ONLINE CURRICULUM IMPLEMENTATION AND IMPACT ON PUPILS' LEARNING OUTCOMES IN THE CRISIS ZONE OF THE NORTH WEST REGION

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DEDICATION

To my children, Wirdoh Sandra Yuveyonge, Wirngo Carl Wiysahnyuy, Wirdoh Terry Kernyuy, Wirdoh Blossom Nangsin-nyuy and Wirdoh Pacomeous Nyuyfoni. May this work inspire you to venture into new fields that can transform your community.

APPROVAL

I hereby certify that this work was carried out by **Wirngo Daniel Wirdoh** of the University of Yaoundé I, Faculty of Education, Department of Curriculum and Evaluation, Curriculum Evaluation.

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LIST OF ACCRONYMS AND ABBREVIATIONS

AI	*Artificial Intelligence*
ARPANET	*Advanced Research Projects Agency Network*
CAST	*Centre for Applied Special Technology*
CD-ROMS	*Compact Disk Read Only Memory*
CESA	*Continental Education Strategy for African*
COVID-19	*Corona Virus Disease 2019.*
DOS	*Disc Operating System*
ECW	*Education Cannot Wait*
EFA	*Education For All*
ET	*Educational Technologies*
FER	*First Emergency Response*
GPE	*Global Partnership for Education*
IIAG	*Ibrahim Index of African Governance*
IPS	*In-plane Switching*
ISP	*Internet service provider*
MINEDUB	*Ministry of Basic Education*
MIT	*Massachusetts Institute of Technology*
MOOCs	*Massive Open Online Courses*
MR	*Mixed Reality*
OCI	*Online Curriculum Implementation*
OCL	*Online Collaborative Learning*
OER	*Open Educational Resources*
PBS	*Public Broadcasting Service*
PPMCC	*Pearson Product-Moment Correlation Coefficient*
SER	*Second Emergency Response*
SMPTE	*Society of Motion Pictures and Technology engineers*
SPSS	*Service Pack for Social Sciences*
THX	*Tomlinson Holsman's Experiment*

TML	*Technology Mediated Learning*
TVS	*Televisions*
UDL	*Universal Design of Learning*
UNESCO	*United Nations Educational, Scientific and Cultural Organization*
UNICEF	*Old Use: United Nations International Children's Emergency Fund*
	New Use: United Nations Children's Fund
VA	*Vertical Alignment Panel*
VR	*Virtual Reality*
WEF	*World Education Forum*

ABSTRACT

The socio-political crises in the North West Region of Cameroon that started in 2016 significantly impacted education delivery. This situation was further worsened by the COVID-19 pandemic which caused schools to shut down globally. The sudden shift from traditional face-to-face classrooms to online through 'myschoolonline' lesson interface was so abrupt. Thus there was a need to find out if this transitioning had an impact on pupils' learning outcomes in the crisis hit North West Region. Three research questions guided the study: *What technologies were used to deliver learning to pupils in the crisis zone of the North West Region; What is the impact of online lessons on pupils' learning outcomes? How can online learning be improved to enhance pupils' learning outcomes?* The study employs the quasi-experimental design and targets 103 primary school pupils with 2 teachers purposefully selected to participate in the study. This owed much to the fact that the researcher could not access individual learners in their respective homes and that the myschoolonline.cm platform could not give the exact number of users by region. The participants were organized into an experimental and a control group. 52 participants in the control and 51 in the experimental with 1 teacher assigned to each of the groups as an observer. The data collected through observation checklist was analysed using descriptive statistics and the classroom achievement test was analysed using independent student T-tests. The findings reveal an array of technologies utilized for curriculum delivery ranging from the use of traditional media platforms. Other communication tools like WhatsApp, Zoom and innovative technologies such as animated apps and virtual reality were equally used. On the other hand, the independent samples t-test for both equal and unequal variances yielded highly significant results. The mean difference between the two groups was -72.861, with a 95% confidence interval ranging from -89.196 to -56.525 suggesting that pupils in the experimental group scored on average 72.861 points higher in overall learning outcomes with an effect size measured by Cohen's d, of 38.052. Regarding strategies to enhance online learning in the region, the correlation matrix revealed a strong positive correlation between technology and academics with overall total scores of $r = 0.691$, $p < 0.01$, suggesting that higher levels of exposure to technology are associated with high academic scores. Key factors influencing academic performance were the effective utilization of technology, personalized learning approaches, collaboration, and professional development opportunities for teachers. Based on these, the study recommends policymakers, educators, and other stakeholders to explore the potential of online learning experiences and foster academic success in crises situation. Also, investment in infrastructure and access to devices is a pre-requisite for such a success.

Keywords: *Online Curriculum Implementation, pupil, learning outcomes, Crisis Zone, Northwest Region*

RESUME

Les crises sociopolitiques dans la région du Nord-Ouest du Cameroun, qui ont débuté en 2016, ont eu un impact significatif sur l'enseignement de l'éducation. Cette situation a été aggravée par la pandémie de COVID-19, qui a entraîné la fermeture des écoles dans le monde entier. Le passage soudain des salles de classe traditionnelles en face à face à l'interface de cours en ligne via l'interface de cours « myschoolonline » a été si abrupt. Il était donc nécessaire de déterminer si cette transition avait un impact sur les résultats d'apprentissage des élèves dans la région du Nord-Ouest frappée par la crise. Trois questions de recherche ont guidé l'étude : quelles technologies ont été utilisées pour dispenser un apprentissage aux élèves dans la zone de crise de la région du Nord-Ouest ; Quel est l'impact des cours en ligne sur les résultats d'apprentissage des élèves ? Comment améliorer l'apprentissage en ligne pour améliorer les résultats d'apprentissage des élèves ? L'étude utilise un modèle quasi expérimental et cible 103 élèves d'école primaire avec 2 enseignants délibérément sélectionnés pour participer à l'étude. . Les participants ont été organisés en un groupe expérimental et un groupe témoin. 52 participants pour le groupe témoin et 51 pour le group expérimental avec 1 enseignant affecté à chacun des groupes en tant qu'observateur. Les données recueillies par le biais de la liste de contrôle d'observation ont été analysées à l'aide de statistiques descriptives et le test de rendement en classe a été analysé à l'aide de tests T indépendants des élèves. Les résultats révèlent un éventail de technologies utilisées pour la prestation des programmes d'études, allant de l'utilisation de plateformes médiatiques traditionnelles. D'autres outils de communication comme WhatsApp, Zoom et des technologies innovantes comme les applications animées et la réalité virtuelle ont également été utilisés. D'autre part, le test t d'échantillons indépendants pour les variances égales et inégales a donné des résultats très significatifs. La différence moyenne entre les deux groupes était de -72,861, avec un intervalle de confiance à 95% allant de -89,196 à -56,525, ce qui suggère que les élèves du groupe expérimental ont obtenu en moyenne 72,861 points de plus dans les résultats d'apprentissage globaux avec une taille d'effet mesurée par le d de Cohen, de 38,052. En ce qui concerne les stratégies visant à améliorer l'apprentissage en ligne dans la région, la matrice de corrélation a révélé une forte corrélation positive entre la technologie et les universitaires avec des scores totaux globaux de $r = 0,691$, $p < 0,01$, ce qui suggère que des niveaux plus élevés d'exposition à la technologie sont associés à des scores scolaires élevés. Les principaux facteurs influençant les résultats scolaires étaient l'utilisation efficace de la technologie, les approches d'apprentissage personnalisées, la collaboration et les possibilités de développement professionnel pour les enseignants. Sur cette base, l'étude recommande aux décideurs, aux éducateurs et aux autres parties prenantes d'explorer le potentiel des expériences d'apprentissage en ligne et de favoriser la réussite scolaire en situation de crise. De plus, l'investissement dans l'infrastructure et l'accès aux appareils est une condition préalable à un tel succès.

Mots-clés : Mise en œuvre du programme d'études en ligne, élève, résultats d'apprentissage, zone de crise, région du Nord-Ouest

CHAPTER ONE:
INTRODUCTION

Since November 2016, the North West region of Cameroon has been hard-hit by the socio-political crises herein referred to as the Anglophone crises. This crisis which resulted in an armed conflict pitting government forces and armed separatist fighters shut down most schools, especially in rural communities. For over six years, the state and other humanitarian organizations have been exploring online teaching as an alternative means to curriculum delivery. Humanitarian organizations operating on the ground reported that more than 3000 children have been killed leaving the physical school environment as a very unsafe zone (Human Rights Watch, 2019).

In recent years, the world has witnessed various crises, including armed conflicts, natural disasters, and pandemics. These disruptive events have significantly affected traditional education systems, leading to the adoption of alternative learning methods. One such alternative is online learning, which has gained prominence during crises. Whether it's the Anglophone crisis in Cameroon, the Boko Haram insurgency, or the global COVID-19 pandemic, online education has emerged as a lifeline for continued learning.

Prior to the COVID-19 pandemic that forced educational institutions worldwide to rapidly transition to online learning, school closure as a security measure for learners in the restive North West region of Cameroon had affected over 700.000 children. (ACAPS, 2019). According to the United Nations International Children's Emergency Fund (UNICEF), the number of children dropping out of school is on the increase. Seeing war impedes children's education, UNICEF called on both parties to protect children and their education. A call that yielded no positive outcomes as the toll of the war on children, parents, and teachers kept aggravating (UNICEF, 2019). According to the United Nations Educational, Scientific and Cultural Organization, (UNESCO) statistics as of January 2019, less than 10% of school-aged children had access to any form of education and less than 20% of schools were operational with very limited enrolment. This, coupled with the mass displacements of families within the regions which stood at about 444.213, made the situation so critical that intervention was seriously needed (ECWI & II report, 2020) this therefore, called for the first emergency response in 2019, intending to provide access to quality education and

psychosocial support to children in the anglophone regions. (UNICEF, 2019). Unfortunately, this initiative had setbacks because none of the warring factors had any consideration for any safe space for children.

When there is an armed conflict, everyone, especially children, is at risk and the school which pulls many pupils together cannot hold. This indicates that without alternative instructional strategies put in place to ensure continuity in educational pursuits, there may be a complete blackout in educational attainment for the majority of children found in this region of Cameroon. Alternative instructional strategies here refer to safe curriculum delivery methods that explore the potential of Information and Communication technologies. Thus, alternative pedagogic practices could be the only leeway to engage these presumably lost children in the path of Education.

The United Nations 2030 agenda, outlining the Sustainable Development Goals highlights in goal number 4 the need to ensure inclusive, equitable quality education as well as ensuring lifelong learning as a solid base for any sustainable development. The document upholds that education is the sole machine that can bring sanity into the world thereby leading all nations to sustainable development (UNGA, 2015). This highlights the need for continuing education even in crisis situations if the agenda were to be realized. Similarly, the Dakar framework identified respective countries as the heart of Education for All (EFA), and the United Nations Educational, Scientific and Cultural Organization (UNESCO) on her part endorsed providing the necessary groundwork to support nations to achieve the dream of education for all (UNESCO, 2023). Thus, all the pledges made were expected to be carried out to ensure that the margin of the educational gap is reduced to its lowest level.

Moreover, the second point of item 10 of the Africa Agenda 2063 highlights the aspiration by Africans to be well-educated and skilled citizens, in science, technology, and innovation for a knowledge society and that no child missed school due to poverty or any form of discrimination. Item 72 in the third section equally notes the affirmation by all heads of state to commit themselves to catalysing education and skill revolution and actively promote science, technology, research, and innovation to build knowledge, human capital capabilities, and skills to drive innovations through the expansion of early childhood, primary and secondary education (AUC, 2015). In a war

situation, these lofty ideas may not be feasible in a physical classroom thus, requiring additional efforts and resources if the drive to attain agenda 2063 is to be kept on the rails.

According to the Guadian, reforms in education ignited the crisis in the Anglophone regions of Cameroon. To them, the main engine that instigated the crisis was education and the victim of the crisis is still education (Guardian, 2018). It therefore may not be an overstatement to posit that education could invariably be the better solution to the crisis since it is through education that most of the conflict points are clarified to bring sanity to troubled minds.

Seeing the troublesome situation crisis zone, UNESCO stepped in to assist the government in continuing with the education of children trapped in the conflict Zones. Educative programs were developed with the intention of continuing education in the war-torn areas. Education Cannot Wait (ECW) under the supervision of UNESCO developed programs in some key subject areas for web-based delivery.

The craving desire for education by the indigenes seems to have shifted towards basic survival strategies. It was, therefore, difficult to decipher how conventional education could continue in such a scenario wherein; teachers were targeted from all directions, children were not free to attend any structured schools, and parents wandering from one area to the other seeking for safety. All positive efforts to get the schools back on the rail were rendered futile with the conflict getting out of a mere boycott to a widespread war. As if to make matters worse, the covid-19 and its related variants instilled another toll into a bad situation when the presidential instruction suspended conventional classes at all levels of the educational sector in the country. (spm.gov.cm, 2020) This led to the government and its partners' decision to opt for alternative strategies to continue with the teaching/learning process. Though not fully prepared for, a shift to digital learning was the alternative adopted by the government and its partners. (Akame, 2021)

The efforts to introduce lessons online so that learners could access the lessons from the confines of their homes were laudable though, the challenge remained the fact that neither the learners had been prepared before time on how to go about studying online nor had the teachers been prepared on online lesson delivery. (Akame, 2021) Thus, after the COVID-19 lockdown, the North West

region could not let go of online learning since one-on-one lessons were not feasible due to the crisis. The few children who kept registering and sitting for official examinations needed to be taught just like those in none non-examination classes who remained within the confines of their homes. Their performance notwithstanding, the need to keep the candle of quality education alight remained the preoccupation of major stakeholders in the educational milieu.

In line with the foregoing, and taking cognizance of the fact that education remains the backbone of development, peace, and social cohesion, it is necessary that research be carried out to investigate the impact of online lessons on pupils' learning outcomes.

Historical Background to the study

The North West Region has been in a warring situation since 2017. At the onset of what started as the teachers' strike to demand educational reforms, the restive North West region has witnessed a plethora of setbacks to the educational system.

Firstly, was the teachers' sit-down strike that paralyzed all educational endeavours letting about 855000 children out of school a figure which dropped to about 700.000, (UNICEF report November 2019) when families started migrating to other regions. The initial internet shutdown by the government which further made things worse for learners who could try to learn online, and much more the hardship on the economic operators who found themselves engulfed by a complete blackout, was another pitfall. This greatly affected the standard of living of many families, and most of them resolved to look for alternative measures to survive rather than remain stuck to an educational system that was no longer yielding any benefits given the high unemployment of graduates which acted as a demotivating factor.

UNICEF in 2019 indicated that they were to procure books and other educational materials for over 37000 out-of-school children to read, remarking that audio lessons would be delivered in the next 9 months to enable out-of-school learners to catch up in Mathematics and English Language. (Dakar/Geneva/New York, 5 November 2019). As to whether the learning materials procured by UNICEF yielded any positive effects or the radio lessons, little or no research has been done to validate the works of these UN agencies. (UNICEF, 2019)

With the ugly reality that the crisis had rather developed into a war whose end could not be foreseen soon, the Ministry of Basic Education together with its partners UNESCO and the Global Partners

for Education, developed lessons with the aid of practicing teachers in the first emergency response of ECW aimed at ensuring continuing learning within the crisis. To ensure that these lessons met the learners within the confines of their hideouts, most of these lessons were produced on CD-ROMs, some online, and others presented as TV and audio lessons.

Worthy of note is the fact that most of these lessons came at a time of total hostilities especially when most of the infrastructure that could ease the transmission of these lessons had been destroyed, homes burnt and the greatest need at this point was the safety need. Whether these lessons met the expected results for which they were designed, is a subject of another research since the base of this research is to find out the impact of online curriculum implementation on pupils' learning outcomes in the crisis zone of the Northwest Region.

The history of online learning dates back to its initial concept which had to do with distance learning. Home studies as then referred to, emanated from 1883 when the first official correspondence educational program dubbed 'Society to encourage Home Studies' was established in Boston, (Ticknor, 1873). It was therefore evident that mankind had foreseen the need to study away from the Brick-and-Mortar classrooms synchronously under the tutorship of a teacher.

In 1911, the University of Queensland instituted the Department of Correspondence Studies to carry on distance education to those who could not afford the classroom-type university structure. Following suit with the University of Queensland, the University of South Africa became a center of attraction as a mega hub in distance learning championing major innovations and revolutionizing the distance education sector. These methods relied solely on postal services and could not reach a significant number of people worldwide. Thus, the underprivileged underdeveloped countries had little or no benefits from the advantages of distance learning left alone in the Basic Education sector.

When the House University in 1953 instituted TV-based lessons to facilitate distance learning, it was as if the peak of distance learning had been reached. Today known as Houston PBS, "the channel that changes you" as they fondly referred to themselves, dedicated a significant 38% of their broadcast time to educational programs thereby expanding the scope of distance learning from the script to the use of technology.

The late 1960s saw the use of computers to facilitate learning wherein an interconnection of computers in a system developed by the U.S. Advanced Research Projects Agency Network (ARPANET) which became the first public packet-switched computer network. It was first used in 1969 and finally decommissioned in 1989. ARPANET's main use was for academic and research purposes. (Techtarget, 2023)

The period from 1984 to 1989 witnessed major strides that were to take the old-age form of distance learning to the next level. The University of Toronto became the first to launch a fully online course with Ron Gordon launching the first Electronic University network. With the National Science Foundation creating the first open computer network which was the precursor to the present-day internet, institutions could now create and distribute electronic information irrespective of the distance. (The National Science Foundation, 1989).

Worthy of note to this study, was the introduction by CAL Campus of the first online-only curriculum with real-time instruction. That is synchronous instructions as we know today. This meant that for the first time apart from the old system of online learning which had to do with learners retrieving and studying courses at their convenience without the intervention of facilitators, learners were to get engaged with a teacher at the same time given a class timetable though from different locations. (University of California)

After the launch of the California Virtual University offering over 700 courses online, Massachusetts Institute of Technology, MIT, launched and open courseware project to provide free MIT courses to people all over the world. This development was the springboard that evoked the interest of many to join the course of online learning. (https://cvc.edu/, 1989).

In 2012, great strides were made towards the development of online learning platforms. Tamm reports that while Andrew and Daphne founded Coursera which is still widely used today, platforms like Udacity and edx, equally emerged making 2012 to be christened "the year of the Massive Open Online Courses, MOOCs." (Tamm, 2019). It would therefore be arguably not an overstatement to state that many nations of the world have seen the urgent need to move by the changing times using technology to enhance learning, Afterall what could be the need to invent things that aid life and not to use such to ease more inventions.

The importance of online learning cannot be overemphasized given the key role it plays in bridging the gap between the developed and the developing nations. Though sometimes confused with e-learning, Keegan reports that the first mention of eLearning was by Elliot Masie an educationist and a researcher to infer how people use computers to learn, enrol in online degrees and improve upon their education. (Keegan, 2020). That may explain why so often these terms are used interchangeably. To him, online education was effective in more than 17000 schools in about 100 countries by 2014, though the notion was still so timid and had now solid grounds in Cameroon.

In Cameroon, the train was rather too slow as the few proponents of online learning were looked upon by those who had the authority and lacked insights into the future as those who did not want the progress of the society without realizing such was to be the backbone of future educational practices. By 2014, it was becoming evident that online resources were going to constitute the core of future education practices. The Ministry of Basic Education thus organized a series of training workshops spearheaded by the Inspectorate of Pedagogy in Charge of Educational Technologies of the said Ministry aimed at training teachers and other stakeholders on the importance of online educational resources and methods of selecting proper content to enrich the educational experience within classroom settings.

Contextual Background

Education, recognized globally as a fundamental human right, plays a pivotal role in empowering individuals to exercise other rights. Cameroon, a signatory to various international agreements, has consistently emphasized education as a cornerstone of its development efforts. From the Jomtien Declaration (1990) to the Incheon Declaration (2015), the government's commitment to education remains unwavering. Law No. 98/004, enacted in 1998, underscores the state's responsibility to collaborate with Regional and Local Authorities (RLAs), families, and both public and private institutions in shaping education policy.

Against this backdrop, the Continental Education Strategy for Africa (CESA, 2016-2025) emerged as a driving force. CESA seeks to realign African education systems with contemporary demands while promoting core African values. Notably, the 2018 Curricula for Nursery and Primary schools in Cameroon were introduced amidst the crisis in the English-speaking regions and the global

upheaval caused by the COVID-19 pandemic. As traditional brick-and-mortar classrooms faced disruptions, alternative educational practices became essential to sustain the flames of learning. Prior to the Covid-19 pandemic, the North West Region had witnessed since 2016, a sharp decline in its drive to keep quality education floating due to the crisis that has crippled all activities. This has been the major challenge to the brick-and-mortar classroom as most parents feared endangering their children's lives for schooling. Covid-19 further complicated the whole system when all had to observe an indefinite lockdown.

The evolution of a catalogue of problems that are today visible through a bloody crisis in the Anglophone regions of Cameroon formally referred to as the British Southern Cameroon stemmed from the 1961 plebiscite organized by the United Nations Organization to seek to reunify the Cameroons partitioned between Britain and France after the defeat of Germany in World War I. As if to mar the first process that already had its scar, the 1972 referendum carrying on from a Federal to the United Republic of Cameroon evoked a lot of bitterness whose signs were later to be visible with the passage of time. As Fanso, (1989) indicates, assimilation stands out as one of the major causes of the Anglophone problem especially after the country retained the name that initially was the name of French Cameroun at independence.

According to the Bamenda Provincial Episcopal Council, the conflict that has so far produced devastating effects, especially on education could have been averted had the government given a listening ear to the cries of the masses. To them, the toll of the crisis on education was so damaging that the government wrongly accused them of associating with activists, an accusation that made them be convoked to court. By the same declaration by the bishops, the state could not imagine the closure of the schools was done without the complicity of the clergy and equally thought the clergy was not doing enough to sensitize parents to send children to school. It is indicative in the bishops' declaration that the brick-and-mortar classrooms were empty by 2017 and as such only an alternative form of education could help dispense knowledge to children. (BAPEC, 2017).

Solidarity and Development Initiative (SODEI), states that attacks on schools, pupils, and teachers witnessed an increase in 2020 making both teachers and pupils dread to go to conventional schools. To UNESCO, as cited by SODEI, many blame the state for not living up to its commitment to

ensure a conducive learning environment despite endorsing for a safe school environment in 2018, a factor that has equally downplayed all initiatives to ensure a safe back-to-school. (SODEI, 2021) This indicates that the safest mode of study could not be in the physical classroom but rather in the virtual classroom where those against schooling might not have a chance to physically hurt those engaged in the educational process.

Thus, North West Region which hitherto had been the hub of education in the country prior to 2016, became a dead centre for educational practices with the indigenes' hopes for continuing quality education completely shattered by school boycotts, the prevalence of war, and numerous lockdowns that made learning practically difficult. AS if to make matters worse, the covid-19 surfaced with its ugly reality of no physical contacts and thus national lock downs to prohibit contact played to the total disfavour of educational systems that had been reliant on face-to-face encounters. This coupled with the continuing war in the North West Region just like elsewhere in the South West Region stagnated all endeavours to bring the educational process back to its normal order in the North West Region. Thus, there was a dire need to adopt alternative educational methods to meet the needs of time.

In keeping with her pledge to support countries in crisis situations and to keep the candle of education burning as agreed in the Dakar Education for All, world forum, UNESCO yielded to calls by the Ministry of Basic Education and in partnership, started off with a series of alternative measures to reach out to learners trapped in the crisis zones. Education cannot wait soon came up with script, radio, television, and CD-based lessons prepared by a team of experts from the Ministries of Education to keep the fire of education alive in the affected areas. (ECW1 and ECW2, 2017).

As the crisis deepened and with the prevalence of the COVID-19 lockdown, there were visible signs that the educational system could not maintain the pre-crisis status quo. Thus, the new reality seemed to have been plunged into, even without sufficient groundwork for its implementation. That is education to meet the ever-changing needs of humanity, wherein each level of attainment is used as a stepping stone for the next. In this case, it could be evident that future learning will depend on the use of technology and may be online-driven, given the continued strides made in the area of

artificial intelligence, (AI). According to Hwang in his drive to verify the impact of artificial intelligence on learner–instructor interaction in online learning, the findings reveal that "AI tutoring systems can provide personalized guidance, support, or feedback by tailoring learning content based on student-specific learning patterns or knowledge level." This indicates that AI could help self-direct learners given its ability to manipulate and follow instruction from digital devices. (Hwang, 2020)

The lofty alternative measures brought to play by the government and its partners, UNESCO, and GPE may seem to be a model worth emulating in other crisis-stricken areas in Africa. After the covid-19 lockdown, most of online programs continue to be solicited since the war is far from seeing it's end and many more online platforms are equally under program. Thus, from the already in use myschoolonline.cm, the Connect My School program though in the pilot phase still has resources that could be borrowed for use in the region.

The basic need for survival in times of crisis may far outweigh the need for education even though safety and survival depend on education. Thus, the hasty nature in which the learners and their instructors had to plunge into online learning needed thorough examination with regards to the quality of the lessons produced, the validity of the lessons, the technology used in lesson delivery and best practices in accessing the proper knowledge sources. Above all it was equally necessary to find out if implementation of the curriculum online could yield desirable effects.

The relationship between the written curriculum and its implementation online needs equally to be examined since the curriculum was never build for crisis situation. Thus, there was ardent to find out if such a program that was designed mainly for traditional classroom situation could yield positive outcomes if adapted in an online situation. All of the afore researchable areas could only be seen in a glimpse through the impact of these online structured lessons on the learners. It therefore certain that the learners and the society remain the mirror through which the sustainability of online lessons can be viewed.

Online learning goes with the usage of electronic gadgets that need to be powered, thus how these gadgets are acquired, be they phones, smart TVs, or computers; how they are powered, and how

they are used to make sure that the learners get what they are intended to achieve in an area with frequent electricity supply whose national average is about 64.72% remains a challenge. (World Bank, 2020). Household coverage of electrical energy is as low as 23% with that of the North West stooping lower. (energypedia, 2018). The Global Economy in its 2018 report indicates that the national internet coverage rate in Cameroon is 58% and that crisis affected areas have a significantly low coverage rate with some households using portable solar panels to light their homes. (The Global Economy, 2018).

In line with the foregoing, it is but necessary to probe into online curriculum implementation and its impact on children's learning in the crisis stricken North West Region of Cameroon in view of answering questions as to if the exploitation of lessons online can positively bring about the much need change in the learners.

Problem Statement

The future of any nation lies in human capital formation which constitutes the base for nation building, employability, and social harmony that in consequence pave the path toward emergence. It is in line with the foregoing that the Cameroon Vision 2035 in section 5.2 of its second part, articulates on the need for proper education and training that are resilient to develop the human capital needed to propel the nation to emergence by 2035 (MINEPAT, 2009).

Given the undisputed importance of education with regards to employability, job creation, sustainability, and the need for innovation, the anglophone crisis coupled with the Covid-19 pandemic, compelled the education system to transition towards online curriculum implementation. However, there remains a pressing concern regarding the impact of online lessons on pupils' learning outcomes during these crises.

While online training is perceived as a viable model for crises, the intersecting challenges of crises, poverty, limited internet access lack of technological devices significantly impede its effectiveness. The disparity in technological resources exacerbates inequalities in accessing online education, especially during times of crisis and especially in rural communities

Research Objectives

Research objectives describe what the researcher intends the project to accomplish which reflect the summary of the approach, and the purpose, and help in focusing the research.

General Research Objectives

To examine the impact of online curriculum implementation on pupils' learning outcomes in some selected schools in Mezam.

Specific Objectives

The specific objectives of the study are to:
- ➢ To evaluate the technologies used to deliver learning to pupils.
- ➢ To examine the effects of engaging with online course materials on pupils' learning outcomes
- ➢ To investigate into ways in which online curriculum implementation can be improved in order to enhance pupils' learning outcomes.

Research Questions

According to Creswell, the research question constitutes a central question and a sub-question. To him, the central question is a broad question that asks for an exploration of the central phenomenon or concept in a study while the sub-questions constitute specific questions to address sub-components within the main question. (Creswell, 2007).

General Research Question:

To what extent does online curriculum implementation impact pupils' learning outcomes?

Specific Research Questions

- ➢ What technologies are used to deliver learning to pupils in the crisis zone of the North West Region?
- ➢ What is the impact of online lessons on pupils' learning outcomes?
- ➢ How can online learning be improved to enhance pupils' learning outcomes?

Significance of the Study

Since 2016 when the crisis in the Anglophone regions began and later when the Ministry of Basic Education with its Education partners UNESCO identified online learning and other technology-mediated learning interfaces, no detailed research has been carried out to probe into the impact of online curriculum implementation on pupils' learning outcomes. (ECW1 and ECW2, 2017) This makes it difficult to evaluate the successes and possible gaps that exist given coming up with better programs that meet the needs so expressed in the curriculum. This study will be of significance to the following: learners; teachers; parents; Ministries of Education; and the government of Cameroon.

To curriculum designers

This study will help curriculum designers in various dimensions: It will equip curriculum designers with the skills to adapt quickly to unforeseen circumstances, ensuring continuity of education in challenging situations. Fosters innovation and resilience among curriculum designers, encouraging the development of creative strategies to deliver quality education during disruptions, enabling them to proactively prepare for future emergencies, ensuring a swift and effective response to maintain educational continuity.

It will equally allow curriculum designers to create inclusive and accessible learning environments, addressing the diverse needs of learners, including those in vulnerable or marginalized communities. It will enhance the professional growth of curriculum designers, providing valuable insights and skills that can positively impact their practice and contribute to the field of education in times of uncertainty.

To the Teachers

The teachers will benefit from the functional model to be developed to be able to reconnect with their pupils and work with them from their varied distances to ensure that the pupils keep the fire of education alive amidst the crisis after all only education can quench the fires ignited by the rage of lack of mutual understanding. This study will equally help teachers to situate their role as facilitators within the online learning platform to assist learners in learning just what is intended for them to learn.

To the Parents

The results of this study will help parents understand the importance of providing modern learners with technological gadgets that can facilitate their studies. Thus, rather than look on these gadgets as a luxury, parents will learn to value most of these gadgets much more than they had valued a textbook thereby bridging the gap between children of every location.

To the Ministries of Education

This research piece will help the Ministries of Education to start investing more in online education and generally technology-mediated learning that is postulating from all ramifications to be the future educational practice. It will equally reshape the type of training given in the Teacher Training Colleges to reflect the demands of the changing time. Thus, online lessons should not just be considered a minor option but an integral part of the training proper wherein student teachers are expected to have done a number of hours on such studies.

To decision-makers

The results of this study will help the government of Cameroon to identify major priority areas to invest in if they really hope for any form of emergence in the near future. Given the role of education in the development of society, the government of Cameroon will identify those pillars spanning from constant electricity supply and availability and affordability of the internet.

Delimitation

The study was carried out in the field of sciences of education, specifically with particular bias to curriculum and evaluation. It pivoted around:

- Technology used to interact with or source online educational materials in relationship to the form of online learning under review, the effects of engaging with online course

materials on pupils' learning outcomes and Ways in which online learning could be improved in the North West region

Geographical Scope:

The study was limited to the North West region. Specifically, it only investigated one regrouping centre within a Bamenda III subdivision of Mezam Division. Other divisions within the North West were not included in the analysis.

Sample Size:

The study's sample size was restricted to the selected centre and as such, findings may not be representative of the entire North West population. Thus, generalizations beyond the studied center should be made cautiously.

Timeframe:

The study had a specific time bound making it difficult for changes in online curriculum over time to be fully explored.

Contextual Factors:

The study may not account for unique contextual factors in other divisions. Local variations in infrastructure, teacher expertise, and student demographics were not fully considered.

Depth of Analysis:

Focusing on one centre limits the depth of analysis. Thus, broader insights into online curriculum implementation may be missed.

Operational definition of terms

- **Online learning**: defined as "learning experiences in synchronous or asynchronous environments using different devices (e.g., mobile phones, laptops, etc.) with internet access." (Qian Gong, 2012)
- **Online curriculum implementation (OCI)**: This refers to the courses put online to enhance the attainment of the written curriculum through online modules. For the purpose of this work, it refers generally to all technology-mediated learning given that a typically online

learning interface within the context of the restive North West region is generally flawed by connectivity challenges caused by breakages in communication infrastructure

- **Impact**: the net effects of an intervention – overall outcomes or consequences resulting from a specific intervention program or action. (Scriven, 1991)

- **Learning outcomes:** Learning outcomes are specific statements of what students will be able to do when they successfully complete a learning experience. (DePaul Univesrsity, 2023).

- **Synchronous Learning:** Synchronous learning means that although you will be learning from a distance, you will virtually attend a class session each week, at the same time as your instructor and classmates. (Ohio State University, 2022)

- **Asynchronous:** Asynchronous learning means that the instructor and the students in the course all engage with the course content at different times (and from different locations). The instructor provides students with a sequence of units which the students move through as their schedules permit. (University of Waterloo, 2023).

- **Virtual classroom**: Virtual Classroom' refers to any class that was originally scheduled as in-person, which has now moved to an online format. 'Online' refers to classes that were always intended to be online. (mcmaster.ca, 2020)

Organisation of study

This work is divided into five chapters. Chapter One delves into the problem which highlights the background of the study, the problem statement, research questions, research objectives, the research hypothesis, justification of the study, significance of the study, delimitation and a summary.

Chapter Two captioned literature review starts with a brief introduction, theoretical review, conceptual framework, and empirical studies and ends with a summary. Chapter three has to do with methodology and highlights the background of the study area, the research design, the population of the study, sample and sampling techniques, the research instrument, data collection technique, and ethical issues.

Chapter three is devoted to Methodology and carries the research proper, collecting data through achievement test items and an observation guide. This chapter brings out results in relationship to the preset methods of data analysis.

Chapter four is based on the presentation and analysis of results while chapter five which is the concluding chapter carries on discussions and conclusion.

CHAPTER TWO
REVIEW OF RELATED LITERATURE

The primary focus of this literature review is to "Reveal any gaps that exist in previous literature and resolve conflicts amongst seemingly contradictory previous studies. It is also aimed at identifying areas of prior scholarship to prevent duplication of effort and point the way in fulfilling a need for additional research." (Fink, 2014). The review of literature equally guides the researcher to build on the successes of previous researchers while looking for alternative solutions to the lapses noticed in existing works related to the topic under review. Thus, literature will be reviewed with regards to a theoretical review that focuses on the different underlining theories that guide the work, empirical studies that identify related literature in connection to the research objectives, and the conceptual model that conceptualizes the framework to be adopted.

Theoretical review

Downes, (2012) posits that knowledge has many authors, knowledge has many facets, it looks different to each person and it changes moment to moment.

> "Knowledge is not a description of a thing. It is a way of understanding that thing. It is a way of relating it to other things, of seeing it in a context, of making sense of it. Knowledge is not something that is simply given to us; it is something that we construct. We construct it by interacting with the world, by learning from our experiences, and by reflecting on what we have learned." (Downes, 2012 p.8)

The above quotation from Downes, (2012) tilts towards the social constructivism theory thereby indicating that learning could take place out of the physical classroom. Thus, the underlining theories that guided this work are social constructivism, connectivism, the Community of Inquiry Theory, and online Collaborative Learning.

Social Constructivism

Vygotsky, (1968) delves a lot into the collaborative nature of learning in which he perceives that human development is socially situated and knowledge is constructed through interaction with others. To him, learning takes place through play and interaction with others and this, he refers to as mediation. Thus, learning is not only transmitted from teacher to learner but it is constructed by

the learner in mediation with others. It therefore indicates that in the absence of traditional instruction, learning still continues to take place and possibly the best way to direct such learning towards desirable outcomes is to provide an enabling environment.

To Vygotsky, (1978, 85) there exist two levels of development in a child, the level of actual development which denotes the current level of the child's intellectual development, and the level of potential development which denotes the level the child can attain if supported by the more knowledgeable other. Vygotsky refers to this as the zone of proximal development.

The major aspects of social constructivism that guided this study were:

The zone of proximal development, (ZPD) is the difference between what a learner can do independently and what they can do with the help of a more knowledgeable other. In online learning, the more knowledgeable other can be a teacher, a tutor, or even another learner. When learners are working in their ZPD, they are able to learn more effectively. This is because they are challenged, but not overwhelmed. They are able to build on their existing knowledge and skills, and they are able to learn from the guidance of others. (Shabani, 2010)

Collaboration: Online learning can provide opportunities for learners to collaborate with each other. This can help learners to share their ideas, to learn from each other, and to build relationships. Collaboration allows learners to share their ideas with each other, which can help them to see different perspectives and to learn from each other's experiences, increased learner engagement, persistence and personal development. (Barkley, 2014). Here are a few benefits of collaborative learning

- **Learning from each other**: When learners work together, they can learn from each other's strengths and weaknesses. This can help them to build on their own knowledge and skills, and to reach their full potential.
- **Building relationships**: Collaboration can help learners to build relationships with each other. This can create a supportive learning environment, and it can help learners to feel more comfortable taking risks and sharing their ideas.
- **Developing teamwork skills**: Collaboration can help learners to develop teamwork skills. This is an important skill for success in school, work, and life. (Dewey, 1938)

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- **Scaffolding**: Scaffolding refers to breaking down complex learning tasks into little chunks of learning activity with progressive difficulty. In online learning, scaffolded instructional materials can be used to support learners to gradually develop the learning outcomes. This can also help learners to learn more effectively. Given the view that in most of online learning, self-directed learning and construction of knowledge is predominant, techniques on how to scaffold to make sure the learners are not lost in the process of learning are very vital to this study. (Radhika, 2019).

There are three main types of scaffolding:

Cognitive scaffolding: This type of scaffolding provides learners with cognitive support, such as hints, prompts, or questions that help them to understand a task or solve a problem. This kind of scaffolding is very important given that in the crisis where children hardly find themselves before a physical teacher, they need to have technologies that can help guide them along as they try to work on their own and equally prompts to respond to their diverse worries as they work (Kaska, 2004).

Affective scaffolding: This type of scaffolding provides learners with emotional support, such as encouragement, praise, or reassurance that helps them to stay motivated and engaged (Bruner, 1960). Given the fact that gunshots, killings and other traumatizing events keep reoccurring, the affective scaffolding in the online platform helps to rekindle hope and spur the learners to keep learning while hoping for better days.

Tools and signs: Online learning can provide learners with tools and signs that can help them to learn. This includes things like online simulations, interactive exercises, and visual representations of concepts. To Piaget, tools and signs are explored in a developmental process. Children begin to use tools and signs in a rudimentary way in early childhood, and they gradually become more sophisticated in their use of tools and signs as they mature (Piaget, 1923). This may be an indication that once children are exposed to diverse forms of technology, though the start may be difficult they will surely learn to develop new skills from their interaction with the tools with the evolution of time. The tools and signs used in the online learning platform need to be scaled such that learners start from the easiest before navigating to more complex scenarios.

Bruner, (1960) views education as a means to create autonomous learners who are able to learn from their environments given the already existing structures or with the provision of structures to help as the foundation of learning. To him, learning should be spiralled around the child's stage of thought, be it the enactive, iconic or symbolic stage making sure that cognitive growth revolves around human capabilities and culturally invented technologies that act as amplifiers to the formation of new inventions.(McLeod, 2014) In line with the foregoing, one may work to examine if the provision of technological tools enriched with appropriate instructional media could ignite learning in children trapped in the war-torn zone.

In line with the foregoing, social constructivism is a learning theory that emphasizes the importance of social interaction in the learning process. According to this theory, knowledge is not simply transmitted from teacher to student, but rather constructed by the student through social interaction with others and the environment. Social constructivists believe that learning is an active process in which students construct their own understanding of the world around them. (Ben Akpan, 2020)

In online learning, social constructivism can be a useful theory for examining the impact of online curriculum implementation on pupils' learning outcomes. Online learning environments can provide opportunities for students to interact with one another and collaborate on projects, which can help them develop critical thinking skills and learn from one another. Social constructivism also emphasizes the importance of context in the learning process, which is particularly important in online learning environments where students may be located in different locations, given diverse challenges and still being given the opportunity to enhance their learning. It is therefore worthwhile to elucidate this theory in this particular study to develop learning communities that may be proactive in enhancing learning. (Mansoureh Hajhosseini, 2016)

Connectivism Theory

Connectivism as one of the theories that guided this study, views learners as "nodes" in a network wherein node refers to any object that can be connected to another object, like a book, webpage, person to solicit learning (**Siemen, 2004**). Thus, connectivism is based on the theory that humans learn when they make connections, or "links," between various "nodes" of information, and continue to make and maintain connections to form knowledge (Siemens, 2005).

Connectivism therefore rest on 8 underlying principles:

Learning and knowledge rests in diversity of opinions. Humans generally have varied opinions about trending issues and it is when the opinions that bring about favourable alteration in human life are accepted over those that basically do not have any positive, impact that learning takes place. Thus, varied contributions in an area of interest help build sustainable solutions to life's issues.

Learning is a process of connecting specialized nodes or information sources. Connections seems to have been the starting point of all learning. Smithsonian Institution's "Survival of the Adaptable," indicates that an appetite for a varied diet, making tools to gather food, caring for each other, and using fire for heat and cooking constitute the basis for the connections that led to early inventions (Darwin, 2023).

Learning may reside in non-human appliances. It is common place to imagine that if a single teacher could possess all knowledge, they will be no need for libraries and that if that were the case teachers will need no books to help in lesson preparation. It is therefore obvious that if a teacher had to consult a book in order to prepare for effective teaching, the book which of course is non-human becomes the harbour of such knowledge. Rockwell equally states that we now live in the age of big data, an age in which we have the capacity to collect huge sums of information too cumbersome for a person to process, as such there is ardent need to make non-human appliances to carry the load (Rockwell, 2017) This is the foundation of Artificial Intelligence, proving that learning may reside in non-human appliances. Starting from Virtual Reality, (VR), to mixed reality, there has been a twist in events related to the field of education that has significantly transformed the world into a one spot walking environment. Field trips could now be undertaken using VR. Launched on November 30, 2022, by San Francisco–based Open AI and founded by Sam Altman, chat GPT is trending in the area of AI. Attaining to students' varied concerns in most countries of the world today. One could seek to verify if such opportunities are given to children to Xray the world and its resources through the use of such varied technologies in the implementation of the curriculum in order to positively alter attitudes, build lasting skills and equip the learners to be useful in the community in which they belong. Given the relevance of this study that seeks to examine the impact of online curriculum in crisis situation, the researcher hopes to investigate into diverse technological equipment that harbour most of knowledge to come out with possible ways

learners who are deprived of the normal brick-and-mortar classrooms could use to boast their learning.

Capacity to know more is more critical than what is currently known. There are a number of ways that students can develop the capacity to know more. They can learn to use online resources, such as Wikipedia and Khan Academy, to access information. They can also learn to network with other learners and experts, and they can learn to collaborate on projects. To Siemen, the ability to know more is the foundation to creativity. In line with the foregoing, viewing that what exists simply constitute the foundation for more since technology keeps evolving, meaningful use of appropriate technologies could help learners to seek to develop more innovation that could help resolve the needs of time.

Nurturing and maintaining connections are needed to facilitate continual learning. Collaborative cohesion between people is an asset that needs to be nurtured and maintain if growth is to be expected of a given community. Without collaboration it is simply impossible to achieve any significant growth. Thus, the needs of the people at any given moment determines what they seek to achieve and as such any assistance given to meet the need become significantly valuable. It therefore means that before any initiative is undertaken, they need to be a liaison between the beneficiaries and the donors to ensure that each donation is understood and happily embraced by the recipients and this relationship needs to be guarded jealously.

Ability to see connections between fields, ideas, and concepts is a core skill. If humans do not seek to relate fields, ideas and concept, the whole life will be an isolation of diverse elements each not related to the other. Thus, there is ardent need to chain up different fields, ideas and concepts to bring about the much-needed change that each society desires.

Currency (accurate, up-to-date knowledge) is the intent of all connectivist learning activities. This point answers the question as to if the present knowledge sought can help resolve current problems. Is it still what others had researched and found solutions to, that is still being rehearsed or the actual situation is the starting point simply using past experiences as a springboard to generate solutions to current problems while envisaging what future challenges would like and their possible solutions.

Decision making is itself a learning process. Choosing what to learn and the meaning of incoming information is seen through the lens of a shifting reality.

Although connectivism is a complex theory, for the sake of this study, it can be summarized by the following principles:

- Learning is a process of connecting specialized nodes of information. It is therefore, believed that once children's needs are identified, the needs of their communities sampled out, and appropriate technology brought to place, children could develop necessary connections that are aimed at addressing the needs of the time and trying to build for the future.

- Learning is more effective when it is collaborative.

- Learning is more effective when it is situated in real-world problems.

- Learning is more effective when it is adaptive to change. (Downes, 2007)

Siemens and Downes, (2011) define connectivism as,

> …the thesis that knowledge is distributed across a network of connections, and therefore that learning consists of the ability to construct and traverse those networks. It shares with some other theories a core proposition, that knowledge is not acquired, as though it were a thing. Knowledge is, in this theory, literally the set of connections formed by actions and experience.

The above definition explicates connectivism to be the 21st-century mode of learning that seeks to resolve perceived gaps that exist in traditional ideas about learning, particularly those concerned with the use of technology. For example, connectivism promotes learning that happens outside of an individual, such as through social networks and knowledge that occurs or is stored by technology. It builds upon established theories to propose that technology is changing what, how, and where we learn. Thus, given the new reality in the crisis zone of the North West Region the application of this theory is unavoidable.

The Community of Inquiry Theory

The community of Inquiry on the other hand, rests on three presences; cognitive, social, and teaching (Anderson et al, 2001). To Anderson, "quality online learning will be knowledge, community, assessment, and learning centred." This theory supports the design of online and blended courses as active learning environments based on course designers, instructors and students building on existing knowledge and seeking for ways of remodelling to diverse bodies of knowledge to build on new ones. To determine the success of online curriculum implementation, the researcher saw the application of this theory necessary since acquisition of knowledge remains the key to all learning, assessment is the major tool to verify if learning has taken place and the building of a community to encourage learning in synergy a valuable asset to creative thinking and innovation.

The community of Inquiry (CoI) theory identifies three key elements that are essential for effective online learning:

Social presence: This refers to the extent to which learners feel connected to each other and to the instructor. Social presence is essential for online learning because it helps learners to feel connected to each other and to the instructor. When learners feel connected, they are more likely to be engaged in the learning process and to participate in discussions.

Rourke et al., (2001) developed a scale for measuring social presence in online learning communities. The scale is based on the following dimensions of social presence:

Immediacy: This dimension refers to the extent to which learners feel connected to each other and to the instructor.

Openness: This dimension refers to the extent to which learners feel comfortable sharing their ideas and feelings

Trust: This dimension refers to the extent to which learners feel confident in each other and in the instructor.

With regards to how social presence develops in learners, the following are highlighted:

Personalization: This component refers to the extent to which learners share personal information with each other.

Self-disclosure: This component refers to the extent to which learners reveal their thoughts and feelings to each other.

Intimacy: This component refers to the extent to which learners feel close to each other (Tu, 2002).

Therefore, to ensure that learning takes place, the technological tools used should be able to improve upon teacher/pupil, pupil/pupil and pupil/content relationships in order to determine if online learning actually impacts children's learning outcomes.

Cognitive presence:

This refers to the extent to which learners engage in critical thinking and discourse. Cognitive presence is essential for online learning because it helps learners to engage in critical thinking and discourse. When learners engage in critical thinking and discourse, they are more likely to learn deeply and to develop their understanding of the material. Cognitive presence helps learners to:

Pose challenging questions: One way to promote cognitive presence is to pose challenging questions that require learners to think critically and to engage in discourse.

Provide opportunities for collaboration: Learners can be encouraged to collaborate on projects and assignments. This can help them to learn from each other and to develop their problem-solving skills.

Use online tools that support critical thinking: There are a number of online tools that can be used to support critical thinking in online learning communities. These tools can help learners to share their ideas, to collaborate on projects, and to engage in discourse.

Provide feedback: The instructor should provide feedback on learners' work. This can help learners to improve their understanding of the material and to develop their critical thinking skills. Owing to the foregoing in relation to the cognitive presence, it was necessary to identify the evidence of cognitive presence that could help to determine the acquisition of critical thinking skills in the learners that proved the prevalence of deep learning. The use of online tools that supported critical thinking, collaboration on projects and assignments, the type of questions used, and the

feedback were some of the ways that the researcher needed to consider to acquire far-reaching results. (Anderson, 2001).

Teaching presence: This refers to the extent to which the instructor facilitates learning and creates a supportive learning environment. Teaching presence is essential for online learning because it helps the instructor to facilitate learning and to create a supportive learning environment. When the instructor facilitates learning and creates a supportive learning environment, learners are more likely to be successful in their learning. The teaching presence helped this researcher to identify the strategies used in aiding the learners to sail through the lessons successfully. How learners' worries are addressed, how they navigate through the learning platform and how they get assistance to their worries actually has an impact on how they learn. (Zulaikha, 2021) To Swan, (2003) substantial progress has been made in conceptualizing and investigating the importance of establishing teaching presence in online learning. The need to increase face-to-face interaction in online learning has led to the virtual visibility of an instructor in online learning. (Baker, 2010).

Online Collaborative Learning (OCL)

Gokhale, (1995) defines collaborative learning as learning in which mixed ability students study together learning from each other and carrying out projects aimed at raising each other's level of reasoning. In a situation where most teachers were on the run, it was but necessary to build a learning environment that favoured peer learning from children from diverse background using an alternative meeting point since the brick-and-mortar classroom was no longer the standard.

Bates (2015) posits that OCL theory is grounded in and integrates cognitive development theories which centres around conversational learning, deep learning conditions, academic knowledge advancement, and knowledge construction within the auspices of internet mediated learning interface.

Online collaborative Learning 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" (Harasim, 2012, p. 81). It is therefore developing interactive virtual learning environments to revolutionize the educational sector. Though new as the theory might be, this theory helped the researcher to identify the strategies that could be used to organise

and run a successful online learning interface that could blend the attributes of a traditional class to the virtual learning environment thereby initiating deep learning, critical thinking abilities and creativity.

The above theories under review indicate the relationship between the respective theories that can help boast online learning to bring out desirable outcomes as exemplified below:

Social constructivism: Social constructivism can be used to inform the design of online collaborative learning activities. For example, an instructor might design an activity where learners work together to solve a problem or create a product. This would allow learners to interact with each other and with the material in order to learn.

Connectivism: Connectivism can be used to help learners connect with resources and experts online. For example, an instructor might provide learners with a list of online resources that they can use to learn about a particular topic. This would allow learners to connect with experts and resources outside of the classroom.

Community of inquiry: The CoI theory can be used to create a supportive learning environment where learners can interact and collaborate effectively. For example, an instructor might create a forum where learners can ask questions, share ideas, and collaborate on projects. This would allow learners to feel connected to each other and to the instructor, which would promote cognitive presence and social presence.

Thus, explains the argument that connectivism is compatible with social constructivism and that it can be used to explain learning that takes place in online collaborative learning. (Siemen, 2004)

Empirical Studies

Several researchers have researched the relationship that exists between online learning and pupils' learning outcomes. For the sake of this study, the researcher decided mainly on the review of empirical literature with regards to meta-analysis that has to do with the impact of online/digital learning on pupils' learning outcomes.

Archer and Savage, (2014) undertook a meta-analysis to reassess the outcomes presented in previous meta-analyses examining the impact of digital learning on language and literacy learning (Slavin et al, 2008 & 2009, Torgenson & Zhu, 2003). The results showed that digital learning had a positive effect on pupils' learning outcomes.

Similarly, Li and Mas, (2010) had carried out a meta-analysis on the impact of digital learning on learners' Mathematic achievement. They considered 46 primary studies with a total of over 36000 learners employing random assignment of learners to control and experimental environment. Their findings revealed a high significantly positive effect of digital learning on mathematic achievement. Worthy of note in their findings was the revelation that younger school learners under the age of 13 years had higher achievement gains than the learners of the secondary schools. This indicates that younger children can grasp concepts and manipulate better is accorded the appropriate technological tools.

In a meta-analysis conducted by Liao et al, (2007) with regards to the effect of digital tools and resources on elementary school learners, 48 studies were taken into consideration targeting over 5000 learners. The findings revealed an overall positive effect with 44 (92%) of the studies indicating a positive effect in favour of digital learning. Somekh et al (2007) in a study to find out the effect of the interactive white board (IWB) in learning in key stage 1 Mathematic for children aged 7 years in England found out that high attaining girls made gains of 4.75 months enabling them to catch up with high attaining boys. The results equally revealed that in key stage 2 for children aged 11years, average and high attaining learners taught exclusively with IWB made the equivalence of an extra 2.5 to 5 months progress over the course of 2 years thereby indicating that the IWB plays a significant role in children's learning.

Hung et al, (2012) explored the effects of using multimedia tools in science learning on learners in elementary schools in Taiwan. In the project-based learning where learners had to take pictures, develop a story based on the picture and then develop a movie from the story using the pictures, the researchers found out that learners who used digital tools had an interesting experience developing their movies with multiple designs while those using the traditional method found it hard to attain their objectives and thus, felt demotivated. In another study to find out how digital games used by learners impacted their understanding of electromagnetic compared to those taught by the teachers using the traditional inquiry-based investigation, the results revealed a significant difference between the control and the experimental groups. Learners in the experimental group

were able to give prompt and apt answers with detailed explanations while those in the control group could barely try to explain what they heard (Anderson & Barnett, 2013)

Higgins et al., (2012) after a meta-analysis on the impact of technology tools and resources, found out that Mathematics and Science recorded greater gains when compared to literacy. In effect, the key benefits relate to problem solving skills, practicing number skills and exploring patterns and relationships (Condie & Monroe, 2007)

In line with the foregoing, and taking cognizance of the ever-changing nature of technology making online learning more user friendly, the impact of online learning on pupils' learning outcomes. In a study to find out the impact of online learning effectiveness and benefits of knowledge management, the researchers identified some key factors that influence online learning amongst which were; learner/instructor self-efficacy, attitude and confidence in using technology involved, educational strategies employed, the ability to monitor and evaluate learning outcomes and learners' motivation. The results of their findings revealed that all the factors put together denote the level of engagement and had a positive impact on learning outcomes. (Hongsuchon, 2022)

Trending technology used in online lesson delivery

In order to identify the different technologies used to deliver online lessons and also develop a model for online curriculum in crisis situation, the researcher needed to make a review of trending technologies that could help in enhancing practical online curriculum implementation in the crisis hit region**.** Thus, the author delved into the review of the Horizon Reports (HRs) from 2011 to 2021 highlighting major trending technologies that continue to impact online learning (Educause, 2022) Mobile technology has been earmarked by most researchers as one of the most impactful of the technologies used in online lesson delivery that has positively impacted on learning outcomes in elementary education in most countries of the world. This cluster include mobile phones, tablets, Bring your own device (BYOD) and apps. (Crompton and Burke, 2017; Liu et al, 2014) Xie et al. (2018) highlights how mobile technology ease learning especially for learners with disability and thereby suggesting the use of mobile technology to enhance inclusive education.

To Hirsh-Pasek et al., (2015) mobile devices were the most common ways for youths to access educational software. This may explain why McEwen and Dube, (2017) proposes the seamless

access to third-party applications to open the door to multiple educational resources with the uses of tablets. Moreover, McLean, (2016) argues that BYOD facilitates learner centred learning and provided a more seamless experience while learning at home since the same device could accompany the learner anywhere.

Maker technology in the likes of 3D printing, Robotics and makerspaces are equally viewed by many as a revolutionary factor in the trend of online learning. To Loy, (2014) maker movement and associated technologies are aimed at promoting authentic learning through hands-on design and construction.

To Ford and Minshall, (2019) 3D printing remains an essential tool that makes abstract concepts look concrete especially in Geometry, making it easy for learners to create their models. Though initially considered by most researchers as expensive, 3D printing has advanced to free and child-friendly versions like tinkercad.com. (Turner et al, 2017)

Binitti, (2012) reveals that robotics aid in improving Science, Technology, Engineering, and Mathematic (STEM) courses and also develop creative thinking skills. This view is supported by Toh et al., (2016) who indicate that in addition to promoting the 21st Century skills with regards to creative thinking, collaboration creativity, and communication, (4Cs) robotics were capable of developing problem-solving skills and enhancing overall academic performance.

On analytic technology, Bodily and Verbert, (2017) in a study on analytics reporting systems suggest mixed results with regard to behaviour and achievement but affirm clear improvement for self-awareness and engagement. According to Yu

and Jo, (2014) analytics technology or learning analytics uses individualized data to provide adaptive instruction and assessment tailored to each student's needs. Learning analytics is argued to improve existing assessment practices by providing continuous, formative assessments that can be used to both identify a learner's strengths and weaknesses and subsequently adapt instruction (Johnson et al., 2011).

With regards to gamification, Merino-Campus and Fernndez, (2010) posit that educative games promote cognitive and motor skills; Li and Tsai, (2013) suggest the use of games to teach content,

promote problem-solving skills and engagement; and Bryan and Joung, (2018) reiterated the primordial role of games in solving mathematical problems.

Simulation technologies provide an immersive and interactive learning environment for learners by placing them in virtual reality (VR) or by blending virtual data or visualizations into the real world using augmented reality (AR). (Educause, 2022) To Hew and Cheung, (2010) 3D immersive virtual world can positively impact on the affective domain and while significantly improving learning outcomes, foster social interaction. Kavanagh et al., (2017) argue that VR improves intrinsic motivation. To Hudson, (2015) the cognitive load on learners in online lessons should be minimized by eliminating confusing, complicated, and overwhelming designs, while Bryan, (2020) posits that more engaging technology infrastructures like augmented reality (AR), virtual reality (VR), retro campuses, sirri 'teach me' and others should be embedded to any meaningful online learning platforms.

Artificial Intelligence, (AI) is making major headlines with a shifting focus towards technology-mediated learning to bridge the gaps of the physical classroom, especially in challenging situations. (Roll and Wylie, 2016) Jiao, (2020 in 'Application of Artificial Intelligence to Assessment's proposes the use of AI tools to facilitate assessments given the multiplicity of crises plaguing the world. This viewpoint seems to be upheld by Kergel in his book, 'From Book Culture to Digital Age,' in which he establishes a relationship between learning and motion with the big idea being how learning is based on motion.

Technology used to deliver online lessons

Different technologies have different effects on the learners depending on how they are manipulated. Those with ease of manipulation attract learners more as they can gradually navigate to more complicated platforms. In a study to explore the use of technology tools to enhance learning amongst learners from diverse linguistic and cultural backgrounds, the analysis of the data identified that digital technologies, multimedia presentations, and social network tools facilitate educational experiences and achievements of participants in asynchronous online learning environments**.** (Kumi-Yeboah, 2020)

Before the crisis learners could easily go out on experiential studies and carry out various practical activities to boast their knowledge about the world of work and nature. In a crisis situation this is not feasible thus, bringing in the need to seek alternative strategies. With the aim of finding out the impact of VR as a pedagogic tool to boast learners' experiential learning, a researcher found out children who used VR could recount and try out a step-by-step analysis of what they observed as opposed to those who only listened to the explanations. The results revealed that the use of VR led to children's overall skill development. (Mujtaba, 2021)

To Gonzale et al., (2023) innovative technologies like animated apps and VR significantly enhanced learning experiences thereby upholding an earlier study revealing that children explore new concepts and concept scenarios through such immersive technologies. (Smith and Johnson, 2021) Animated videos provide learners with a possibility of listening, and seeing which attain to two major senses that greatly impact learning. Most of these simulations done as cartoons in animated forms attracts the admiration of most learners. In a study to find out the impact of video simulations in simulation-based education in online lessons, the results revealed a significant effect on learning outcomes in both online and on-campus. To the researchers, simulation-based education remains one of the best ways to initiate learning in children. (Neila Campus, 2021)

To Smith, (2022) traditional media platforms like televisions, radios and projectors are widely used in most communities to ease online learning given the ease to acquire and use. Though many critics posit that the television is rather making children to shift from the course of learning. Lanza, (2012) states that the TV remains one of the most valuable tools for online learning depending on what program learners watch, the provision of time to respond to their worries and sufficient pauses for them to answer their questions before the answers are supplied. To her, learners may tend to abandon programs that do not attain to their worries.

Given the challenges posed by the expensive nature of the televisions and other gadgets to ease learning, poor electricity network, the radio could be viewed as an alternative measure though with the weakness that it attains only to audio learners. Interactive audio instruction, (IAI) has been reported to deliver high quality education to learners in remote and crisis affected regions of the world. Unlike in a regular radio, the learners interact with the audio teacher and pauses are observed

to make sure pupils complete their lessons and timely feedback is given with regards to their level of improvement. (Education Commission, 2020)

Different communities have different technologies that appeal most to them and they feel comfortable with given the ease to use and the need of time. Introducing new technologies may seem difficult but when such technologies meet the aspirations of learners, they can do everything possible to master the technologies. In a study carried out by Nforgwei Malvina Anyinyong and Ümmü Altan Bayraktar, to examine The Use of Social Media Platforms WhatsApp and Telegram as Educational Tools During COVID-19 in Cameroon, the results revealed that WhatsApp and telegram were used to transmit knowledge to learners in voice, text and video formats. The study also revealed that learners equally preferred using zoom and google meet for interactive classroom experiences. (Anyinyong, 2022) Generally, WhatsApp and video conferencing tools such as zoom have been found to significantly ease lesson delivering in challenging situations thereby ensuring continuous teaching presence and communication between the teachers and the learners. (Jones & al., 2023)

Ngoungouo in a study carried out to investigate the use of ICTs in Cameroon schools came up with the conclusion that the majority of teachers in addition to the face-to-face classroom encounters, use mobile phones, computers and storage devices for additional engagement of pupils in and out of the school setting. The study equally revealed that teachers consulted MOOCs in lesson preparation and equally adapted some content for use by pupils. (Ngoungouo, 2017) Similarly, Oye and Laheal, (2012) argues that e-learning is the use of information and technology tools like internet, computers, mobile phones, LMS, televisions and radios.

Children love to manipulate and sometimes verbal explanations may not resolve the needs of many pupils. Experimentation with technological gadgets may just be another motivating factor to learning. In a study carried out by Güven and Sülün, (2012) on the effects of computer-enhanced teaching in science and technology lessons on the structure and properties of matter such as the periodical table, chemical bonding and chemical reactions in Turkey, their proposition came to the effect that computer enhanced learning could instil interest in scientific and technological knowledge.

Engagement with online technologies

According to Schunk and Mullen, (2012) learner engagement is defined as the involvement of the student's cognitive and emotional energy to accomplish a learning task. It has been found to correlate with important educational outcomes, including academic achievement, persistence, satisfaction, and sense of community. Additionally, to Halverson and Graham, (2019) learner engagement is a multifaceted construct that encompasses the cognitive, emotional, and behavioural aspects of learning. It is defined as the degree to which learners are actively involved in their own learning experiences. To them, engaged learners are motivated, focused, and committed to their learning goals. They actively participate in class activities, interact with peers and instructors, and take responsibility for their own learning.

The level of deep learning in a pupil can in an instance be viewed only from the level of engagement in an activity. This explains why most teachers would want their learners to stay focused during a learning activity. A meta-analysis on numerous studies on learner engagement, revealed that learner engagement is a meta-construct including multiple facets which have been mainly conceptualized as behavioural, emotional and cognitive dimensions. While defining student engagement as the investment of time, energy, and interest in school activities, they argued that student engagement is a critical factor in determining student success. To them, enhanced learner engagement resulted in overall positive learning outcomes. (Appleton et al, 2008) In a related study to evaluate the Relationships between student engagement and academic achievement, a meta-analysis was carried out to determine the effect of engagement on academic achievement. Considering engagement from 3 facets, behavioural, emotional and cognitive, the studies revealed that apart from minute cultural hitches, engagement was a prerequisite to academic achievements. (Hao et al, 2018)

For learners to stay focused there is ardent need to constantly give them real-time feedback so that the chain of engagement is not broken. Studies have been carried out that indicate that constant feedback enhances engagement which consequently boast learning achievement. (Tsai, 2020). Similarly in an article titled, "Students' learning outcomes and online engagement in times of crisis," the researcher came up with the findings revealing that students' engagement and teacher behaviour significantly influence learning achievement. To them, peer sharing and constant teacher feedback greatly motivated the level of engagement of learners. (Kalid, 2021).

Children basically learn more through play. Organized play therefore enhances learning (Cook, n.d). To Kiili et al. (2014) digital games increase engagement and hence improve upon learning outcomes; immersive learning interface keep learners engaged and focused. Thus, the use of Augmented Reality, (AR) and Virtual Reality, (VR) help in enhancing learners' engagement in highly educative simulations thereby enhancing learning achievements. (Loup, 2016) In an article on virtual world teaching experiential learning, emphasis is laid on second life (SL) learning as a prerequisite to proper engagement of learners in project base lessons. Thus, the researchers highlight the needs for enhancing 3D printing into online learning scenario to help boast project-based learning that keep the learners engaged for as long as they visualize how their contributions can impact upon future developments (Jarmon, 2009).

The only visible sign that learning is taking place is determined by the level of engagement in learning activities. What takes the learners attention must keep them engaged and at this moment reduces the stress of the teacher having to keep asking the learners to stay focused. Thus, once the learners are engaged, the teacher can easily monitor, evaluate their work and give prompt feedback. It may therefore not be an overstatement to state that the level of engagement with the learning experiences determine the attainment of expected learning outcomes. Shivani (2021) in a study to evaluate factors influencing students in online courses, decomposes student engagement into six constructs; skill engagement, (SE) emotional engagement, (EE) cognitive engagement, (CE) performance engagement, (PEE) participation engagement (PAE) and value to students. (VtS) Skill engagement is based on constructivist assumptions that learners are able to make the best use of their resources like time and effort in order to complete study material (Dixson, 2015; Purinton & Burke, 2019). Emotional engagement referring to how learners connect with learning experiences and peer groups to pursue knowledge. When these connections are favourable, learners feel the need to stay engaged (Black & Allen, 2018)

- **Skill Engagement (SE):** This construct focuses on the effort put in by the learner to attain course objectives. To Dixson, (2021) SE refers to making constant effort to study which can be seen through reading course materials, making summary notes, organizing the material learnt, attending video/audio sessions and making presentations. To Handelsman et al., (2005) SE refers to what learners "do" and include reading course materials, and making conscious efforts to learn. This could be reflected in the type of questions raised by

the learners and their eagerness to attend supplemental revision lessons. Thus, the greater the effort put in to learn, the greater the output.

- **Emotional Engagement (EE):** This is denoted by the learner's feeling about the course content in relationship to attaining desired goals in life. To Marks, (2000) EE refers to learners' emotions about learning. Fredrick et al., (2004) posit that EE has to do with interest in class activities, peer relationship, course, instructors and the learning experiences. When learners find the course to be interesting and valuable to their personal lives, they feel emotionally engaged (Handelsman et al., 2005; Dixson, 2015). To Dixson, (2015) engaging learners emotionally brings in more effort thereby making the course more interesting to learners and increasing their desire to learn. Black and Allen, (2018) hold that teachers should cultivate EE in learners. Williams et al., (2013) postulate that positive emotions stimulate and enhance cognition thereby increasing the desire to learn.

- **Cognitive Engagement (CE):** Learners have varied choices as to what they learn online and choosing particular course material in order to attain particular goals is determined by CE. To Biggs, (1987) CE refers to how learners approach learning and how their experiences lead to learning. This construct indicates behavioural perspectives thereby denoting how learners' responses to self-regulated learning and effective use of deep learning strategies increase desired learning outcomes (Fredrick et al., 2004; Park & Yun, 2017). This therefore, indicates that CE enhances greater learners' engagement across multiple dimensions thereby enhancing learning outcomes.

- **Participation Engagement (PAE):** For learning to take place, there is bound to be interaction. This interaction has multiple dimensions ranging from the learner/environment, learner/facilitator, learner/learner, learner/content, and learner/technology. To Handelsman, (2004) PAE deals with peer interactions and the joy derived from manipulating content in diverse ways. Drouin, (2008) posits that social interaction cultivates PAE which leads to social construction of knowledge, a prerequisite for positive learner satisfaction. To Oliveira et al., (2011) multi-level interactions, resource sharing and activities involving higher level thinking develop learners' competences in online learning. To Dixson, (2015) PAE can be enhanced through having fun on online chats, helping learners to navigate through content, and posting regular slots in online forums to keep the learners engaged.

- **Performance Engagement (PEE):** This refers to the learner's effort towards achieving high scores in assignments and the determination to do practical activities with a marked degree of accuracy. All the efforts the learner puts in place is to ensure that they attain higher test scores and equally perform challenging activities above the level of their peers (Handelsman et al., 2005; Dixson, 2015). Thus, PEE points to the learner's desire to perform well and attain course objectives.

- **Value to Student:** Measurement of perceived value of assignment to learners is another dimension of engagement (Purinton & Burke, 2019). Whether the learner finds the assignment to be unique, unusual and creative enough to contribute to the learner's aspiration and the attainment of set goals or if the course design aligns with the expected learning outcomes increases the learner's engagement (Graeff, 2010). According to Dixson, (2015), learners derive value from engagement in an online course, when the course acts as a bridge between the learner and the content.

Children learn in diverse ways using diverse learning styles and as such the different forms of engagement need to be taken cognizance of to attain to the different learners. According to Park and Yun, (2017), cognitive engagement reflects the capacity of the student to engage into learning activities. Due to limited peer/instructor interaction in online learning, participation engagement becomes challenging and only the inclusion of collaborative exercises in online lessons can help boast this construct. (Kurucay & Innan, 2019) To Dixson, (2015) performance engagement diverts the students' attention towards attainment of goals with learners striving to have good scores with each timely feedback. With regards to value to student, studies indicate that students can go an extra dimension to research and try to do what strikes their interest most. (Hayes, 2018)

Taking cognizance of the fact that every learner is unique, it's important to experiment with different engagement strategies and adapt them based on student feedback and outcomes. For instance, the following principles have been found to be useful in improving learner engagement:

- **Active Learning**: Encourage students to actively participate in their learning process by incorporating interactive elements such as quizzes, discussions, and group projects. This promotes engagement and helps students retain information better. (UCL, n.d)

- **Clear Expectations**: Clearly communicate the course objectives, expectations, and grading criteria to students. This provides them with a sense of direction and helps them stay focused on their learning goals. (UCL, n.d)

- **Meaningful Feedback**: Provide timely and constructive feedback on students' assignments and assessments. This helps them understand their strengths and areas for improvement, fostering a sense of engagement and motivation. (Nicolás, 2015)

- **Collaborative Learning**: Facilitate opportunities for students to collaborate with their peers through group activities, virtual discussions, or online forums. Collaborative learning promotes engagement, critical thinking, and social interaction among students. (Molly, 2022)

- **Multimedia Content**: Utilize a variety of multimedia resources such as videos, interactive simulations, and visual aids to enhance the learning experience. This caters to different learning styles and keeps students engaged. (UCL, n.d)

- **Personalization**: Tailor the learning experience to meet individual students' needs and interests. This can be achieved through adaptive learning platforms, personalized assignments, or providing choices in topics or assignments. (Sparvell, 2021)

- **Gamification**: Incorporate game-like elements such as badges, leaderboards, or rewards to make the learning experience more enjoyable and engaging. Gamification can motivate students to actively participate and progress in their learning journey. (Mening, 2017)

Challenges envisaged and measures used by previous researchers to mitigate: Previous researchers have identified diverse challenges that could mar online learning, ranging from learners' factors, teachers' factor, technological equipment and the environment. In a study to evaluate the factors that motivate students' acceptance and use of online platforms, the results revealed that user support, perceived ease of use and perceived usefulness were the main motivating factors. (Ndongfack, 2017)

It is necessary to identify possible barriers that need to be resolved in a bid to come up with far reaching recommendations that may enhance online curriculum implementation (OCI). Mbakwa,

(2019) posits that amongst other challenges faced by computer aided instruction, computer-assisted learning and online learning in Cameroon, the lack of trained teachers in the field of technology is a major drawback. To address this issue, Johnson et al., (2016) suggest that schools can provide targeted training and professional development opportunities for teachers to help them effectively use technology in their teaching. This can include workshops, online courses, and one-on-one coaching sessions. Additionally, online lesson designers can provide teachers with access to technical support and resources to help them troubleshoot issues that may arise during online lessons.

OCHA indicates that after the UN declaration in 2016 including access to education as a human right, a study was carried out to enhance goal 4 of the UN agenda 2030 for sustainable development. To them, this study reiterated findings from previous studies indicating that limited access to digital hardware and lack of training of teachers were major obstacles to online learning in the South West Region of Cameroon. (SODEI, 2021). To close up this gap that makes the dream of online learning look unrealizable, Pauletto, (2023) suggests the creation of learning centres to cater for learners in needy communities as well as providing support materials to teachers and facilitators to help in lesson delivery.

In a study to find out the impact of TPACK framework on teacher professional development, the results indicated that teacher professional development was a predictor of positive learning outcomes and efficient teaching. (Ndongfack, 2015) This explains why Mcaleavy and Gorgen, (2020) argues that for teachers to be proficient in online modules, they need professional development support in the use of technology driven lessons. The school of education of the American University (2018) in its blog titled "Professional Development for Teachers: Understanding its Importance," states that webinars, online courses, virtual conferences, and other forms of online training could be offered to teachers to keep them abreast with current trends. To them, necessary steps should be taken to ensure teachers have access to digital resources that align with student learning objectives. This can involve identifying relevant resources, creating rubrics for evaluation, and attending online workshops on classroom technology integration

Patterson, in his research, The State and Challenges of Technology Enhanced Learning in Cameroon's English Subsystem of Education, posits that many children even prior to the crisis had no access to technological accessory, many in schools where there were computer laboratories

indicated that no one was there to teach and as such no computer assisted lessons and that teachers on their part stated they were not able to carry out technology mediated lessons since they were only trained on face-to-face. (Mbakwa, 2019). This therefore indicates the state of the teachers who were expected to assist the learners by 2018 when the crisis was ongoing and suggest possibly that maybe they could have been somehow useful if they too had not been given some prior training. Conversely, Johnson et al., (2016) suggests online tutorials to aid the facilitators to walk the learners through online learning platforms with adequate material to help them troubleshoot varied problems within the educational process.

Ndongfack, (2015) posits that the low level of appropriation of digitalization by Cameroon teachers is alarming and therefore difficult to positively tilt towards the changing paradigm. Therefore, if the covid-19, "imposed a new normal where by traditional learning almost completely shifted to online learning," necessary strides needed to be taken to ensure that the level of digitalization of the Cameroonian teacher be equally stepped up to match up with the expectations of the new job requirements. (Dhawan, 2020)

The poor appropriation of digitalization notwithstanding, in a research to find out the impact of artificial intelligence on learner-instructor interaction in online learning, the researchers found out that AI had a positive impact on learning experiences and boost engagement in online learning by providing real-time personalized assistance to both learners and instructors to ease the learning process. (Seo, 2021). In line with the foregoing challenges that seem to obscure the course of online curriculum implementation, the office of educational technologies produced a guide for teachers to help them carry online lessons with a marked degree of ease and another guide for parents which can enable them assist the learners in online lessons. The office equally suggested ways of closing the digital divide through the establishment of learning centres. Office of Educational Technology. (2021).

Mode of improving online learning

The evolution in technology is so rapid that with the passage of each day humans are working hard to make life easier and to transform the old ways of doing things to more dynamic and easier ways. Therefore, the trending technologies that have been used in online lesson delivery have been upgraded and new technology invented to ease online lesson delivery. Thus, to seek ways of

improvement upon an online platform, necessary research has to be done with regards to the emerging technologies developed in order to make online learning replicate the practices of a face-to-face learning environment with additional inputs to boast outcomes. In line with the foregoing, the researcher reviewed predicted technologies with regards to maker-technologies, analytics, simulations, games and artificial intelligence (AI).

- **Maker Technologies:** Maker technologies are most often associated with "makerspaces and "maker movements." There encompass a broad range of tools and activities to promote project-based learning. These include: 3D printing, electronic, robotics, arts and craft, and gardening tools (Hughes & Robb, 2020). These technologies have become prominent in online education prompting learners to engage in hands-on activities remotely. For instance, learners can explore electronics through virtual circuit simulators, experiment with robotics using virtual robot programming environments. Additionally, 3D printing enable learners to design and create physical objects remotely while handwork and gardening can be explored through online tutorials, arts and crafts tools and gardening tools where applicable (Hughes & Robb, 2020).

- **Analytics:** In online learning just like in the face-to-face encounter, there is ardent need to monitor the level of concentration of the learners and their progress in order to give personalized feedback that boast the interest of the learner. Kew and Tasir, (2021) in a review of the focus of learning analytics in online environments, found out that applied focus of learning analytics is more oriented towards monitoring, prediction and interventions. The review equally revealed that, the commonly used types of learner-analytics data were learning behaviour data and learning level data (Tasir, 2021).

- **Simulations:** Simulations can be a powerful tool to enhance student learning and engagement in an online course. Simulations allow students to apply their knowledge and skills to realistic scenarios and receive feedback in a safe, virtual environment (Chisum, n.d). By simulating real-life situations, students can gain practical experience and develop critical thinking, problem-solving, and decision-making skills (Rimon, 2016). Simulations also provide opportunities for active learning, collaboration, and exploration of different outcomes (Trefal, 2020). They can help students understand complex concepts, reinforce learning objectives, and bridge the gap between theory and practice (Chisum, n.d). Additionally, simulations can be used to assess student performance and provide

personalized feedback, enabling instructors to identify areas for improvement and tailor instruction accordingly (Chisum, n.d). Overall, simulations offer a dynamic and interactive learning experience that can make online courses more engaging, immersive, and effective.

- **Digital games:** Mening R. (2017) postulates that games can motivate learners to actively participate and proceed in their learning journey. To this researcher, reproducing lessons in form of games will significantly enhance learning. In a meta-analysis of game-based STEM education, a group of researchers came up with the conclusion that digital games contributed and overall moderate effect on STEM education (Liang-Hu et al., 2022).

- **Artificial intelligence (AI):** Artificial Intelligence has the potential to revolutionize eLearning by providing personalized and efficient learning experiences for learners. Seo et al., (2021) carried out a study to verify the impact of AI on learner/instructor interaction and found out that though with the risk of violating social barriers, participants envision adopting AI systems in online learning can enable personalized learner/instructor interaction at scale. Additionally, the benefits of AI include amongst others the following:

  o Personalization: AI can analyse data on students' learning style, progress, and interests to create personalized curriculum, learning materials, feedback, and support (Amelia, 2023).

  o Efficiency: AI can automate routine tasks for educators, such as grading assignments and quizzes, providing feedback, and analysing student performance (Karandish, 2021).

  o Adaptive Learning: AI-powered adaptive learning algorithms can adjust to students' learning style and pace, ensuring that they receive tailored instruction (Amelia, 2023).

  o Enhanced Content Creation: AI can generate personalized learning materials, such as customized quizzes, flashcards, and summaries (Amelia, 2023).

  o Improved Assessment and Evaluation: AI can assist in automated scoring and feedback on assignments and quizzes, as well as analyse student data to identify areas of strength and weakness (Amelia, 2023).

  o Increased Engagement: AI-powered chatbots and virtual assistants can provide individualized assistance to students, answering their questions and guiding them through the learning process (Amelia, 2023).

o Closing the Educational Gap: AI can help identify students who are struggling or falling behind, enabling educators to provide targeted interventions and support (Karandish, 2021).

Learning outcomes

A study by Bloom, (1956) found out that knowledge, skills and attitudes were the three main domains of learning and this led to the development of the Bloom's taxonomy that is most widely used today. In another related study, Krathwohl, (1964) remodelled the Bloom's taxonomy adding a fourth dimension which he referred to as the affective domain though this fourth dimension is still argued to have elements of attitude embedded into it. Wiggins and McTighe, (2005) developed a framework for writing learning outcomes that they referred to as 'Understanding by Design.' To them, there are three dimensions of learning which have to do with knowledge, skills and decomposition. To Hattie, (2009) the main important components of student learning, that indicate learning outcomes are knowledge, skills and attitudes.

Important educational outcomes, including academic achievement and satisfaction have been found to correlate with learner engagement. Lessons that are interesting to learners keeps learners on board while those that are boring make learners to leave online learning environments earlier. (Graham, 2019). In a research to compare learning outcomes in online versus traditional scenarios respectively, the results after randomization of learners placed either under online instruction or traditional instruction revealed no difference in the scores of the different groups. This indicates that either of the options could yield the same results. (Stack, 2015)

In order to ascertain productive learning outcomes of OCI, it is necessary to review the relationship between the outcomes obtained from OCI and that obtained from the traditional face-to-face classroom encounters. A meta-analysis carried out to evaluate studies that had to compare online learning to face-to-face learning encounters from 1996 to 2008 revealed a significantly higher learning outcomes attributed to online learning as against the face-to-face learning encounter (Means, 2010). In a related study by (Qiangfu, 2022) the results came out to the effect that online learning had greater learner satisfaction and as such had more significant outcomes compared with face-to-face encounters.

Given that learning outcomes can only be viewed from the lens of the different subject areas when related to children's performance, Garcia et al., (2022) revealed that the implementation of online lessons using varied technologies resulted in high Mathematics scores. Similarly, Martinez and Rogriguez, (2023) affirmed that the use of technology positively impacted on learners' Mathematics scores.

To Lee et al., (2020) the adoption of online learning in consequence leads to higher learning outcomes in English language skills notably vocabulary acquisition, grammar, comprehension and communication abilities. To Wang and Liu, (2021) digital literacy and practical ICT skills can be significantly boasted through online learning. Online learning therefore generally improves on learners' performance in diverse subject areas since diverse learning styles do abound. (Gomez & Perez, 2022)

Conceptual map
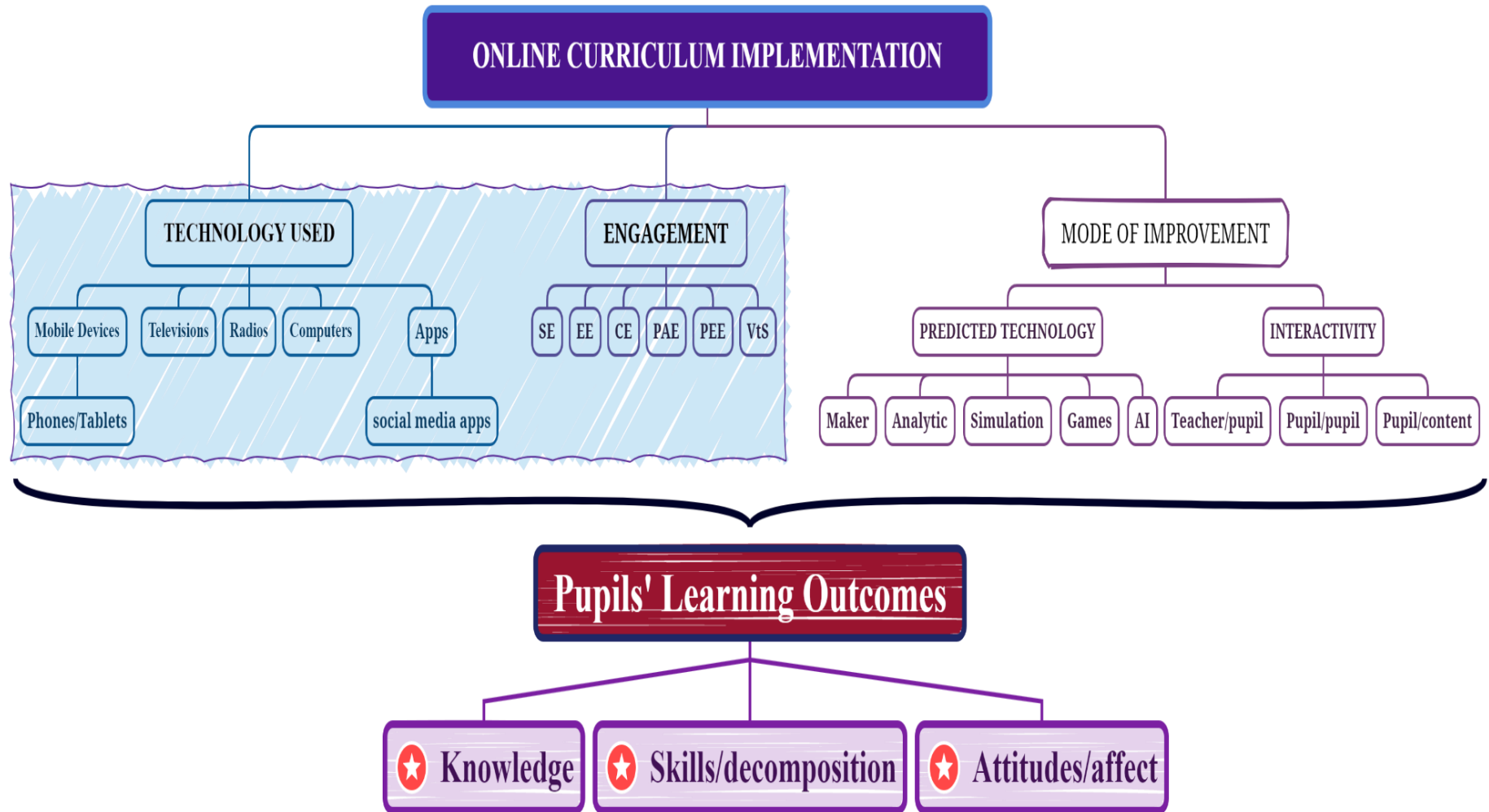
Figure 1: Conception of online curriculum implementation and learning outcomes (Source: The student researcher)

Table 1: The recapitulative table showing the operationalization of variables

General Research Question	Specific Research Questions	Variables	Indicators	Modalities	Measurement scale	Statistical test
To what extent does online curriculum implementation impact pupils' learning outcomes in the crisis zones of the North West Region?	1. What technologies are used to deliver learning to pupils in the crisis zone?	DV: Technology used	-VR -AI -IWB -Digital games -BYOD -3D	Manipulation of varied technologies in the experimental study.	Analyses of technologies deployed.	Pearson
		DV: Learning outcomes	Average scores in achievement tests.	Marks obtained in figures		
	2. What is the impact of OCI on pupils' learning outcomes	- Impact on Mathematics - Impact on English Language -Impact on ICT	Scores in - Mathematics - English - ICT	- Classroom Achievement Test .		Independent Sample Test
		DV: Learning outcomes	- Average scores in Pupils' achievement test	- Marks obtained in figures	Ordinal	
	3. How can online learning be improved in the North West Region?	IV: Mode of Improvement	Evaluation of technologies deployed. Predicted Technology ✓ Maker ✓ Analytics ✓ Simulations ✓ Games ✓ AI Interactivity ✓ Pupil/teacher ✓ Pupil/pupil ✓ Pupil/content	- Strongly disagree - Disagree - Agree - Strongly agree	Ordinal	Peason
		DV: Learning outcomes	- Average scores in achievement test			

Table 2: Forms of online curriculum implementation, impact and measurement. (Wong, 2021)

Indicator	Forms of online learning				Impact	Measurement
Types	Synchronous		Asynchronous			
Examples	Virtual classrooms	Tv/radio lessons	Online learning resources	Cd based lessons	Knowledge	Sample tests mental drills, MCQs
Mode	Live sessions		Prerecorded lessons			
Technology used	Mobile phones, Computers, Radios, Televisions		Cd-Rom drives Mobile phones Televisions Computers		Skills	Test performance Math II, Writing and reading

Table 2 indicates the relationship that exists between the independent and the dependent variable stating the channel that can link the two. Thus, online curriculum implementation could either be done synchronously or asynchronously. It could be synchronous through virtual class setups, online live classes, zoom meetings, tv lessons and all other platforms that enable the pupils to follow lessons live and equally express their worries that are instantly resolved be the online facilitator. It is asynchronous in situations where preprepared lessons are accessed by the pupils at their convenience the challenge here being that the learners cannot express their worries as in a live session be it on tv or radio. In this case cd rom drives and other forms of prerecorded lessons are used. Thus, for online lessons to reach the learners, there must be a means of transmission otherwise referred here as the technology infrastructure.

Knowledge

According to (Einstein, 1879-1955), knowledge is experience while everything else is information. To Bates, (2005) knowledge is giving meaning to information and integrating it with other contents of understanding. Generally, knowledge is information in action. (O'Dell and Crawson, 1998). Thus, for the purpose of this study, knowledge will be measured through a sample test of measurement with regards to drills in Mathematics Paper I and MCQs whose scores will be analysed to have a glimpse of how learners can recall basic concepts learnt even without employing them to solve pressing problems.

Skills

UNESCO, (2011) defines a skill as, the ability, proficiency or dexterity to carry out tasks that come from education, training, practice or experience. It can enable the practical application of theoretical knowledge to particular tasks or situations. Thus, it is an ability and capacity acquired through deliberate, systematic and sustained effort to smoothly and adaptively carryout complex activities or job functions involving ideas (cognitive skills), things (technical skills), and or people (interpersonal skills)

Given that the definition of skills tallies closely to knowledge, cognitive skills and interpersonal skills will be used as a based to have a foresight of what learners can do through technical skills. Thus, a sample test at the level of procedural memory was employed to see how learners can put

the knowledge into problem solving scenarios. Thus, Mathematics II and handwriting will be the key at this level.

Attitudes

Munn, (2023) defines attitudes as, "learned predispositions towards aspects of the environment which may be positively or negatively directed towards people, services and institutions." Similarly, in lecture 02, Social Psych, Myers defines attitude as, "a favourable or unfavourable evaluative reaction toward something or someone, exhibited in one's beliefs, feelings, or intended behaviour (Myers, p. 36). It is a social orientation - an underlying inclination to respond to something either favourably or unfavourably."

Taking cognizance of the above definitions with regards to attitude, the researcher set out to look for possible ways of measuring attitudes in learners. The Scottish social research group posits that attitudes can be measured using quantitative data collection methods particularly the Linkert scale and the semantic differential.

To them, the Linkert scale uses five propositions ranging from strongly disagree, disagree, neutral, agree to strongly agree while the semantic differential uses a set of opposites graded from "0" denoting the lowest evaluation to "6" denoting the highest evaluation. While the Linkert scale was used in the design of teachers/facilitators questionnaires, attitude on the part of the learners was tested using essay to decipher how they felt about online learning and what they thought could be done to make things better.

In line with the foregoing, assessing the impact of online courses on the knowledge, skills and attitude in learners to verify if online courses meet the objective for which they were intended is very primordial. Most of the technology infrastructure depend on electrical energy to be sustained and as such the electrical energy in any of the forms, solar energy, thermal or hydro electricity supply is a prerequisite for the functioning of most of these devices and as such determines its widespread usage. This may be an intervening factor in the usage of the technology infrastructure.

Another intervening factor to the online learning interface will be the lack of tv signals and poor internet connectivity and as such in order to bypass these and work towards that which may be

meaningful to the research in question, the elimination of chances of these will be determined by the choice of research design and particularly the sample.

Table 3: A comparative table for traditional face-to-face classroom curriculum implementation and an online curriculum implementation. (Gherhes, 2021)

Attribute	Traditional face-to-face	online
Definition	instruction that takes place in a classroom where both instructor and students are physically present	Learning that takes place with the mediation of technology with means of audio/visual and textual transmissions.
Instructor	Present	Remote
Mode of lesson delivery	Face to face	online
Infrastructure	Physical classrooms	Technology mediated
Level of discipline	Rigid	Not controlled
Location of study	School	Anywhere
Form	Synchronous	Asynchronous/virtually synchronous
Presence	Physical	Virtual
Social interaction	Physical	No interaction but for controlled cases

Table 3 indicates the differences between a traditional face-to-face classroom and an online classroom. By definition, while the face to face takes place in a synchronous classroom setting with the physical presence of both the teacher and learners, the online takes place anywhere, whether synchronous or asynchronous, the learners can only feel a virtual presence. Though all could be enhanced by technology, while technology is optional in the face-to-face, it is a condition sine qua non for online learning.

CHAPTER THREE
METHODOLOGY

McMillan & Schumacher, (2010) defines research methodology as a systematic and purposeful, planned to yield data on a particular research problem "the specific procedures or techniques used to identify, select, process, and analyse information about a research topic which allows the reader to critically evaluate a study's overall validity and reliability." Simply put, "a research methodology is the primary principle that will guide your research." (Dawson, 2019). It therefore goes without gainsaying that methodology is a combination of methods and procedures involved in a research piece in relation to the background of the study area and the topic under review. Thus, this chapter will take into consideration the background of the study area, research design, area of the study, population of the study, sample and sampling techniques, research instruments, test for validity and reliability of instruments, methods of data collection, procedure for data analysis, ethical consideration, operationalization of variables and summary of the chapter.

Background of the Study Area

The study was carried out in the North West Region of Cameroon which prior to 2016 was an active hub in terms of the standards and quality of education before the advent of the school boycott that hitherto paralyzed the educational system. It is one of the two regions that constitute the former British Southern Cameroon that adopted the Anglo-Saxon sub-system of education from the former colonial masters.

Geographical situation

The North-West Region, formerly known as the North-West Province, is one of ten regions in Cameroon. Its capital is Bamenda, and it shares borders with the Southwest Region, West Region, Adamawa Region, and Nigeria. The region has a rich history, including ties to the Tikar people and colonization by Germany and the United Kingdom. In recent years, it has been affected by separatist movements and violence. (UNHCR, 2019). This region located in the highlands of Cameroon with a conglomerate of mountains, hills and plains is administratively divided into 7 Divisions, Boyo, Bui, Donga Mantung, Mezam, Menchum, Momo and Ngohketungia.

Map of the Cameroon showing the North West Region

Figure 2: Map of Cameroon indicating the geographical location of the North West Region and its divisions.

Research Design

Research design has been defined by different authors in different ways all pointing towards the same direction. To some, it is a strategy for answering your research question using empirical data, an over-all operational pattern or framework of the project that stipulates what information is to be collected from which sources by what procedures," (McCombes., 2021); to others it refers to the overall plan, structure or strategy that guides a research project, from its conception to the final data analysis. A good research design serves as the blueprint for how you, as the researcher, will collect and analyse data while ensuring consistency, reliability and validity throughout your study

(Jansen, 2023); yet to some it refers to the overall strategy or plan for conducting a research study outlining the methods and procedures that will be used to collect and analyse data, as well as the goals and objectives of the study (Hassan, 2023). To Schindler, (2001) it constitutes the blue print for the collection, measurement and analysis of data. To Nworgu, (1991:55) research design is a specification of how data relating to a given problem should be collected and analysed. According to Green and Tull (1978), a research design, is "the specification of methods and procedures for acquiring the information needed.

According to Kerlinger, (1986) research design is the plan, structure, and strategy of investigation conceived so as to obtain answers to research questions and to control variance. Kerlinger's definition tilts towards an experimental research design to which refers to "the process of carrying out research in an objective and controlled fashion so that precision is maximized and specific conclusions can be drawn regarding a hypothesis statement (Bell, 2009). Generally, the purpose is to establish the effect that a factor or independent variable has on a dependent variable." This research uses a twist of quantitative and qualitative designs. 'Mixed methods' is a research approach whereby researchers collect and analyse both quantitative and qualitative data within the same study.

This research is based on a quasi-experimental research design in which the researcher consistently divided the pupils into two groups, one the experimental group and the other the control group to find out the difference in the scores in a given test and determine how the usage or no usage of technology to interact with the courses influenced their understanding and impacted learning.

The first step was to identify pupils who were using any form of online learning to carry on their education and those who were not. The next step was to balance up the number of girls to match the number of boys in each group thirdly the group that had been using online method of learning had to be reinforced.

Population of the study

According to Avwokeni (2006), population of study is defined as "the set of all participants that qualify for a study." Akinade and Owolabi (2009) defined population as "the total set of observations from which a sample is drawn." Adeniyi et al. (2011) see it as "the total number of large habitations of people in one geographical area, for example, the population of a country." Popoola (2011) defines population as "the totality of the items or objects under the universe of

study." The population of the study is the group of individuals, objects, or events that the researcher is interested in studying. It is the larger group from which a sample is drawn and to which the researcher wants to generalize the findings (Mbati, 2022).

According to Creswell (2012), population is a group of individuals who have the same characteristic. To Furi (2007), population is the "whole subject that will be investigated in research." Bryman, (2018) defines population in research as the entire group of people, events, or things that a researcher is interested in studying and about which they want to conclude. Owing to the above definitions the population of the study is the pupils and teachers of the restive North West Region for whom online lessons have been prepared given the fact that the crisis has left many out of the school milieu and there is growing fears that education remains a nightmare to many. This is backed by the evidence that proper interaction with learning material can greatly impact on the socio-cognitive and affective domains of pupils intellectual and physical development thereby influencing their know-how, and their know-being.

Target Population

According to the Research Foundation, the target population refers to a group of people or objects which forms the subject of a study. This is the unit of analysis which must be clearly defined to ensure that the findings can be generalized to the larger population (Ndjama, 2020).

According to Creswell (2012), "the target population is a group of individuals with some general characteristics that can be identified and studied by researchers." To Amin (2005), it is the population to which the researcher intends to generalize his results. In this study the targeted population was made of class six pupils entrapped in the 3 sub-Divisions of Mezam Division of the North West region whose only access was either through the re-grouping centers sometimes controlled by untrained teachers and those who had to study using online course materials with the use of diverse technology infrastructure. Statistically, this had to do with all the internally displaced class 6 pupils in the main regrouping centres in Bamenda as can be seen in table 3.

Table 4: Distribution of target population.

DIVISION	SUB DIVISION	CENTRE NAME	ENROLMENT		
			Boys	Girls	Total
MEZAM	Bamenda I	G. S. Bamenda station	51	45	96
	Bamenda II		25	22	47
	Bamenda III	GPS complex			
	TOTAL		71	72	143

Accessible Population

Researchers draw their samples from the accessible population to conduct their studies and make inferences about the larger target population (explorable.com, 2009). To Bih (2017), it is part of the targeted population which the researcher can actually reach. In line with the foregoing definitions, the accessible population is therefore the part of the targeted population that the researcher can actually have access to get results from which the sample is drawn.

The accessible population of the study was therefore internally displaced class 6 pupils in the Bamenda annex regrouping centre lodged at GPS Group II Bamenda. This owed much to the fact that the security situation could not let the researcher to get into any of the other divisions of the region. This regrouping centre equally had the highest number of internally displaced pupils living under very deplorable conditions and their choice of a government school amidst threats owed much to the financial hardship of the parents. In this centre, these children depended solely on the teachers for direct instruction and had to go without any form of teaching in terms of private teachers and others in days or weeks of lockdown and ghost towns. The table below indicates the enrolment of the accessible population.

Table 5: Classification of the accessible population.

S/N	NAME OF GROUP	ENROLMENT		
		BOYS	GIRLS	TOTAL
1	G1A	23	20	43
2	G1B	20	19	39
3	G2	28	33	61
	TOTAL	71	72	143

Sample and Sampling Techniques

Sampling is a process in statistical analysis where researchers take a predetermined number of observations from a larger population. It allows researchers to conduct studies about a large group

by using a small portion of the population. The method of sampling depends on the type of analysis being performed, but it may include simple random sampling or systematic sampling. Sampling is commonly done in statistics, psychology, and the financial industry (Tuovila, 2023). To Creswell (2002), a sample is sub-group of the population that the researcher plans to study for generalizing about the target population. To buttress this view, Kothari and Garg (2014) define sampling as "the process of selecting representative elements from a given population that will form the sample."

Sample Size

While Nworgu (1999) defines a sample, as that portion of the population from which data is collected; Forti et al (1998) sees it as that part of totality or the universe of population actually used for an investigation. Thus, the Sample size here refers to the actual portion of the accessible population that the researcher actually manipulated to verify the effects of the independent variable on the dependent variable.

Therefore, this study set out to investigate into online curriculum implementation and its impact on pupils' learning outcomes in the restive North West Region of Cameroon. To do this, the research sought to obtain primary data from pupils in the respective Divisions of the North West Region with regards to the usage of programmed online lesson given that most areas of the region do not have functional Schools. Thus, the population of the study is with regards to pupils, and teachers in the North West region, from which the researcher drew the sample to be studied to verify the impact of online curriculum implementation on pupils' learning outcomes. Taking cognizance of the variation in usage of technological gadgets in the respective Divisions of the North West, the discrepancies in the availability of network, the challenges posed by irregular electricity supply and the persistent armed conflict, the researcher had the challenge to choose the sampling technique that could be more representative.

Before delving into the techniques used it would be better to have a bird's view of what a sample is. Sampling is a process used in statistical analysis in which a predetermined number of observations are taken from a larger population. The methodology used to sample from a larger population depends on the type of analysis being performed (Kumari, 2021). Wikipedia holds that in statistics, quality assurance, and survey methodology, a sample is a selection of a subset of individuals from within a statistical population to estimate characteristics of the whole population.

(wikipedia, 2023). It therefore means that for generalizations to be made a proper representation should be taken out of the entire population to make sure that generalizations are not too erroneous.

Calculation of sample size

The sample size was determined in relation to the formula published by the research division of the National Education Association (NEA, n.d). Though a table has been available for ready, easy reference it could have been constructed using the following formula.

$$S = \frac{X^2 NP(1-P)}{d^2(N-1)+X^2 P(1-P)}$$

Where s = required sample size. X^2 = the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841). N = the population size. P = the population proportion (assumed to be .50 since this would provide the maximum sample size). d = the degree of accuracy expressed as a proportion (.05).

Calculation proper given a confidence level of 95%

X = 95% which is equivalent to 1.96,

P = 50% which is equivalent to 0.5

D = 0.05

N = 143

$$S = \frac{x^2.\,NP(1-P)}{d^2(N-1)+(1.96)^2 0.5(1-0.5)}$$

$$S = \frac{1.96^2 X143X(1-0.5)}{0.05^2(143-1)+(1.96)^2 0.5(1-0.5)}$$

$$S = \frac{137.3372}{1.2954}$$

Equation 1: Sample size

Therefore, S = 106.01 which is approximated at 106 pupils

The above calculation for the accessible population of 143 gives a sample size of 106 pupils and when compared to the (Krejcie, 1970) table it fits in between an estimate for the sample of 140 and 150.

Table 6: Krejcie and Morgan table for determining sample size from a given population.

N	S	N	S	N	S
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note: N is population size while S is sample size.

Source: Determining sample size for research activities by R V KREJCIE and D W MORGAN

To ensure that class representation reflected the number of pupils in the classrooms, the enrolments were expressed as percentages and multiplied by the total calculated sample size as expressed in the table below.

Table 7: Sample size calculation

S/N	NAME OF GROUPING	ENROLMENT		
		BOYS	GIRLS	TOTAL
1	G1A	$\frac{23}{100} \times \frac{71}{1} = 17$	$\frac{20}{100} \times \frac{72}{1} = 14$	31
2	G1B	$\frac{20}{100} \times \frac{71}{1} = 14$	$\frac{19}{100} \times \frac{72}{1} = 14$	28
3	G2	$\frac{28}{100} \times \frac{71}{1} = 20$	$\frac{33}{100} \times \frac{72}{1} = 24$	44
	TOTAL	51	52	103

The table above indicate that the sample size of 106 had to be remodified to fit into class representation based on each class enrolment. Thus, the final calculated figure using percentages and approximation stood at 103 pupils distributed as 51 girls and 52 boys.

Sampling Technique

Sampling techniques are methods used to select a subset of individuals or objects from a larger population for research purposes. There are two primary types of sampling methods: probability sampling and non-probability sampling (McCombes., 2021).

Probability sampling involves random selection, allowing researchers to make strong statistical inferences about the whole group1. Examples of probability sampling techniques include simple random sampling, systematic sampling, stratified sampling, and cluster sampling (Mc Combes, 2021).

Non-probability sampling involves non-random selection based on convenience or other criteria, making it easier to collect data1. Common examples of non-probability sampling techniques include convenience sampling, purposive sampling, snowball sampling, and quota sampling

(Khalifa, 2020). The choice of sampling technique depends on various factors such as the research objectives, available resources, and the characteristics of the population being studied (Qualtrics, 2020). Researchers should carefully consider the strengths and limitations of different sampling techniques to ensure that their samples are representative and their findings are valid.

The researcher made use of probability sampling. Probability sampling is a sampling method that involves randomly selecting a sample, or a part of the population that you want to research (Nikolopoulou., 2023). This is usually done through a random selection process, like a drawing. Thus, the different random sampling techniques were identified ranging from simple random sampling, cluster sampling, systematic sampling and stratified random sampling.

Wisconsin university defines learning as direct evidence got from examining student work or performance which can offer insight into what and to what degree students have learned through evaluating exams, papers, performances and observations. (University of Wisconsin, n.d.). To this effect, it was necessary for the researcher to consciously choose a technique that will be inclusive taking cognizance of the ability to acquire electronic gadgets or have access to such in order to facilitate learning.

Different researchers have defined stratified random sampling. For example, Scribbr provides a definition and guide on stratified sampling 1. Stratified sampling is a method of obtaining a representative sample from a population that researchers have divided into relatively similar subpopulations (strata) (Frost, n.d). To him, researchers use stratified sampling to ensure specific subgroups are present in their sample. Qualtrics, (2020) states that researchers use stratified random sampling when they are already aware of subdivisions within a population that need to be accounted for in their research which accounts for numerous advantages as follows:

- Stratified random sampling gives you a systematic way of gaining a population sample that takes into account the demographic make-up of the population, which leads to stronger research results.

- The method is fair for participants as the sample from each stratum can be randomly selected, meaning there is no bias in the process.

- As participant grouping must be exhaustive and mutually exclusive, stratified random sampling removes variation and the chances of overlap between each stratum.

- Lastly, it helps with efficient and accurate data collection. Having a smaller, more relevant sample to work with means a more manageable and affordable research project.

Additionally, stratified random sample incorporates other random sampling techniques giving an additional advantage (Simkus, 2023).

Given the varied advantages as exemplified, and the different attributes under consideration with regards sex, age, and level of education to name but these few, it was but necessary for the researcher to undertake this technique given the following reasons:

- Estimates from stratified random samples are simply the weighted average or the sum of estimates from a series of simple random samples, each generated within a unique stratum. Which indicates that other techniques are embodied in the stratified random sampling technique and thus, giving it an age over the other techniques.
- The bias that could invariably go with a simple random sampling technique in minimized.
- The respective groups are taken care of without the one overriding the other.
- The key population characteristics are carried in the sample and
- It generally gives a minimal error margin and a great level of precision in relation to the simple random sampling.

Sampling Proper

After due calculations of the sample size, the researcher then moved on to identify his sample. Explanations were given to the pupils with the aid of the teachers who had been briefed on the exercise. In all the classes, girls had to pick each of the yellow papers which either had, "please come," or "keep working," while the boys had to pick up the blue paper with same twisted instructions. Those who picked the "please come" paper had to move to the school hall, while those who picked the "Keep working" had to keep working in class under the guidance of one of the teachers.

In the hall, all the girls selected from the different classrooms randomly were merged together and so too the boys. Here the researcher explained that those who picked "experimental" would move

to study in the prepared computer hall while those who picked "control" would move to a separate classroom where they will be taken care of by their experience class six teachers.

In order to avoid bias, the girls had to pick from a separate basket while the boys picked from another basket. Care was taken to make sure that the number of experimental in each basket remained the same. At the end of the exercise, both the boys and girls who picked experimental were merged together while those who picked control were equally merged together.

The control group was assigned odd numbers while the experimental group was assigned even numbers. The numbers assigned for the control group were 1 for the first boy, 3 for the first girl, 5 for the second boy, 7 for the second girl and it continued to alternate till the last pupil in the control group. For the experimental group, the 2 was assigned to the first girl, 4 to the first boy and the numbers kept alternating till the last pupil in the experimental group. The summary table of the final selection was as per table hereunder.

Table 8: Distribution of Sample by class, gender and group.

| S/N | NAME OF | ANALYSIS OF PARTICIPANTS | | | | SUMMARY OF THE GROUPS | |
| | | BOYS | | GIRLS | | | |
		CONTROL	EXP	CONTROL	EXP	CONTROL	EXP
1	G1A	9	8	7	7	**16**	**15**
2	G1B	7	7	7	7	**14**	**14**
3	G2	10	10	12	12	**22**	**22**
	TOTAL	**26**	**25**	**26**	**26**	**52**	**51**

Table 7, indicates the sample sorted out from each of the classrooms and the total sample for the research which stood at 103 pupils stratified according to sex to maintain gender balance and randomly redistributed as follows: 52 for the control group and 51 for the experimental group giving an overall sample size of 103 participants.
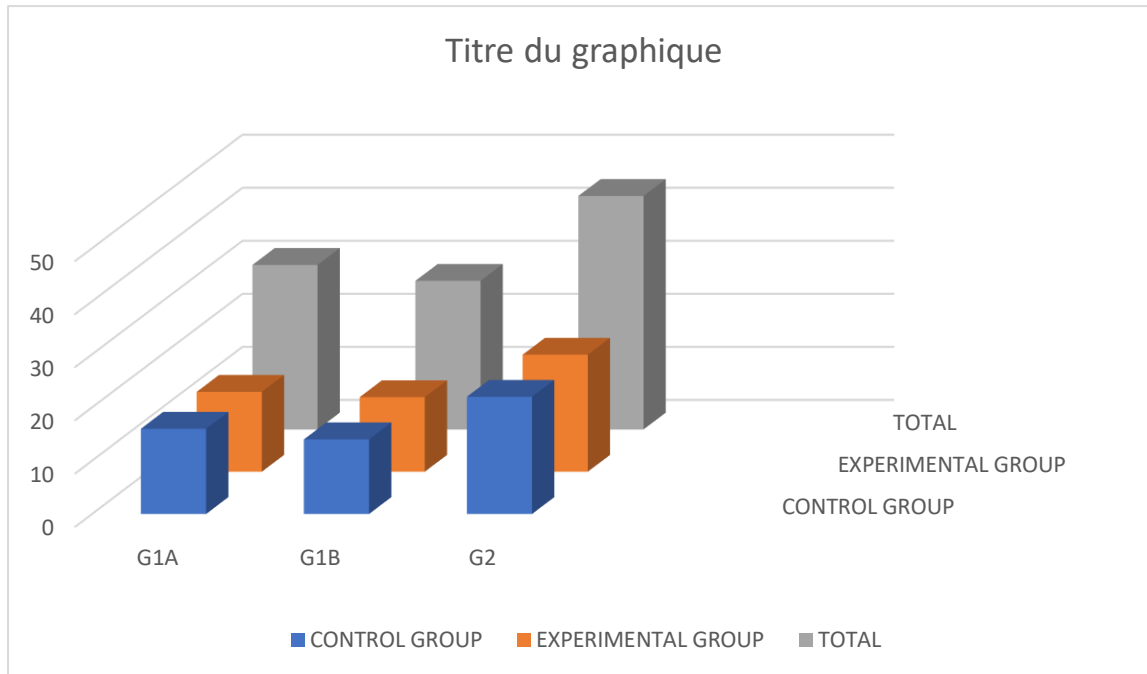
Figure 3: The sample

Figure 4 indicates the approximate balance in the sample according to the various class representations in relationship to the enrolment of the respective streams in the regrouping centres. A conscious effort to ensure gender balance and reduce sample bias both in class representation and gender representation. The about equally redistributed the participants approximately into two equal groups one the control which was above the experimental by 1 male candidate and since gender was not the main focus of the study. The scores of all members participating in the research were to be considered according to the type of treatment given each of the groups.

Data collection tools

The researcher used tests and observation checklist for teachers. "A test is an instrument designed, produced and implemented to elicit information about an individual respondent in respect of his knowledge, attitude, skills, assumed values and preference," (OLAJIDE, 2018). This typically suited the experimental design that was meant to obtain data in respect to learning outcomes as visible through knowledge acquisition, skill acquisition and attitudes. The researcher equally used observation checklist to gain insights into learners' interaction with online learning interface and finally an interview guide to sample their opinions on what they thought could be done to improve online learning to boast education in the region under review.

A test aid researchers' judgements based on correct interpretation of data and should be carefully designed to meet the expectations of the research in question, taking cognizance of the future respondents (Ojerinde, 1986). To him, to verify the impact of a program upon the lives of those it was designed especially in the humanities and social sciences, a test remains an adequate tool. Thus, since this study set out to verify the impact of online curriculum implementation on pupils' learning outcomes, it was but necessary for the researcher to administer a test to two sampled groups such that one group could control to make sure that intervening variables did not obscure the direction of the research. To avoid any bias, while one of the samples was made of pupils who have never been exposed to any form of technology mediated learning, the other was made of pupils who use online and other forms of technology assisted learning in order to verify if the group that has been using technology have any edge over the group that has not been using technology.

Discussing the meaning, nature and scope of evaluation, Lawal (2009) and Ojerinde (1986) are agreed that there are generally two types of tests – the free response and objective type tests. While the free response test is easy to set and cumbersome to correct, it could be very subjective given that the expressions of the testee may lure the tester to allocate inappropriate scores, the objective test allows for little or no opportunity of obtaining different results. Given the inherent advantages of the two, the researcher used a blend of the two with more leaning on the objective test (Lawal, 2009). Secondly, the observation guide was structured to have Never, Often, Always and a comment section for additional comments on the actions observed.

Each of the instruments was divided into sections. Generally, before the beginning of the first section, A, of all the instruments which had to do with demographic data, the researcher introduced the self, and his mission stating all ethical consideration that were to be undertaken for this typically academic endeavour.

The test was structured into English Language taking cognizance of the different parts, I and II as evident in the primary end of course examinations, each comprising of sub components as will be viewed in the table below, Mathematics, which was equally sub divided into paper I and paper II and equally ICT subdivided into components for easy administration.

Table 9: Layout of test components

S/N	SUBJECT	COMPONENT	MARKS
1.	MATHEMATICS	✓ Maths I	30
2.		✓ Maths II	70
		✓ Dictation	10
3.	ENGLISH I	✓ Guided Writing	10
		✓ Handwriting	10
		✓ Composition	30
4.	ENGLISH II	✓ Grammar And Vocabulary	20
		✓ Reading Comprehension	20
5.	ICT	✓ ICT	10

Test for validity and reliability

Validity

Blumberg et al., (2005) defines validity as "the extent to which an instrument measures what it asserts to measure." In agreement with the above definition, Robson (2011), states that "validity of a research instrument assesses the extent to which the instrument measures what it is designed to measure." In order to ensure that the instrument measured exactly what they were designed to measure, the following steps were taken.

Content validity

Content validity is an evaluation of how well an instrument, such as a test, covers all relevant parts of the construct it to me is designed to measure. In this case a construct is a theoretical concept, theme, or idea that cannot usually be measured directly (Nikolopoulou, 2022). Thus, the researcher constructed a test blueprint to make sure that the test followed different aspects of learning ranging from knowledge, skills and attitude and then proceeded in constructing test items. In all, 107 test items were set and presented back to a team of 5 judges made up of 2 Regional Pedagogic Inspectors and 3 Regional pedagogic Advisers for proper examination to make sure that the criteria for setting test items in the line with the new curriculum of the Primary schools was

scrupulously followed. The following results were obtained from the average consent of all the judges involved:

Test items

Total number of items =107

Number declared valid =103

Coefficient of Validity Index (CVI) =$\frac{103}{107}$

$$= 0.96$$

Observation checklist

Total number of items = 16

Number of items declared valid = 15

Coefficient of Validity Index (CVI) = $\frac{15}{16}$

$$= 0.9$$

Decision rule

The CVI for test items was equal to 0.96 while that for the observation checklist was equal to 0.93. Thus, considering the rule of Thumb which states that validity is accorded when the CVI ≥ 0.7, the instruments were accorded content validity. It would be recalled that one of the conditions given the researcher was that overall content delivery and evaluation strategies were to be closely monitored by the Regional Delegation to ensure that the proper content was being delivered and appropriate evaluation strategies used.

Face Validity

Face validity refers to the physical appearance of the test in relation to what it sets out to measure (Bhandari, 2023). This type of validity is concerned with whether a measure seems relevant and appropriate for what it's assessing on the superficially (Zack, 2021). It therefore, refers to the extent to which a test appears to measure what it claims toIt portrays the rate of validity of test and questionnaire items by establishing that the tool seems an appropriate way to find out what is being measured. It shows the attractiveness of the instrument, represents the general overview of the content on which the test is based. Hence, good face validity makes the test readily acceptable to the respondents and helps to motivate the respondent such that one can say —I think I will find out

what I want to know by asking these questions. It looks all right. (Amin 2005). As afore mentioned, the questionnaire items were submitted to the RPIs for review to check not only the content but the structure to ensure that it met the standards expected in any official examination organized by the Ministry of Basic Education and again necessary modifications and adjustments were made to ensure that the structure was suitable for used within the scope of the Ministry of Basic Education by the Regional Pedagogic Inspectorate of Primary Education. These were then submitted to the supervisor for final corrections. The questionnaire items and the interview guide in this study finally met the requirements of face validity for each of the item reviewed and modified.

Reliability of instrument

The reliability of a measurement instrument is "the extent to which an instrument yields consistent, reproducible estimates of what is assumed to be an underlying true score," (ATS, 2007). The test-retest reliability was used for the pupils' test wherein the test the pupils took was retaken after 2 weeks and results compared to establish the degree of relationship between the scores obtained in the first session and those obtained after two weeks. To ensure that the items on the questionnaire to teachers measured the same construct and the quest for homogeneity attained, the researcher used internal consistency reliability.

The test-retest is defined as the degree to which scores on same test by same individuals are consistent overtime (Bih, 2017). The researcher carried out a pilot test with respondents who are part of the population and not of the sample. The same exercise was repeated after a period of two weeks using same respondents. The results obtained at the different periods were compiled and computed using the Cronbach's Alpha to measure the internal consistency of the instrument, and the stability. The table below that follows the reliability analysis of the testing of the instrument according to variables.

Results obtained from the test and retest were as follows:

Table 10: Presentation of individual pupil's scores in the different domains for validity and reliability tests.

Exam no	knowledge					SKILL			ATTITUDES	TOTAL
	Maths I	Guided Writing	ICT	GR/VOCAB	MATHS II	DICTATION	WRITING	READING C.	COMPOSITION	
1	17	9	12	15	34	9	5	12	17	130
2	15	7	5	13	17	4	6	9	4	80
3	12	8	6	14	15	6	6	10	1	78
4	2	0	0	9	11	1	7	0	2	32
5	5	0	3	11	15	5	6	1	7	53
6	9	6	4	15	19	2	5	11	12	83
7	11	5	4	13	12	4	6	7	8	70
8	8	5	6	10	8	6	6	7	8	64
9	12	8	4	12	13	7	5	10	12	83
10	11	7	15	10	30	7	5	12	15	112
11	15	6	8	14	28	6	4	11	15	107
12	16	5	6	14	31	8	6	15	16	117
13	16	9	10	16	33	7	7	14	13	125
14	14	5	7	17	15	7	6	13	5	89
15	18	6	10	9	12	6	7	10	11	89
Total	181	86	100	192	293	85	87	142	146	1312

Table 10 reveals the results of the first test pending the results of the retest to establish the reliability of the test.

Table 11: Retest for validity and reliability.

Exam No	knowledge				SKILL				ATTITUDES	TOTAL
	Maths I	Guided Writing	ICT	GR/VOCAB	MATHS II	DICTATION	WRITING	READING C.	COMPOSITION	
1	16	8	11	16	35	10	6	10	16	129
2	16	7	6	14	15	3	4	11	2	80
3	13	7	6	16	15	7	6	11	2	86
4	3	1	2	10	12	3	7	1	4	47
5	5	3	3	10	15	5	7	3	6	62
6	11	6	5	16	21	3	5	11	14	98
7	9	6	4	12	12	4	5	9	9	77
8	9	6	7	10	10	7	6	7	8	78
9	13	9	5	13	12	7	6	11	13	98
10	11	6	15	11	35	7	5	13	16	129
11	16	7	9	15	31	8	5	11	15	128
12	17	6	6	14	32	8	6	16	17	134
13	16	9	12	16	34	6	5	16	12	139
14	15	7	7	18	15	7	6	14	8	111
15	16	6	11	10	11	7	7	12	13	108
Total	186	94	109	201	305	92	86	156	155	1384

The test-retest revealed a strong correlation between test scores indicating that the test could measure what it was set to measure thereby giving a leeway for the test to be carried out.

To verify the level of correlation in order to establish the level of reliability using the Pearson correlation coefficient calculator the researcher took the respective results for the test to be "X" while the results of the respective candidates in the retest were taken to be "Y" as per table below.

Table 12: Correlation analysis.

Exam No	X	Y
1	130	129
2	80	80
3	78	86
4	32	47
5	53	62
6	83	98
7	70	77
8	64	78
9	83	98
10	112	129
11	107	128
12	117	134
13	125	139
14	89	111
15	89	108

Table 13: Analysis of results using Pearson Correlation Coefficient Calculator.

$X - M_x$	$Y - M_y$	$(X - M_x)^2$	$(Y - M_y)^2$	$(X - M_x)(Y - M_y)$
42.533	28.733	1809.084	825.604	1222.124
-7.467	-20.267	55.751	410.738	151.324
-9.467	-14.267	89.618	203.538	135.058
-55.467	-53.267	3076.551	2837.338	2954.524
-34.467	-38.267	1187.951	1464.338	1318.924
-4.467	-2.267	19.951	5.138	10.124
-17.467	-23.267	305.084	541.338	406.391
-23.467	-22.267	550.684	495.804	522.524
-4.467	-2.267	19.951	5.138	10.124
24.533	28.733	601.884	825.604	704.924
19.533	27.733	381.551	769.138	541.724
29.533	33.733	872.218	1137.938	996.258
37.533	38.733	1408.751	1500.271	1453.791
1.533	10.733	2.351	115.204	16.458
1.533	7.733	2.351	59.804	11.858
Mx: 87.467	My: 100.267	Sum: 10383.733	Sum: 11196.933	Sum: 10456.133

Figure 4: Level of correlation between the two tests
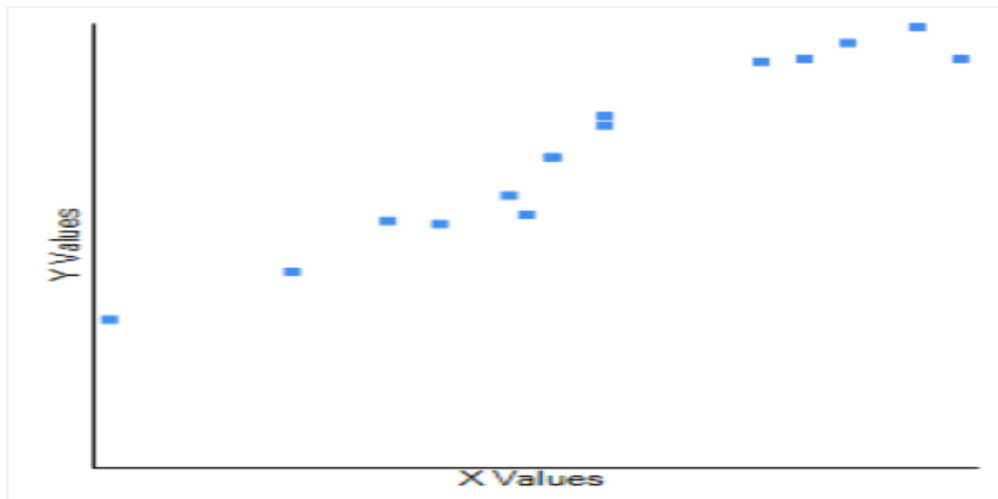
Result Details & Calculation

X Values
$\sum$ = 1312
Mean = 87.467
$\sum(X - M_x)^2 = SS_x$ = 10383.733

Y Values
$\sum$ = 1504
Mean = 100.267
$\sum(Y - M_y)^2 = SS_y$ = 11196.933

X and Y Combined
N = 15
$\sum(X - M_x)(Y - M_y)$ = 10456.133

R Calculation
$r = \sum((X - M_y)(Y - M_x)) / \sqrt{((SS_x)(SS_y))}$

r = 10456.133 / $\sqrt{((10383.733)(11196.933))}$
= 0.9697

Meta Numerics (cross-check)
r = 0.9697

Key

X: X Values
Y: Y Values
M_x: Mean of X Values
M_y: Mean of Y Values
$X - M_x$ & $Y - M_y$: Deviation scores
$(X - M_x)^2$ & $(Y - M_y)^2$: Deviation Squared
$(X - M_x)(Y - M_y)$: Product of Deviation Scores

Equation 2: Interpretation of the reliability test scores

The above R value indicates that there was a strong positive correlation denoting that high test scores went with high retest scores while low test scores went with low retest scores. This

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therefore, indicates that the internal reliability and stability of the instrument were high enough at 0.9697 for the study to be carried out given that the rule of thumb stipulates just a p value of ≥ 0.05.

Data collection technique

The teaching experience with the use of online modules ranging from myschoolonline.cm, other open educational resources and the extensive usage of video simulations from YouTube to buttress most practical lessons went on for a month. During this period, the pupils in the experimental group were taught how to manipulate content in their computers and most often they hardly stayed long during break. The researcher and two of their teachers were always readily available to attend to the anxious pupils who wanted to explore the best in their computers before closing time.

At the level of the control group, intense face to face lessons were being carried out with the class teachers covering the same material that was being covered with the online learners. The difference here was simply the level of treatment and the resources employed in the online learning interface.

Note should be taken that this was the prelude to the test which was going to be taken together with those of the control group at the end of the exercise and as such much attention was paid to the online curriculum implementation as effected by myschoolonline.cm in relationship to mathematics, English and ICT. The general consideration was given to the different taxonomic levels that constituted the framing of the table of specification for the test items.

Primary Data

The administration of the test was carried out in the same halls where the candidates were mixed though care was taken to make sure no communication existed between candidates during the course of the examination. The assigned numbers were used as examination numbers and the sitting position was serially arranged from 1 to the last number. It was therefore easy at the end to identify members of the control and the experimental groups respectively by their numbers, odd or even.

Data was equally got from the teachers in relationship to what they felt was necessary to improve upon the level of technology in the region, the instruments used for online learning, how children perceive the use of technology mediated lessons and what they felt could be done to enhance the level of online curriculum implementation in the region.

The two teachers assisting the researcher in the online lesson exploitation room as was called, equally had observation checklist that had to do with the challenges, the engagement of pupils, the interaction of pupils with each other, and the motivation level of the learners to learn new items since mastery of content was what could propel a learner to keep using a laptop to learn rather than simply follow up projected lessons.

Design of instrument for data collection

The main instrument used for data collection with regards to the pupils was an examination based on the lessons carried out during the experimental phase to test the impact of online curriculum implementation on pupils' learning outcomes. It was structured the acquisition of knowledge, skills and attitude in three distinct subject areas notably Mathematics, English Language and ICT. Thus, the analysis of the results was to be done in relation to the respective subject areas under review.

An observation guide was equally produced to record observations in relation to learners' engagement to online curriculum implementation, possible changes in behaviour as a result of online implementation and their familiarity with the technologies deployed.

Question Paper Design

The examination question papers were structured following the official MINEDUB setting which had to do with the preamble and the body. At the level of the preamble, the subject area and the domain were indicated. The space for the total score was provided and the overall mark stated. The space for the candidate's and the class. This was examination number was equally provided as well as the time allowed followed by the instructions for each section and then the test items.

The structure of the test paper equally had in its introductory part, the instructions that detailed out all the expectations from the candidates and the mode of indicating the correct answers. The questions were built in relationship to the items to be tested. For instance, provision was made to provide answers to open-ended questions before mark allocation in braces, boxes to check with regards to multiple choice questions, (MCQs). Sufficient spaces were produced for questions that needed a procedure to come up with an answer and equally for the essay.

Observation guide design

The observation guide had as major components the preamble followed by the guide proper structured in 3 phases with regards to technology used, engagement and learning outcomes each having 4 columns starting from serial number, the items, the frequency of observations and a comment section to possible detail the reasons behind each observation.

Correction of test items

After the written phase of test in the respective subject areas, the researcher then proceeded to the coding. This was assigning anonymous numbers against the respective candidates to avoid bias by markers during the marking session. MER2 started the reverse numbering from examination number 103 back to the MER103 which denoted examination number 2. MER1, rather denoted examination number 102 and as such all even examination numbers became odd codes while all odd examination numbers became even codes. Note was taken to ensure that the coding started from the last examination numbers to the first. This was to eliminate any possibility of any marking bias since from the writing phase the candidates had been put in same halls mixed together and following all examination conditions to make sure they wrote under the same conditions.

The marks were then entered in a blind sheet that contained just the codes without the examination numbers. The reordering of the codes in descending order rearranged the scores in order but for MER2 and MER1 that had to be reordered manually. In the final score sheet, while MER2 and the rest of the even codes were replaced by the word 'control,' MER1 and the rest of the rest of the odd codes were automatically replaced by the word experimental in the excel sheet. Thus, examination results came out as reflected in the table 13.

The scores of both the candidates in the control and those in the experimental groups were all placed in the same marksheet with no totals to avoid the temptation of modifying results for analysis using SPSS.

Observation Checklist

The observation checklist was structured to capture some important elements like student engagement, interaction, collaboration, or critical thinking skills that could help enhance the learning experience. Moreover, data collected through the observation checklist served as evidence

to support the results of the experimental study thereby adding value to the overall findings and conclusions of the study. It was aimed at helping the researcher make informed recommendations about and its impact on learning outcomes.

The observation guide was filled by the two teachers who constantly followed up the learners to ascertain the cause and effects of certain behaviours that could either enhance or mar learning outcomes.

Technique of Data Analysis

The data obtained from test results was analysed using an independent sample T-Test where comparisons of means and standard deviations were done to obtain the significant level and the difference between test scores of both the control and experimental groups to establish the degree of impact of online curriculum implementation on pupils learning outcomes in the crisis zone of the north west region.

The observation guide and personal observations that addressed objectives one and five as expressed in the research questions one and three respectively were analysed using descriptive statistics in and results presented in form of tables.

The overall research question that had to do with the impact of online curriculum implementation on pupils' learning outcomes in the crisis zone of the North West region was analysed using an independent T-Test.

Ethical Consideration

It was hard for the learners in the control group to accept the verdict that they were not going to use the computers since they had not used any computer to study before, the children who did not come out of the classrooms were equally weary to have a clue of what was going on. The researcher had to quell the troubles that engulfed especially the control group by stating that they would take their turn in the laboratory after the first phase if they worked hard with their teachers, the rest of the class six pupils were also to have access to the computers for two weeks. This stabilized the groups and they understood that because of the limited computers brought by the researcher not everybody could get into the laboratory at the same time.

CHAPTER FOUR
FINDINGS

The findings section of this dissertation delves into the examination of online curriculum implementation and its implications on the learning outcomes of pupils within the crisis zones of the North West Region. Stemming from the overarching general research question, "To what extent does online curriculum implementation impact pupils' learning outcomes in the crisis zones of the North West Region?" This section navigates through specific inquiries aimed at unravelling the intricate dynamics at play.

In pursuit of a comprehensive understanding, the specific research questions guiding this investigation are outlined as follows:

1. What technologies are employed to facilitate the delivery of learning to pupils amidst the crisis zone?
2. What discernible impact do online lessons exert on the learning outcomes of pupils within the crisis zone?
3. In what ways can the efficacy of online learning be enhanced within the North West Region?

These inquiries serve as pivotal signposts, guiding the exploration and analysis of data, ultimately contributing to a nuanced comprehension of the interplay between online curriculum implementation and its influence on the educational landscape of crisis-affected regions. Through rigorous examination and interpretation, this section endeavours to shed light on the efficacy, challenges, and prospects of online learning within the context of the North West Region.

Table 14: Gender of Respondents

Gender	Frequency	Percent
Male	51	49.5
Female	52	50.5
Total	103	100.0

The results indicate that out of the total 88 respondents surveyed, 30 (34.1%) were male and 58 (65.9%) were female. This suggests a higher representation of females among the respondents compared to males.

Table 15: Ages of Respondents

Age	Frequency	Percent
10	12	9.1
11	31	30.7
12	57	60.2
Total	103	100.0

The data on the ages of respondents reveals the distribution of participants across different age groups. Among the total of 88 respondents, 8 (9.1%) were aged 10, 27 (30.7%) were aged 11, and the majority, 53 (60.2%), were aged 12. This indicates a predominant presence of respondents within the 12-year-old age bracket, followed by those aged 11, with the least representation among 10-year-olds

Answer to Research Questions

1. **What technologies are used to deliver learning to pupils in the crisis zone**

Constant assignments by teachers and the researcher that necessitated the use of technology outside of the experimental setting revealed that most families possessed and put at the disposal of pupils a wide array of technology ranging from Television, radios, and animated apps to keep children from straying into dangerous zones, and WhatsApp. Some learners equally revealed using VR, Zoom, and projected lessons in church-based learning centers.

Table 16: Frequency of technology used

TECHNOLOGY USED	NO OF LESSONS	TIME SPENT ON LESSON (In minutes)	% TIME
TV	24	360	12.5
PROJECTED	32	960	33.33
VIRTUAL REALITY	26	650	22.57
RADIO	24	240	8.33
ANIMATED APPS	16	240	8.33
WHATSAPP	10	150	5.21
ZOOM	4	40	1.39

Figure 5: Frequency of use of Technology
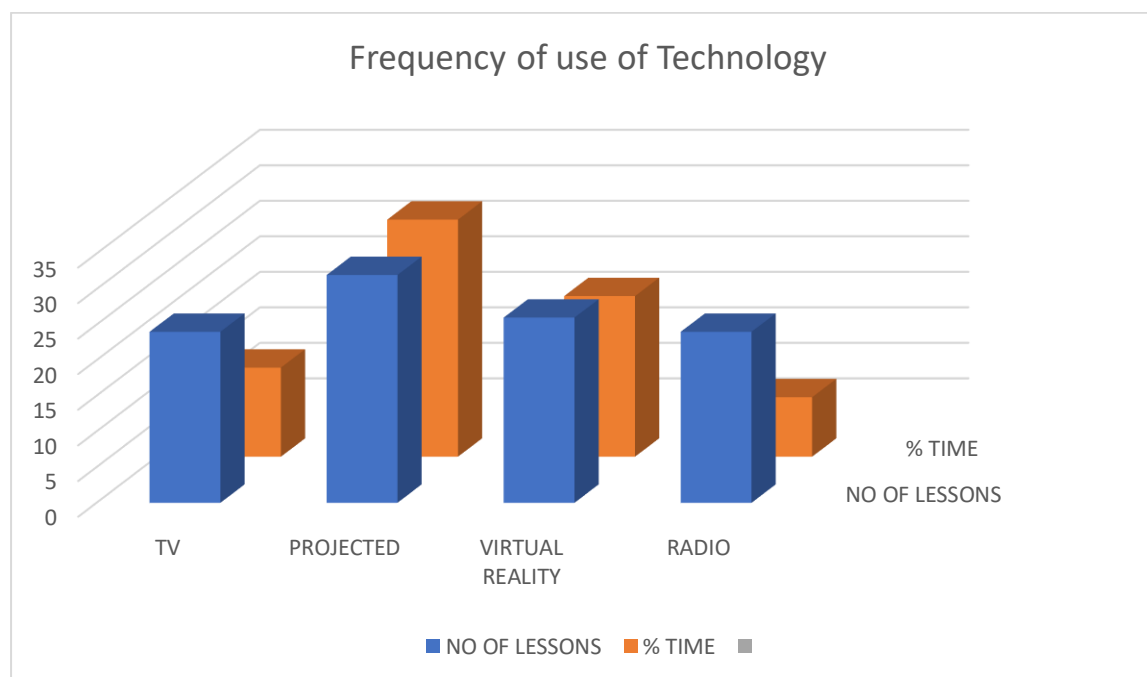
The data above indicates that the greater time was given to audio-visual lessons with the use of projector, virtual reality and television. Audio lessons with the use of the radio though with many lessons had less percentage of time.

Table 17: Technology used to teacher respective subjects.

Tech used during study	Subject taught with specific technology
Televisions	Mathematics, English language and ICT
Radios	English language and ICT
Projectors	Mathematics, English language and ICT
WhatsApp	Mathematics, English language and ICT
Zoom	Mathematics, English language and ICT
Animated apps	Mathematics, English language and ICT
VR	Mathematics, English language and ICT

The data suggests a diverse array of technologies utilized to deliver learning to pupils in crisis zones, showcasing a multi-faceted approach to educational delivery. Among the technologies identified during the study are televisions, radios, projectors, WhatsApp, Zoom meetings, animated

apps, and virtual reality (VR). These technologies are employed for teaching subjects such as Mathematics, English language, and Information and Communication Technology (ICT).

Televisions, Radios, and Projectors: These traditional media platforms are likely chosen for their wide reach and accessibility, making them suitable for delivering educational content to a broader audience within crisis zones.

WhatsApp and Zoom Meetings: Instant messaging platforms like WhatsApp and video conferencing tools like Zoom offer real-time interaction and engagement opportunities between teachers and students, fostering a more dynamic learning environment even in remote settings.

Animated Apps and VR: These emerging technologies present innovative ways to enhance learning experiences by incorporating interactive and immersive elements, potentially increasing student engagement and comprehension of complex concepts.

Overall, the utilization of a combination of traditional and modern technologies reflects a concerted effort to adapt to the unique challenges of delivering education in crisis-affected areas. However, it's crucial to consider factors such as infrastructure limitations, access to devices, and digital literacy levels when assessing the effectiveness and scalability of these technological interventions. Additionally, ongoing evaluation and feedback mechanisms are essential for refining and optimizing the use of technology in educational contexts within crisis zones.

2. **What is the impact of online lessons on pupils' learning outcomes?**

The impact of online lessons on pupils' learning outcomes was assessed through a comparison between a control group and an experimental group. The control group received traditional instruction methods, while the experimental group received online lessons using various technologies.

The impact of online lessons on pupils' learning outcomes in Mathematics

Table 18: Group Statistics of learning outcomes on Mathematics

	Tech used during study	N	Mean	Std. Deviation	Std. Error Mean
Maths Scores	Control Group	51	33.24	19.218	2.691
	Experimental Group	37	65.59	19.690	3.237

The group statistics indicate significant differences in the mean scores of the two groups. The control group had a mean score of 33.24 with a standard deviation of 19.218, whereas the experimental group had a substantially higher mean score of 65.59 with a similar standard deviation of 19.690. This suggests that pupils in the experimental group, who received online lessons, achieved significantly higher scores in Mathematics compared to those in the control group.

Table 19: Independent Samples Test of learning outcomes on Mathematics

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Maths Scores	Equal variances assumed	.087	.768	-7.717	86	.000	-32.359	4.193	-40.695	-24.024
	Equal variances not assumed			-7.687	76.611	.000	-32.359	4.210	-40.742	-23.976

The independent samples t-test further confirms the significant difference in mean scores between the two groups. With equal variances assumed, the t-test yielded a t-value of -7.717 with 86 degrees of freedom, resulting in a p-value of .000, indicating a highly significant difference. Similarly, with equal variances not assumed, the t-value remained significant at -7.687 with 76.611 degrees of freedom and a p-value of .000.

The mean difference between the two groups was -32.359, indicating that pupils in the experimental group scored, on average, 32.359 points higher than those in the control group. The

95% confidence interval of the difference ranged from -40.695 to -24.024, further supporting the conclusion that online lessons had a substantial positive impact on pupils' learning outcomes in Mathematics.

Overall, these findings suggest that the implementation of online lessons using various technologies resulted in significantly improved learning outcomes in Mathematics compared to traditional instruction methods.

Table 20: Independent Samples Effect Sizes on Mathematics

		Standardizer[a]	Point Estimate	95% Confidence Interval	
				Lower	Upper
Maths Scores	Cohen's d	19.417	-1.667	-2.154	-1.172

a. The denominator used in estimating the effect sizes.

Cohen's d uses the pooled standard deviation. .

The effect size, as measured by Cohen's d, provides valuable insights into the magnitude of the difference between the two groups in terms of their Mathematics scores. Cohen's d value of -1.417 indicates a large effect size, suggesting a substantial difference in the mean scores between the control and experimental groups. A negative Cohen's d indicates that the mean score of the experimental group (online lessons) is higher than that of the control group (traditional instruction).

The 95% confidence interval for Cohen's d ranges from -2.154 to -1.172. Since this confidence interval does not include zero, it confirms that the difference in mean scores between the two groups is statistically significant. Overall, the large effect size of -1.417 indicates a substantial impact of online lessons on pupils' learning outcomes in Mathematics, further supporting the conclusion drawn from the statistical tests.

The impact of online lessons on pupils' learning outcomes in English Language

The impact of online lessons on pupils' learning outcomes in English Language was assessed through statistical analysis, comparing the scores of a control group (receiving traditional instruction) and an experimental group (receiving online lessons using various technologies).

Table 21: Group statistics of learning outcomes on English Language

Group Statistics					
	Tech used during the study	N	Mean	Std. Deviation	Std. Error Mean
English Language Scores	Control Group	51	49.41	19.674	2.755
	Experimental Group	37	81.43	15.284	2.513

The group statistics indicate a substantial difference in mean scores between the control and experimental groups, with the experimental group showing a notably higher mean score.

Table 22: Independent Samples Test of learning outcomes on English Language

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
English Language Scores	Equal variances assumed	4.787	.031	-8.253	86	.000	-32.021	3.880	-39.734	-24.308
	Equal variances not assumed			-8.588	85.557	.000	-32.021	3.729	-39.433	-24.608

The independent samples t-test, with both equal and unequal variances, yielded highly significant results. The mean difference between the two groups was -32.021, with a 95% confidence interval ranging from -39.734 to -24.308. These results suggest that pupils in the experimental group, who received online lessons, scored, on average, 32.021 points higher in English Language than those in the control group.

Table 23: Independent sample effect size of learning outcomes on English Language

Independent Samples Effect Sizes

		Standardizer[a]	Point Estimate	95% Confidence Interval	
				Lower	Upper
English language Scores	Cohen's d	17.967	-1.782	-2.278	-1.279

a. The denominator used in estimating the effect sizes.

Cohen's d uses the pooled standard deviation.

The effect size, as measured by Cohen's d, was calculated to be 17.967. This indicates a large effect size, suggesting a substantial difference in English Language scores between the two groups. The 95% confidence interval for Cohen's d ranged from -2.278 to -1.279, further supporting the conclusion that online lessons had a significant positive impact on pupils' learning outcomes in English Language. Overall, these findings suggest that the implementation of online lessons using various technologies resulted in significantly improved learning outcomes in English Language compared to traditional instruction methods.

The impact of online lessons on pupils' learning outcomes in ICT

The impact of online lessons on pupils' learning outcomes in ICT (Information and Communication Technology) was assessed by comparing the scores of a control group (receiving traditional instruction) and an experimental group (receiving online lessons using various technologies).

Table 24: Group statistics of learning outcomes on ICT

Group Statistics

	Tech used during study	N	Mean	Std. Deviation	Std. Error Mean
ICT Scores	Control Group	51	6.63	4.045	.566
	Experimental Group	37	15.11	4.047	.665

The group statistics indicate a considerable difference in mean scores between the control and experimental groups, with the experimental group showing a significantly higher mean score.

Table 25: Independent sample test of learning outcomes on ICT

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
ICT Scores	Equal variances assumed	.026	.873	-9.707	86	.000	-8.481	.874	-10.217	-6.744
	Equal variances not assumed			-9.706	77.702	.000	-8.481	.874	-10.220	-6.741

The independent samples t-test, with both equal and unequal variances, yielded highly significant results. The mean difference between the two groups was -8.481, with a 95% confidence interval ranging from -10.217 to -6.744. These results suggest that pupils in the experimental group, who received online lessons, scored, on average, 8.481 points higher in ICT than those in the control group.

Table 26: Independent sample effect sizes of learning outcomes on ICT

				95% Confidence Interval	
		Standardizer[a]	Point Estimate	Lower	Upper
ICT Scores	Cohen's d	4.046	-2.096	-2.619	-1.566

a. The denominator used in estimating the effect sizes.
Cohen's d uses the pooled standard deviation.

The effect size, as measured by Cohen's d, was calculated to be 4.046. This indicates a large effect size, suggesting a substantial difference in ICT scores between the two groups. The 95% confidence interval for Cohen's d ranged from -2.619 to -1.566, further supporting the conclusion that online lessons had a significant positive impact on pupils' learning outcomes in ICT. Overall, these findings suggest that the implementation of online lessons using various technologies resulted in significantly improved learning outcomes in ICT compared to traditional instruction methods.

The impact of online lessons on pupils' overall learning outcomes

The impact of online lessons on pupils' overall learning outcomes, encompassing all subjects, was assessed by comparing the scores of a control group (receiving traditional instruction) and an experimental group (receiving online lessons using various technologies).

Table 27: Group statistics on overall learning outcomes

	Group Statistics				
	Tech used during study	N	Mean	Std. Deviation	Std. Error Mean
Total Scores	Control Group	51	89.27	39.636	5.550
	Experimental Group	37	162.14	35.736	5.875

The group statistics indicate a significant difference in mean scores between the control and experimental groups, with the experimental group showing a substantially higher mean score.

Table 28: Independent samples test on overall learning outcomes

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Total Scores	Equal variances assumed	1.467	.229	-8.867	86	.000	-72.861	8.217	-89.196	-56.525
	Equal variances not assumed			-9.015	81.941	.000	-72.861	8.082	-88.939	-56.783

The independent samples t-test, with both equal and unequal variances, yielded highly significant results. The mean difference between the two groups was -72.861, with a 95% confidence interval ranging from -89.196 to -56.525. These results suggest that pupils in the experimental group, who received online lessons, scored, on average, 72.861 points higher in overall learning outcomes than those in the control group.

Table 29: Independent sample effect sizes on overall learning outcomes.

		Independent Samples Effect Sizes			
		Standardizer[a]	Point Estimate	95% Confidence Interval	
				Lower	Upper
TOTAL Scores	Cohen's d	38.052	-1.915	-2.422	-1.400

a. The denominator used in estimating the effect sizes.
Cohen's d uses the pooled standard deviation.

The effect size, as measured by Cohen's d, was calculated to be 38.052. This indicates a very large effect size, suggesting a substantial difference in overall learning outcomes between the two groups. The 95% confidence interval for Cohen's d ranged from -2.422 to -1.400, further supporting the conclusion that online lessons had a significant positive impact on pupils' overall learning outcomes. Overall, these findings suggest that the implementation of online lessons using various technologies resulted in significantly improved overall learning outcomes compared to traditional instruction methods.

Research question three: How can online learning be improved in the North West Region?

Correlation

The correlation matrix provides insights into the relationships between variables, specifically examining the correlation between technology exposure and various academic scores (Maths, English language, ICT, and total scores).

Table 30: Correlation table on the improvement of learning outcomes in the North West Region.

	Correlations				
	Technology Exposure	Maths Scores	English language Scores	ICT Scores	TOTAL
Technology Exposure					
Maths Scores	.640[**]				
English language Scores	.665[**]	.861[**]			
ICT Scores	.723[**]	.809[**]	.836[**]		
Total Scores	.691[**]	.963[**]	.963[**]	.881[**]	
Mean	1.42	46.84	62.88	10.19	119.91
Std. Deviation	.496	25.115	23.913	5.823	52.343
N	88	88	88	88	88

**. Correlation is significant at the 0.01 level (2-tailed).

Technology Exposure and Academic Scores

There is a strong positive correlation between technology exposure and academic scores in Mathematics ($r = 0.640$, $p < 0.01$), English language ($r = 0.665$, $p < 0.01$), ICT ($r = 0.723$, $p < 0.01$), and overall total scores ($r = 0.691$, $p < 0.01$). These correlations suggest that higher levels of exposure to technology are associated with higher academic performance across all subjects and overall total scores.

Correlation between Academic Scores

Strong positive correlations are observed among the academic scores themselves. Specifically, there are strong positive correlations between Maths and English language scores ($r = 0.861$, $p < 0.01$), Maths and ICT scores ($r = 0.809$, $p < 0.01$), English language and ICT scores ($r = 0.836$, $p < 0.01$), and all of these scores combined to form the total scores ($r = 0.963$, $p < 0.01$).These correlations indicate that higher scores in one subject tend to be associated with higher scores in other subjects as well as in the overall total scores. Overall, these correlations suggest a positive relationship between technology exposure and academic performance, as well as strong positive associations among academic scores across different subjects.

Improving Maths Scores through online learning

To improve Maths scores through online learning in the North West Region, several strategies can be considered based on the regression analysis provided.

Table 31: Model summary based on the improvement of Mathematics scores.

Model Summary[b]				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.640[a]	.409	.402	19.417

a. Predictors: (Constant), Technology Exposure
b. Dependent Variable: Maths Scores

ANOVA[a]						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	22453.677	1	22453.677	59.555	.000[b]
	Residual	32424.095	86	377.024		
	Total	54877.773	87			

a. Dependent Variable: Maths Scores
b. Predictors: (Constant), Technoligy Exposure

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.876	6.306		.139	.890
	Technology Exposure	32.359	4.193	.640	7.717	.000

a. Dependent Variable: Maths Scores

Increase Technology Exposure

The regression analysis shows that Technology Exposure has a significant positive effect on Maths scores ($\beta = 0.640$, $p < 0.001$). Therefore, increasing students' exposure to technology and online learning resources could potentially enhance their Maths performance. This could involve providing access to digital devices, internet connectivity, and educational software specifically designed to support Maths learning.

Implement Interactive and Engaging Online Resources

Incorporating interactive and engaging online resources, such as virtual manipulatives, educational games, and multimedia presentations, can make Maths learning more interesting and effective. These resources can help students visualize mathematical concepts, practice problem-solving skills, and engage actively in their learning process.

Provide Individualized Support and Feedback

Online platforms can facilitate personalized learning experiences by offering adaptive learning algorithms, individualized learning paths, and instant student progress feedback. Tailoring instruction to students' individual needs and providing timely feedback can help address specific learning challenges and promote Maths proficiency.

Offer Collaborative Learning Opportunities

Online learning platforms can enable collaborative learning experiences through features like discussion forums, group projects, and virtual peer tutoring. Collaborative learning promotes active engagement, enhances problem-solving skills, and fosters a sense of community among students, which can positively impact Maths performance. By implementing these strategies, stakeholders

in the North West Region can work towards improving Maths scores through online learning, thereby enhancing educational outcomes and opportunities for students in the region.

Improving English Language Scores through the use of online learning

To improve English Language scores through online learning in the North West Region, several strategies can be considered based on the regression analysis provided.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.665[a]	.442	.435	17.967

a. Predictors: (Constant), Technology Exposure

b. Dependent Variable: English language Scores

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	21986.191	1	21986.191	68.109	.000[b]
	Residual	27761.434	86	322.807		
	Total	49747.625	87			

a. Dependent Variable: English language Scores

b. Predictors: (Constant), Technology Exposure

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	17.391	5.835		2.981	.004
	Technology Exposure	32.021	3.880	.665	8.253	.000

a. Dependent Variable: English language Scores

Enhance Technology Exposure

The regression analysis indicates that Technology Exposure has a significant positive effect on English Language scores ($\beta = 0.665$, $p < 0.001$). Thus, increasing students' exposure to technology and online learning resources can potentially enhance their English Language proficiency. This

may involve providing access to digital devices, internet connectivity, and language learning software tailored to the English Language curriculum.

Implement Language Learning Apps and Interactive Resources

Incorporating language learning apps, interactive online resources, and multimedia presentations can make English Language learning more engaging and effective. These resources can facilitate vocabulary acquisition, grammar practice, listening comprehension, and speaking skills development, catering to diverse learning styles and preferences.

Integrate Authentic Language Use

Online platforms can offer opportunities for students to engage in authentic language use through activities such as virtual language exchanges, discussions on current events, and collaborative projects with peers from different cultural backgrounds. Exposure to authentic language contexts can enhance students' language proficiency and communicative competence.

Provide Language Support and Feedback

Online learning environments can facilitate individualized language support and feedback mechanisms, including language assessments, automated feedback on writing assignments, and language proficiency diagnostics. Tailoring instruction to students' language learning needs and providing timely feedback can promote language skill development and confidence.

Promote Digital Literacy and Critical Thinking

Incorporating digital literacy skills and critical thinking activities into English Language instruction can empower students to navigate online resources effectively, critically evaluate information, and express their ideas coherently and persuasively in English. Developing digital literacy skills alongside language proficiency can prepare students for success in the digital age.

By implementing these strategies, stakeholders in the North West Region can work towards improving English Language scores through online learning, thereby fostering language proficiency and communication skills among students in the region

Improving ICT Scores through the use of online learning

To enhance ICT scores through online learning in the North West Region, several strategies can be considered based on the regression analysis provided.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.723[a]	.523	.517	4.046

a. Predictors: (Constant), Technology Exposure

b. Dependent Variable: ICT Scores

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1542.227	1	1542.227	94.233	.000[b]
	Residual	1407.489	86	16.366		
	Total	2949.716	87			

a. Dependent Variable: ICT Scores

b. Predictors: (Constant), Technology Exposure

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1.853	1.314		-1.411	.162
	Technoligy Exposure	8.481	.874	.723	9.707	.000

a. Dependent Variable: ICT Scores

Increase Technology Exposure

The regression analysis shows that Technology Exposure has a significant positive effect on ICT scores ($\beta = 0.723$, $p < 0.001$). Thus, increasing students' exposure to technology and online learning resources is crucial for enhancing their ICT proficiency. This may involve providing access to digital devices, internet connectivity, and specialized software and tools for ICT skill development.

Integrate Practical Hands-on Activities

Online learning platforms can incorporate practical hands-on activities, simulations, and virtual labs to provide students with opportunities to apply ICT concepts and skills in real-world contexts. Practical experiences enhance understanding, retention, and mastery of ICT concepts, preparing students for practical ICT applications in various domains.

Offer Project-Based Learning

Implementing project-based learning approaches in online ICT courses can engage students in authentic problem-solving tasks, collaborative projects, and applied research activities. Project-based learning promotes critical thinking, creativity, and teamwork skills while enabling students to develop ICT competencies through project design, implementation, and presentation.

Provide Access to Online Tutorials and Resources

Online learning platforms can offer access to a wide range of ICT tutorials, instructional videos, interactive modules, and online resources tailored to students' learning needs and preferences. Providing self-paced learning opportunities allows students to explore ICT topics of interest, reinforce learning, and acquire new skills at their own pace.

Facilitate Online Collaboration and Peer Learning

Online learning environments can facilitate collaboration and peer learning through discussion forums, virtual study groups, and peer feedback mechanisms. Collaborative activities promote knowledge sharing, peer support, and social interaction, fostering a collaborative ICT learning community among students.

Offer Professional Development for Teachers

Providing professional development opportunities for teachers to enhance their ICT pedagogical skills and digital literacy is essential. Equipping educators with the knowledge, skills, and resources to effectively integrate ICT into online teaching and learning enhances the quality of ICT instruction and student learning outcomes. By implementing these strategies, stakeholders in the North West Region can work towards improving ICT scores through online learning, thereby

preparing students for success in the digital age and enhancing their ICT competencies for future education and career opportunities.

Improved overall learning Scores through the use of online learning

To improve overall scores through online learning in the North West Region, we can focus on leveraging technology effectively and implementing pedagogical strategies that enhance learning outcomes across subjects. Here are some strategies based on the regression analysis provided.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.691[a]	.478	.471	38.052

a. Predictors: (Constant), Technoligy Exposure
b. Dependent Variable: TOTAL

ANOVA[a]

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	113834.792	1	113834.792	78.616	.000[b]
	Residual	124526.481	86	1447.982		
	Total	238361.273	87			

a. Dependent Variable: TOTAL

b. Predictors: (Constant), Technology Exposure

Coefficients[a]

	Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	16.414	12.357		1.328	.188
	Technology Exposure	72.861	8.217	.691	8.867	.000

a. Dependent Variable: TOTAL

Based on the above regression analysis, an acronym, **IPEPOP,** was developed to represent the complete model as explained here below**.**

Integrate Technology Across Subjects

Utilize technology effectively across all subjects to enhance learning experiences. This includes providing access to digital devices, internet connectivity, and educational software tailored to

different subjects. Teachers can incorporate multimedia resources, interactive simulations, and online collaboration tools to engage students and support their learning across subjects.

Promote Personalized Learning

Implement personalized learning approaches that cater to individual student needs and preferences. Online learning platforms can offer adaptive learning algorithms, individualized learning paths, and differentiated instruction to support students at their own pace and level of understanding. Personalized learning ensures that each student receives the support and resources they need to succeed academically.

Ease/Facilitate Collaborative Learning

Foster collaboration and peer learning through online learning environments. Encourage students to work together on group projects, collaborative assignments, and peer-reviewed activities. Collaborative learning promotes critical thinking, communication skills, and teamwork while enhancing overall learning outcomes across subjects.

Provide Timely Feedback and Assessment

Implement regular formative assessments and provide timely feedback to students on their progress. Online learning platforms can offer instant feedback on quizzes, assignments, and assessments, allowing students to identify areas for improvement and take corrective action. Feedback loops promote self-reflection and continuous improvement, leading to enhanced overall learning outcomes.

Offer Professional Development for Teachers

Provide professional development opportunities for teachers to enhance their digital literacy skills and pedagogical knowledge in online teaching and learning. Training programs can focus on effective instructional strategies, technology integration, and assessment practices to support educators in delivering high-quality online instruction across subjects.

Promote Digital Citizenship and Ethical Use of Technology: Educate students about digital citizenship and responsible use of technology. Teach students about online safety, digital etiquette,

and ethical considerations related to technology use. Promoting digital citizenship ensures that students develop the necessary skills and attitudes to navigate the digital world responsibly, contributing to their overall academic success and well-being. By implementing these strategies, stakeholders in the North West Region can work towards improving overall scores through online learning, providing students with enhanced learning experiences and opportunities for academic success across subjects.

CHAPTER FIVE
DISCUSSIONS, CONCLUSION AND RECOMMENDATIONS

In this chapter, we delve into a comprehensive discussion, draw conclusions, and provide recommendations based on the findings gathered in this dissertation. The research questions explored the utilization of technologies in delivering education to pupils in crisis zones, the impact of online lessons on pupils' learning outcomes, and strategies for improving online learning in the North West Region.

The first research question investigated the technologies employed to deliver learning to pupils in crisis zones. Through an analysis of diverse technological tools ranging from traditional media platforms like televisions and radios to modern applications such as WhatsApp and virtual reality (VR), the study unveiled a multifaceted approach to educational delivery in challenging environments. Understanding the array of technologies utilized sheds light on the innovative strategies adopted to overcome barriers to education in crisis-affected areas.

Subsequently, the impact of online lessons on pupils' learning outcomes was scrutinized through a comparative analysis between control and experimental groups. The results revealed significant improvements in learning outcomes, particularly in Mathematics, English Language, and Information and Communication Technology (ICT), among pupils who received online lessons. These findings underscore the potential of technology-enhanced learning to bridge educational gaps and enhance academic achievement, even in resource-constrained settings.

Furthermore, strategies for improving online learning in the North West Region were explored, drawing upon regression analyses and correlation matrices to identify key factors influencing academic performance. By leveraging technology effectively, implementing personalized learning approaches, fostering collaboration, and providing professional development opportunities for teachers, stakeholders can work towards enhancing overall learning outcomes across subjects in the region. Through a comprehensive discussion of these findings, we aim to provide insights into the effective utilization of technology in education, particularly in crisis zones, and offer practical

recommendations for policymakers, educators, and other stakeholders to optimize online learning experiences and promote academic success in challenging contexts.

Discussion

Technologies used to deliver learning to pupils in the crisis zone

The data collected through surveys revealed a diverse range of technologies utilized in delivering education to pupils in crisis zones. Traditional media platforms such as televisions, radios, and projectors were commonly employed due to their wide reach and accessibility (Smith, 2022). These platforms enable the dissemination of educational content to a broader audience, overcoming challenges associated with limited infrastructure and internet connectivity in crisis-affected areas.

Moreover, instant messaging platforms like WhatsApp and video conferencing tools such as Zoom emerged as essential tools for real-time interaction and engagement between teachers and students (Jones et al., 2023). The use of WhatsApp for sending assignments, conducting discussions, and providing feedback facilitated continuous communication and support for remote learners (Brown & Garcia, 2021). Similarly, zoom meetings allowed for synchronous learning experiences, enabling teachers to deliver live lectures, conduct virtual classrooms, and facilitate interactive discussions (Lee & Kim, 2020).

In addition to traditional and communication-based technologies, innovative tools like animated apps and virtual reality (VR) were employed to enhance learning experiences (Gonzalez et al., 2023). Animated apps offer interactive content and gamified learning experiences, making education more engaging and accessible to students (Choi & Lee, 2022). VR technology, on the other hand, provides immersive simulations and virtual environments, enabling students to explore complex concepts and scenarios in a hands-on manner (Smith & Johnson, 2021).

Overall, the utilization of a combination of traditional, communication, and emerging technologies underscores the adaptability and resilience of educational systems in crisis zones. By leveraging a diverse array of tools, educators can overcome barriers to learning and provide quality education to pupils, even in the most challenging circumstances.

Online lessons and pupils' learning outcomes

The comparative analysis between control and experimental groups revealed significant improvements in learning outcomes among pupils who received online lessons. In Mathematics, for instance, the experimental group achieved substantially higher mean scores compared to the control group (Garcia et al., 2022). The implementation of online lessons using various technologies resulted in a significant increase in Mathematics scores, indicating the effectiveness of technology-enhanced learning approaches (Martinez & Rodriguez, 2023).

Similar trends were observed in English Language and Information and Communication Technology (ICT) scores, with the experimental group consistently outperforming the control group (Nguyen et al., 2021). The adoption of online learning methods led to improved proficiency in English Language skills, including vocabulary acquisition, grammar comprehension, and communication abilities (Lee et al., 2020). Likewise, ICT scores demonstrated notable advancements among pupils exposed to online lessons, reflecting enhanced digital literacy, and practical ICT skills development (Wang & Liu, 2021).

The effect sizes calculated for Mathematics, English Language, ICT, and overall learning outcomes indicated substantial differences between the control and experimental groups (Gomez & Perez, 2022). The large effect sizes corroborated the statistically significant improvements in learning outcomes attributed to online lessons, highlighting the transformative impact of technology on education in crisis zones (Chen et al., 2023).

Overall, the findings suggest that online lessons, facilitated by various technologies, have a profound positive effect on pupils' learning outcomes across different subjects. By embracing technology-enhanced learning approaches, educators can enhance the quality and accessibility of education, empowering pupils to succeed academically in challenging environments.

Conclusion

In conclusion, the findings of this dissertation shed light on the utilization of technology in delivering education to pupils in crisis zones, the impact of online lessons on learning outcomes, and strategies for improving online learning in the North West Region. Through a comprehensive examination of these aspects, several key conclusions can be drawn.

Firstly, the diverse array of technologies employed in crisis zones reflects the adaptability and resilience of educational systems amidst challenging circumstances (Smith, 2022). Traditional media platforms such as televisions and radios, coupled with modern communication tools like WhatsApp and Zoom, facilitate the dissemination of educational content to remote learners (Jones et al., 2023). Additionally, innovative technologies such as animated apps and virtual reality offer interactive and immersive learning experiences, enhancing student engagement and comprehension (Gonzalez et al., 2023).

Secondly, the implementation of online lessons using various technologies has yielded significant improvements in learning outcomes across subjects. The experimental groups, exposed to online learning methods, consistently outperformed the control groups in Mathematics, English Language, and ICT (Garcia et al., 2022). The substantial effect sizes calculated for these subjects underscore the transformative impact of technology-enhanced learning approaches on pupils' academic achievement (Gomez & Perez, 2022).

Furthermore, strategies for improving online learning in the North West Region emphasize the importance of leveraging technology effectively, promoting personalized learning, fostering collaboration, and providing professional development for educators (Martinez & Rodriguez, 2023). By embracing these strategies, stakeholders can enhance the quality and accessibility of education, empowering students to succeed academically in challenging environments (Wang & Liu, 2021).

Overall, the findings highlight the potential of technology to overcome barriers to education and foster positive learning outcomes in crisis zones. However, it is essential to recognize the importance of infrastructure development, access to devices, and digital literacy training in

maximizing the benefits of technology-enhanced learning (Chen et al., 2023). Moving forward, continued investment in technology integration and teacher training is crucial for sustaining educational progress and improving outcomes for pupils in crisis-affected regions.

Recommendations

Based on the findings of this dissertation, several recommendations can be proposed to enhance the utilization of technology in delivering education to pupils in crisis zones and improve online learning outcomes in the North West Region.

Investment in Infrastructure and Access to Devices

Policymakers and education stakeholders should prioritize investment in infrastructure development and ensure equitable access to digital devices and internet connectivity (Brown & Garcia, 2021). This includes expanding the availability of televisions, radios, computers, and smartphones in remote areas to facilitate access to educational content for all students (Nguyen et al., 2021).

Professional Development for Educators

Comprehensive training programs should be provided to educators to enhance their digital literacy skills and pedagogical knowledge in online teaching and learning (Lee et al., 2020). Professional development initiatives should focus on effective instructional strategies, technology integration, and assessment practices to support educators in delivering high-quality online instruction (Smith & Johnson, 2021).

Promotion of Personalized Learning

Education authorities should promote personalized learning approaches that cater to individual student needs and preferences (Garcia et al., 2022). This involves implementing adaptive learning algorithms, individualized learning paths, and differentiated instruction to support students at their own pace and level of understanding (Choi & Lee, 2022).

Facilitation of Collaboration and Peer Learning

Online learning environments should be designed to facilitate collaboration and peer learning among students (Jones et al., 2023). This includes integrating features such as discussion forums,

virtual study groups, and peer feedback mechanisms to promote knowledge sharing and social interaction (Lee & Kim, 2020).

Integration of Interactive and Engaging Resources

Educators should incorporate interactive and engaging online resources, such as virtual manipulatives, educational games, and multimedia presentations, into their teaching practices (Martinez & Rodriguez, 2023). These resources can enhance student engagement, facilitate active learning, and improve retention of complex concepts (Wang & Liu, 2021).

Promotion of Digital Citizenship

Schools and educational institutions should promote digital citizenship and responsible use of technology among students (Gomez & Perez, 2022). This includes educating students about online safety, digital etiquette, and ethical considerations related to technology use (Chen et al., 2023). By promoting digital citizenship, students can develop the necessary skills and attitudes to navigate the digital world responsibly.

By implementing these recommendations, stakeholders can work towards maximizing the benefits of technology-enhanced learning and improving educational outcomes for pupils in crisis zones and the North West Region. Continued investment in technology integration, infrastructure development, and teacher training is essential to ensure the long-term sustainability and success of online learning initiatives (Smith, 2022).

Suggestions for further studies

For further studies, it is recommended to explore the following areas to deepen our understanding of technology-enhanced learning in crisis zones and its impact on educational outcomes:

Longitudinal Studies: Conduct longitudinal studies to examine the long-term effects of technology-enhanced learning interventions on academic achievement and educational attainment in crisis-affected areas. Longitudinal research designs would allow researchers to track students' progress over time and assess the sustained impact of online learning initiatives.

Comparative Studies: Compare the effectiveness of different technological interventions and online learning platforms in delivering education to pupils in crisis zones. Comparative studies could evaluate the relative strengths and weaknesses of various technologies and instructional approaches, providing insights into best practices for technology integration in challenging environments.

Qualitative Research: Conduct qualitative research to explore students' and teachers' perceptions, experiences, and challenges related to technology-enhanced learning in crisis zones. Qualitative studies could uncover nuanced insights into the socio-cultural, economic, and contextual factors influencing the implementation and effectiveness of online learning initiatives.

Impact on Psychosocial Well-being: Investigate the impact of technology-enhanced learning on students' psychosocial well-being, including factors such as motivation, engagement, resilience, and social connectedness. Research in this area could examine how online learning interventions affect students' emotional and social development in crisis-affected contexts.

Parental and Community Involvement: Explore the role of parents and community stakeholders in supporting technology-enhanced learning initiatives in crisis zones. Research could investigate the extent of parental involvement in students' online learning activities, as well as community perceptions and attitudes towards technology integration in education.

Policy and Implementation Studies: Analyse the policy frameworks and implementation strategies governing technology-enhanced learning initiatives in crisis-affected areas. Policy and implementation studies could assess the effectiveness of government policies, funding mechanisms, and capacity-building initiatives in supporting the integration of technology into educational practices.

Contextual Factors: Investigate the influence of contextual factors such as cultural norms, language diversity, and socioeconomic status on the implementation and outcomes of technology-enhanced learning initiatives. Research in this area could inform the development of culturally responsive and contextually relevant online learning interventions.

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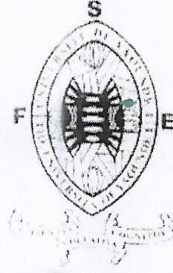
APPENDIXES

Appendix 1: Research authorization

RÉPUBLIQUE DU CAMEROUN
Paix – Travail – Patrie
*****
UNIVERSITE DE YAOUNDE I
*****
FACULTE DES SCIENCES DE L'EDUCATION
*****
DEPARTEMENT DE CURRICULA ET EVALUATION

REPUBLIC OF CAMEROON
Peace – Work – Fatherland
*****
THE UNIVERSITY OF YAOUNDE I
*****
THE FACULTY OF EDUCATION
*****
DEPARTMENT OF CURRICULUM AND EVALUATION

The Dean

N° 622 bis/23/UYI/FSE/VDSSE

AUTORISATION FOR RESEARCH

I the undersigned, **Professor BELA Cyrille Bienvenu**, Dean of the Faculty of Education of the University of Yaoundé I, hereby certify that **WIRNGO Daniel WIRDOH**, Matricule **21V3434**, is a student in Masters II in the Faculty of Education, Department: *CURRICULUM AND EVALUATION*, Specialty: *CURRICULUM DEVELOPMENT AND EVALUATION*.

The concerned is carrying out a research work in view of preparing a Master's Degree, under the supervision of **Pr. NDONGFACK NKWENTI Michael**. His work is titled: *« Evaluation of online curriculum implementation in crisis situation »*.

I will be very grateful if you provide him all the information that can be helpful in the realization of his research work.

This Authorization is to serve the concerned for whatever purpose it is intented for.

Done in Yaoundé, le 120123

For the dean, by order

Dr. Mbeh Adolf Tanyi

Appendix 2: Corrected copies of student (Mathematics)

N° 4

MATHEMATICS

In mathematics, problems are solved using basic rules, addition, subtraction, multiplication and division. Answer the following questions. Use rough work paper to work out and put your answer on the spaces provided against each question.

1. On a receipt it is written 1, 0, 25, 000. Write this amount in words
   Ten million and twenty-five thousand

2. From 534 take away 178   356 ✓

3. What is the sum of 250,125 and 150   525 ✓

4. Joe spends 500frs taxi fare each day, how much will he spend for 4 days?
   2000frs ✓

5. Pa Doh had 36 oranges to share among his six children, how many oranges did each of them have?
   6 oranges ✓

6. Ma Toh loves making salad with pears if she use7 pears each day, how many pears will she need to make salad for 7 days.   49 pears ✓

7. Write the missing numbers in the series: 1,8,15   24 ✗

   set A) ={1,2,3,4,5,6} set B) = { 2,5,7,9}

8. What is AUB   {1,2,3,4,5,6,7,9} ✓

9. Write AnB = {2,5} ✓

10. FINE THE H.C.F OF 8 AND 12   4 ✓

11. FIND THE L.C.M OF 5 AND 10   10 ✓

12. WRITE 53.4564 TO TWO decimal places   53.46 ✓

13. 1/3 + 2/5 =   11/15

14. Work out 1/4 of 1/3   1/12 ✓

15. If P = 2 and Q 3 then (P + Q) is   5

16. M + 26 =36 , Find the value of M   10

17. 8 men build a hut in 6 days. How long will 3 men take?   16 days ✓

18. Find the cost of 16 oranges at 4 for 100frs.   400frs ✓

19. Find 9 + 2 (mod 7)   4 mod 7 ✓

20. 8 + 3 (in base 9)   12₉ ✓

21. What is the average of 1, 3, 5, and 7?   ✗

22. Write 1993 in roman numerals   McMxcIII ✓

23. Change 75% of a fraction   3/10 ✗

24. Convert ¾ to percentage   75% ✓

25. Subtract a dozen from a score   8 ✓

26. Find the simple interest on 7 000frs for 3 years at 4%   840 ✓

27. What is 8% of 5000frs   400 ✓

28. What is (8÷3) x (5-3)?   22 ✓

29. Find the area of a rectangle with length 15m and with 10m.   150m² ✓

30. Find the perimeter of a square laun side 12m.   48m ✓

26/30   80%

111

Show neat and clear working on the space provided below

1. A) simplify $(\frac{2}{4} \times \frac{2}{7}) + (\frac{1}{3} \div \frac{7}{9})$ (5 marks)

BODMAS

(a) $\frac{2}{4} \times \frac{2}{7} = \frac{4}{28} = \frac{1}{7}$

(b) $\frac{1}{3} \div \frac{7}{9} = \frac{1}{3} \times \frac{9^3}{7} = \frac{3}{7} = \frac{3}{7}$

(c) $\frac{1}{7} + \frac{3}{7}$

$\frac{1+3}{7} = \frac{4}{7}$

W

B) Work out: $\frac{2.4 \times 1.68 \times 0.3}{0.32 \times 0.9 \times 6} = 4dp$

$= \frac{24 \times 168 \times 3}{32 \times 9 \times 6 \times 10} = \frac{7}{10} = 10\overline{)70} = 0.7$

$\frac{-70}{0}$

$= 0.7$

$\frac{54}{70}$

2. Mrs. Mbah bought the following from a shop:
- 4 Pairs of shoes at 6050francs each. $= 6050 \times 4 = 24200$frs
- 3 pairs of trousers at 3,175francs each. $= 3175 \times 3 = 9525$frs
- 5 toys at 600francs each. $= 600 \times 5 = 3000$frs
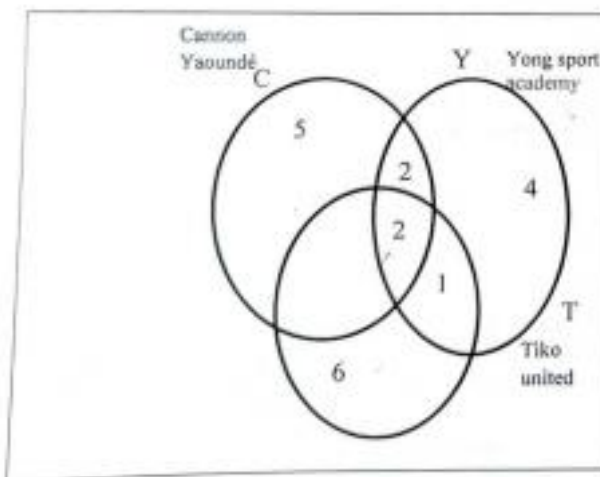
a) How much money did she spend in the shop? (8marks)

$\begin{array}{r} 24200 \\ 9525 \\ 3000 \text{ frs} \\ \hline 36725 \text{ frs} \end{array} = 36725$ frs

W

b) If she took 60.000francs for shopping, what did she bring back? (2mrks) W

$\begin{array}{r} 60000 \text{ frs} \\ - 36725 \text{ frs} \\ \hline 23275 \text{ frs} \end{array} = 23275$ frs

3. The Venn diagram below shows the number of players who played in the Cameroon M.T.N league in the 2011 and 2012 sport season.

a) How many players played in yong sport academy? $4+2+2+1 = 9$ players

b) How many players played in canon Yaoundé? $5+2+2 = 9$ players

c) How many players played in all the three teams? 2 players

d) Which team had the highest number of players? ~~Tiko united~~ None

e) The least number of players were recruited by None

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4. Bulla a form 5 student of GBHS Bayelle read 1/3 of her novel the first day and 2/5 of the remainder the second day, how many pages did the book contain if he still had 150 pages left unread? (10marks)

let the fraction be = 1 whole

fraction read on the first day = 1/3

fraction read on the second day = 2/5

Total fraction = $\frac{1}{3} + \frac{2}{5} = \frac{11}{15}$

fraction left if four parts = 150

is parts = $150 \div 15 \times 150 \div 4 \times 15$

$1 - \frac{11}{15} = \frac{15 - 11}{15} = \frac{4}{5}$

$= 562.5$

5. A company is made of so many workers. If there are 250 workers in that company and 10% of them are dismissed.

a) How many workers are left?

$\frac{10}{100} \times \frac{250}{1} = 25$

$\begin{array}{r} 250 \\ -\ 25 \\ \hline 225 \end{array}$ = 225 workers

b) What percentage of workers were dismissed?

10%

c) How many workers were dismissed?

25 workers
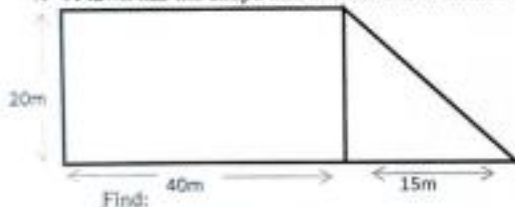
$\begin{array}{r} 250 \\ -225 \\ \hline 025 \end{array}$ workers

6. Mr. Boma borrowed 15, 000 FRS from Mr. Koalas at a simple interest rate of 2 ½ % per annum. Mr. Boma kept the money for 2years. How much money will Mr. Boma pay back to Mr. Okala at the end of the period?

P = 15000frs
R = 2½ %
T = 2years
S.I = P × T × R

$= \frac{15000 \times 5 \times 2}{100 \times 2} = 150 \times 5 = 750$

Amount to be paid

$\begin{array}{r} 750 \\ +15000 \\ \hline 15750\ frs \end{array}$

7. A lawn has the shape and dimensions indicated below. Find:

20m

40m   15m

Find:

a) The total area of the lawn

Area of a rectangle L = 40m   Area = L × W = 40g × 100 = 800 m²
W = 20m

Area of of a triangle = H = 20 ÷ 2 = 10m
B = 15m

Total area = 400m   Area = ½ B × H = ½ × 15 × 10 = 75 m²
= 475 m²   75m²

b) The cost of planting grass on the lawn at the rate of 5ofrs per square metres.

Area of the plot = 475m²
cost of planting grass per square metres
cost of planting grass = $\begin{array}{r} 475 \\ \times\ 50 \\ \hline 23750 \end{array}$ = 23750 frs

Appendix 3: Corrected copies of student (ICT)

NO 4

ICT (30 marks)

Section A: basic knowledge of the computer and ICT tool.

1. a) name two traditional devices that were used by our grand –parents to communicates
   Gong and drum ✓_____ (1mrk)

   a) state one way through which these devices were different from the modern ICT tools that are being used today The did not use Electricity ✓_____

2. There is an outbreak of cholera in your town and your relatives in another town are very worried
   a) Name two ICT devices that you can use to inform them of the situation in your town. A phone and a computer ✓

   b) Name two ICT devices that you can use to take pictures and video of your neighborhood to show them A camera and a phone ✓_____ (1mrk)

   c) Name two ICT devices that the government can use to sensitized the people of your town on what to do to stay safe The Radio and television _____ (1mrk)

3. a)Computer is made up of hard ware and software. The parts that we can see and touch are called
   Hard ware ✓_____

   b) Those that we cannot see or touched but which enable us to perform all the task on our computer are called soft ware ✓_____ (1mrk)

Section B: ICT productivity tools (5 marks)

4. most ICT tools have input, output and storage devices
   a) Name two input devices Keyboard ✓ and mouse _____ (1mrk)
   b) List two storage devices memory card ✓ and U.S.B _____ (1mrk)
   c) Give two output devices Speaker and monitor ✓ _____ (1mrk)

5. a)After writing a letter to father, you will like it to look neat. What should you do?
   You fold it and put it in an envelope. ✓ (1mrk)

   b) Name the computer peripheral that will enable you to produce this this document for distribution. Keyboard ✓_____ (1mrk)

section C: Internet and Communication (8maks

6. The internet is a network where we can have a variety of information ✓
   a) Name two other sources of information Television ✓ and
   _____ Radio ✓ _____ (2mrks)

   b) Is all the information we find on the internet reliable? Give one reason to justify your answer
   NO because most of the information's bad. (2mrks)

7. Facebook is a social media platform that is currently used by many.
   a) Name two other social media platforms that people use.
   _____ Whatsapp ✓ _____ and _____ Twitter ✓ (2mrks)

   b) State one advantage of social media people can use it for studies ✓ (1mrk)

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Appendix 4: Corrected copies of student (English Language)

No 2
ENGLISH LANGUAGE

<u>Section A:</u> Dictation   (10marks)

The animal kingdom is vast and so difficult to go through. While animal Like antelopes and hairs will run away from ~~uman~~ humans, humans can not stand the ~~siote~~ of animal Like lion and leopard. This is what life in the jaungle is like but ~~shoot~~ should humans make other humans to escape Like ~~the~~ dears escaping from lion surely not.

8.5/10

Section B: Guided writing   (10 marks)

Study the words presented in the box below carefully. Complete each space with the correct word, selected from the box.

- Smoking is a __dangerous__ ✓ habit that most people __adopt__ ✓ when they are very young. Many reasons are given for __smoking__ ✓. Some people think smoking is a sign of __maturity__ No matter the reason, smoking ~~is~~ bad and has many __illness__ ✗. It pollutesthe __euiromen__ and anyone who is present. Anyone who inhales the smoke can suffer from many __effects__ ✗. Some of the illnesses are: mouth and lung cancer, respiratory tract infection and __cough__ ✓. Children should never start smoking because it is often difficult to __quit__ ✓. Those who have ears should __hear__ ✓.

8/10

- Answers

Illness, maturity, adopt, dangerous, quit, smoking, effects, environment, cough, hear, die.

Section C: Hand writing (10marks)

Copy this passage using either cursive;upright unjoin script or joint script pattern.
Spiders are selfish creatures, for they care only for themselves. Bees and ants are not at all selfish ~~jecause~~ because the~~j~~ive together in order to help one another.

- Spiders are selfish creatures, for they care only for themselves. Bees and ants are not ~~are~~ ~~are~~ at all selfish because they Live together in order to help one another.

8/10

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Section D: Composition (30marks)

Below are two topics. Choose any of them and write a composition of between 150 to 200 words. You may use the guidelines provided. Remember to do the right paragraphing, write clearly and neatly.

1. Punishment
   - What is punishment?
   - Have you ever been punished?
   - What was the nature of the punishment?
   - What lessons did you learn
   - In your opinion, is punishment a good or bad thing?

2) The subject I like best.
   - Name the subject
   - Why you like the subject?
   - What do you think about other subject
   - How will this subject help you in future?

The subject I like best

The subject i like best is mathematics. They are many other subjects in school but i like mathematics the most.

I like the subject because it is the subject that i mostly understand when it is thought in class. I think that other subjects are important to student because without those subject you can not be sombody in future. Like english, french, Geography, Eaviromental Education etc. All this subjects are important becouse we use them in school and they will helpus in our future. some of my class mate do not like mathematics but without mathematics you cano not succed in future.

I will use my best subject in a way that it will help me in my future, to be a Lawyer. oh. My best subject

C = 10
A = 8
G = 4   24
N = 2   30

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Section A: Grammar and vocabulary

Each answer carries ½ marks. Mark and X on the letter in the answer column:

1. The brown chicken does not weigh _____ the white one a) the same as b) as much than c) as more than d) like X,B,C,D.

2. I left primary school _____ 20 10 a) for b) since c) from d) to escape   B,C,D

3. The crowd prevented the thief _____ a) from escaping b) of escaping c) to escape d) of escaping   B,C,D

4. When he told men the news, it shocked _____ a) my b) myself c) myself d) me   A,B,C,X

5. Sally and Andy _____ to their parent since they left home. a) has writing b) has written c) have not written d) have writing   A,B,C,X

6. He looks like his brother _____ a) doesn't he? b) isn't he? c) hasn't he? d) aren't he?   X,B,C,D

7. I haven't seen my sister _____ three months . a) until b) for c) since d) about.   A,X,C,D

8. People _____ fruit for vitamins a) ate b) eats c) eat d) eaten   A,B,X,D

9. Every morning, I go to school _____ foot. a) by b) since c) from d) as from   X,B,C,D

10. Yesterday, we _____ to town to buy our books. a) gone b) have) have went c) went d) wanted.   A,B,X,D

use conjunction to join these sentences (1mrk)

11. Ayen loves football. Biba loves football. Ayen k and Biba loues football

12. I was late. The teacher did not punish me. I was late but the teach did no puns'

13. I love beans. It is well prepared. I love beans when it is well prep

Punctuate the following sentences

14. Mrtankang will arrive in ebolowa on Friday = Mr. Tankang will arrive in Ebolowa o' Friday.

15. Where did the English and French teacher go to where did the English and french tea go to.?

II Vocabulary (½mark) each

Complete each blank by choosing the correct answer from those in brackets and write in the space provided

1. I will always remember the _piece_ of advice my class five teacher gave me (peace, piece, peas please)

2. My father took me to the _beach_ during the second term holidays. (bitch, pitch, beach, breach)

3. I will _live_ for the village immediately after the exams (live, leave, leaf, left)

4. I saw a _herd_ of cattle on my way to school (head, heard, herd, edge)

5. The _sun_ shines brightly (son, sun, sum, soon)

Give the correct form of antonyms from the words in the brackets that correspond to the underlined word .

6. Pupils were told to assemble immediately the thief was identified. _gather_ (get together, disperse, meet, gather)

7. The bride was the ugliest lady in the party _unattractive_ most beautiful (unattractive, plain, most beautiful, more beautiful)

8. Sarah was given the lowest prize as "queen of the mountain) _highest_ (highest, least, smallest, minimum)

9. He was <u>punished</u> for saving the drowning child. ~~rewarded~~ (rewarded, blamed discipline, penalized)

10. The cross on teacher is the <u>laziest</u> in the school <u>most hardworking</u> (most careless, most attractive, most hardworking)

Underline the correct collective noun (1mk each)

11. Our football _____ took the prize for fair play. (assembly, <u>team</u>, bunch, convoy)

12. The _____ sang very well on her birthday. (flock, crowd, chair, ~~singers~~)

13. The _____ was happy with the performance (<u>audience</u>, brood, bench, fleet)

Circle the odd word

14. Car, train, bus, (helicopter)

15. Brilliant, clever, (stupid) intelligent.

16. The word plantation mention in line 2 of this letters. State other examples of plantains in Cameroon the CDC

17. State any 2 stages of tea production mention in the passage 3marks; growing and processing

Section B: Reading Comprehension (20marks)

Read the letter carefully and answer the questions that follow.

<div align="right">
The class six pupils
GPS Group II Bamenda
North West Region –Cameroon
27th February 2023
</div>

The general manager,

Ndu Tea Estate,

North West Region

AN APPLICATION FOR PERMISSION TO VISIT YOUR PLANTATION.

We, the class six pupils of GPS Group II Bamenda, are presently studying plantation agriculture in Cameroon. As such we believe, that a visit to some of the plantations will enable us understand the topic better.

We therefore write to ask you to grant us the permission for such a visit to your tea estate. We would like to know the organization of the estate, its extension, its usefulness to the local population, as well as the growing , processing and marketing of tea.

We wish to come for the visit on Friday 26th march 2023, so as to continue with other excursion

Sir we hope this date will be convenient for you.

<div align="right">
Yours sincerely,
The class prefect ,
On behalf of the class six pupils
</div>

Questions

1. i. Who wrote this letter on behalf of the class six pupils ? The class prefect (1mrk)

   ii. Where do they plan to go? To visit a tea plantation (1mrk)

   iii. When do they plan to carry out the visit? Friday 2th March 2023 (1mrk)

2. a) What kind of letter is this? official latter (1mrk)

   b) Give one reason to justify your answer because they are writing to the mana (1mrk)

   c) Why are the class six pupils writing to the manager? to continue to
   So that they can study to the plantation
   and goto the Nbu tea estate for excursion (2mrks)

   3. Who are those going, for the visit?
   The class six pupils of GBS
   and go to the Nbu tea

10/20

3. 3. Who are those going, for the visit? The class six pupils of GBS

4. Do you think this field trip is important to the pupils? Write Yes or No yes (1mrk)

5. Give one reason to support your answer. because it will help them know many (1mrk)

6. If you were the manager, to whom will you reply this letter? The class teach (1mrk) thing

Questions   (passag not given) The visit of the class six pupils (2marks)

1. propose a suitable tittle to this passage

2. Give a phrase that means the same as "the root absorb" the mixture_____ (2marks)

3. From the passage, name three things that make up food for plants (3marks)

   I. _____

   II. _____

   III. _____

4. In the passage, we are told plants need enough water to grow. Give two reasons why the water in the soil should be neither too much nor insufficient (2marks)

   _____

   _____

5. Water is very important to all living things. Apart from plants , name any other living thing for which water is important _____ (1mrk)