EDC.....	12
Table 4: Study centres in each region.....	17
Table 5: Subjects offered at EDC, enrolment and lecturer: learner ratio (EDC, 2018)	18
Table 6: ICT initiatives in Mauritius since the 1990s.....	21
Table 7: Connectivity for different sub-Saharan Africa countries	23
Table 8: The impact of different conceptions of learning on practice	31
Table 9: TIM matrix.....	50

COL PROJECT

ESTABLISHING ONLINE LEARNING FOR EMLALATINI DEVELOPMENT CENTRE (EDC)

1. Introduction

1.1 Need for and Importance of the Study

The benefits and facilities of online learning at school level all over the world were not fully realised until COVID-19 forced educational institutions to explore the possibilities of teaching-learning online after campus closures. Open schooling, using the online learning as a method of education, has now become prevalent in many developing countries. However, there was an absence of financial support, for online learning policy (OLP) in general and Open Distance and eLearning (ODeL) in particular for many educational institutions, especially schools for establishing online learning platforms. Emlalatini Development Centre is no exception.

Enrolment numbers are rising rapidly, particularly at the secondary school level. But quality assurance remains limited. Open schooling must mean access to quality education, otherwise its introduction becomes counterproductive. The Commonwealth of Learning (COL) supports the expansion of Open and Distance Learning (ODL) to meet the growing need for primary and secondary education, as well as lifelong learning. The expansion of secondary education is now the world's most pressing educational challenge (www.col.org).

Goal 4 of the Sustainable Development Goals (SDGs) aims to ensure inclusive and quality education for all and promote lifelong learning. One target is to ensure that all girls and boys complete free, equitable and quality primary and secondary education by 2030. Yet, this is impossible to achieve within present mainstream education systems.

According to the Annual Education Census for 2017 in Eswatini (MoET, 2017), between 8,000 and 10,000 learners dropped out of schooling between Grades 1 and 7, as illustrated in Figure 1 below which shows flow rates for grade 1 to 7, 2014 – 2017.

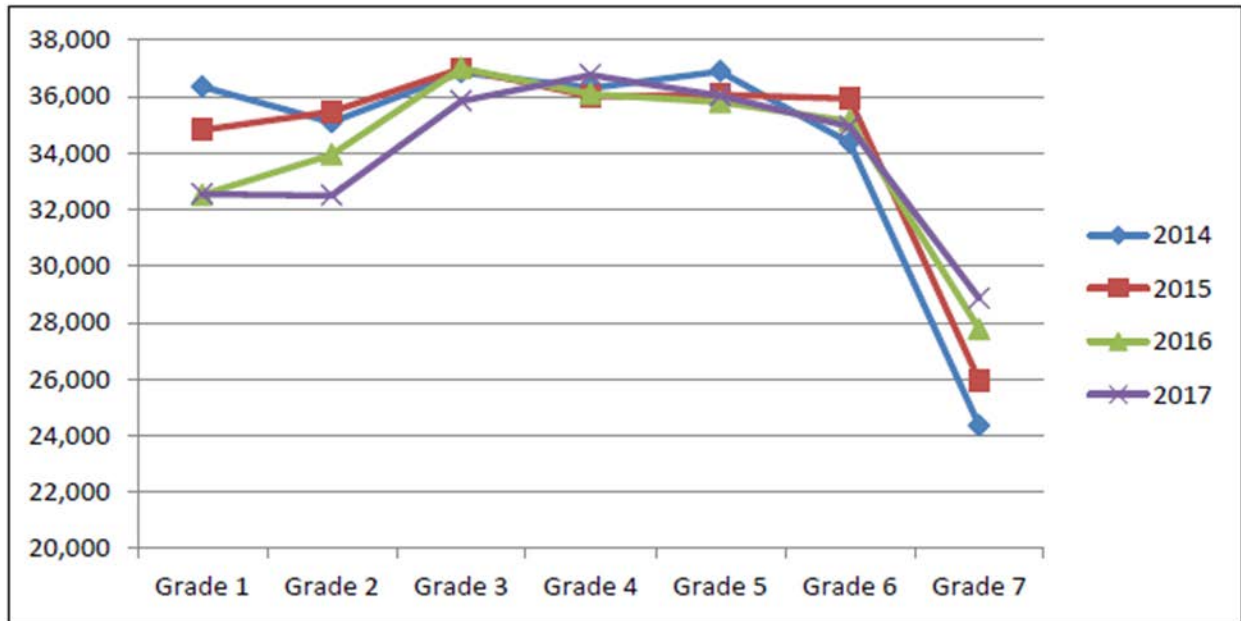


Figure 1: Flow rates grade 1-7, 2014-2017 (Source: MoET, 2017 Report, p. 10.)

Figure 1 above shows that there has been consistent improvement in the numbers of learners reaching Grade 7 but it shows a declining trend that has set in at Grade-7. There is still need for a significant improvement in schooling provision to retain more learners (MoET, 2017). However, Figure 2 below shows the declining enrolments at EDC over 5 years (MoET Netip, 2018).

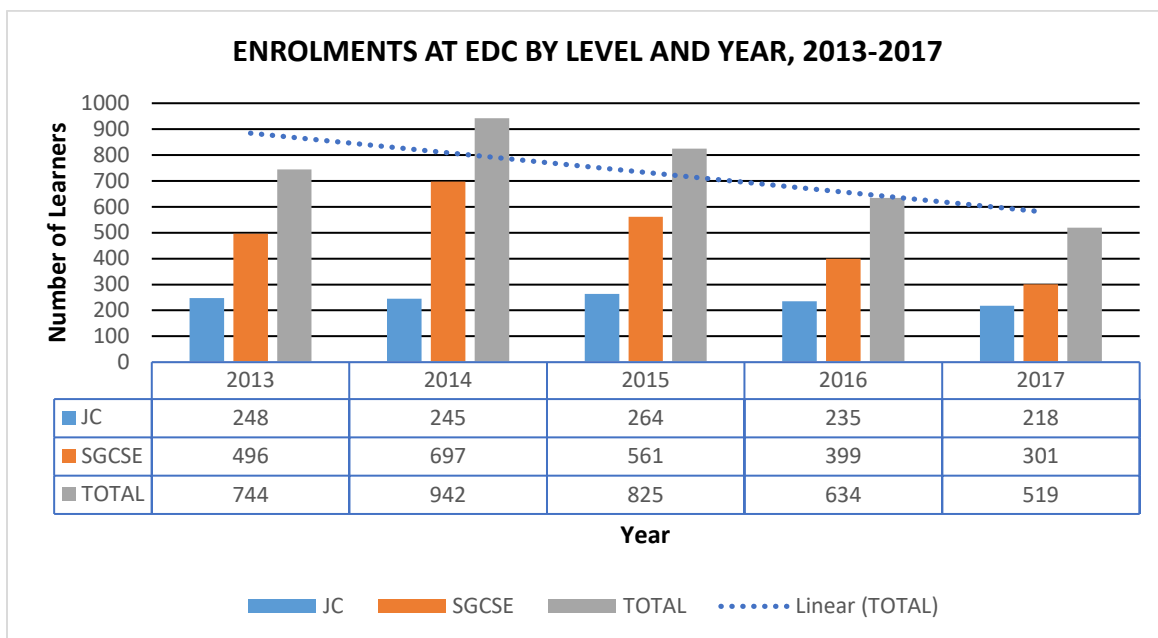


Figure 2: Enrolments at EDC by level and year, 2013-2017 (Source: MoET Netip, 2018, p. 56.)

A comparison between Figures 1 and 2 indicates that in its current mode of operation, EDC is not meeting the needs of the learners who drop out of formal schooling after Grade 6.

In 2016, the UNESCO Institute for Statistics ([UIS, 2016](#)) reported that more than 263 million children and youth were out of school and this number is increasing. More than 200 million are of secondary school age. This situation is a global education crisis. Mainstream schools in developing countries especially, cannot constructively address this crisis as they can hardly cope with the present numbers of learners in schools. These countries are faced with other challenges such as shortages of well-qualified teachers, quality learning resources and a lack of classrooms and other infrastructure. To ensure that developing countries achieve SDG4, which aspires to ensure inclusive and equitable quality education and lifelong learning for all by 2030, a new way of thinking about schooling is required.

Open schooling is a supplementary or complementary model of schooling, which uses a range of flexible approaches, based on open and distance learning, to provide structured teaching and learning opportunities. It has emerged as a viable alternative to supplement and complement primary and secondary education and can be provided by standalone, independent distance education institutions, or be managed as part of the education ministry within a specific directorate. The [open schooling model](#) addresses the challenges of out of school youth without having a disruptive effect on mainstream schooling. Both systems can work symbiotically and can benefit from each other. There is no one perfect model for open schooling; individual countries can tailor the model to match their priorities.

Addressing the challenge of out of school youth (OOSC) requires a multi-dimensional approach. COL has been promoting the open schooling model across the Commonwealth countries. The new approach to open schooling at COL is more holistic and focuses on the training of teachers in eLearning, using open educational resources (OER), improving the management of open schools and supporting the use of appropriate technologies in teaching and learning. This involves integrating the open schooling approach into mainstream schools to enable many out-of-school youths to access formal education and hence, this project was undertaken to develop guidelines for online learning for Emlatini Development Centre, to enable it to reach and support more learners.

1.1.1 Beyond Covid-19: employing open, distance and e-learning methods to open schooling for all

Online learning is booming as more Universities and businesses recognize the benefits it brings to learners. The biggest change that education systems globally have seen this year is the massive shift to e-learning or digital classrooms due to COVID-19. Lockdown and closure of educational institutions due to the Covid-19 pandemic forced most learners, teachers and schools, colleges, Universities to shift to digital learning platforms all over the world. Google and YouTube have

been working to expand access to technology in classrooms, with an equal investment in developing tools, as much as ensuring that educators and learners are equipped to use them.

On 19 March 2020, *The Economist* carried an article titled “**Mid-term Break: How COVID-19 is interrupting children’s education**”. Responding to this article, COL observed that **even without the challenge** of the current pandemic there are around 300 million children worldwide whose schooling is not just interrupted: the opportunity for meaningful and sustained schooling for these learners simply does not exist. It means the traditional classroom is also not optimal in many contexts and online learning is a poor substitute for the kind that happens in a classroom in most contexts. However, hopefully, the post Covid-19, the situation responds positively to have the full range of face-to-face, blended, online and distance options to different educational needs and contexts. COL observes that the article correctly points out that, despite the growth in the use of digital resources, there are few instances of systemic support processes for educational institutions, teachers and learners, and “most states are not prepared.” This is a key area in which COL provides advice and support to Commonwealth countries (COL, 2020a)

1.1.2 Open Schooling with Online Learning Model in Eswatini

The Ministry of Education and Training in Eswatini held meetings with COL’s Education Specialist: Open Schooling, Dr Tony Mays in June 2019 to explore the ongoing development of the Open Schooling (OS) model in Eswatini where COL is supporting the implementation. The discussions reflected on progress made to date and lessons learned while also identifying an Open Schooling with Online Learning Model of Implementation for the future and a related monitoring and evaluation (M&E) strategy.

Currently, administration at EDC is largely manual and paper-based. The administration system will need to be digitised if EDC is to operate at scale. The following areas for improvement have already been identified (Reinventing Emlalati Development Centre - A Proposal for Change, 2019):

- Establish the causes of the misalignment of EDC administrative systems with ODL systems
- Align EDC systems with ODL system
- System for accessing the library at study centres
- Pre-enrolment, on-going during studies and post-graduation learners support
- Learner record keeping system at EDC and study Centres computerized
- Measurement and evaluation system
- Reporting system
- Quality assurance system
- Learner support system
- Learning material development system
- Access to laboratory services at the study centre
- Registration system should be computerized

- Accounting system should be computerized (Maseko, 2019, p. 6).

We hope that the move from the existing model of printed material with face-to-face sessions to online learning with digital resources can help address the logistical challenges inherent in a reliance on the existing model and to help improve access, retention, success and progression.

It is in this context that, in collaboration with COL, the EDC constituted a research team to explore the principles that should inform the Online Learning System for Emlalatini Development Centre (EDC) and to submit a report thereon before 30th of April 2020. The research team, comprising Mr Simon S. Maseko, Prof Chandraiah Esampally, Dr Khetsiwe E. Mthethwa-Kunene and Dr Nkhululeko Dlamini-Nxumalo did desktop research on developing an online learning system for EDC and submitted a report to the Commonwealth of Learning on 30-04-2020.

1.2 Concept of Online Learning

According to Joshua Stem (2005), Online Learning is education that takes place over the Internet. It is often referred to as “e-learning” among other terms. However, online learning is just one type of e-learning - the umbrella term for any learning that involves the use of any digital device or media to facilitate learning. Distance learning has a long history and there are several types available today, including:

- **Correspondence Courses:** conducted through regular mail with little interaction.
- **Telecourses:** where content is delivered via radio or television broadcast.
- **CD-ROM Courses:** where the learner interacts with static computer content.
- **Online Learning:** Internet-based courses offered synchronously and/or asynchronously.
- **Mobile Learning:** by means of devices such as cellular phones, tablets, PDAs and digital audio players (iPods, MP3 players).

By far the most popular approach today is online learning which can also be accessed through mobile devices.

However, online learning can work only if appropriate devices/licences/connectivity are affordable, accessible and available, teachers are adequately trained and supported for online teaching and learners are adequately oriented and motivated.

Jennifer Mathes (2020) defined online learning as “*Online learning uses the internet as a delivery modality to offer thoughtfully designed, quality, learner-focused learning experiences, built on proven best practices that create effective interactions between learners, peers, instructors, and content*”.

Joshua Stem in his research pointed out that some of the main advantages of online learning include:

- **Convenience:** 24/7 access from any online computer; accommodates busy schedules.
- **Enhanced Learning:** Research shows increased depth of understanding and retention of course content; more meaningful discussions; emphasis on writing skills, technology skills, and life skills like time management, independence, and self-discipline.
- **Levelling of the Playing Field:** Learners can take more time to think and reflect before communicating; shy learners tend to thrive online due to anonymity of the online environment.
- **Interaction:** Increased learner-to-teacher and learner-to-learner interaction and discussion; a more learner-centered learning environment; less passive listening and more active learning; a greater sense of connectedness, synergy. However, a study by Bates and Sangra (2011) showed that most online learning was not like this. There is still a lot of talking head transmission of content typical of the broadcast model.
- **Innovative Teaching:** Learner-centered approaches; increased variety and creativity of learning activities; address different learning styles; changes and improvements can translate to on-ground courses as well.
- **Improved Administration:** Time to examine learner work more thoroughly; ability to document and record online interactions; ability to manage grading online.
- **Savings:** Accommodate more learners; increased learner satisfaction resulting in higher retention and fewer repeats.
- **Maximize Physical Resources:** Lessen demand on limited campus infrastructure.
- **Outreach:** Give learners options; reach new learner markets; appeal to current learners thus, increasing enrolments.

However, these are all potential advantages which can be achieved only if the system is designed appropriately for context and teachers are trained and supported. Hence it was necessary to explore the literature to develop a framework for a model appropriate for Eswatini and EDC.

1.3 Objectives of the Study

The objectives of the study are as follows:

1. To develop a research-based motivation to support EDC's move online.
2. To develop criteria / guidelines for an appropriate online/mobile learning management system; and
3. To develop guidelines for establishing online learning for EDC.

1.4 Research Methodology

The research team took advantage of the COVID-19 pandemic lockdown to undertake a desktop research study which collected both qualitative and quantitative secondary data from reliable

sources and analysed it. The research was conducted through a systematic review of literature on models and guidelines for online learning and paid particular attention to secondary education, even though the review of literature covered all levels of education from primary school to tertiary level, including non-formal, adult and continuing education.

There are several research papers reporting about successful online learning environments (OLE). To develop a model and guidelines for introducing online learning at EDC, research papers studied by the authors included online learning theories/models, Information and Communication Technology Frameworks, Blended Learning, integration of collaborative learning technologies¹ guidelines for online learning and effectiveness of online learning, advantages and disadvantages of online learning.

The authors analysed information from distance education, open and distance learning, use of ICTs, mobile learning and online or e-learning from reputable sources such as government websites; international organisations like the Commonwealth of Learning (COL), UNESCO, and the World Bank; books, journals, databases and list servers. Conference proceedings and unpublished reports were also consulted. The literature review offered insights into various aspects of the state of online learning in the region and the continent including guidelines and models used, success stories and challenges. To develop the guidelines for introducing online learning at EDC and the proposed online learning model for EDC, the research team focused on administration and management, curriculum design, course production, quality assurance, learner support, and the use of ICTs, collaborative learning technologies, feedback, evaluation and how the online learning has changed the role of the instructor.

1.5 Limitations

1. Though appropriate care was taken to get accurate information from reliable secondary sources, some sources might not have provided totally accurate data.
2. Since the research team could not access paid sources of websites, the researchers depended on the data that is available on free websites.
3. The time given to carry out the research was very short and hence, the research team was able to write the report with the available data collected.

In view of the limitations mentioned above, the research team recommends that research into good practice in ODeL, blended and online provision should be ongoing. Also, data needs to be collected on learner performance and from learners, teachers and others on what works/does not work and this should then feed back into improved practice.

¹ <https://drive.mobisystems.com/sharelink/66aA5SYmsJwG83vvhV1poJ2YaM3VDyqF8ucr13pEFnuZ>

1.6 Plan of the Study

Based on the objectives, the project study is organised into six chapters including introduction and conclusions and recommendations.

1. **Introduction.** This is introductory in nature. It deals with the rationale for the study as well as the importance and conceptual analysis of online learning. It also covers objectives, methodology and limitations of the study.
2. **Profile of Eswatini and Emlalati Development Centre.**
3. **Review of Literature.** In this the past literature on online learning, guidelines for online learning and various models of online learning were reviewed.
4. **Online learning ICT frameworks and guidelines for EDC**
5. **Conclusions and Recommendations.**

2. Profile of Eswatini and Emlalati Development Centre

2.1 Profile of Eswatini (Formerly Swaziland)

2.1.1 Demographics of Eswatini

Eswatini, officially the Kingdom of Eswatini, was previously called Kingdom of Swaziland. Eswatini is a beautiful landlocked and mountainous country that shares borders with Mozambique and South Africa. It has a population of about 1.3 million people. Britain granted autonomy to Eswatini, at the time Swaziland, in the late 19th century. In 1968, Eswatini was granted independence. In 2006, the country effected a new constitution which created a more independent parliament and judiciary. King Mswati III renamed the country from Swaziland to Eswatini in April 2018. Eswatini is classified as a lower-middle income country even though it is facing severe economic challenges like poverty and unemployment². The area of the country is 17,364 Square kilometres. The major languages in the country are SiSwati and English; and the major religions are Christianity and indigenous beliefs. The country exports sugar, and many Emaswati work in South Africa and send their earnings home. Figure 3 below shows the map of Eswatini and neighbouring countries.

² <https://www.cia.gov/library/publications/the-world-factbook/geos/wz.html>



Figure 3: Geographic location of Eswatini³

2.1.2 The Communication system in Eswatini

The communication system in Eswatini ranges from telephones with fixed lines to mobile cellular, broadcast media, and broadband wireless systems. The communication infrastructure has a geographic coverage of about 90% and a rising subscriber base. The communications system in the country has improved from one mobile cellular provider to two. According to the Central Intelligence Agency's World Factbook 2020, by July 2016, there were 42 000 telephone fixed line subscribers at a subscription ratio of 3 per 100 inhabitants. Mobile cellular subscriptions stood at 995 000 and at a ratio of 68 per 100 inhabitants. Internet users were 414 724, which translates to **28.6%** of the population. By 2018, the telecom sector had expanded from 2G, 3G, 4G and LTE services from 2013. The country stood at 162 for telephone fixed lines and 161 for telephone mobile cellular in comparison to the world.

The telephone system consists of carrier-equipped, open-wire lines and low-capacity, microwave radio relay (CIA, 2020). Satellite earth station – one (1) Intelsat (Atlantic Ocean).

³ <https://geology.com/world/swaziland-satellite-image.shtml>

Broadcast media include one (1) state-owned TV station; satellite dishes can access South African providers; state-owned radio network with three (3) channels; and one (1) private radio station (CIA, 2020).

Broadband - fixed subscriptions: Total: 7,000. Subscriptions per 100 inhabitants: less than 1 (2017 est.). Country comparison to the world: 176 (CIA, 2020). Table 1 shows Eswatini Internet Usage and Population Growth in 2014.

Table 1: Eswatini internet usage and population growth 2000-2014⁴

YEAR	USERS	POPULATION
2000	10,000	1, 143,927
2012	251,448	1,386,914
2014	389, 051	1,435,613

Internet users as of December, 2014 was 27.1% of the population according to IWS. The Gross National Income per capita (2015) is US\$9,714 according to the World Bank

An average person working in Swaziland earns around E5840 per month. The lowest average is E 790 and the highest average is E25, 900 Eswatini minimum wage rate is E531.60 for a domestic worker, E420 for an unskilled worker and E600 for a skilled worker a month. (www.salaryexplorer.com).

MTN Eswatini, Eswatini mobile and Eswatini Postal Telecommunications Centre provide mobile network and internet in Eswatini. These provide affordable packages, for example MTN Eswatini has a package of E2 for 8MB for daily use, while Eswatini mobile has 7MB plus 3.5MB night data for the same amount.

2.1.3 Context of ODL Policy in Eswatini

Eswatini has offered distance education for many decades without a national policy guiding the provision of distance education in the country. This was despite a call by the Southern African Development Community (SADC) Regional Open and Distance Learning Policy Framework of 2012) for all SADC member states to develop a national policy on ODL. SADC countries were encouraged to “integrate Open and Distance Learning (ODL) into the national education and training systems through national policies; and develop ODL policies that are linked to other relevant national policies and are in line with regional, continental and global commitments to education and training in general and ODL in particular” (p. 26). Eswatini’s education provision has been guided by the national Education Policy and other related policies which focus on traditional face-to-face provision.

⁴ <https://www.internetworldstats.com/af.sw.htm>

“The MoET operations are guided by the National Education and Training Sector Policy, the Eswatini’s 1997 National Development Strategy, Vision 2022, Government’s commitments to Global, Continental and Regional Protocols and Conventions. Such global commitments include the United Nations (UN) Agenda 2030, the African Union (AU) Agenda 2063 and the Southern African Development Community (SADC) Protocol on Education and Training. In the National Education and Training Sector Policy (2018), under Higher Education (HE), open and distance learning (ODL) is viewed as critical to optimise access to Higher Education. A dedicated ODL Policy is important for skills development particularly for employability purposes. The National Education and Training Sector Policy (2018) on Information Communication Technology (ICT) states that the MoET shall facilitate an enabling environment for adoption and use of ICT in all education and training establishments. This will be done through the digitisation of information relating to curricula, mobile learning, e-learning, e-assessment and e-governance. Such undertaking will ensure the facilitation of the expansion of ODL by leveraging ICTs.” (Draft National ODL Policy of Eswatini, 2018).

About one in five primary school going aged children does not attend school.⁵ Table 2 shows the youth unemployment rate in Eswatini from 2015 to 2019

Table 2: Eswatini youth unemployment rate from 2015 to 2019

Year	Unemployment rate (%)
2019	45.8
2018	44.15
2017	43.04
2016	43.32
2015	44.7

While the drop-out rate for primary education in 2012 was 25.3 %. Also, among the population aged 15 years old and above, 13% of men and 16% of women have no education. While 3% of men and 3% of women between 15 and 19 years have never attended school⁶.

In 2019, with support from the Commonwealth of Learning, the Ministry of Education and Training developed a National ODL Policy for Eswatini and it is currently at a draft stage. This draft policy lists Emlalatini Development Centre as the only public institution offering secondary education through ODL.

⁵ <https://www.unicef.org/infobycountry/swazi> and 536446.html

⁶ <https://www.statista.com/statistics/813070>

2.2 Profile of Emlalatini Development Centre (EDC)

2.2.1 Foundation of EDC based on National Educational Policies and Open and Distance Learning Theories

The Ministry of Education and Training of Eswatini reported that the Emlalatini Development Centre offers an alternative non-formal education to the formal secondary school system through distance learning combined with face-to-face teaching. EDC follows the same curriculum as the formal secondary schools converting the learning materials to distance-learning modes. The EDC programmes respond to the needs of diverse learners, drop-outs from the secondary school as well as offering a second chance to others who want to upgrade their examination grades to improve their chances to be re-admitted to the formal education system, and at the University or TVETSD. The distance learning mode also provides the opportunity for persons at work to continue their education for further qualification (MoET Netip, 2018).

For EDC to perform well, it is necessary to establish and maintain an educational system that contains an educational model with a supporting infrastructure. This will enable EDC to promote education in three dimensions, namely: a) the educational system will enable the enrolled non-traditional learners to attain the educational objectives (effectiveness), b) it will enable to attain educational objectives as 'lean' as possible, i.e. reducing wasted time from learners and staff (efficiency), c) it is maximal attractive and open for the target groups that are aimed at and as closed as possible for other groups (accessibility). It will be required to monitor whether the educational system and infrastructure of EDC are still best on these aspects or it needs to be changed.

Table 3 presents the characteristics of the current educational model that is used by Emlalatini Development Centre. It is adapted from Moore and Kearsley (2012).

Table 3: Characteristics of the current educational model that is used by EDC

Aspect	Current educational model
Mission	To use dedicated academic and support staff to provide access to quality and affordable Open and Distance Learning to the youth and adults of Swaziland and the SADC region as a whole, cost-effectively and cost-efficiently. To continuously improve on our service delivery to reach the highest levels of excellence by integrating current and relevant information and communication systems (ICTs) in all departments.
Delivery Mode	Workbooks and audio
Admission requirements	Learners who have completed and passed Eswatini Primary Certificate
Study orientation	Tutors orient learners after they have registered.
Study start	It is open, learners can register anytime in the year.
Curriculum design	JC: English, History, Mathematics, Science, Siswati, Commerce, Business Studies, Book-keeping and Accounts and Religious Education SGCSE: English, History, Mathematics, Biology, Siswati

Aspect	Current educational model
Subscription and payment	
Time constraints	Learners can study at any place e.g. Home, Library.
Pacing	Learners determine their own pace.
Location	Learners can be in any location.
Instruction	Workbooks and audio
Study activities	Learners are expected to use their workbooks, which have exercises and tests.
Tutoring	Each department has one tutor except for the English department which has three tutors. They are always available for learners by appointment.
Mentoring	Tutors also serve as mentors.
Testing and exams	Tests are written on completion of a module. The learners write the examination set by the Examination Council of Eswatini.

The history of ODL in Eswatini, dates to the early 1970s when the Danish Government established Ephesus House Correspondence School. Originally located at Ephesus House and called the Swaziland International Education Centre, the centre started out as a project sponsored by the Danish government to help South African refugees to continue with their education through correspondence studies and its mandate was subsequently expanded to include citizens of Swaziland (SIEC, u.d.). In 1978, the project came to an end and the centre became part of the Ministry of Education and was renamed Emlalatini Development Centre (EDC) in 1981 (Draft National ODL Policy of Eswatini, 2018).

In the Swaziland Education and Training Sector Policy of April, 2011, under Non-Formal and Continuing Education Policy Objectives (page 40), the Ministry of Education and Training shall, “Incorporate and upgrade Emlalatini Development Centre (EDC) to become a fully-fledged Open and Distance Learning (ODL) institution.”

In the Medium Term, the same policy states that the Ministry of Education and Training shall, “Strengthen Emlalatini Development Centre (EDC) to widen the range of curricula options and diversify services by using re-capacitated Regional Education Centres (RECs) and selected primary/secondary schools as delivery centres to ensure the use of ICT and ODL where feasible in course development and delivery and to differentiate delivery modes for different learner groups such as children, adolescents and adults.”

Over the years, Government have increasingly realized that the financial resources available for conventional schooling fall short of the increased demand for education and training. ODL therefore provides an amicable solution to ensuring that Governments reach the presently unreachable and provide educational access to all.” (Report on the Proposed Rehabilitation and Expansion of Open and Distance Learning at Emlalatini Development Centre, Ministry of Education and Training, Emlalatini Comprehensive Plan 2011-2015).

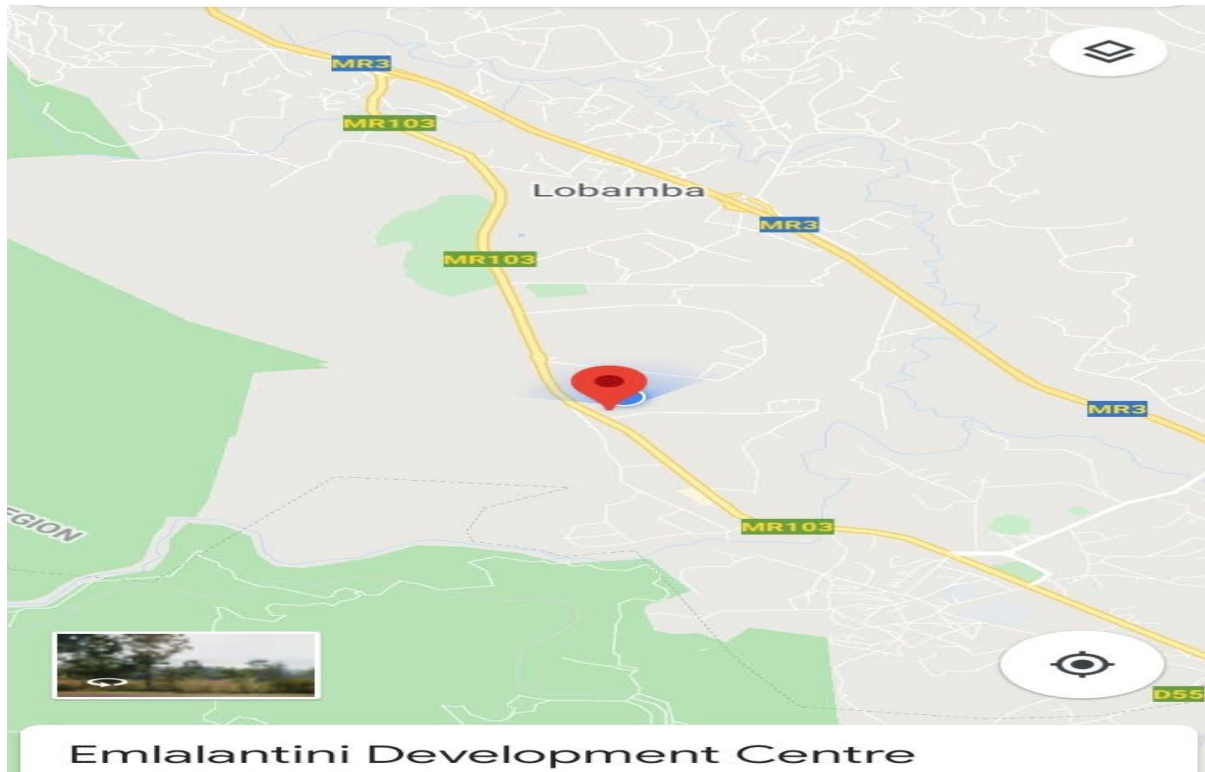


Figure 4: Location of EDC⁷

2.2.2 EDC Mandate

A recent report proposed rehabilitation and expansion of Open and Distance Learning at Emlalantini Development Centre, as part of the Ministry of Education and Training, *Emlalantini Comprehensive Plan of 2011-2016*.

In this Report, EDC is expected to:

1. Review and broaden its curriculum by introducing new subjects.
2. Broaden its scope to cover primary education by introducing primary education programmes to complement *Sebenta*, an institution for Non-formal Adult and Literacy Education.
3. Strengthen existing programmes by upgrading the Science Laboratory.
4. Increase the size of the academic and support staff.
5. Revive Study Centres in Regional Education Centres.
6. Put in place Learner Support Systems, including ICTs and employing a Learner Advisor, amongst **others**.

⁷ <https://maps.google.com/>

2.2.3 Subjects offered at EDC

The following subjects are offered at EDC.

(A) SWAZILAND GENERAL CERTIFICATE OF SECONDARY EDUCATION (SGCSE)

- | | | |
|---------------------|---------------------|-------------|
| 1. English Language | 2. Mathematics | 3. History |
| 4. Siswati Language | 5. Business Studies | 6. Accounts |
| 7. Biology. | | |

Sebenta: is a non-profit making organization that provides a variety of services to enable people to achieve personal goal through Adult Basic Literacy and Non-formal Education

Currently following the subjects which are offered by the MoET in schools are not offered at EDC.

- | | | |
|------------------------|---------------------------|---------------------------|
| 1. Physical Science | 2. Information Technology | 3. Geography |
| 4. Religious Education | 5. English Literature | 6. Prevocational Subjects |

(B) JUNIOR CERTIFICATE (JC)

- | | | |
|-----------------------|---------------------|-----------------|
| 1. English Language | 2. Mathematics | 3. History |
| 4. Siswati Language | 5. Business Studies | 6. Book-keeping |
| 7. Integrated Science | 8. Literature | |

Currently following the subjects which are offered by the MoET in schools but are not offered at EDC.

- | | |
|---------------------------|--------------|
| 1. Prevocational Subjects | 2. Geography |
|---------------------------|--------------|

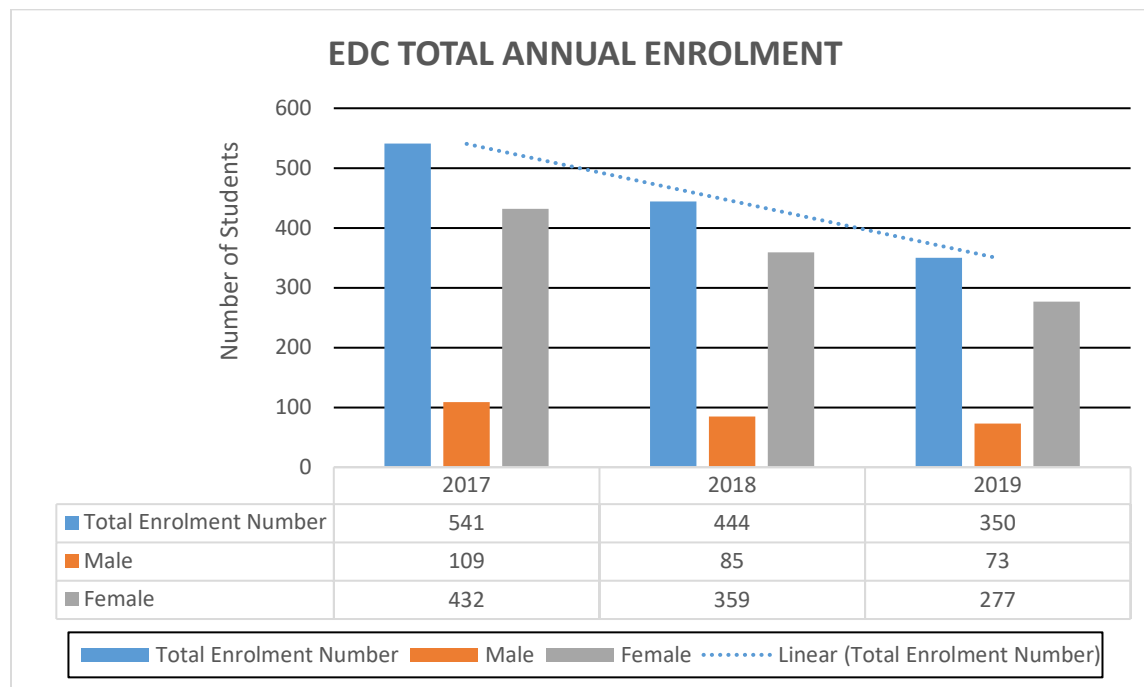


Figure 5: Learner enrolment since 2017 (Data source: EDC, 2018, 2019)

The statistics presented in Figure 5 above show that learner enrolment for EDC has been decreasing over the three-year period. The decline was most likely because of the review of fees which was done in 2019. This confirms the need for ODL because literature shows that ODL is lower in costs compared to conventional learning. There's a variance of 22 learners between Figure 2 and Figure 5. In Figure 2, the 22 learners from 2016 are excluded in 2017 for accuracy.

2.2.4 Profile of EDC learners

The profile of learners at EDC according to EDC report (2018) are:

34 % youth and 66 % are adults, that is, 180 learners less than 18 years and 348 learners greater than 18 years in 2018. The profile shows that EDC accommodates all type of learners, young and old, irrespective of their age and gives them an opportunity (a second chance in life) to complete their secondary education. About 81 % are women and 19 % are men, with an enrolment of 444

2.2.5 Delivery Modes and Technologies

Workbooks are the main teaching material used by the learners at EDC, this is noted in the excerpt:

“Learners at EDC use self-access study materials, which are referred to as workbooks. This is the main support for the learners. Most of the workbooks are self-contained, however, some courses make use of textbooks. Each workbook contains self-check practice exercises that are designed to help learners to learn to remember. The workbooks also contain tests which the learners are expected to complete and send to EDC for informative feedback. Difficulty sheets are supplied with the workbooks and learners receive guidance on how to complete them. They are expected to present any challenges they come across to their tutors who then respond to the learners’ concerns. However, this form of support is outdated and problematic because of the delays in the postal system”⁸.

In addition to the use of workbooks, learners are also expected to avail themselves for face-to-face support in the following ways:

- Residential course in April/ May for a week. Learners receive intensive support from their tutors.
- Both Junior Certificate (JC) and Swaziland General Certificate of Secondary Education (SGCSE) learners come attend learning sessions on Tuesday, Thursday and Saturday.
- During the week, learners can arrange to meet their tutors at EDC for private face-to-face sessions.

2.2.6 Learning support strategies

Emlalatini Development Centre has eight operational development centres which have been established at the following rural education centres

⁸ <http://colfinder.net/materials/Supporting>

The study centres are classified according to the four regions in the country as shown in Table 4 below.

Table 4: Study centres in each region

Manzini	Hhohho	Lubombo	Shiselweni
1. Siphofaneni High School 2. Kwaluseni Primary School 3. Mankayane High School	1. Ezulwini (EDC)	1. Lubombo Central High School	1. New Haven Bible College 2. Edwaleni High School

The location of the study centres shows that there is an uneven distribution. In addition, these centres are used mainly to distribute teaching materials to learners, and thus learners are still expected to attend face-to-face sessions at EDC. Only a few learners manage to attend these sessions because of different challenges which include financial means to get to EDC. Some cannot attend because they are held up at work. This indicates the greater need for ICT because it implies that accessibility is still a challenge for some learners, yet technology breaks the boundaries, making it possible for most learners to have access to information. This can be possible because statistics in Table 1 show that a number of Swazis use cell phones. However, two additional study centres are not yet operating, as negotiations are still on-going, these are in Big Bend and Simunye.

Study Centre Coordinators have been employed and trained by EDC to do all the administrative duties at the study centres, including registration and monitoring tutorial sessions on Saturdays.

Other learning support strategies that are used by EDC are:

- Telephonic and postal support
- Audio/CDs- used on by the English department
- Tutorial sessions
- Providing learners with self-instructional material
- Pre-course, in-course and post-course counselling service.

From the learning support that is used, it is evident that technology is used minimally. This makes it impossible for EDC to realise its goal fully, that of offering the best support to their learners and to reach them in the four regions of the country. This is worsened by that some of the learners cannot attend the face-to-face sessions because they are held up at work and others have challenges financially. Most of the ones who attend are in the Manzini and Hhohho region because they are closer to EDC. According to the EDC report, one of its mandates is:

“To ensure the use of ICT and ODL where feasible in course development and delivery. To differentiate delivery modes for different learner groups such as children, adolescents and adults.”

Using digital support such as email, social media, broadcast and telephone can enable EDC to reach out to most learners so that they do not lag behind.

It is important to use different teaching methods because learners have different learning styles and have different needs, thus using different methods helps to accommodate their different needs, for example assistive technology for the disabled.

2.2.7 Assessment

Tutors monitor progress of learners through tests where they are then expected to give informed feedback to learners, while summative assessment is through JC, SGCSE and the examination is set by the Examination Council of Eswatini. This is observed in the excerpt:

“Tutors can monitor the progress of learners on the course through regular submission of tests, which they mark, comment on and return to learners. Also learners take the JC or the SGCSE examination at the end of the year”

2.2.8 Professional development

Emlalatini Development Centre depends on government for funding. EDC’s dependency on government for support has proved to be a challenge and thus EDC usually seeks assistance elsewhere.

“Emlalatini depends on government, through the Ministry of Education and Training for staff training and development”

The curriculum offered at EDC is indicated in Table 5. The lecturer: learner ratio is a cause for concern as presented in Table 5.

Table 5: Subjects offered at EDC, enrolment and lecturer: learner ratio (EDC, 2018)

Department	Number of Lecturers	Number of learners	Lecturer-learner ratio.
1. English	3	529	1 : 176
2. Siswati	1	220	1 : 220
3. Commercials	1	385	1 : 385
4. Mathematics	1	320	1 : 320
5. Biology/Science	1	132	1 : 132
6. History	1	202	1 : 202

The large number of learners per teacher indicates the great demand for the use of ICT which can enable the teacher to reach the learners without being limited by physical boundaries and the need for travel. It would also open possibilities for digital assessment too.

2.2.9 Enabling and hindering factors

There are several challenges which EDC faces while trying to fulfil its goal. Below is a summary of the challenges encountered.

- An unreliable postal system hampers the learning process, because learners don't get their workbooks on time, resulting in turn-around time for assignments and tests being too long and thus the feedback not benefitting the learners.
- It becomes difficult to monitor learners' progress because of lack of capacity.

The challenges presented show that EDC still relies a lot on traditional methods to support its learners, a model which is now out-dated and as indicated by falling enrolment, not meeting learner needs.

2.2.10 Technology

The importance of technology in teaching and learning is also observed in the excerpt:

"...integrating technology into teaching and learning in a meaningful and purposeful way would ensure that effective learning takes place. There is need to embrace technology in our education system...in order to achieve this, learning institutions need to be equipped with basis resources for teaching and learning" (EDC, 2019).

Teaching and learning cannot be separated from technology, especially in open and distance learning institutions where technology has removed the belief that teaching is confined only to the classroom. According to the TPACK model *"learners will use engaging technologies in collaborative, inquiry-based learning environments with teachers who are willing and able to use technology's power to assist them in transforming knowledge and skills into products, solutions and new information"*⁹.

2.2.11 Conclusion

- Emlalatini Development Centre uses mainly workbooks and face-to-face sessions to support their learners. But printing and distribution of workbooks has become difficult and face-to-face sessions are accessible to only a few of the learners.
- Telephone and post are the only methods used to communicate with learners and the postal system is unreliable.
- The study centres are unevenly distributed and are very few. Learners meet tutors only once, on Saturday, because most of the learners are working. Learners are still expected to attend their learning sessions at EDC and study centres.
- Teachers need training on integrating ICT in their teaching.

⁹ <https://www.slideshare.net/mobile/pfisser/2012-1213-warchau-keynote-21st-tpack-petra-fisser>

2.3 Reinventing Emlalatini Development Centre

Eswatini Government Institution is offering Junior Certificate and General Certificate of Secondary Education levels of provision. EDC offers its services by means of open and distance learning (ODL), with occasional face-to-face contact sessions, and is open to any learner wishing to complete their secondary education (EDC, 2018). The most recent innovations in provision include:

- Increased face-to-face tutorials over weekends
- Establishment of 12 study centres to minimize the costs of travel for learners to access support
- Introduction of classes for Forms 1-5 so that learners can enrol at the level they need. (EDC, 2019).

Despite these innovations, EDC has experienced declining enrolment over the past three years as indicated in Figure 5.

The declining enrolment is due to an annual increase in school fees which seems contrary to the needs of the country and prompted EDC to contact COL for advice and support. A new model is needed to reduce costs per learner and hence the fees that need to be charged.

3. Literature review

3.1 Introduction

This section of the report presents the review of related literature on how ICTs and Online/eLearning have been used in education, with a focus on the Sub-Saharan Africa region to establish guidelines for online learning. Attention was paid mainly to secondary education provision, but also to tertiary education albeit to a lesser extent where experience and guidelines seemed transferable. The section concludes by proposing guidelines for establishing online learning in a secondary education institution like EDC.

Current trends in Africa and Asia show that online education is gaining momentum in these regions despite the persistent technological challenges (Trines, 2018). The rapid increase in smartphones allows mobile learning giving access to the internet, even to people in remote rural areas. Escalating population growth and the demand for education are causing neighbouring countries like South Africa to embrace online education. While still in infancy, digital forms of education are likely to be pursued in the same manner as traditional distance learning models. Online learning is a means to widen educational opportunities. UNESCO estimates that one in five children did not participate in any form of education in 2016. Africa's youth population is expected to double by 2050 but few resources are dedicated to educating the youth. In addition, there is no budget to build more schools and employ more teachers to cater for this expected growth.

It is against this backdrop that online education is getting increased attention as a possible solution to widen access to education at an affordable cost. For example, efforts have been made in South Africa to provide the British curriculum IGCSE high school subjects online. They created socially rich online learning experiences where learners are interacting with each other and their teachers in real-time (Paddock, 2019).

Several considerations must be made when an institution is planning to transform to Online Learning. The internet infrastructure and reliable electricity supplies are all important (Okocha, 2020; Mthethwa-Kunene & Maphosa, 2020; Saide, 2014). Okocha (2020) highlights that poor internet infrastructure and lack of reliable electricity supplies might negatively impact online learning. For example, weak internet can impede delivery of lessons online; and there could be unequal access to the internet by learners from wherever they may be, and some might also experience power cuts. He also emphasises the importance of virtual libraries. Okocha (2020) further states that “One thing this [COVID-19 crisis] will likely teach us is that we should prepare for the use of virtual learning technology, online instruction and getting learners and lecturers to have access to virtual libraries”. An institution will also have to choose a learning platform to use from the countless options including Moodle, Canvas, Blackboard, Sakai, and WiKiEducator learning management systems, which are widely used especially in higher education. There are also a growing number of new platforms aimed at the schooling sector.

Burns and Santally. (2019) conducted a study on ICTs in Secondary Education in Sub-Saharan Africa. They picked four cases for the study, which were South Africa, Mauritius, Botswana and Cape Verde. Some of the reasons for the choice of countries are articulated below. The four countries were selected because they have fully developed secondary systems and have documented their efforts to integrate ICTs within their education systems. Bashir, Lockheed, Ninan and Jee-Peng (2018) state that the four countries have achieved more than 80% enrolment in lower secondary schools, which is the other reason why the countries were chosen. In addition, based on global statistics, the four countries rank in the top 5 within Africa (International Telecommunication Union, 2017). Therefore, their ICT environment was found suitable for the study. In our case, we focus on the Mauritius study since it has the latest statistics at the time of publication.

Table 6 shows that the integration of ICT is a process which requires time to complete.

Table 6: ICT initiatives in Mauritius since the 1990s

Year	Actions / Policies
1990s	Building of ICT Infrastructure
2000 – 2010	Consolidation of ICT Infrastructure and Computer equipment through school IT Projects

2012 - 2016	Digital learning initiatives at the national level under public-private partnerships (World Bank Commonwealth of Learning Sankore Microsoft, etc.
2018	The development of ICT in education strategy.

Source: UIS Statistical database (2015)

Several issues were explored across the case-studies and are summarised below.

3.1.1 Funding

It is worth noting that funding is at three different levels, that is, international aid, national government and private sector companies. Mauritius, South Africa and Botswana all have access to government finances for educational technology and other technology-related expenses. In addition, schools receive money for Learning and Teaching Supplementary Materials (LTSM). Cape Verde, a small economy receives financial support from the governments of Portugal and Luxembourg. The international governments provided 4000 Samsung tablets in 2018. From the private sector end, schools receive aid from companies. For example, Cape Verde received bilateral aid from Huawei.

3.1.2 Connectivity

There exist public private partnerships with mobile telecommunication companies to provide internet access to secondary schools in Botswana. Companies such as Mascom and Orange provide such initiatives. Furthermore, mining companies in Botswana and South Africa provide internet access to rural areas.

In Mauritius there is a 10mb connectivity line for all secondary schools, while South Africa has free-to-view direct broadcast satellite for educational broadcasting. In Cape Verde they have a submarine cable system connectivity about to be completed this year 2020. In Botswana, Television broadcasts mathematics and science programming.

The following table summarises some of the results on the connectivity for the different surveyed countries.

Table 7: Connectivity for different sub-Saharan Africa countries

Technology/Connectivity	Project and Country
Radio	OLSET (South Africa), KIE (Kenya)
Television broadcast	Mindset (South Africa), Learning Channel (South Africa) Talk Back TV (Botswana) Ethiopian Ministry of Education Centre for Technology Development and Decisionmaking Sup (Egypt)
Video	Discovery Channel Global Education Fund (Angola, Tanzania) Uganda, Zimbabwe)
DVDs and CDs	Learnthings Africa, CurriculumNet Uganda, Mindset (South Af
Second-hand PCs	Schoolnets in Cameroon, Mali, Mozambique, Namibia, Nig Senegal, Swaziland, Zambia Zimbabwe
PC refurbishment centres	SchoolNet Africa and GEEP(Senegal), World Links (Zimbabw Computers for Schools Kenya, SchoolNet Uganda, Compu Education Trust (Swaziland), SchoolNet Namibia
Dial-up Internet	SchoolNet Cameroon,
Satellite datacast	Mindset (South Africa)
Broadband Internet	Mauritius Ministry of Education and Ministry of IT
VSAT connectivity	SchoolNet Uganda, NEPAD e-Schools (Mali, Uganda, Rwan
Mobile phones	Teacher SMS Project (Kenya), Math on Mxit, Meraka Institute Africa; M-Girls, Mindset (South Africa)
Open source software	Openlab (SchoolNet Namibia); SchoolNet Mozambique

Source: Farrell and Isaacs (2007). Survey of ICT and Education in Africa: A Summary Report, based on 53 Country Surveys.

3.1.3 Learning Content

Mauritius provides audio-visual rooms in schools for video projections. An interesting fact is that teachers are self-motivated to integrate social media in their teaching as well as create personal websites they use to share learning resources. Secondary schools in Mauritius have implemented Moodle as their Learning Management System (LMS). Moodle is a free open source LMS and the most popularly used LMS globally at secondary and tertiary level.

3.1.4 Support

South Africa was reported to have an onsite technology support person or administrator in every school. Support is essential, particularly in distance education.

3.1.5 Specific example schools

South Africa has low-cost private schools employing blended learning, namely the SPARK School chain and Nova pioneer high schools.

3.1.6 Challenges

Burns and Santally (2019) point out that the greatest challenge facing technology use in secondary schools in sub-Saharan Africa is a comprehensive lack of readiness. This includes physical, human, technical, systems and policy readiness as detailed below.

- **Physical readiness.** *Across the continent, many secondary schools lack electricity (or fuel to run generators, or updated electrical systems), particularly in rural areas and in slum communities in urban areas. Schools lack plugs. They lack a physical space for computers. They lack security (a huge issue in South Africa and Cape Verde).*
- **Human readiness.** *Despite their general openness to using technology, teachers often lack the skills to use technology, most fundamentally keyboarding skills. Beyond this most basic set of skills, many teachers lack an understanding of how to integrate technology into their subject areas—for example, how to allow learners to use technology to learn basic facts (like multiplication tables) while freeing up the teacher to focus on designing and facilitating more higher-level learning activities. It is critical to emphasize that this is not the fault of teachers. Governments have placed technology in schools with either little or no basic technology skills training. More critically, governments have not trained teachers on how to teach with technology.*
- **Technical readiness:** *Across the continent, secondary schools lack the robust and reliable infrastructure required to support the use of ICT in education. Internet access is limited, slow, and unreliable. As a case in point, after initially distributing tablets to secondary school learners in grades 10 and 11, the government in Mauritius had to rethink its strategy due to poor device quality, poor/lacking school connectivity, a lack of digital materials and relevant learning resources, theft and hacking of the devices, and a lack of a utilization strategy. Many schools openly use pirated software; in the candid words of one principal, “If we didn’t use pirated versions, we wouldn’t have any software at all.” Often, there is no budget for technology beyond the actual desktop computer itself. Software is not updated because there is no available technology support staff in schools (South Africa being an exception) or because there is no budget for maintenance or no maintenance plan. The degraded state of infrastructure is more than a technical issue; when technology fails to work or fails to work reliably, teachers begin to distrust it, and they may choose not to use it.*
- **System readiness:** *Many or even most education systems in sub-Saharan Africa are simply not set up to incorporate and capitalize on the affordances of technology. Governments are unable to harness or use opportunities to create proper quality education and provisions to equip youth adequately for the modern workplace.*
- **Policy environment:** *Taken together, the above issues both contribute to and are compounded by a weak policy environment. Where policy documents exist, there is often disparity in what they advocate (“the fourth Industrial Revolution,” “information*

societies,” “twenty-first-century learning”) and what they can support. Educational technology policies may not be connected to or supported by comprehensive and enabling telecommunications; teacher education policies that support ICTs in education may or may not be in place. Policies may only exist in the aspirational realm, without supporting clearly defined and resourced implementation strategies at the national, regional, school, or individual educator levels.

The challenges for the use ICT in secondary schools in developing countries highlighted by Burns and Santally (2019) are similar to those cited for the tertiary education level.

3.2 Factors influencing the adoption of eLearning

Some studies (Mthethwa-Kunene & Maphosa, 2020; Njenga, 2011) have investigated factors influencing the adoption of eLearning and the use of learning management systems in Higher Education Institutions. These studies reported that both institutional and personal factors affect the adoption of online learning. Njenga (2011), in a study on eLearning adoption in Eastern and Southern African higher education institutions, found that adoption of eLearning is affected by both organisational and individual characteristics. The individual characteristics that were listed as having a large impact on the adoption were: perceived usefulness, self-efficacy, demonstrability, perceived ease of use, perceived complexity, perceived compatibility, intrinsic motivation, collaboration and communication, extrinsic motivation, subjective norm and personal innovations. With regard to organisational characteristics, factors having great impact on adoption of eLearning were: absorptive capacity, management support of eLearning, communication behaviour, centralisation of decision making, the level of formalisation, and the organisational institutional culture.

Recently, Mthethwa-Kunene and Maphosa (2020) conducted a study investigating institutional and personal factors promoting or hindering ODL learners’ utilisation of the Moodle Learning Management System at the University of Eswatini. The Technology Acceptance Model (TAM) was used as a theoretical and analytical framework. The study found that ODL learners’ perceived usefulness and ease of use, trust and satisfaction affected their usage of the Moodle Learning Management System albeit with weak to moderate positive relationships. Institutional factors such as inadequate technological infrastructure, insufficient learner training and support, and limited usage of the system by course instructors were mentioned by the learners as impeding their usage of the system.

While there are challenges in establishing online learning particularly in rural or low-income remote areas, for the COVID-19 crisis period, international organisations have pledged to support developing countries to continue offering education through online learning or otherwise. For example, according to the SADC-UNESCO agreement of 14 April 2020, two focus areas are

“Making distance learning possible for all learners at all levels; and Support teachers and teacher educators through access and capacity building to use relevant technologies to facilitate and support distance learning”. UNESCO pledged that support will be provided to SADC countries for mobilizing resources and implementing innovative, and context appropriate solutions to provide education and learning remotely, leveraging hi-tech, low-tech and no-tech approaches, and to seek equitable solutions and universal access. Eswatini can also take advantage of this support to ensure secondary schools and other levels benefit.

The Commonwealth of Learning (COL), in its statement on COVID-19 (2020b)¹⁰, pledges to share its expertise and resources to enable stakeholders to keep the doors of learning open for all ensuring that valuable time is not lost during the closure of schools due to the COVID-19 pandemic. COL indicates that open, distance and online learning, if done well, can have the same outcomes as campus education without requiring teachers and learners to be in the same place at the same time. COL shares the following guidelines to consider:

1. Institutions should take emergency policy decisions to adopt alternative ways of teaching, including online learning.
2. Ensure that learning is delivered using ICT tools such as radio, TV, mobile devices so that no learner is disadvantaged.
3. Identify and use existing Open Educational Resources (OER) to provide quality learning.
4. Develop and implement strategies for synchronous/asynchronous approaches.
5. Encourage teachers to use free resources such as Moodle Cloud to conduct online classes.

It is important for an institution to decide on an appropriate model of eLearning given the wide-ranging possibilities of online learning. The South African Council on Higher Education (CHE) presents a continuum by plotting the support of ICTs ranging from fully offline to fully online. The CHE further notes the following three options for internet use: Internet-supported, Internet-dependent, and fully online.

- *Internet-supported programmes*: Participation online is optional and supplementary for learners. Enrolled learners can access additional information on units of study such as study guides, examination information, reading lists and other online learning resources.
- *Internet-dependent programmes*: Participation via the internet is a requirement, and could include online interaction, communication and access to course materials via the Web. Thus, learners must use the internet to interact with content and to communicate

¹⁰ <https://www.col.org/news/press-releases/keeping-doors-learning-open-covid-19>

with staff and/or other learners. However, other methods are also used – for example, face-to-face instruction.

- *Fully online programmes:* There is no physical face-to-face component although there could be a virtual face-to-face component. All interactions with staff and learners, education content, learning activities, assessment and support services are integrated and take place online.

An institution can use high-technology or low-technology solutions based on the reliability of local power supplies, internet connectivity, and digital skills of teachers and learners (UNESCO, 2020). It is also important to decide on the nature of the Online Learning to be adopted. Blended Online Learning seems to be feasible. According to Mohamed-Amin and Amrien (2016), blended learning can be defined as a teaching and learning approach that uses Web-based teaching and learning modes and face-to-face interaction. In areas with low connectivity access or high cost, thereof, it is important that learners can complete a lot of the work offline such as download resources and work through it, draft an assignment offline, and then upload online when ready.

3.3 The effectiveness of e-learning for imparting quality education to learners

Sharma (2018) examined the effectiveness of e-learning for imparting quality education to learners by referring to 12 sources of study for his review of the literature. There has been a significant amount of research by scholars, academicians and technology experts with technology at its prime focus but the effectiveness of e-learning in extensively shaping the future of learners and adding quality to their thinking and values has not been discussed as robustly. The examination of effectiveness of e-learning is useful for not just the learners but also for the trainers as it helps them in refining their methods of teaching. Some important and relevant findings were taken and compiled from his literature study as follows.

- A study by Ruggeri and others stresses the various forms in which e-learning has benefited in tele-health facilities and learning in remote places. Digital literacy rate upliftment and need for infrastructure for e-learning have been cited as effective measures to fulfil the objectives of e-learning comprehensively. However, the study does not use any quantitative assessment or analytical tools for proving the findings of the report (Ruggeri *et al.*, 2013).
- Liaw, in a research study on effectiveness of e-learning, investigates the reason for dissatisfaction of some of the e-learning learners. The research surveys 424 university learners for their feedback on effectiveness of e-learning and suggests that the intention and study focus are the main factors that influence the objectives and usefulness of e-learning (Liaw, 2008).
- A study conducted in Tehran Alzahra University tried to investigate the relation between e-learning and motivation for the learners. The study uses a questionnaire-based survey and the university learners as respondents, quantitative methods like Pearson's correlation were used to understand the survey findings and form a relationship between the dependent and independent variables for the research. The findings suggest that motivation of the learners is affected by e-learning significantly. But the study has many limitations as it is based on a single

university and uses no interviews; hence, the findings are not supported by corroborative evidence of face-to-face interviews or a global audience (Harandi, 2015).

- Other researchers delved into the various aspects that make e-learning an effective tool for transferring knowledge. According to the report one of the factors that make e-learning suitable in the changing environment due to dynamic nature of the technological upgrades, especially in the developing world, is the low cost and ease of course adjustment for upgrading the courses quickly. The researchers stress that e-learning opportunities are a gateway of growth and prosperity for the developing world. However, the study lacks the point of view of the learners and misses the key point of including the quality of the education provided in a compromise for low cost (Sekiwu & Naluwemba, 2014).
- English as an international language is used officially for international trade, businesses, learning and higher education. It is increasingly incumbent on learners from non-English speaking countries to be conversant with English in order to smoothly learn and do business with their counter parts in other countries. A study based in the Kingdom of Saudi Arabia addresses the usefulness of e-learning in English education for Saudi learners. It suggests that the involvement of the learners is an important aspect and e-learning through its innovative methods helps learners relate to the techniques with ease. Resource generation, usefulness and effectiveness for learners were some of the factors that were highlighted by the study as a mark of success of e-learning in English language for learners in Saudi Arabia. However, the study has limitations of using only a specific country for the research base (Khan, 2016).
- Other than these, interactive videos are a major contributing factor that help the learners in analysis of subject content and to evolve a deeper understanding of the study material. The 3D technology, various software and multi-dimensional approach have convincingly made e-learning equivalent to classroom studies, if not better (*Zhang et al.*, 2006).
- A research based on data mining for trends in e-learning establishes the fact that the researchers on e-learning are moving their focus from effectiveness of the e-learning to the methods of teaching. Medical education and training institutions have been identified as the most aggressive users of e-learning and present a wide scope for induction of such practice in future. The study remarks that the scope, expectations and applicability for developing and developed countries differ significantly (Miklian, 2018).
- The government policies have a major role to play in growing the effectiveness of the e-learning for the learners and businesses. However, the limitations of the studies include lack of empirical data to support the views expressed and to corroborate the findings (Hung, 2010).

3.4 Designing Online Learning Models based on Education Learning Theories

There is need for clarity on the underpinning pedagogic approach and learning model (Capacho, 2014), because otherwise a typical learning management system may be used simply to transmit content rather than to foster engagement and collaboration and all students will be required to follow the same learning pathway in the same sequence within the same timeframe (Hoic-Bozic, Dlab, & Mornar, 2016).

While the Holistic Approach to Technology Enhanced Learning (HoTEL) project in Europe developed a very useful map of key learning theories, theorists and influences in about 2014

(Millwood, 2020), Karageorgakis (2018) clarified two of the major learning theories, Behaviourism and Constructivism, by referring to six sources of study to find out how they can contribute to designing online learning programmes.

Behaviourism

The basic principle of Behaviourism is that learning is the result of a person's response to a stimulus. The learner does not work independently on the environment but on the contrary, the behaviour is controlled by environmental factors, thus not having the control of the learning or the time it takes to achieve it (Technology in Education, n.d). All the objectives are predetermined, while the learner is tasked with absorbing the offered knowledge so that in the final stage they may present desired and predetermined behaviours. The learner is individually assessed and controlled to ascertain if their behaviours and performances demonstrate that they have acquired the new knowledge according to the criteria the teacher has set in the form of the 'right' responses (Weegar & Pacis, 2012). Thus, the teacher is at the center of learning, trying to find ways to elicit the desired behaviours by providing the appropriate stimuli. However, this is done without taking into account the social-cultural context of the learners as well as their needs, and hence may ultimately fail to contribute to the acquisition of a higher level of competence or those skills that require deeper processing (Technology in Education, nd; Kostaditidis, 2005). The emphasis in behaviorism is on that which is observable and not on the mind or cognitive processes. Behaviorism led to the development of taxonomies of learning because it emphasized the study and evaluation of multiple steps in the learning process (Picciano, 2017a).

Constructivism

On the other side, another predominant learning theory is constructivism, which asserts that learning is an active process as learners enter the process of building knowledge by trying to clarify the events of the world environment (Technology in Education, n.d.). Constructivists believe that learning only happens when there is active processing of information and so they ask learners to create their own motifs by linking new knowledge to those motives. As a result, this enables them to constantly undergo the cultivation of their post-cognitive skills (Technology in Education, n.d; Kostaditidis, 2005). Constructivists do not share the stance of behaviourists who claim that knowledge is independent of the mind and believe that the mind is the internal representation of the outside world. This way they believe that learners are forced to construct their own knowledge through personal experiences and real events (Weegar & Pacis, 2012). Actions in the constructivist model enhance the ability to solve the problems of those involved and the ability to conduct research and work within a group. At the same time, the educator plays the role of the assistant-supporter of the learning process and his/her learners, encouraging them to formulate their own ideas and conclusions (Weegar & Pacis, 2012). Thus, Cognitive theorists promoted the concept that the mind has an important role in learning and sought to focus on what happens in between the occurrence of environmental stimulus and

learner response. They saw the cognitive processes of the mind, such as motivation and imagination, as critical elements of learning that bridge Theories and Frameworks for Online Education (Picciano, 2017b).

Parallel to behaviourism and cognitivism was the work of several education theorists who focused on the social construction of knowledge.

Social Constructivism

The theorists here include Lev Vygotsky, John Dewey, and Jean Piaget. Their focus on social constructionism was to describe and explain teaching and learning as complex interactive social phenomena between teachers and learners. Vygotsky posited that learning is problem solving and that the social construction of solutions to problems is the basis of the learning process. Vygotsky described the learning process as the establishment of a “zone of proximal development” in which the teacher, the learner, and a problem to be solved exist. The teacher provides a social environment in which the learner can assemble or construct with others the knowledge necessary to solve the problem. Likewise, John Dewey saw learning as a series of practical social experiences in which learners learn by doing, collaborating, and reflecting with others. While developed in the early part of the 20th century, Dewey’s work is very much in evidence in a good deal of present-day social constructivist instructional design. The use of reflective practice by both learner and teacher is a pedagogical cornerstone for interactive discussions that replace straight lecturing, whether in a face-to-face or online class. Jean Piaget, whose background was in psychology and biology, based his learning theory on four stages of cognitive development that begin at birth and continue through one’s teen years and beyond. Seymour Papert, in designing the Logo programming language, drew from Jean Piaget the concept of creating social, interactive microworlds or communities where children, under the guidance of a teacher, solve problems while examining social issues, mathematical and science equations, or case studies. Papert’s approach of integrating computer technology into problem solving is easily applied to many facets of instructional design (Picciano, 2017c).

According to Ertmer and Newby (1993), the three schools of thought can, in fact, be used as a taxonomy for learning. **Behaviourists’** strategies can be used to teach the **what** (facts); **cognitive strategies** can be used to teach the **how** (processes and principles); and constructivist strategies can be used to teach the **why** (higher-level thinking that promotes personal meaning, and situated and contextual learning). A possible link between the three theoretical schools and the impact of different conceptions of learning on practice are suggested in Table 8 below.

Table 8: The impact of different conceptions of learning on practice

Decisions made regarding:			
Communicating the curriculum	<ul style="list-style-type: none"> • Outcomes and content finalized before programme. Apply to all learners. • All learners start and end at the same time and follow the same study sequence. • Emphasis on providing 'finished' content through lectures/ printed materials/ multi media/ ICTs. • Use of generic tutorial letters offering assignment model answers/ provision of model answers to tasks. • In-course activities few or used to consolidate memorization of content. • Tutor/materials developer seen as expert transmitting knowledge. 	<ul style="list-style-type: none"> • Outcomes and content finalized before start but programme offers core and elective options. • Continuous enrolment, but same study sequence for all learners. • Emphasis on providing resources and scaffolding to enable learners to construct their own understandings, through tutorial-in-print; 1-1 contact tutorials; emails; tele tutoring. • Emphasis on individual feedback on assignments. • In-course activities require learners to construct and demonstrate their own understanding. • Tutor/materials developer seen as scaffolding learning opportunities. 	<ul style="list-style-type: none"> • Outcomes and content negotiated with learners before start of programme. • Continuous enrolment and modularization allows multiple pathways. • Emphasis on providing resources, not always complete, that reflect multiple perspectives and inviting discussion via email/website/social media, in small group contact tutorials. • Emphasis on formative feedback on both individual and group tasks; feedback as continuation of discussion. • In-course activities favour discussion with others and examination of multiple viewpoints and multiple resources.
Engaging with the curriculum	<ul style="list-style-type: none"> • Assume that learners have appropriate study skills. • Learners expected to master content. • Emphasis on recall in activities, assignments and examinations. 	<ul style="list-style-type: none"> • Enable reflection on and development of metacognitive skills. • Learners expected to construct own understanding; therefore concern with both product and process. • Emphasis on problem identification and problem-solving in activities, assignments and examinations. 	<ul style="list-style-type: none"> • Enable reflection on and development of metacognitive and social skills. • Learners expected to co-construct knowledge with others; emphasis on process. • Emphasis on critical analysis and open-ended discussion.
Applying what has been learned	<ul style="list-style-type: none"> • Assessment by tutors only. • Assessment tasks require recall. • Assessment tasks include assignment content tests; examinations. 	<ul style="list-style-type: none"> • Assessment by self and others. • Assessment tasks require application of knowledge in authentic situations. • Variety of individual assessment tasks, including portfolios. 	<ul style="list-style-type: none"> • Assessment by self, peers and tutors. • Assessment tasks require reflection and application in congruent real-life contexts. • Variety of assessment tasks, including group tasks.
Typical resources	<ul style="list-style-type: none"> • Single prescribed textbook 	<ul style="list-style-type: none"> • Prescribed and recommended mixed resources; with intent to set up debates 	<ul style="list-style-type: none"> • No limits on resources consulted including idiosyncratic resources and resources co-constructed as part of the learning process

Source: Mays, 2014, pp. 121-122

In Table 8, column 1 is a logical consequence of behaviourist-associationist approaches to teaching/learning (emphasising the **what**); column 2 of cognitive-constructivist approaches to teaching/learning (emphasising the **how**); and column 3 of socio-constructivist-connectivist

approaches to teaching/learning (emphasising the **why**). However, the dotted lines indicate that the dividing lines are permeable. In practice, teachers move between theoretical assumptions although one is likely to have a dominant impact on practice.

3.5 Advantages and disadvantages of eLearning

Kattoua, Al-Lozi and Alrowwad (2016) studied E-Learning Systems in Higher Education by referring to 7 sources of study on e-learning. In their study they identified the following advantages and disadvantages of e-learning:

Advantages of Web-based learning

Callan et al. (2010) and Garrison (2011) identified many advantages for e-learning technologies including:

- Less expensive to deliver, affordable and saves time access the materials from anywhere at any time.
- Access to global resources and materials that meet learners' level of knowledge and interest.
- Self-pacing for slow or quick learners reduces stress and increases satisfaction and retention.
- E-learning allows more affective interaction between the learners and their instructors using emails, discussion boards and chat room.
- Learners can track their progress.
- Learners can also learn through a variety of activities that apply to many different learning styles that learners have.
- It helps the learners develop knowledge of using the latest technologies and the Internet.
- The e-learning could improve the quality of teaching and learning as it supports the face-to-face teaching approaches.

Disadvantages of Web-based learning

While Web-based courses have advantages, it is equally important to note that there are disadvantages. These might include little or no "in-person" contact with the faculty member, feelings of isolations, a difficult learning curve in how to navigate within the system, problems with the technology, the need for the learner to be actively involved in learning, and increased lead-time required for feedback regarding assignments (Holmes & Gardner, 2006; Masa'deh et al., 2013; Kanaan et al., 2013; Tarhini et al., 2013b). There are also different aspects, especially in the developing countries, such as providing the required funds to purchase new technology, lack of adequate e-learning strategies, training for staff members and most importantly the learner resistance to use the e-learning systems (Wagner, 2008). Bounnik and Marcus (2006) stated that learners' dissatisfaction in using e-learning included the following:

- Lack of a firm framework to encourage learners to learn.
- A high level of self-discipline or self-direction is required, learners with low motivation or bad study habits may fall behind.
- Absence of a learning atmosphere in e-learning systems.
- The distance-learning format minimizes the level of contact, e-learning lacks interpersonal and direct interaction among learners and teachers.
- When compared to the face-to-face learning, the learning process is less efficient.

Due to the rapid growth of internet technology, schools and universities around the world are investing heavily in e-learning systems to support their traditional teaching and to improve their learners' learning experience and performance. However, the success of an e-learning system depends on the understanding of certain antecedent factors that influence the learners' acceptance and usage of such e-learning systems. It is concluded that a successful e-learning system should consider the personal, social, cultural technological organizational and environmental factors.

3.6 Guidelines for establishing online learning

Various authors have recommended guidelines for successfully establishing online learning and courses (Bagarukayo & Kalema, 2015; Strickland & Butler, 2005). Bagarukayo and Kalema (2015) evaluated eLearning usage in South African universities discussing the challenges for adoption of eLearning and adoption of Learning Management System and recommended the following for successful eLearning implementation: training and support in ICT, content creation skills and policy; cost and technology aspects; content access for a diverse population; large class size; curriculum review; infrastructural and technical issues; instructor motivation and job security; and engaged learners and instructor.

Strickland and Butler (2005), in their article titled 'Establishing Guidelines for determining appropriate courses for online delivery', outline a five-step process for determining whether or not a course should be offered online: determining if offering online classes is consistent with the intended outcomes of the programme; examining course objectives if they warrant the course to be offered online as many courses require hands-on experiences that are not possible online; determining the needs of learners through a formal or an informal survey; determining the level of support available to both faculty and learners such as faculty accessing online class development software and frequent staff development workshops, and learners accessing technical support both before enrolling in such courses and while they are enrolled; and pilot-testing of the Online Course.

Guidelines for quality online learning

To provide quality online learning Daniel and Uvalic-Trumbic (2013), in their report on Academic Partnerships, list institutional support (vision, planning, and infrastructure), course development, teaching and learning (instruction), course structure, learner support, faculty support, technology, evaluation, learner assessment, and examination security as elements essential for quality online learning.

In other studies, the most common structure included aspects of institutional management, curriculum design, learner support, and other elements of educational provision. The most general categorization of activities was management (institutional strategy, visions, and

resourcing), products (processes of curriculum and module development), and services (learner, and staff support, information resources etc.) (Martin *et al*, 2017).

The National Association of Distance Education Organizations of South Africa (NADEOSA) in 2005 published quality criteria for distance education in South Africa which was based on an iterative engagement with distance education providers over a period of several years. There are 13 criteria: policy and planning, learners, programme development, course design, course materials, assessment, learner support, human resource strategy, management and administration, collaborative relationships, quality assurance, information dissemination, and results, with a total of 184 standards.

The International Council for Open and Distance Education (ICDE, 2015) analysed 40 quality standard models and found that institutional management, curriculum design and learner support were the most common key quality issues (Martin *et al.*, 2017).

Based on a review of the literature, the following standards are recommended to be adopted by EDC.

3.7 Standards needed for High School Online Learning

The quality of online course offerings should be considered in terms of the following areas:

(i) Management and Administration

The course should be managed to ensure effective learner and school participation. Support systems should provide resources to teachers, learners, and parents comparable to those provided by face-to-face courses, as well as special support necessitated by the unique circumstances of the online environment.

(ii) Curriculum Design

Online courses should be informed by and reflect the most current research on learning theory. They should be designed to take advantage of the special circumstances, requirements, and opportunities of the online learning environment and support the development of 21st century learning skills.

(iii) Course Design

Online curricular offerings should be challenging, relevant, and aligned with appropriate national standards for learner learning.

Assessment should be authentic, formative, and regular, providing opportunities for learners to reflect on their own learning and work quality during the course. End-of-course assessments should give learners the opportunity to demonstrate appropriate skills and understandings that reflect mastery of the course content.

(iv) Quality Assurance

Teacher Quality —Online Teachers should be skilled in the subject matter, learning theory, technologies, and teaching pedagogies appropriate for the content area and the online environment.

Learner Roles—Learners should be actively engaged in the learning process and interact on a regular basis with the teacher and online classmates in the course.

(v) The use of Information Technology in Distance Education

Technological Infrastructure — the technical infrastructure supporting the online course should provide the necessary tools for instruction and interactivity. The technology behind the course should work reliably, simply, and economically. Technical assistance should be available whenever needed by learners or teachers.

(vi) Curriculum - Online curricular offerings should be challenging, relevant, and aligned with appropriate national, state, and/or district standards for learner learning. The criteria include: The online course is aligned with appropriate national, state and/or district standards for learner learning; interdisciplinary content and activities are encouraged; and the course provides an appropriate balance of exposure to a range of topics and deeper exploration of selected topics for learner mastery. Online courses should be informed by and reflect the most current research on learning theory. They should be designed to take advantage of the special circumstances, requirements, and opportunities of an online learning environment and support the development of 21st century learning skills.

(vii) Instructional Design - The criteria include: The course makes maximum use of the online medium by incorporating primary source materials, media, outside experts, and resources beyond the geography and culture of the learners’ brick-and-mortar classroom experience. The course schedule includes a variety of activities, both online and offline; the course fosters the development of “Information Literacy” skills; the course fosters the development of communication skills and the ability to collaborate online.

(viii) Teacher Quality - Online teachers should be skilled in the subject matter, learning theory, technology use, and teaching pedagogies appropriate to the content area and the online environment. The criteria include: the online teacher has expertise in the subject matter being taught; the online teacher utilizes effective teaching techniques; the online teacher has frequent and timely interactions with learners in the course; the online teacher models personal attributes that support a learning environment; the online teacher has been trained to teach online.

(ix) Learner Role - Learners in the online course should be actively engaged in the learning process and interact on a regular basis with the teacher and online classmates. The criteria

include: learners are active participants in a learning community based on learner-to-learner as well as learner-to-teacher discussions; learners' collaborative skills and teamwork are emphasized; learners are encouraged to develop time-management and organizational skills; and engaged learning, self-direction, and development of critical thinking skills are emphasized.

(x) Assessment should be authentic, formative, and regular, providing opportunities for learners to reflect on their own learning and work quality during the course. End-of-course assessments should give learners the opportunity to demonstrate appropriate skills and understandings that reflect mastery of the course content. The criteria include: The online course clearly describes how learner performance will be assessed. Learner learning is assessed on an ongoing basis and through a variety of methods. The online teacher provides fair, accurate, and timely assessment of learner work.

(xi) Management and Support Systems – The course should be managed to ensure effective learner and school participation. Support systems should provide comparable resources to teachers, learners, and parents that would accompany face-to-face courses, as well as special supports necessitated by the special circumstances of the online environment. The criteria include: The online course is clear in its description of learning objectives, work required, and prerequisite skills or courses necessary for success; the online course provides the necessary registration, grading, and other administrative systems to facilitate learner participation in the course; a professional support system is in place to ensure teacher success in delivering the online course. Course resources are available to support learner success; Learner rights and responsibilities are recognized and upheld within the course structure; The course is evaluated on a regular basis and improvements are made based on those evaluations; The online platform provides necessary resources for effective delivery of the course; Adequate and timely support is available to the teacher and learners when technical issues arise; and Equipment for learner involvement is adequate and meets universal service standards for learners with special needs.

4. Online learning ICT frameworks and guidelines for EDC

4.1 Theories/models of online learning environment

This section deals with the various models of online learning and presents the proposed online learning model and guidelines for Emlalati Development Centre (EDC) for establishing a collaborative online learning environment to improve the quality of education and to reach the unreached. The learning theories are briefly recapped because the development of online learning models is based on the three popular learning theories; behaviourism, cognitivism and social constructivism.

Just as no single learning theory has emerged for instruction in general, the same is true for online education. A number of theories have evolved, most of which derive from the major learning theories for education discussed previously. Similarly, there are several theories for online learning, however, the appropriate theories/models for online learning are discussed below.

4.1.1 The Community of Inquiry

Garrison, Anderson & Archer (2000) developed the “community of inquiry” model for online learning environments. They described an educational community of inquiry as a group of people who work collaboratively, engaged in purposeful critical discourse and reflection to construct personal meaning and confirm mutual understanding (Garrison, 2009).

According to Garrison (2009), the Community of Inquiry theoretical framework represents a process of creating a deep and meaningful (collaborative-constructivist) learning experience through the development of three interdependent elements – social, cognitive and teaching presence (Garrison, 2009).

The community of inquiry has become one of the more popular models for online and blended courses that are designed to be highly interactive among learners and faculty using discussion boards, blogs, wikis, and video-conferencing. Figure 6 below shows the community of inquiry model.

Community of Inquiry

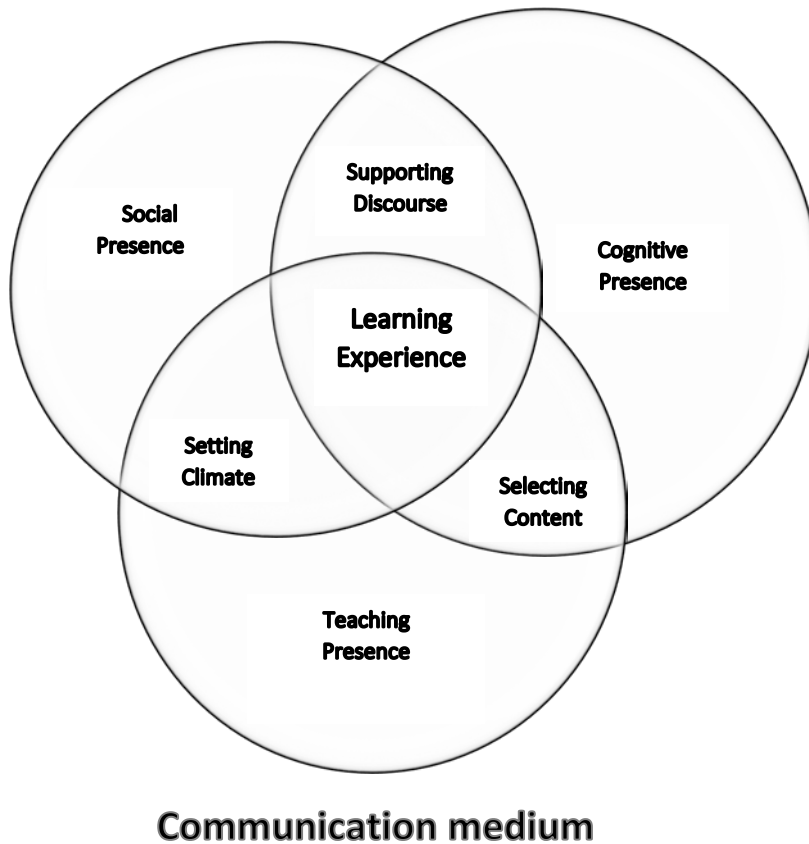


Figure 6: Community of Inquiry model

Source: Adapted from: Col, col.athabascau.ca/col-model/; www.printfriendly.com/p/g/PmLzS5

Social presence is “the ability of participants to identify with the community (e.g., course of study), communicate purposefully in a trusting environment, and develop inter-personal relationships by way of protecting their individual personalities.” (Garrison, 2009)

Teaching Presence is the design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes (Anderson, Rourke, Garrison, & Archer, 2001).

Cognitive Presence is the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse (Garrison, Anderson, & Archer, 2001).

4.1.2 Online Collaborative Learning (OCL)

Online collaborative learning (OCL) is a theory proposed by Linda Harasim that focuses on the facilities of the Internet to provide learning environments that foster collaboration and knowledge building. Harasim describes OCL as: a new theory of learning that focuses on

collaborative learning, knowledge building, and Internet use as a means to reshape formal, non-formal, and informal education for the Knowledge Age” (Harasim, 2012, p. 81).

Like Siemens, Harasim sees the benefits of moving teaching and learning to the Internet and largescale networked education. In some respects, Harasim utilizes Alberto Barabasi’s position on the power of networks. In OCL, there exist three phases of knowledge construction through discourse in a group: (i) idea generating; (ii) idea organizing; and (iii) intellectual convergence (Harasim, 2012, p. 82). OCL also derives from social constructivism, since learners are encouraged to collaboratively solve problems through discourse and where the teacher plays the role of facilitator as well as learning community member. This is a major aspect of OCL but also of other constructivist theories where the teacher is not necessarily separate and apart but rather, an active facilitator of, knowledge building. Because of the importance of the role of the teacher, OCL is not easy to scale up. Unlike connectivism, which is suited for large-scale instruction, OCL is best situated in smaller instructional environments.

4.1.3 Anderson’s model for online learning

Terry Anderson (2011) considered a number of theories and models but focused on the well-respected work of Bransford, Brown, and Cocking (1999) who posited that effective learning environments are framed within the convergence of four overlapping lenses: **community-centeredness, knowledge-centeredness, learner-centeredness, and assessment centeredness**. He also accurately commented that the Internet’s hyperlink capacity is most compatible with the way human knowledge is stored and accessed. The essence of **interaction among learners, teachers, and content** is well understood and is referenced in many theories of education, especially constructivism. With these three elements in mind (the Bransford, Brown, and Cocking lenses, the affordances and facilities of the Internet, and interaction), Anderson then proceeded to construct a model for online learning. See Figure 7 below.

Anderson begins his argument by discussing how effective learning environments (including online learning environments), should consist of four components: Learner-Centred, Knowledge-Centred, Assessment-Centred, and Community-Centred.

The model below focuses on two modes of online learning (Collaborative, community of inquiry models, and independent study model). In online learning environments, teachers and learners interact with one another and the content provided. Teachers and learners can interact within these communities in both asynchronous and synchronous methods. The online learning environment provides a collaborative community where learners can build relationships amongst peers while simultaneously constructing knowledge. Numerous tools can help in the facilitation of these environments including drills, simulations and tutorials.

In this model, the learning outcomes (1) are translated into course content and resources plus appropriate strategies for the teaching and learning process that will enable learners to achieve those intended outcomes. Once these basic parameters have been determined, the development team (2) shares the responsibility of translating the theory and intentions into practice in the form of courseware (stored on a Content Management System) and online learning functions, which are delivered by (3), the Learning Management System (LMS), which is interfaced with the library and other digital resources (4), related services (5), and the learner information system (6) via a secure server (7) that can authenticate the learner login (Terry Anderson, 2008).

The learners will connect to the LMS and related services via a user-friendly portal system (8) so that, with a single login, they can also have access to their courses. Finally, to ensure ongoing improvement, an independent evaluation process for the effectiveness of the system (based on achievement of the learning outcomes and learners' feedback), and an independent quality assessment process will be in place (9), which also feeds back into the development cycle (Terry Anderson, 2008).

A growing body of literature provides insight into the possible advantages and the minimum requirements for integrating ICTs into learning provision more generally (Simonson, Smaldino, Albright, & Zvacek, 2003) and on the unique opportunities provided by the online environment in particular (Anderson & Elloumi, 2004). The literature suggests the need to recognize the increased diversity of the potential learners and to design with different learning needs in mind from the outset (Ehlers, 2004; Davis, 2007; as cited in Moore, 2007), including the need to address issues of cultural diversity (Gunawardena & LaPointe, 2007; as cited in Moore, 2007) and make the necessary investment in appropriate curriculum design ahead of marketing and registration (Butcher, 2001). It is then necessary to create awareness of the nature and demands of distance and technology mediated learning prior to registration (Simpson, 2004; Davis, 2007; as cited in Moore, 2007) and give attention to the ways in which both tutors and learners are prepared, monitored and supported in an online or technology mediated learning environment (McPherson & Nunes, 2004) throughout the learning process. The design of the learning process may usefully be informed by an understanding of adult and possibly self-learning theory (Davis, 2007; as cited in Moore, 2007; Hase and Kenyon 2001) and the changing expectations and preferred learning styles of learners (Dede, Dieterle, Clarke, Ketelhut, & Nelson, 2007; as cited in Moore, 2007) and in particular the need for interaction, customization and reciprocity in learning partnerships (Beldarrain, 2006). Caplan, Thiessen, and Ambrock (as cited in Anderson & Elloumi, 2004) point to the need for multi-disciplined teams to develop these kinds of programmes which will obviously have implications for project management, time and cost and in turn models a particular form of professional practice (Glennie and Mays, 2013).

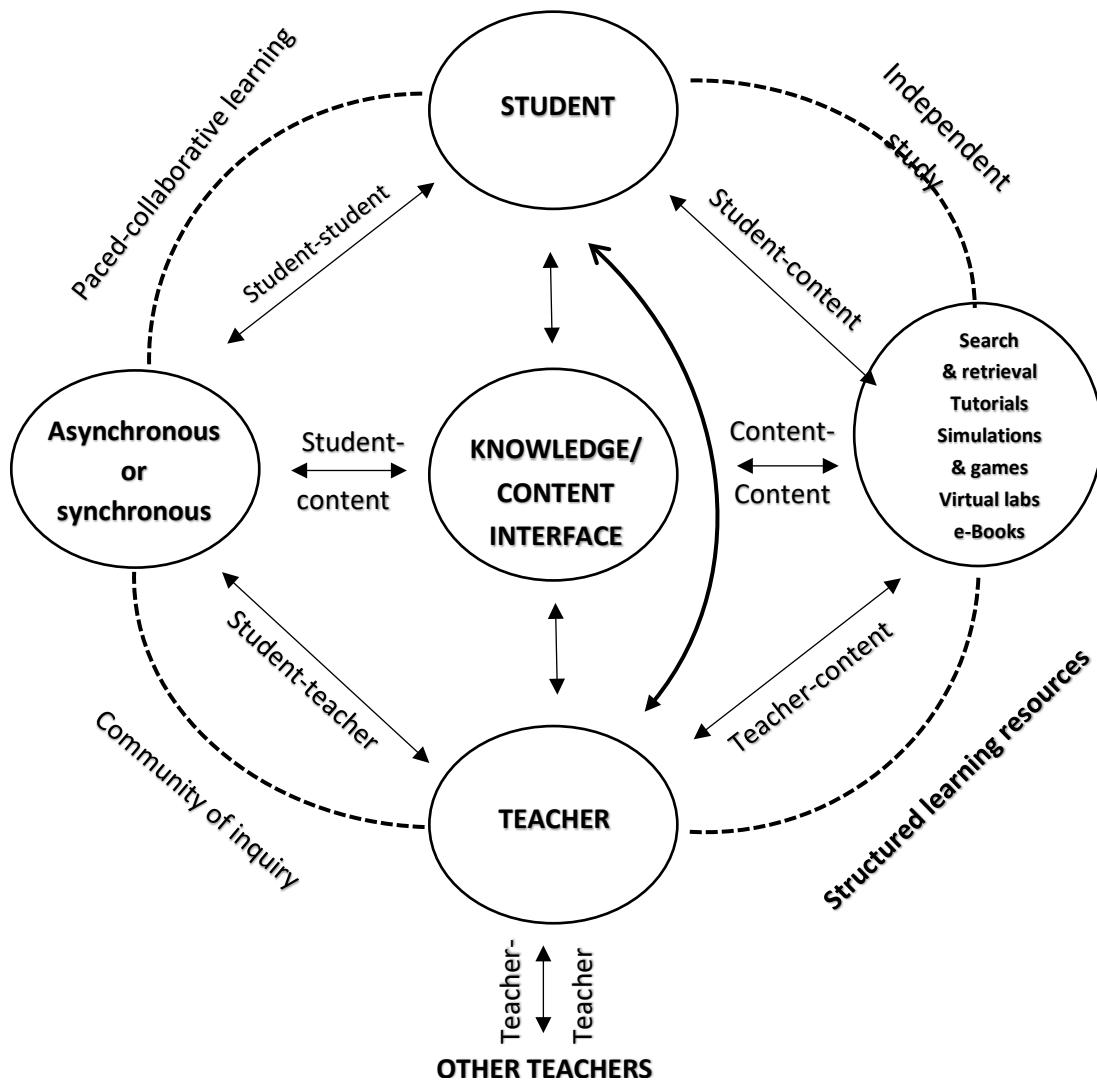


Figure 7: Anderson's model of online learning¹¹

Figure 7 illustrates one model of the many possible models. As noted by Glennie and Mays (2013), not all aspects of Anderson's model above will necessarily feature in all programme designs. For example, the development of simulations and games or virtual labs is time-consuming and may not be appropriate to all contexts. However, it does seem to make sense for all programmes to create opportunities for greater learner-content interaction (through the design of meaningful activities with automated feedback for example); opportunities for learner-teacher interaction outside of normal office hours by email and through online fora; as well as learner-learner interaction as learners can often support one another in the learning process and an online

¹¹ https://ustpaul.ca/upload-files/DistanceEducation/TOWARDS_A_THEORY_OF_ONLINE_LEARNING.pdf

community of learning can help overcome the sense of isolation that often characterizes distance provision. The next section looks at the different modes of provision of learning.

4.1.4 Modes of provision of Learning

This model discusses the possible combinations of learning that EDC can choose from. The diagram in Figure 8 illustrates a grid of possibilities developed by Saide (Glennie & Mays, 2013) and subsequently incorporated into policy (DHET, 2014) and accreditation guidelines (CHE, 2014), in South Africa.

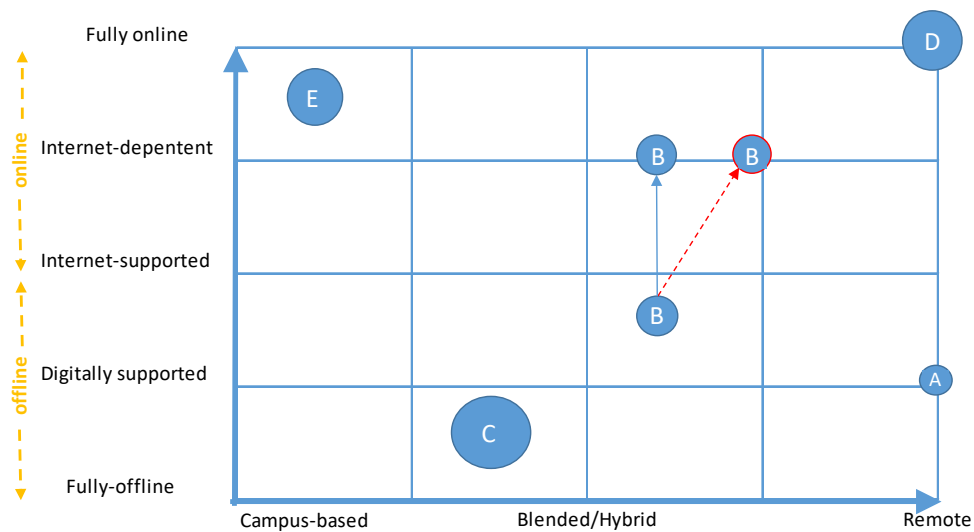


Figure 8: Grid illustrating a range of provision (Glennie & Mays, 2013, p. 134)

Glennie and Mays state that there are a range of possibilities for mode of provision, and these may include several options like:

- A. An off-line programme offered to widely distributed learners but including digital support such as podcasts and videos loaded onto a tablet or flashdrive;
- B. A part-time programme with face-to-face contact support offered in several satellite centres, some digital resources and optional online discussion forums;
- C. A large lecture-based programme offered on the main campus as well as on a variety of satellite campuses;
- D. A fully-online programme offered to learners all over the world;
- E. A fully-online programme which learners’ access in computer-labs or by using their own devices in wifi-hotspots on campus.

They argue that within this framework, “distance education” therefore refers to practices towards the right-hand side of the grid in Figure 8 in which it is assumed that learners will rarely,

if ever, be in the same time and place as their teacher. This has profoundly different implications for learner and staff roles and also for what facilities need to be put in place and maintained at the extremes of practice, notwithstanding that there may be some programmes converging towards a blended mode of provision. Critical for the current discussion is a consideration of how ICTs are utilised to facilitate active learner engagement with the curriculum, to provide a wide range of learning support strategies and to enable reliable assessment that is consistent with the overall purpose of the programme, without necessarily requiring teachers and learners to be in the same place at the same time. We are thus looking to uses of technology that involve far more than simply providing “print behind glass.” Probably the most important and perhaps the most difficult transition to the online/ blended mode for both the instructor and learner is that of adjusting to the online communication medium, be it used synchronously or asynchronously. This includes concepts and practice surrounding teaching and learning interaction, engagement, and facilitation (Glennie and Mays, 2013).

A question then arises when using the mode in Figure 8 above. The question is: Which of these examples should be classified as ODL provision (Glennie and Mays, 2013)?

As learner needs and institutional capacity change, the mode of provision might migrate over time (e.g. from B to B1 or B2). Making informed decisions about what mode or technology to use and how requires insight into learner profiles and learning contexts, including the implications of possible cross border provision, clarity on the relative benefits of the decisions made and systemic and institutional agility (Baijnath, 2013; DHET RSA, 2014; Firdhouse, 2016; Lo, 2017; UNESCO, 2005). Of course, in a developing country context, availability of and access to ICT cannot be assumed, and institutional leadership may play a significant role in the extent to which these issues are addressed (Macharia & Pelser, 2013). Glennie and Mays (2013) refer to a third dimension, pedagogy, which is not illustrated in the grid in Figure 1, but which will nonetheless have a fundamental impact on the learning and business models adopted. In this instance, pedagogy is used as a more general term for the assumptions about learning that underpin practice and the ways in which an understanding of learners and learning contexts influences the choices made (Beetham & Sharpe, 2013). This broad understanding subsumes other more audience-focused lenses such as andragogy, heutagogy or even ubuntugogy. Reflecting on twelve years’ experience of the role that ICT has played in the UK, Caird and Lane (2015), identify four major teaching models: face-to-face teaching models; distance teaching models; ICT-enhanced blended teaching models and online teaching models. However, as Amory, Bialobrzeska and Welch (2018) illustrate, every teaching and learning context is unique and involves making choices along a series of continua of possibilities as illustrated in Figure 9. The next section looks at another possible model that improves on the ones discussed above.

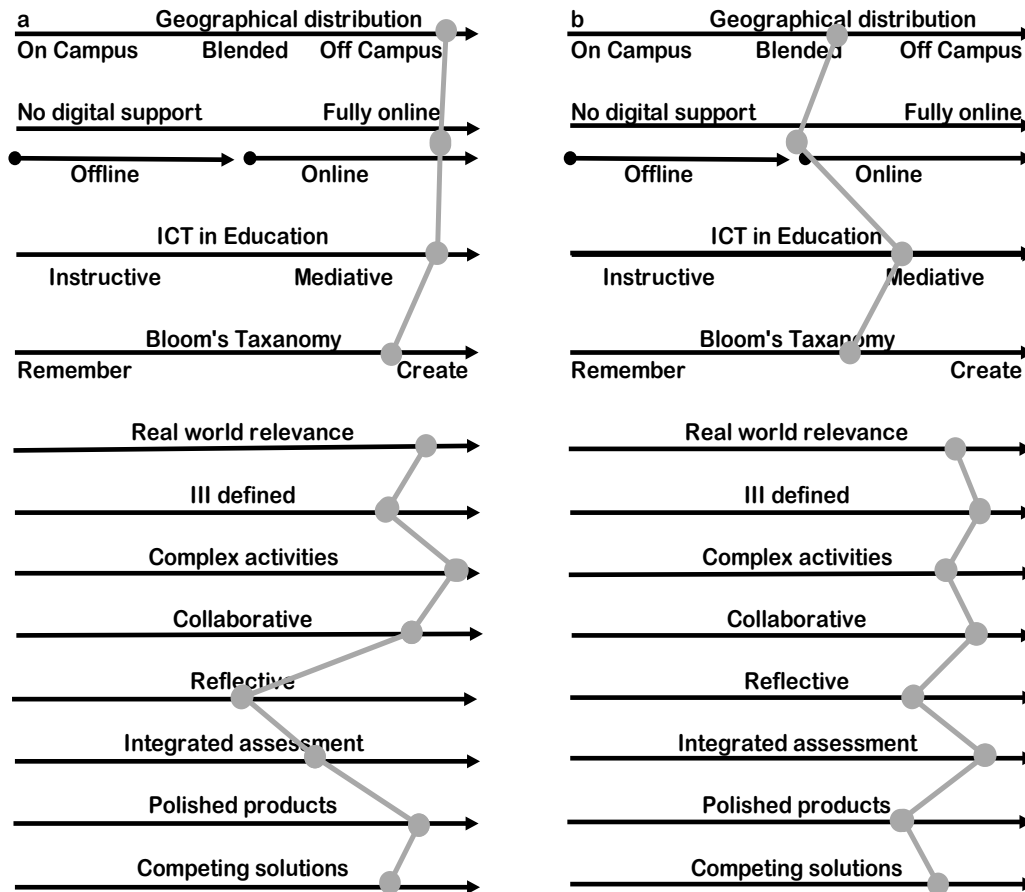


Figure 9: Continua of modes of provision

A useful approach to embedding flexibility in different contexts is to see it in relation to how, and to what extent, flexibility is being integrated in leveraging key dimensions of learning and teaching, and these are as follows:

- Learning experience design** - this is about the design and development of productive learning experiences so that each learner can make the most of the learning opportunities they afford.
- Learner-content engagement** - this is about learners' engagement and interaction with the subject matter in ways that suit individuals, their styles and approaches to studying and its time, place and pace.
- Learner-teacher engagement** - this is about choices learners have in relation to the mode and method of their engagement and interaction with their teachers and tutors.
- Learner-learner engagement** - this is about choices learners have in relation to the mode and method of their engagement and interaction with their peers in small and large groups, and in offline and online educational settings.

- (e) **Learner engagement with the learning environment** - this is about adaptable access, interaction and engagement with the learning environment (such as with mobile devices, Wi-Fi access and innovative use of study space).
- (f) **Learner engagement with assessment activities** - this is about choices learners have in relation to the fulfilment of their assessment requirements.
- (g) **Learner engagement with feedback** - this is about choices learners have in relation to access to feedback on their learning and assessment activities.
- (h) **Learner engagement with the institution** - this is about choices learners have in relation to their engagement with the services of the educational institution (Naidu, 2018).

The next section discusses the Design Framework.

4.1.5 Design framework

This framework provides a basis for designing instruction. Sometimes it is referred to as the philosophy or the theory behind a specific design. As observed previously, three schools of thought have been widely used and explored to provide guidance for instructional practice: behaviourism, cognitive psychology and constructivism (Villalba and Romiszowski, 2001). However, of the three, constructivism has been identified as the most suitable one for online learning environments (Hung, 2001; Oliver, 1999; Hung and Nichani, 2001). Figure 10 below shows an example of a design framework for online learning environments.

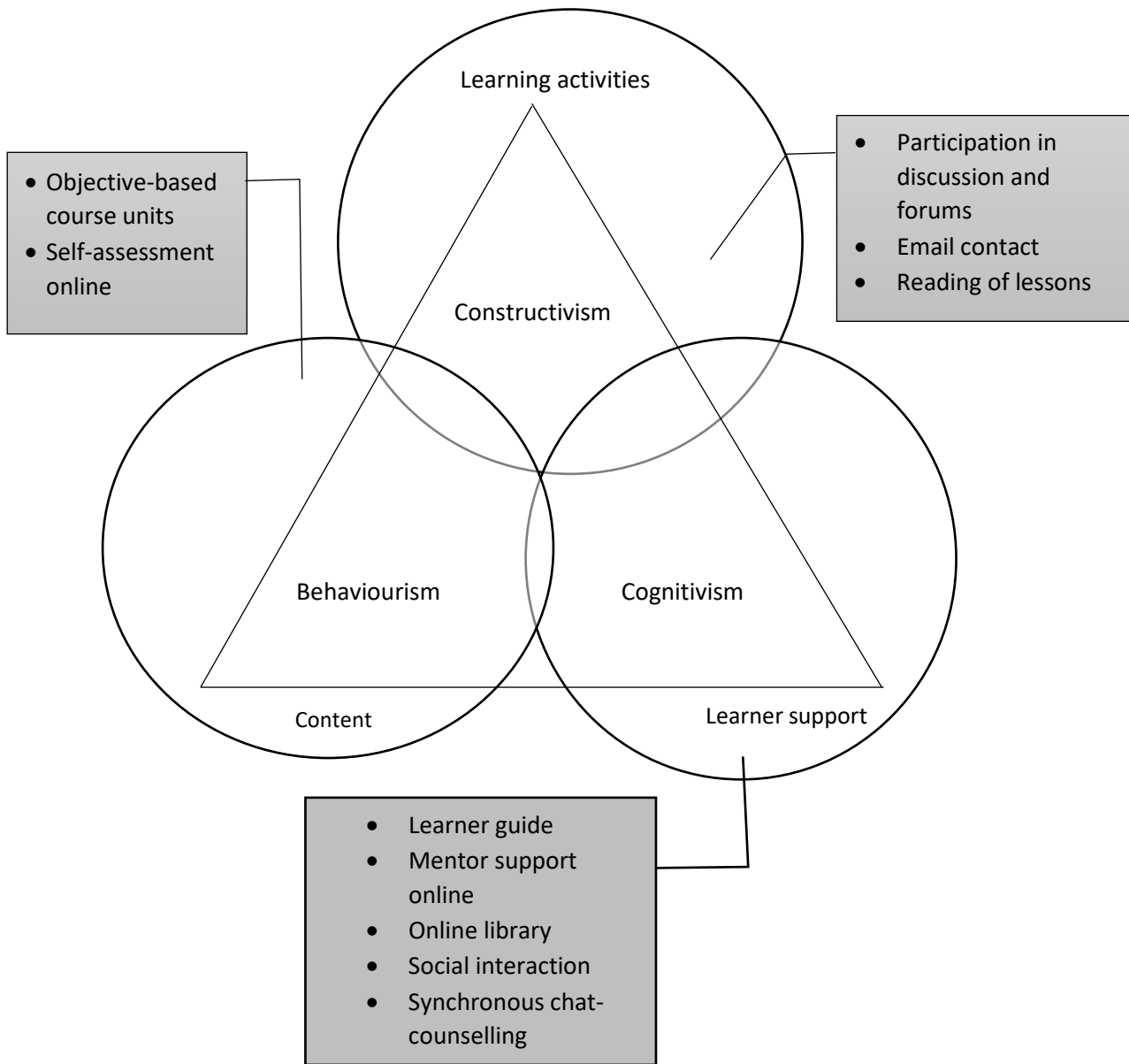


Figure 10: Design framework for online learning environments¹²

¹² Adapted from S Mishra - British Journal of Educational Technology Agency, 2002 – [speakeasydesigns.com: http://www.speakeasydesigns.com/SDSU/learner/SAGE/compsprep/Online_Learning_Environments.pdf](http://www.speakeasydesigns.com/SDSU/learner/SAGE/compsprep/Online_Learning_Environments.pdf)

Application of the framework

The framework depicted above was used in developing the online learning facilities for a six-month Post-Graduate Certificate in Management of Displacement, Resettlement and Rehabilitation (<http://www.rronline.org>) offered by the Indira Gandhi National Open University, India. The programme, developed with the support of the World Bank, is now in the process of its impact evaluation. Using the framework, an attempt has been made to provide a complete learning environment to the distance learners through the use of the web technology. Being a social science programme requiring much discussion, it demanded more of constructivist approach. However, this framework provides a blend of all the best features of different approaches available with us. It is expected that this framework will also be useful in online delivery of other subjects (Mishra, 2002). The next section discusses the TIPS Framework.

4.1.6 The TIPS Framework for Quality Assurance

The TIPS Framework is used to offer suggestions to teacher-practitioners as creators and authors of their own OER (Kawachi, 2014).

Defining quality in absolute terms is elusive because it depends upon whose perspective we choose to adopt. However, quality has been fairly well defined by Harvey & Green (1993) as being on five dimensions; - with Fitness for Purpose as the dimension most relevant to quality for open educational resources (OER), Cost Efficiency as another which is also relevant and Transformative Learning, (the other two dimensions are not concerned with education). The key dimension for quality of OER is thus Fitness for Purpose, and this indicates that the purpose needs to be defined, and this depends on whose perspective we adopt. According to the third dimension of quality as Fitness for Purpose, we are grappling here with the issue of whose purpose? And therefore, here in version 2.0 we suggest a practical way forward to accommodate the different perspectives. The challenge is illustrated by e.g. an OER highly rated as excellent quality by learners in their remedial learning, but which teachers elsewhere find terribly difficult to adapt, change the language, and relocalise to another culture and context. So, on one level (let's call this the basic or ground level with learners in class) the OER is high quality, but on another higher level (of the teachers as re-users and translators) this same OER is low quality and unusable. The global institution and OER experts (say at the highest level) would rate this OER more critically because of the difficulty to remix (Kawachi, 2014).

The present TIPS Framework version 2.0 incorporates the perspectives of global OER experts at level-1, and the perspectives of teacher-practitioners as prospective OER authors at level-2. While teachers indicated their imaginative use of the TIPS Framework for future authoring their own OER, the Framework does not yet include feedback from actual use in the field. Moreover, the current Framework does not yet include the learners' perspectives on quality, or the results from impact studies on improved learning using OER by learners at level-3. Impact studies are in progress in a range of countries to see how well the TIPS Framework can assist teachers in creating their own OER. Here we also hope to see how helpful the Framework is for learners as

co-creators of OER - particularly if learners after completing a regular course can build OER from their notes and other experiences in order to offer these OER to the following cohort of learners. These ongoing studies are further described in the summary shown in Appendix 1 where a simplified Feedback Form is offered (Kawachi, 2014). The next section discusses the TPACK Framework.

4.1.7 The TPACK Framework

Koehler et al. (2013) explain that the Technological Pedagogical Content Knowledge (TPACK) framework (Koehler & Mishra, 2008; Mishra & Koehler, 2006) is used to describe the type of teacher knowledge required to teach effectively with technology. Describing what teachers need to know can be difficult because teaching is an inherently complex, multifaceted activity which occurs in varied settings. By its nature, teaching is an ill-structured problem (Leinhardt & Greeno, 1986; Spiro, Coulson, Feltoich, & Anderson, 1988) requiring reasoning about a wide range of interrelated variables such as the background knowledge that learners bring into the classroom, teacher and learner expectations about the content to be covered, and school and classroom guidelines and rules. The use of technology in the classroom introduces a new set of variables into the teaching context, and adds complexity due to its rapidly-changing nature (Koehler & Mishra, 2008). The TPACK framework identifies a unifying structure that not only respects this complexity, but also provides guidance for appropriate technology integration (Koehler & Mishra, 2008; Mishra & Koehler, 2006). The TPACK framework describes the kinds of knowledge that teachers need in order to teach with technology, and the complex ways in which these bodies of knowledge interact with one another. This builds on the approach used by Shulman's (1986) pedagogical content knowledge (PCK), describing how and why teacher knowledge of pedagogy and content cannot be considered solely in isolation. Figure 11 below shows the TPACK Framework.

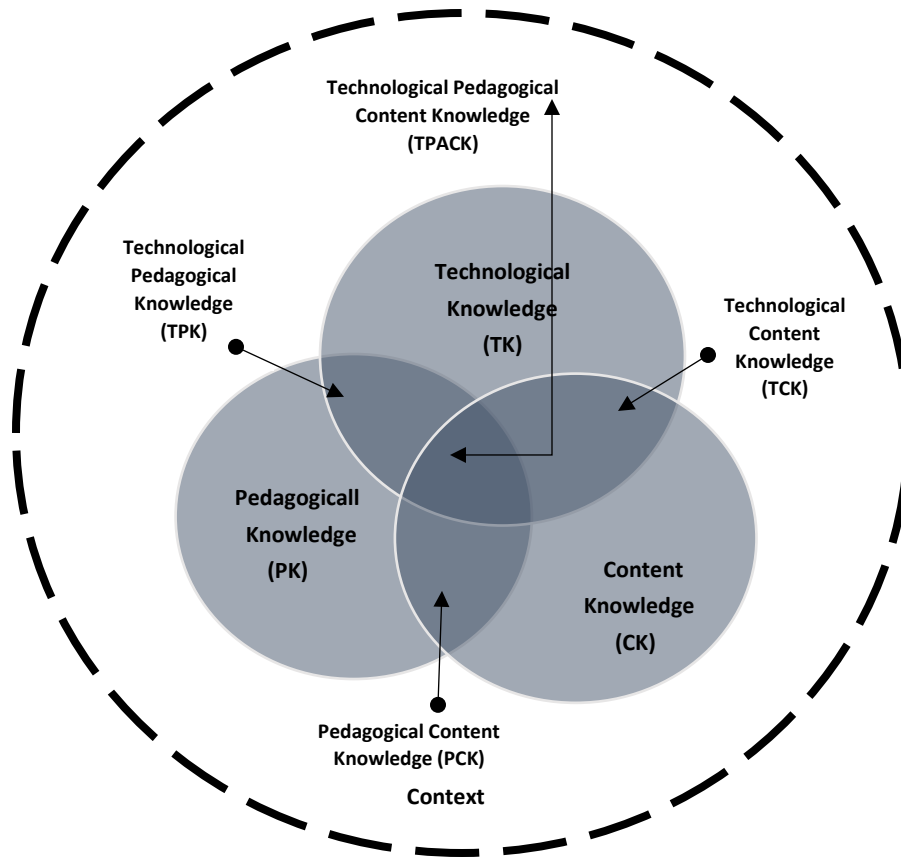


Figure 11: TPACK framework (Image from <http://tpack.org>)

Teachers, according to Shulman, need to master the interaction between pedagogy and content in order to implement strategies that help learners to fully understand content. The TPACK framework extends Shulman's (1986) notion of PCK by including knowledge of technology (CEMCA, 2013). The last framework to be discussed is the TIM Framework.

4.1.8 Technology Integration Matrix: Choosing and integrating online collaborative technologies into a lesson plan

The Technology Integration Matrix (TIM, 2009) is a descriptive tool that is used to analyse the level of instruction and technology in a primary or secondary classroom. The horizontal axis of the matrix contains the levels of technology in the curriculum (i.e., entry, adoption, adaptation, infusion, transformation). The vertical axis states the characteristics of the classroom during the learning process (i.e., active, collaborative, constructive, authentic, goal directed). The combination of the vertical and horizontal axis creates 25 cells displayed on the matrix (Hornack, 2011). Table 9 below shows a TIM Matrix.

Table 9: TIM matrix

		1	2	3	4	5
		Entry	Adoption	Adaptation	Infusion	Transformation
TECHNOLOGY INTEGRATION MATRIX		The teacher uses technology to deliver curriculum content to learners.	The teacher directs learners in the conventional use of tool-based software. If such software is available, this level is the recommended.	The teacher encourages adaptation of tool-based software by allowing learners to select a tool and modify its use to accomplish the task at hand.	The teacher creates a learning environment that infuses the power of technology tools throughout the day across subject areas.	The teacher creates a rich learning environment in which learners regularly engage in activities that would have been impossible to achieve without technology.
A	Active Learners Learners are actively engaged in using technology as a tool rather than passively receiving information from the technology.	Indicator: Learners use technology for drill and practice and computer based training.	Indicator: Learners begin to utilize technology tools to create products, for example using a word processor to create a report.	Indicator: Learners have opportunities to select and modify technology tools to accomplish specific purposes, for example using colored cells on a spreadsheet to plan a garden.	Indicator: Throughout the school day, learners are empowered to select appropriate technology tools and actively apply them to the tasks at hand.	Indicator: Given ongoing access to online resources, learners actively select and pursue topics beyond the limitations of even the best school library.
B	Collaborative Learners use technology tools to collaborate with others rather than working individually at all times.	Indicator: Learners primarily work alone when using technology.	Indicator: Learners have opportunities to utilize collaborative tools, such as email, in conventional ways.	Indicator: Learners have opportunities to select and modify technology tools to facilitate collaborative work.	Indicator: Throughout the day and across subject areas, learners utilize technology tools to facilitate collaborative learning.	Indicator: Technology enables learners to collaborate with peers and experts irrespective of time zone or physical distances.

C	Constructive Learners use technology tools to build understanding rather than simply receive information.	Indicator: Technology is used to deliver information to learners.	Indicator: Learners begin to utilize constructive tools such as graphic organizers to build upon prior knowledge and construct meaning.	Indicator: Learners have opportunities to select and modify technology tools to assist them in the construction of understanding.	Indicator: Learners utilize technology to make connections and construct understanding across disciplines and throughout the day.	Indicator: Learners use technology to construct, share, and publish knowledge to a worldwide audience.
D	Authentic Learners use technology tools to solve real-world problems meaningful to them rather than working on artificial assignments.	Indicator: Learners use technology to complete assigned activities that are generally unrelated to real-world problems.	Indicator: Learners have opportunities to apply technology tools to some content-specific activities that are based on real world problems.	Indicator: Learners have opportunities to select and modify technology tools to solve problems based on real-world issues.	Indicator: Learners select appropriate technology tools to complete authentic tasks across disciplines.	Indicator: By means of technology tools, learners participate in outside of school projects and problem-solving activities that have meaning for the learners and the community.
E	Goal Directed Learners use technology tools to set goals, plan activities, monitor progress, and evaluate results rather than simply completing assignments without reflection.	Indicator: Learners receive directions, guidance, and feedback from technology, rather than using technology tools to set goals, plan activities, monitor progress, or self-evaluate.	Indicator: From time to time, learners have the opportunity to use technology to either plan, monitor, or evaluate an activity.	Indicator: Learners have opportunities to select and modify the use of technology tools to facilitate goalsetting, planning, monitoring, and evaluating specific activities.	Indicator: Learners use technology tools to set goals, plan activities, monitor progress, and evaluate results throughout the curriculum.	Indicator: Learners engage in ongoing metacognitive activities at a level that would be unattainable without the support of technology tools.

Source: Hornack, 2011, *Technology Integration Matrix*¹³

The TIM is helpful in lesson planning. The Technology Integration Matrix (TIM, 2009) is an excellent resource for integrating technology into any lesson plan (Hornack, 2011).

¹³ http://teche.pbworks.com/f/hornackassignment4-4_22_2011.pdf

4.2 Theory of change and the online ICT frameworks that inform the formulation of the online learning model and guidelines for EDC

4.2.1 Theory of Change

This section outlines the broad approach that EDC in collaboration with the Commonwealth of Learning (COL) and the Ministry of Education, Government of Eswatini is currently pursuing to establish OER based Blended Online for EDC to meet the needs of educational demand for out of school youth and adults. Accordingly, EDC seeks to propose a blended online learning model and develop guidelines for the blended online learning using the Theory of Change.

COL's theory of change assumes a causal link between hoped for *impacts* from achieved *outcomes* resulting from completed *outputs* which have been enabled through appropriate *activities* made possible through provision of appropriate *inputs* as illustrated in Figure 12 below.

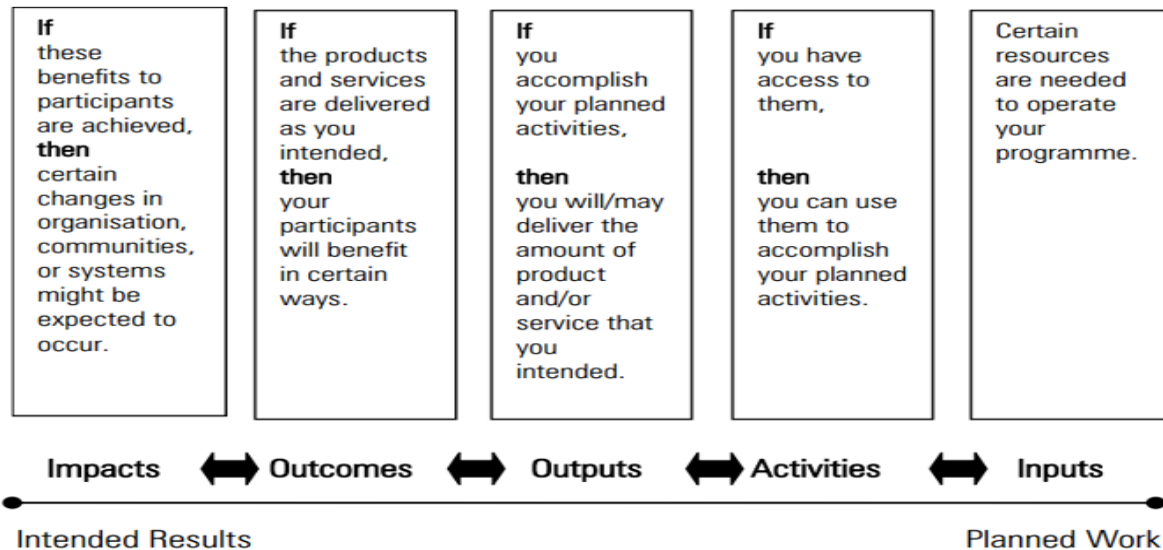


Figure 12: The results chain and causality

Source: COL, Proposal to reinvent Emlalati Development Centre, 2019

The diagram below provides the conceptual framework for the Theory of Change followed by a brief description of the model.

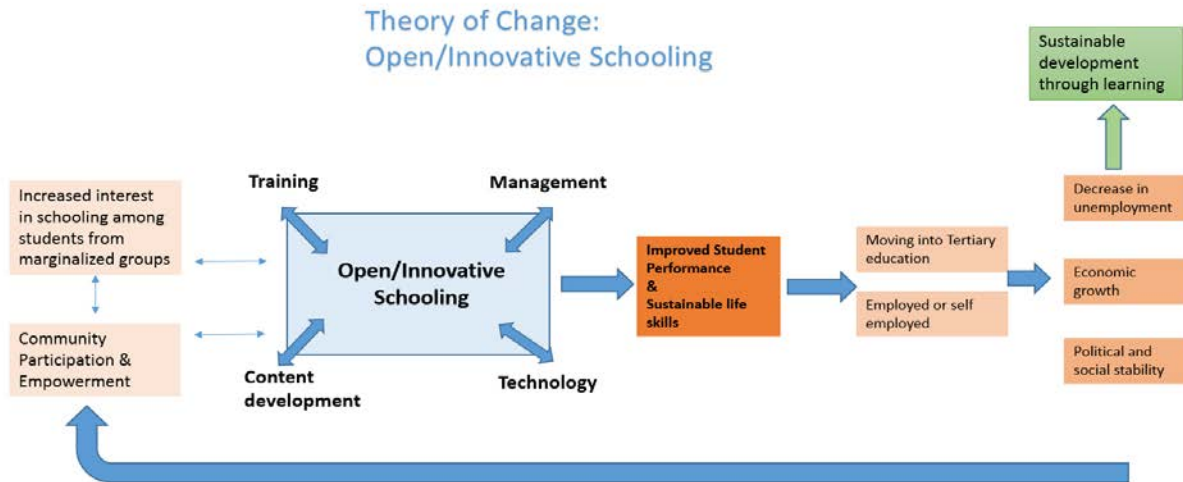


Figure 13: Theory of change

Source: COL, Proposal to reinvent Emlalatini Development Centre, 2019

Brief description:

1. The number of out of school youth and adolescents is unacceptably high and even beginning to increase in some regions.
2. Youth and adults who have not completed schooling are often unable to access employment nor other education and training opportunities and, having no stake in society and/or feeling marginalised by society, may be more easily radicalised or drawn to anti-social behaviour as the only means to survive.
3. In an increasingly global knowledge society successful completion of schooling is a pre-requisite for active and productive citizenship.
4. The present formal school systems can hardly cope with the number of learners presently in schools, let alone address the needs of out-of-school youth and adults (Tony Mays, 2018 Reinvention of Emlalatini Development Centre - A Proposal to the Ministry of Education and Training of Eswatini).

The Information and Communication Technologies that are discussed below distinguish between the Learning Management System Design and the Instructional Design from choosing technologies when designing a lesson. The technologies will also inform the development of the guidelines for the introduction of online learning at EDC. The first section looks at what EDC needs to do before embarking on the development of the online system, the Online Learning System Framework.

4.2.2 Online learning system framework

EDC needs to develop an online learning system framework. Before embarking on the development of an online learning system, in part or in whole, careful stock needs to be taken of the needs of the intended learners, the curriculum to be offered, and the context for the project. The framework considers the various factors that must be considered for the infrastructure for online learning, including planning, structural and organizational issues, the components of a system and the interfaces among them, and various related issues, such as human resources, decision-making, and training. Terry Anderson (2008a) observed that once an online learning system was developed, an infrastructure must be able to evolve in order to accommodate changing learner needs, technologies, and curricula.

Building the infrastructure for online learning has many interconnected components and many factors must be considered, so that it is to provide a straightforward checklist or recipe to follow. Distance education has provided an understanding of how the entire system of course design, development, and delivery occurs, and how these link to related learner services and other components, all of which are vital aspects of ensuring effectiveness and quality of education. Anderson T (2008b) emphasised that the focus here should be on the planning and organization of an online learning system, and some of the associated issues that must be considered for establishing online learning environment for any Institution.

The ideal case is based upon a good understanding of an institution's core business and values, the nature of the intended learner market, and the needs of the curriculum. This understanding is expressed through the learning outcomes of the program to be developed and delivered. On this basis, an overall online learning framework can be developed. According to Terry Anderson (2008c), the framework shows the organization of the various components of the proposed system, after which a relatively complete business plan for the endeavour can be developed. Figure 14 describes one such framework for a post-secondary institution, on which the discussion of the various components is based.

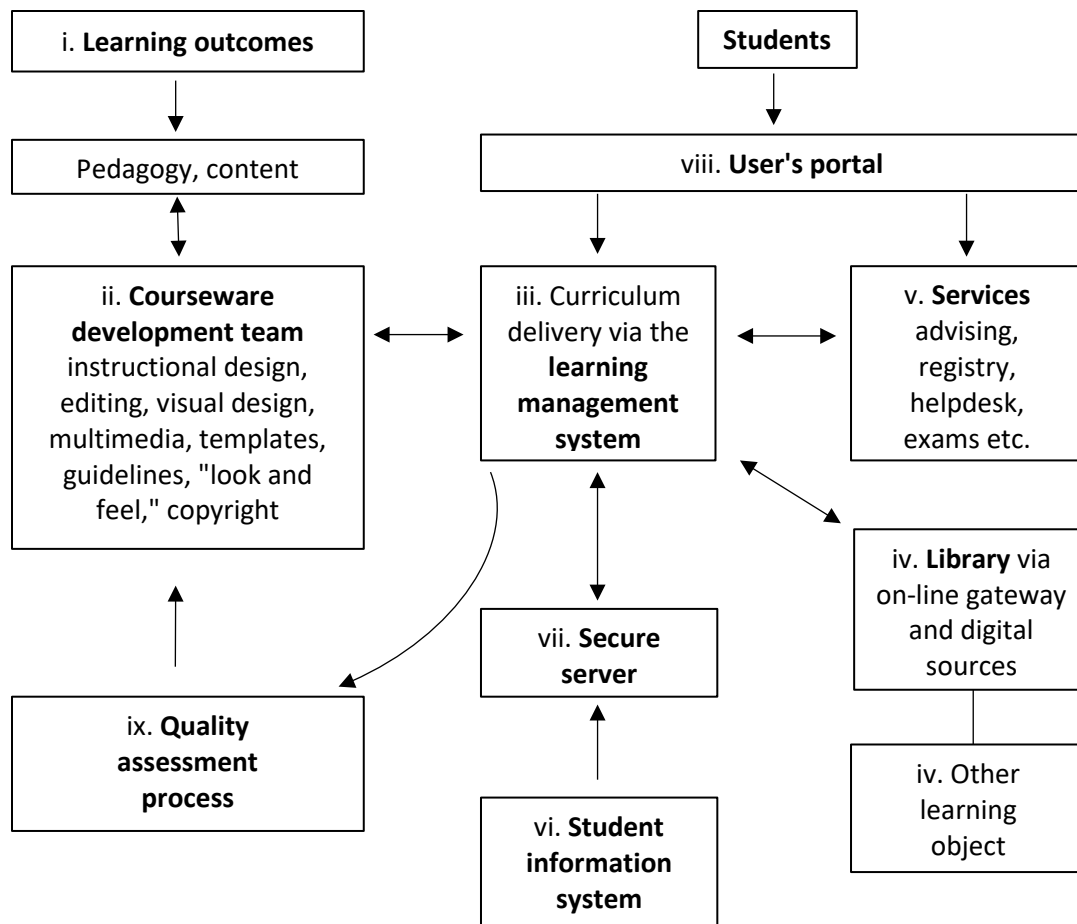


Figure 14: Structure for online learning¹⁴

4.3 Proposed Model for Blended Online Learning for EDC

Based on the above online learning system framework and various models discussed, the following model for blended online learning is proposed for Emlalatini Development Centre. This proposed model, is highly flexible and accessible to reach the unreachable. Further, online learning content is easily updateable and revisable and it provides access to a vast quantity of information which improves the quality of education. Below is a proposed model for blended online learning for EDC.

¹⁴ Adapted from Alan Davis, Paul Little & Brian Stewart: Developing an Infrastructure for Online Learning: Terry Davis, 2008, Theory and Practice of Online Learning: <https://www.aupress.ca/books/120146-the-theory-and-practice-of-online-learning/>

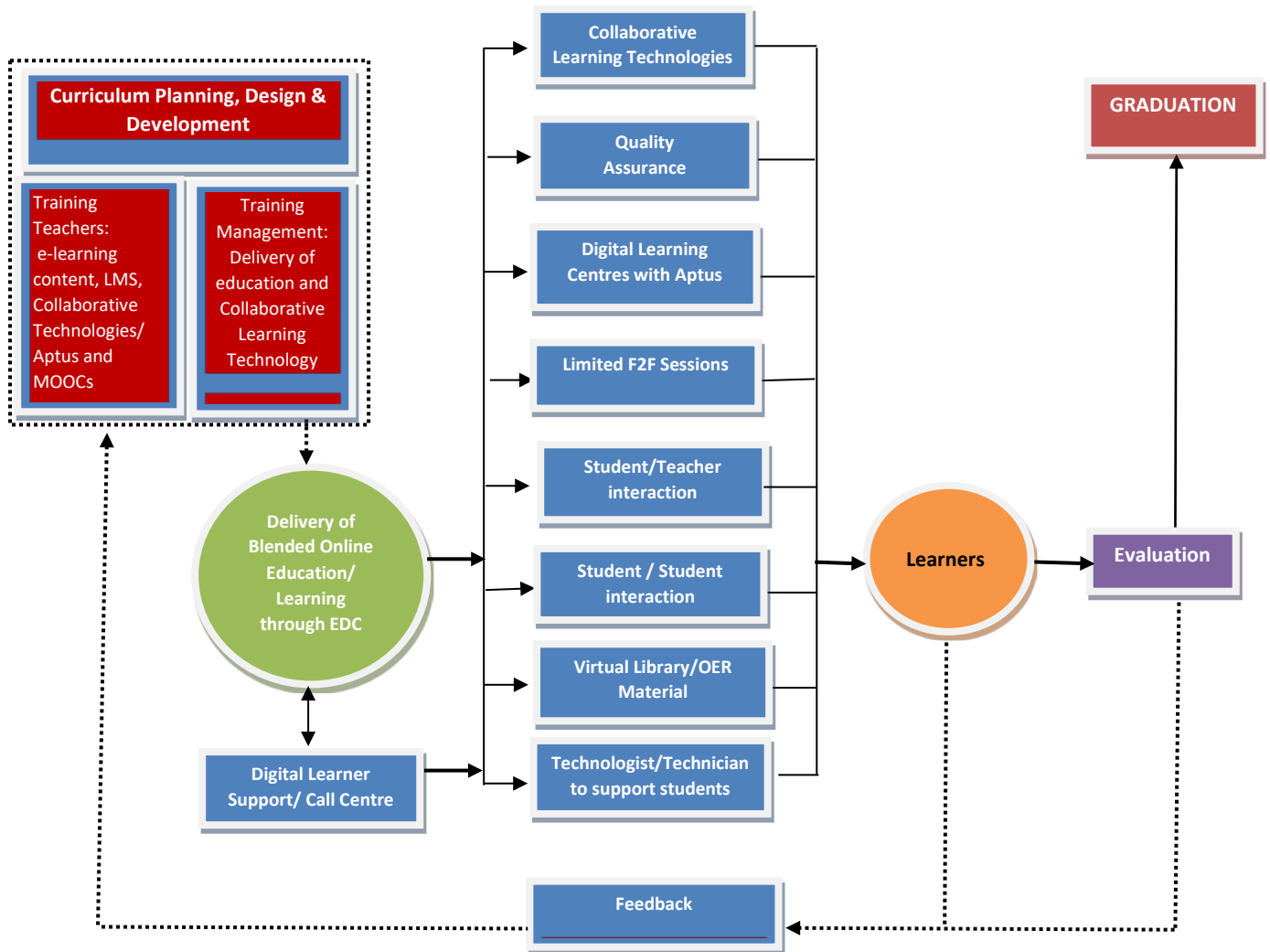


Figure 15: Proposed Online Learning Model for EDC

Broadly the instructional delivery is divided into two systems. (1) Online Learning and (2) Limited face-to-face teaching.

Learning management systems are the primary vessel for *discussion forums in online courses*. The proposed model suggests that the learners can discuss with their teachers, their fellow colleagues and access OER materials, etc. If they face any technical problem in handling the system, they can take the help of technician/technologist available at the digital centre.

Online learning gives learners the opportunity to plan study time around the rest of their day, instead of the other way around. Learners can study and work at their convenience. Some learners even report better concentration in online classes due to the lack of classroom activity.

Online discussions are a collaborative tool to facilitate communication and knowledge construction (Johnson, 2007). An individual can view content and contribute to an online discussion any time or place on their computer with an internet connection.

Online forums can be used for many purposes, such as helping learners to review material prior to an assignment or exam, engaging learners in discussion of course material before coming to class, and reflecting on material that they have read or worked with outside of class.

5. Conclusions and recommendations

5.1 Overview

The literature survey shows that online learning is a growing and exciting new way of learning in the digital era. The EDC, Eswatini Government Institution, is offering Junior Certificate and General Certificate of Secondary Education levels of provision. EDC offers its services by means of ODL, with occasional face-to-face contact sessions, and is open to any learner wishing to complete their secondary education (EDC, 2018). The most recent innovations in provision include:

- Increased face-to-face tutorials over weekends
- Establishment of 12 study centres to minimize the costs of travel for learners to access support
- Introduction of classes for Forms 1-5 so that learners can enrol at the level they need. (EDC, 2019).

Despite these innovations, EDC has experienced declining enrolment over the past three years. The declining enrolment seems contrary to the needs of the country and hence, prompted EDC to contact COL for advice and support.

5.2 Delivery modes and technologies

Workbooks are the main teaching material used by the learners at EDC. In addition to the use of workbooks, learners are also expected to avail themselves for face-face support in the following ways:

- Residential course in April/ May for a week. Learners receive intensive support from their tutors.
- Learners can attend a one-day session on Tuesday (JC) and Thursday SGCSE.
- Learners can arrange to meet their tutors at EDC.

Other learning support strategies that are used by EDC are:

- Telephonic and postal support
- Audio/CDs- used on by the English department
- Tutorial sessions
- Providing learners with self-instructional material
- Pre-course, in-course and post-course counselling service

From the learning support that is used, it is evident that technology is used minimally. This makes it impossible for EDC to realise its goal fully, that of offering the best support to their learners and to reach them in the four regions of the country. Yet according to the EDC report, one of its mandate is: “To ensure the use of ICT and ODL where feasible in course development and delivery. To differentiate delivery modes for different learner groups such as children, adolescents and adults.” Therefore, the teaching and learning cannot be separated from technology, especially in open and distance learning institutions where technology has removed the belief that teaching is confined only to the classroom.

5.3 Motivation to support EDC’s move online

EDC still relies a lot on traditional methods to support learners with minimal integration of ICT in their lesson delivery, which is a contradiction to its goal and that of the MoET which states that “the MoET shall facilitate an enabling environment for adoption and use of ICT in all education and training establishments. This will be done through the digitisation of information relating to curricula, mobile learning, e-learning, e-assessment and e-governance. Such undertaking will ensure the facilitation of the expansion of ODL by leveraging ICTs”. Since EDC operates as ODL it is expected that it should combine the traditional methods with technology.

However, there is no e-learning in what EDC practices. According to the theory of change, there must be appropriate use of technology. Technology must be used effectively in the teaching and learning process so that it benefits the learners. Blended online learning is a method that focuses on online learning materials and opportunities with traditional classroom-based methods (<https://en.m.wikipedia.org/wiki>).

5.4 Accessibility and Availability

Open and Distance Learning also covers learners in a wider geographical area who have challenges with attending classroom lectures. This is because ODL gives learners the freedom to work where and when they choose.¹⁵ EDC also has only eight operational study centres with five in one region and the remaining three regions having one centre each, making it difficult for learners to reach that one centre. To make things worse, these study centres are not fully operational. Thus, learners are expected to attend classes at the main centre at Ezulwini. It may be expensive for some learners to attend classes there. Also, some learners may not be able to attend their classes because some of them are working. These challenges hinder EDC to operate to its full potential. For EDC to fulfil the dream of supporting the learners to complete their secondary education, it must be accessible to them. That can be possible using eLearning/ online learning.

¹⁵ <https://higheredrevolution.com/importance-and-effectiveness-of-e-learning-95130046ed46c>

5.5 Teacher training

Online learning also makes it possible for teachers to address the challenge of overcrowding which result to teacher and learner ratio not being appropriate. Online learning helps solve class size problems¹⁶. EDC also has a challenge of shortage of staff. Using online strategies can enable learners to work independently at their own time and pace without putting a lot of pressure on them. Allowing the learners to work independently promotes learner-centred approaches, enhances their understanding and involvement. That gives them a sense of belonging as the theoretical framework also encourages content development. Also, since teachers use predominately traditional methods of teaching, because of the shortage of facilities to support learners to use online learning, it means the teachers need training for them to be able to use technological strategies as expected by online teaching.

5.6 Summary of Conclusions

- Online learning has the potential to increase learner enrolment and reach the unreached. It is a viable solution for Open and Distance Learning which tends to be flexible and cost-effective providing education at the learners' convenience. The wide range of modes of provision ranging from fully offline to fully online offers choices for different educational institutions to choose a suitable mode according to their needs, circumstances and affordability. The Blended Learning mode of provision seems to be a workable option for schools in developing countries with learners in rural and remote areas faced with unavailable or weak or unreliable internet and unreliable electricity power supplies. Considering the profile of EDC and characteristics of its learners, it is recommended that for online learning, the Blended Learning mode of provision is established at the institution. This establishment will not only improve the learning of the current enrolment but has prospects of reinventing the declining numbers and increasing the enrolment reaching the thousands of youth and adults who for one reason or another could not complete their secondary education through the formal education system. Such a change is likely to positively contribute to the lives of the youth and adults as well as improve the economy of the country. The Theory of Change spells out what to do in order to reach many learners by using online learning.
- The establishment of an online system is informed by models and guidelines which ensure its relevance and practicality given prevailing conditions and needs. For Emlaladini Development Centre to successfully develop and introduce online learning, the institution should consider the proposed online learning model and guidelines for setting up online learning environment. The institution must establish a digital platform which will allow development and accessing of content in different formats; enrolment, managing, and tracking large numbers of learners; synchronous and asynchronous activities; formative and summative assessments; and links with social media; among other things.

¹⁶ <https://ilearnhighschool.com/surrey-school-overcrowded-and-online-schools-help/>

- The adopted model should be open for modification in order to allow strengthening by key stakeholders such as the Commonwealth of Learning, Service Provider, the Ministry Education and Training, and Government of Eswatini.

5.7 Recommendations

Based on the conclusions of the online desktop research, declining enrolment numbers at EDC and the impact of the COVID-19 pandemic it is recommended that:

4. EDC move from the print to online learning and blended learning. Establishing an online learning system at EDC will allow learners continue learning anywhere and anytime. Such a mode of provision will ensure that learners continue to learn even in times of school closure such as the COVID-19 pandemic thus minimizing the negative impacts of such unprecedented happenings. Online learning implementation is likely to increase learner enrolment resulting in most of youth and adults completing their secondary education and ultimately improving the economy of the country.
5. The change must be guided by the guidelines for introducing online learning at EDC that have been developed as a result of the Online Desktop Research as well as COL's Theory of Change. EDC should develop an online learning platform that is unique to the needs of the institution and is based on the local context.
6. The following should be put in place to support the successful establishment and implementation of Online Learning for EDC:
 - a. An IT Department is established at EDC to provide the necessary technical expertise and maintenance of the system.
 - b. A Quality Assurance Department should also be established at EDC assure quality provision of education at all stages.
 - c. Build ICT Infrastructure for the Online Learning Environment.
 - d. Train teachers to develop or use existing OER to provide quality education through online learning.
 - e. Develop and implement strategies for synchronous / asynchronous approaches through online learning.

5.8 ICT guidelines for online learning for EDC

For Emlalati Development Centre to successfully develop and introduce online learning, the institution seeks to propose an online learning model and guidelines for online learning. The proposed model will be modified and strengthened in consultation with the Commonwealth of Learning, Service Provider and the Ministry Education, Government of Eswatini.

The institution will be guided by the COL Theory of Change which spells out what it has to do in order to successfully implement an online learning strategy that can help reach many learners. EDC institution must develop its own Online Learning System framework from existing models. Designing of online learning instructions must consider the, Design

Framework, the Community of Inquiry and the Modes of Provision, the TIPS Framework, the TPACK Framework, the Technology Integration Matrix and the collaborative online technologies. A list of collaborative online technologies is shown as Annex 2.

The following requirements are therefore needed for a digital platform (or perhaps more likely several platforms) to support Emlaladini's online learning:

- An IT Department is established at EDC to provide the necessary technical expertise and maintenance of the system.
- A Quality Assurance Department should also be established at EDC to assure quality provision of education at all stages.
- Build ICT Infrastructure for Online Learning Environment.
- Train teachers to develop or use existing OER to provide quality education through online learning.
- Develop and implement strategies for synchronous / asynchronous approaches through online learning.

The online learning system should have the following functionalities:

- It must support **collaborative authoring** in multi-media with the ability to download constituent text/audio/video resources in multiple formats.
- It must facilitate **content management** and versioning.
- It must allow the **tracking of individual learners** over a period with continuous enrolment in one or more subjects and no pre-specified start or end dates.
- It must be able to **accommodate thousands** of learners all proceeding at their own pace in one to ten subject areas.
- It must be possible to track progress through **dashboards** at the national level as well as separately at state level.
- It must be possible to **work offline** most of the time and **sync online** at key stages e.g. submission of modular assignments in text, audio and/or video format.
- It must be able to accommodate **more than one language** e.g. English, Portuguese, French and Siswati.
- It must also be able to accommodate **mathematics and science formulae**.
- It must have a **formal assessment plug-in** that syncs to a national database but also the ability to create **in-course quizzes** that can be randomly generated and attempted multiple times.
- It must have a **dashboard for learners** that helps learners to see their progress, like in Khan Academy.
- It should be possible for learners to gain **badges** e.g. successful completion of a quiz, micro-credentials e.g. successful completion of a module and formal verifiable national certificates e.g. successful completion of a subject grade.
- It must have the option to request additional **tutor support** online, like with Khan Academy.
- It must have an option to participate in **open-ended discussion forums**.
- It should be possible to **link to common social media platforms** like WhatsApp in ways that protect learners' real identity.
- It must be able to accommodate access to open educational resources (**OER**)
- It must be able to accommodate to conduct **online examinations**
- It must be able to accommodate the **grading** of assignments, tests and all types examinations.

- It must be able to accommodate access to **collaborative learning technologies**.
- It must be able to create **MOOCs**.
- It must enable **video conferencing**.
- It must be **upgradable**.

5.9 Suggested process for developing a blended online learning platform for EDC

After consultation with the Ministry of Education and Commonwealth of Learning, EDC should identify the appropriate online learning platform by calling for proposals from service providers. The successful service provider should accommodate all the guidelines suggested above.

Discuss with Service Provider regarding detailed operational model and functional specifications as per the requirements of EDC as suggested in the proposed online learning model in section 4 and fix the timeline (see Appendix 2) for installing the online platform for EDC.

Training of Course/OERs Developers and management on Technology Enabled Learning using collaborative learning technologies for both face-to-face and online learning

Development of OERs.

The Service Provider will start working on establishing online learning Platform for EDC.

EDC monitors the progress of the work as per the timeline. After pre-testing or preliminary testing the App should be ready for user acceptance testing to make sure that the online learning platform is appropriate for online learning environment.

The timeline schedule should be prepared – covering:

- For Service Provider to understand the EDC Vision and idea for online learning platform.
- Development of online learning platform for EDC
- Uploading or incorporation of content and supporting materials.
- Progress assessment.
- Testing of the online learning platform
- Alteration if required;
- Ensure comprehensive functionality on various mobile device and software;
- Launch of the online learning platform
- On-going maintenance.

For Emlaladini Development Centre to successfully develop and introduce online learning the above guidelines are to be followed. There is also a need to decide on a suitable mode of provision of learning from all the available possibilities and depending on the availability of funds. The proposed model is open to be modified and strengthened by consulting the Commonwealth of Learning, Service Provider and the Ministry Education, Government of Eswatini.

References

- Davis, A., Little, P., & Stewart, B. (2008). Developing an Infrastructure for Online Learning in Terry Davis, 2008, Theory and Practice of Online Learning: <https://www.aupress.ca/books/120146-the-theory-and-practice-of-online-learning/>. Retrieved on 20-4-2020.
- Anderson, T. (2011). Toward a theory of online learning. In T. Anderson & F. Elloumi (Eds.) Theory and Practice of Online Learning, Published by AU Press, Athabasca University, 2nd Edition, Chapter 2 (pp. 45-74). Retrieved from: <http://technologyandlearning.weebly.com/theories-of-online-learning.html>
- Bashir, S., Lockheed, M., Ninan, E., & Jee-Peng, T. (2018). Facing forward: Schooling for learning in Africa. Washington, DC: World Bank. Retrieved from: <https://openknowledge.worldbank.org/handle/10986/29377>
- Bagarukayo, E., & Kalema, B. (2015). Evaluation of elearning usage in South African universities: A critical review. *International Journal of Education and Development using Information and Communication Technology (IJEDICT)*, 11(2), pp.168-183
- Burns, M. & Santally, M. I. (2019, November). *ICTs in Secondary Education in Sub-Saharan Africa: Policies, Practices, Trends and Recommendations*.
- Capacho, J. (2014). Representative model of the learning process in virtual spaces supported by ICT. *Turkish Online Journal of Distance Education - TOJDE*, 15(4), 75-89.
- Kawachi, P. (2014). Open Education Resources: TIPS Framework. Commonwealth of Learning. Accessed from: <http://oasis.col.org/handle/11599/562>
- Koehler, M. J., Mishra, P., Akcaoglu, M., & Rosenberg, J. M. (2013). The Technological Pedagogical Content Knowledge Framework for Teachers and Teacher Educators. Commonwealth Educational Media centre for Asia. Accessed from: <https://pdfs.semanticscholar.org/8d80/98360cd542c98ac33c47e7b4232919c0a40a.pdf.%20Retrieved%202022-4%20-2020>
- Commonwealth of Learning (u.d.). *Technology-Enabled Learning Implementation*. Accessed from: <https://www.col.org/programmes/technology-enabled-learning/technology-enabled-learning-implementation>
- Commonwealth of Learning (2020a). Beyond COVID-19: Employing open, distance and e-learning methods to open schooling for all. Accessed on 16 April from: <https://www.col.org/news/col-blog/beyond-covid-19-employing-open-distance-and-e-learning-methods-open-schooling-all>
- Commonwealth of Learning (2020b). Keeping the doors of learning open COVID-19. Accessed on 16 April 2020 from: <https://www.col.org/news/press-releases/keeping-doors-learning-open-covid-19>
- Council on Higher Education (2014). Distance Higher Education Programmes in the Digital Era: Good Practices Guide. Saide, South Africa. ISBN: 978-1-919856-93-3, Ebook: 978-1-919856-94-0. Accessed 17 April 2020 from: https://www.saide.org.za/documents/CHE_-_Distance_Higher_Education.pdf
- Daniel, J., & Uvalic-Trumbic, S. (Eds.). (2013). A guide to quality in online learning. Accessed from: <https://www.academicpartnerships.com/Resource/documents/A-Guide-to-Quality-in-Online-Learning.pdf>
- Ethink Education (2019). A step by step guide on designing blended online courses. Accessed on 13 April 2020 from: <https://ethinkeducation.com/blog/step-by-step-guide-designing-blended-online-courses/>
- EDC (2018) Annual Report, 2018
- EDC (2019a). Reinventing Emlalatini Development Centre-A Proposal for Change, v2.0 (2019), EDC and COL Document.
- EDC (2019b) Annual Report, 2019
- Ertmer & Newby (1993). In: Anderson T (2011). https://www.aupress.ca/app/uploads/120146_99Z_Anderson_2008-Theory_and_Practice_of_Online_Learning.pdf

- Farrell, G., & Isaacs S. (2007). Survey of ICT and Education in Africa: A Summary Report, Based on 53 Country Surveys. Washington, DC: infoDev / World Bank. Available at: <http://www.infodiv.org/en/Publication.353.html>
- Fred Saba (2014). <https://distance-educator.com/introduction-to-distance-education-theorists-and-theories-charles-wedemeyer/> . Retrieved on 28-4-2020.
- Garrison, Anderson & Archer (2000). In: Anderson T (2011). https://www.aupress.ca/app/uploads/120146_99Z_Anderson_2008-Theory_and_Practice_of_Online_Learning.pdf
- Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education model. *The Internet and Higher Education*, 2(2-3), 87-105.
- Graham, Henrie, & Gibbons (2013). Retrieved from: https://www.angelo.edu/instructional-design/online-teaching/section_13.php on 20-4-2020.
- Global Partnerships for Education (2020). School interrupted: 4 options for distance education to continue teaching during COVID-19. Accessed on 15 April 2020 from: <https://www.globalpartnership.org/blog/school-interrupted-4-options-distance-education-continue-> International Telecommunications Union (2017). ICT development index 2017. Retrieved from <https://www.itu.int/net4/ITU-D/idi/2017/index.html#idi2017byregion-tab>
- Geology.com, <https://geology.com/world/swaziland-satellite-image.shtml>
<https://www.cia.gov/library/publications/the-world-factbook/geos/wz.html>.
- Glennie & Mays (2013): Towards a Policy on Open and Distance Learning: A desktop review on government support for open and distance learning to inform policy development: <http://digitalcommons.apus.edu/internetlearning/vol2/iss2/10>:
- Commonwealth of Learning. Attribution-ShareAlike 4.0 International Licence: <http://creativecommons.org/licenses/by-sa/4.0> Retrieved on 20-4-2020
<https://www.col.org/news/news/five-commonwealth-countries-adopt-col%E2%80%99s-openinnovative-schooling-model>. Retrieved on 19-4-2020.
https://en.wikipedia.org/wiki/Transactional_distance. Retrieved on 28-04-2020.
- Hoic-Bozic, N., Dlab, M. H., & Mornar, V. (2016). Recommender system and web 2.0 tools to enhance a blended learning model. *IEEE Transactions on Education*, 59(1), 39-44.
- Hornack, A. M. (2011). Technology Integration Matrix: http://teche.pbworks.com/f/hornackassignment4-4_22_2011.pdf. Retrieved 23-4 -2020
- Jennifer Mathes, Chief Executive Officer, Online Learning Consortium (2020). <https://onlinelearningconsortium.org/a-defining-moment-for-online-learning/>. Retrieved on 20-4-2020.
- Joshua Stem (2005). What is Online Learning? <http://www.sloan-c.org/resources/index.asp>. Retrieved on 20-4-2020.
- Jugee, S., & Santally, M. (2016). The tablet PC Initiative in Mauritius: A situational analysis. *International e-Journal of Advances in Education*, 2(4): 14–22. Retrieved on 18 April 2020 from <http://ijaedu.ocerintjournals.org/download/article-file/225658> teaching-during-covid-19.
- Holmes and Gardner, 2006; Masa'deh et al., 2013; Kanaan et al., 2013; Tarhini et al., 2013b).
- Martin, F., Polly, D., Jokiah, A., & May, B. (2017). Global standards for enhancing quality in online learning. *Quarterly Review of Distance Education*, 18(2), 1-102.
- Mays, T. (2014). Teaching, learning and curriculum resources. In P. du Preez, & C. Reddy (Eds.), *Curriculum studies: Visions and imaginings* (pp. 110-133). Cape Town: Pearson.
- Ministry of Education and Training (2017). Annual Education Census. Mbabane, Swaziland.
- Ministry of Education and Training (2018). National Education and Training Sector Policy. Mbabane, Eswatini
- Ministry of Education and Training (2019). National ODL Policy of Eswatini (Draft), Mbabane, Eswatini.
- Mishra S. (2002). A design framework for online learning environments - British Journal of Educational Technology Agency, https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Online_Learning_Environments&btnG=#d=gs_qabs&u=%23p%3DgNbnmHZ2QW0J Retrieved on 20-4-2020

- Mohamed-Amin E., & Amrien H. M. (2016). Implementation of Blended Learning in Higher Learning Institutions: A Review of Literature. *International Education Studies*, 9(3) p.41. DOI: 10.5539/ies.v9n3p41
- Moore & Kearsley, 1996
- Mthethwa-Kunene K. E. & Maphosa C. (2020). An Analysis of Factors Affecting Utilisation of Moodle Learning Management System by Open and Distance Learning Students at the University of Eswatini. *American Journal of Social Sciences and Humanities*, 5(1), 17-32, e-ISSN: 2520-5382.
- NADEOSA (2005) <http://www.oerafrica.org/resource/nadeosa-quality-criteria-distance-education>
- Njenga, J. K. (2011). eLearning adoption in Eastern and Southern African higher education institutions. A thesis submitted in partial fulfilment of the requirements of the degree of Doctor of Philosophy in the Department of Information Systems, University of the Western Cape.
- Report on the Proposed Rehabilitation and Expansion of Open and Distance Learning at Emlalatini Development Centre, Ministry of Education and Training, Emlalatini Comprehensive Plan 2011-2015.
- O'Neil et al., pp. 17. Retrieved from: https://www.angelo.edu/instructional-design/online-teaching/section_13.php on 20-4-2020.
- Okocha, S. (2020). Poor internet brings academic work to a virtual standstill. Available at: <https://www.universityworldnews.com/post.php?story=20200408203452445> accessed on 15 April 2020
- Paddock, R. (2019, October 6) SA's first online high school to launch in 2020. Retrieved from: <https://www.sabcnews.com/sabcnews/sas-first-online-high-school-to-launch-in-2020/>
- Picciano, A. G. (2017). Theories and frameworks for online education: Seeking an integrated model. *Online Learning*, 21(3), 166-190. doi: 10.24059/olj.v21i3.1225
- Picciano, A. G. (2017). Theories and frameworks for online education: Seeking an integrated model. *Online Learning*, 21(3), 166-190. doi: 10.24059/olj.v21i3.1225
- <https://pdfs.semanticscholar.org/3cca/fe84fdd09730ba808761d910a5a2baf364cd.pdf>
- Picciano, A. G. (2017). Theories and frameworks for online education: Seeking an integrated model. *Online Learning*, 21(3), 166-190. doi: Retrieved from: 10.24059/olj.v21i3.1225, <https://files.eric.ed.gov/fulltext/EJ1154117.pdf> on 24-4-2020.
- Sharma, P. (2018). The effectiveness of e-learning for imparting quality education to students, Retrieved from: https://www.researchgate.net/publication/323335958_Literature_Review_The_effectiveness_of_e-learning_for_impacting_quality_education_to_students, on 14 April, 2020.
- Shu-Sheng Liaw, 2008
- Strickland J. S., & Butler, J. (2005). Establishing Guidelines for determining appropriate courses for online delivery. *Journal of Interactive Online Learning* www.ncolr.org/jiol, 4(2) ISSN: 1541-4914/129. Accessed on 14 April 2020 from: <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.518.2717&rep=rep1&type=pdf>
- Sujatha, K. (2002). Distance education at secondary level in India: The national open school. United Nations Educational, Scientific and Cultural Organization (UNESCO).
- Tagreed Kattoua, Musa Al-Lozi, Ala'aldin Alrowwad (2016)
- The Economist (3 April 2020) carried an article titled "Mid-term Break: How COVID-19 is interrupting children's education.", <https://www.col.org/news/news/five-commonwealth-countries-adopt-col%E2%80%99s-openinnovative-schooling-model>. Retrieved on 19-4-2020.
- Technology in Education. (n.d.) Learning Theories. <https://economu.wordpress.com/εκπαιδευτικό-υλικό/θεωρίες-μάθησης> ">Retrieved October 4, 2017, by <https://economu.wordpress.com/Educational-york/> views.
- Theodosis Karageorgakis (2018), Constructivism and Behaviorism in Designing Online Learning programs, Retrieved from: <https://elearningindustry.com/designing-online-learning-programs-constructivism-behaviorism> on 14-04-2020.

- The Southern Africa Development Community (SADC) Secretariat and the United Nations, Educational, Scientific and Cultural Organisation (UNESCO) have signed a Joint Statement and Action Plan on ensuring continuity of learning in the context of COVID-19. Available at: <https://en.unesco.org/news/sadc-and-unesco-sign-agreement-ensure-learning-never-stops> accessed on 15 April 2020
- Tony Bates A.W., & A. Sangrà (2011), *Managing Technology in Higher Education: Strategies for Transforming Teaching and Learning*. Retrieved from: https://www.researchgate.net/publication/279513336_Managing_Technology_in_Higher_Education_Strategies_for_Transforming_Teaching_and_Learning on 27-04-2020
- Trines, S. (2018). *Educating the masses: The rise of online education in sub-Saharan Africa and south Asia*. Accessed from: <https://wenr.wes.org/2018/08/educating-the-masses-the-rise-of-online-education>
- UNESCO Institute for Statistics (UIS, 2016), <https://www.col.org/news/news/five-commonwealth-countries-adopt-col%E2%80%99s-openinnovative-schooling-model>. Retrieved on 20-4-2020.
- UNESCO (2020). *COVID-19: 10 Recommendations to plan distance learning solutions*. Accessed on 14 April 2020 from: <https://en.unesco.org/news/covid-19-10-recommendations-plan-distance-learning-solutions>
- Weegar, M.A., & Pacis, D. (2012). *A Comparison of Two Theories of Learning - Behaviorism and Constructivism as applied to Face-to-Face and Online Learning*. Presented at the E-Leader Conference. Manila, Philippines. Retrieved from: Theodosios Karageorgakis (2018), *Constructivism and Behaviorism in Designing Online Learning programs*, <https://elearningindustry.com/designing-online-learning-programs-constructivism-behaviorism> on 14-04-2020.

Appendices:

Appendix 1: The TIPS Framework of QA Criteria for Teachers as Creators of OER

T : Teaching and learning processes	
C-1	Consider giving a study guide for how to use your OER, with an advance organiser, and navigational aids
C-2	Use a learner-centred approach
C-3	Use up-to-date appropriate and authentic pedagogy
C-6	You should clearly state the reason and purpose of the OER, its relevance and importance
C-7	It should be aligned to local wants and needs, and anticipate the current and future needs of the learner
C-10	Bear in mind your aim to support learner autonomy, independence, learner resilience and self-reliance
C-12	You should adopt a gender-free and user-friendly conversational style in the active voice
C-13	Don't use difficult or complex language, and do check the readability to ensure it is appropriate to age/level
C-14	Include learning activities, which recycle new information and foster the skills of learning to learn
C-15	Say why any task-work is needed, with real-world relevance to the learner, keeping in mind the work needed to achieve the intended benefit
C-18	Stimulate the intrinsic motivation to learn, e.g. through arousing curiosity with surprising anecdotes
C-21	Monitor the completion rate, learner satisfaction and whether the learner recommends your OER to others
C-23	Include a variety of self-assessments such as multiple-choice, concept questions, and comprehension tests
C-24	Provide a way for the learner and other teachers to give you feedback and suggestions on how to improve

C-25	Link formative self-assessment to help-mechanisms
C-26	Try to offer learning support
I : Information and material content	
C-28	Make sure that the knowledge and skills you want the learner to learn are up-to-date, accurate and reliable. Consider asking a subject matter expert for advice
C-29	Your perspective should support equality and equity, promoting social harmony, and be socially inclusive, law abiding and non-discriminatory
C-30	All your content should be relevant and appropriate to purpose. Avoid superfluous material and distractions
C-32	Your content should be authentic, internally consistent and appropriately localised
C-34	Encourage learner input to create localised content for situated learning : draw on their prior learning and experience, their empirical and indigenous knowledge TIPS Framework : Version 2.0
C-35	Try to keep your OER compact in size, while allowing it to stand alone as a unit for studying by itself. Consider whether it is small enough to reuse in other disciplines
C-36	Add links to other materials to enrich your content
P : Presentation product and format	
C-37	Be sure the open licence is clearly visible
C-40	Ensure your OER is easy to access and engage
C-44	Present your material in a clear, concise, and coherent way, taking care with sound quality
C-47	Put yourself in your learner's position to design a pleasing attractive design, using white-space and colours effectively, to stimulate learning
C-48	Have some space for adding moderated feedback later on from your learners
C-49	Consider whether your OER will be printed out, usable off-line, or is suitable for mobile use

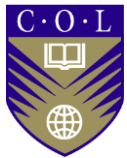
C-51	Use open formats for delivery of OER to enable maximum reuse and remix
C-52	Consider suggesting which OER could come before your OER, and which OER could come afterwards in a learning pathway
S : System technical and technology	
C-54	Consider adding metadata tags about the content to help you and others later on to find your OER
C-55	Give metadata tags for expected study duration, for expected level of difficulty, format, and size
C-56	Try to use only free sourceware/software, and this should be easily transmissible across platforms
C-57	Try to ensure your OER is easily adaptable, e.g. separate your computer code from your teaching content
C-59	Your OER should be easily portable and transmissible, and you should be able to keep an off-line copy
C-60	Your OER and the learner's work should be easily transmitted to the learner's own e-portfolio
C-62	Include a date of production, and date of next revision

Appendix 2: Proposed timelines and short term outcomes

Key activities (illustrative)	Target date
Phase 0: Creating an enabling environment for change	
1. Identify Service Provider	
Phase 1: Content development	
Identify 12 subjects for content development	
Identify 30 content developers	
Identify 15 Study Centres for piloting	
Develop 1500 OER using OER related to the 12 subject areas	
Quality assure OER developed	
Implement a marketing and branding strategy of Blended online learning and EDC in order to sensitise the nation and remove the negative perceptions of online learning and the institution.	
Study visit of EDC and Ministry officials, including Planning Department (typically 3) to a working Blended online learning system (COL), where possible.	
Development of a new EDC institutional policy and planning framework based on Eswatini Draft National ODL Policy	
Phase 2: Pilot	
Launch pilot in 15 Study Centres	
Monitor pilot in 15 Study Centres	
Evaluate pilot in 15 Study Centres	
Plan scaled provision for more Study Centres	
Phase 3: Scaled provision	
Phase 4: Systemic provision	
Open access to content in all Study Centres and interested schools	
Monitor provision/use in all Study Centres	
Evaluate provision/use in a sample of Study Centres	
Use evaluation to make improvements	

Short term outcomes (STO)
STO 1a

<p>More learners enrolled at EDC become lifelong learners, achieve educational mobility, employment and entrepreneurship, and enhanced opportunities for livelihoods through engagement with online learning each year.</p>
<p>STO 1b</p> <p>More learners enrolled at EDC, particularly from marginalised groups, are empowered and have the ability to make life choices through engagement with online learning each year.</p>
<p>STO 1c</p> <p>More learners enrolled at EDC are able to take informed decisions and responsible actions for environmental conservation through engagement with online learning.</p>
<p>STO 2a</p> <p>More learners enrolled at EDC successfully complete open schooling programmes relevant to sustainable development.</p>
<p>STO 2b</p> <p>Participation of boys/girls and women/men, marginalised communities and disadvantaged groups in quality education and learning is increased in Eswatini through online learning.</p>
<p>STO 3a</p> <p>More learners enrolled at EDC implement quality ODL and technology enabled learning systems and practices in online learning.</p>
<p>STO 3b</p> <p>More enabling frameworks and strategies for ODL/OER are in place in EDC in support of online learning.</p>
<p>STO 3c</p> <p>More institutions/organisations in Eswatini engage with diverse stakeholders in the labour market, financial institutions, and civil society to offer quality learning opportunities through online learning.</p>



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