Professional Learning Community Handbook 3 Numeracy Across The Curriculum

HANDBOOK FOR COORDINATORS



Wisdom, Knowledge and Prudence

 \star







GOVERNMENT OF GHANA







Published by the Ministry of Education; Ghana, under Creative Commons Attribution-Sharealike 4.0 International License.

PROFESSIONAL LEARNING COMMUNITY HANDBOOK 3

NUMERACY ACROSS THE CURRICULUM

Coordinator Version

CONTENTS

FOREWORD	iii
ACKNOWLEDGEMENT	v
BACKGROUND	vii
PLC SESSION 1: RELEVANT PEDAGOGIES THAT CAN SUPPORT THE DELIVERY OF THE SECONDARY EDUCATION CURRICULUM	1
PLC SESSION 2: THE CONCEPT OF TEACHING AT THE RIGHT LEVEL USING DIFFERENTIATION	15
PLC SESSION 3: SOCIAL AND EMOTIONAL LEARNING (SEL)	30
PLC SESSION 4: THE CONCEPT AND IMPORTANCE OF NUMERACY ACROSS THE CURRICULUM	46
PLC SESSION 5: SUPPORTING THE TEACHING AND LEARNING OF NUMERACY AT THE RIGHT LEVEL IN INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)	59
PLC SESSION 6: SUPPORTING THE TEACHING AND LEARNING OF NUMERACY AT THE RIGHT LEVEL IN TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING.	72
PLC SESSION 7: SUPPORTING THE TEACHING AND LEARNING OF NUMERACY AT THE RIGHT LEVEL IN BUSINESS STUDIES	85
PLC SESSION 8: SUPPORTING THE TEACHING AND LEARNING OF NUMERACY AT THE RIGHT LEVEL IN LANGUAGES	97
PLC SESSION 9: SUPPORTING THE TEACHING AND LEARNING OF NUMERACY AT THE RIGHT LEVEL IN SCIENCE SUBJECTS	111
PLC SESSION 10: SUPPORTING THE TEACHING AND LEARNING OF NUMERACY AT THE RIGHT LEVEL IN THE SOCIAL SCIENCES	127
PLC SESSION 11: SUPPORTING NUMERACY ACROSS THE CURRICULUM THROUGH LESSON OBSERVATION	142

FOREWORD

Continued teacher professional development cannot be overemphasized because educational needs are changing all the time and teachers need to be acquainted with these changes. The use of structured regular professional development activities for teachers, help them to improve their understanding of how to deliver effective learning outcomes.

In the light of this, the Ghana Education Service has collaborated with the National Teaching Council, tutors of Colleges of Education, teacher educators of some Universities and Technical Universities in Ghana as well as teachers from 12 Senior High Schools, Senior High Technical Schools, and Technical Institutes to develop this third Professional Learning Community (PLC) Handbook. This PLC Handbook is intended to assist heads and teachers of Secondary Schools to run weekly PLC sessions in schools. These sessions are dedicated periods in the school's weekly schedule where all teachers come together and work collaboratively to improve teaching and learning.

PLC sessions will help teachers to build a collective understanding of how to improve outcomes for all learners in their schools through a series of practical activities such as lesson study, team teaching and action research. The involvement of teachers from 12 Senior High Schools, Senior High Technical Schools and Technical Institutes in the writing of this Handbook means that the primary users of the Handbook are the ones who have been involved in its creation, helping to ensure its relevance and practicality.

This third PLC handbook, focuses on improving numeracy across the curriculum and covers the following topics:

- Relevant pedagogies that can support the delivery of the Secondary Education Curriculum
- > The concept of teaching at the right level using differentiation
- Social and Emotional Learning (SEL)
- > The concept and importance of numeracy across the curriculum
- Supporting the teaching and learning of numeracy at the right level in Information and Communication Technology (ICT)
- Supporting the teaching and learning of numeracy at the right level in Technical and Vocational Education and Training.
- Supporting the teaching and learning of numeracy at the right level in business studies
- Supporting the teaching and learning of numeracy at the right level in languages
- Supporting the teaching and learning of numeracy at the right level in science subjects
- Supporting the teaching and learning of numeracy at the right level in the social sciences
- Supporting numeracy across the curriculum through lesson observation.

Based on feedback from the use of the first two Handbooks, this third PLC Handbook is designed to further improve quality and relevance of teaching and learning through the use of strategies which promote Social and Emotional Learning (SEL) and teaching at the right level using differentiation.

The Handbook is structured in 11 generic Sessions which are appropriate for all SHS, SHTS and STEM schools and includes concepts specific to needs of technical institutes.

The hope and expectation is for this PLC Handbook to continue to play the much-needed role of supporting the transformation of our secondary education system and that it will be used effectively across all Ghanaian secondary education institutions.

Dr. Eric Nkansah Director-General Ghana Education Service

ACKNOWLEDGEMENTS

Many thanks to Robin Todd and all other members of the T-TEL team for contributing to the success of the writing of the manual in diverse ways.

The writing team was made up of the following contributors:

T-TEL TEAM					
Professor Jonathan Fletcher	T-TEL – Key Advisor, T	T-TEL – Key Advisor, Teaching & Learning Partnerships			
Beryl Opong-Agyei	T-TEL – National Seco	ndary Education Coor	rdinator		
Alberta Djaaba Tackie	T-TEL – Curriculum Im Coordinator	plementation, Teach	ing and Learning		
Roger Kwamina Aikins	T-TEL – GM Commerc	ial-Oversees Design, I	Print and Distribution		
WRITERS	INSTITUTIONS	WRITERS	INSTITUTIONS		
Alidu Baba Iddrisu	Zabzugu Senior High School, Zabzugu	Josiah Bavachiga Kandwe	Walewale Technical Institute, Walewale		
Esther Okaitsoe Armah	Mangoase Senior High School, Mangoase	Atikiba Eric	Nabango Senior High Technical School, Nabango		
Adam Abubakari	Gambaga Girls Senior High School, Gambaga	N-yalamba Jerry Njomoun	E.P Agric Senior High Technical School, Tatale		
Blessington Dzah	Ziavi Senior High Technical School, Ziavi	Avole Baba Ansbert	Bolgatanga Senior High School, Bolgatanga		
Anthony Nyame	Bosome Senior High Technical School, Bosome	Salifu Hudu	Lambussie Senior High School, Lambussie		
Benedicta Ama Yekua Etuaful	Ogyeedom Senior High Technical School, Gomoa Afransi	Sampson Dedey Baidoo	Benso Senior High Technical School, Benso		
Dr. Kwaku Addo- Kissiedu	University for Development Studies, Tamale	Dr. Ann Dodor	Takoradi Technical University, Takoradi		
Grace Annagmeng Mwini	Tumu College of Education, Tumu	Ambrose Ayikue	St. Francis College of Education, Hohoe		
Maxwell Bunu	Ada College of Education, Ada	Eric Kwabena Abban	Mt. Mary College of Education, Somanya		
Bernard Kuug	National Teaching Council	Faustina Graham	Ghana Education Service HQ		

PROFESSIONAL LEARNING COMMUNITY HANDBOOK 3

NUMERACY ACROSS THE CURRICULUM – COORDINATOR VERSION

1. Background to the Professional Learning Community Sessions in this Handbook

There are eleven weekly Professional Learning Community (PLC) Sessions in this Handbook, which aim to guide teachers to support the teaching of numeracy across the Senior High School (SHS) curriculum. The Sessions are not subject specific therefore teachers who teach Technical and Vocation Education and Training (TVET) subjects can use it as well.

In addition to supporting the teaching of numeracy across the SHS curriculum, the PLC Sessions are designed to support:

- Professionalising teaching by supporting teachers in developing communities of practice and enhancing their professionalism.
- > Improving the learning outcomes and life chances for all learners.

2. Features of the PLC Sessions

- The main resources for the weekly teacher Sessions are the teacher version of the Handbook and the PLC Coordinator version of the Handbook.
- Both versions are written to provide information to guide the 11 weekly PLC Sessions that are linked directly to the teaching of numeracy.
- The PLC Coordinator version of the Handbook has prompts for leading the PLC Session.
- The teacher version of the Handbook contains activities for teachers and guidance for what they will do during the Session.
- The times suggested for the activities in the various sections of the Sessions are a guide only and can be reviewed as appropriate.
- The weekly PLC Sessions are of 90-minute duration although schools may extend this duration to enable teachers to complete the extension activities in specific sessions together.

PLC Session 1: Relevant pedagogies that can support the			
delivery	of the Secondary Educa	ation Curriculum	
Focus: the bullet points provide the frame for what is to be done in the session. The writer should use the bullets to guide what they write for the PLC Coordinator s and teachers to do and say during each session. Each bullet needs to be addressed	Guidance Notes on Leading the session. What the PLC Coordinator will have to say during each stage of the session	Guidance Notes on Teacher Activity during the PLC Session. What teachers will do during each stage of the session	Time in session
1. Introduction	 1.1 Start the PLC session by asking teachers to share two things they did differently in the classroom or elsewhere based on PLC Handbook 2, on literacy across the curriculum, which they think impacted learning positively. 1.2 Ask teachers to discuss and summarise in a single sentence why they think what a colleague did by way of application of lessons learned in PLC Handbook 2, literacy across the curriculum, supported learning. 	 1.1 Share two things you did differently in the classroom or elsewhere based on PLC Handbook 2, on literacy across the curriculum, which you think impacted learning positively. 1.2 Discuss and summarise in a single sentence why you think what your colleague did by way of application of lessons learned in PLC Handbook 2, literacy across the curriculum, supported learning. 	20 mins

2. Planning	2.1 Ask a teacher to read the	2.1 Read the Purpose, Learning	30
for	Purpose, Learning Outcomes	Outcomes (LOs) and Learning	mins
teaching,	(LOs) and Learning Indicators	Indicators (LIs) for the session.	
learning	(Lls) for the session.		
and			
assessment	Purpose:	Purpose:	
activities,	The purpose of the session is to	The purpose of the session is to	
making	discuss relevant pedagogies	discuss relevant pedagogies	
links with	that can support the delivery of	that can support the delivery of	
the Pre-	the Senior High School	the Senior High School	
Tertiary	/Technical, Vocational	/Technical, Vocational	
(standards-	Education and Training	Education and Training	
based)	(SHS/TVET) curriculum.	(SHS/TVET) curriculum.	
Curriculum			
and using	LO1: Demonstrate knowledge,	LO1: Demonstrate knowledge,	
GESI, SEL,	understanding and	understanding and	
ICT and 21 st	application of appropriate	application of appropriate	
century	pedagogies that can	pedagogies that can	
skills	support teaching and	support teaching and	
	learning of the content of	learning of the content of	
	the SHS/TVET curriculum	the SHS/TVET curriculum	
	(NTS 2c, 2d, 2f, 3a, 3e - 3g,	(NTS 2c, 2d, 2f, 3a, 3e -	
	3j and 3l).	3g, 3j and 3l).	
	 LI 1.1 Identify at least three appropriate pedagogies that can be used to deliver the SHS/TVET curriculum. LI 1.2 Discuss an example of appropriate pedagogies that support the delivery of SHS/TVET curriculum. LO2: Demonstrate knowledge and understanding of planning for integrating varied appropriate pedagogies in lessons (NTS 2c, 2d, 2f, 3a, 3e - 	LI 1.1 Identify at least three appropriate pedagogies that can be used to deliver the SHS/TVET curriculum. LI 1.2 Discuss an example of appropriate pedagogies that support the delivery of SHS/TVET curriculum. LO2: Demonstrate knowledge and understanding of planning for integrating varied appropriate pedagogies in lessons (NTS 2c, 2d, 2f, 3a, 3e -	
	3g, 3j and 3l). LI 2.1 Discuss the benefits of using appropriate and varied pedagogies in the planning of lessons. LI 2.2 Examine different	3g, 3j and 3l). LI 2.1 Discuss the benefits of using appropriate and varied pedagogies in the planning of lessons. LI 2.2 Examine different	
	או מוכצובא טו ווונפצו מנוווצ	או מוכצובא טו ווונפצו מנוווצ	

appropriate varied pedagogies	appropriate varied pedagogies	
in lesson delivery.	in lesson delivery.	
,		
2.2 Ask teachers in nairs to	2.2 In nairs identify and share	
identify and share with their	with your partners and the	
identify and shale with their	with your partners and the	
partners and the larger group,	larger group, three appropriate	
three appropriate pedagogies	pedagogies used across the	
used across the curriculum (NTS	curriculum (NTS 3e, 3g).	
3e, 3g).		
E.g.	E.g.	
a) Science	a) Science	
i. Demonstration	Practical method, etc.	
ii. Practical method		
iii. Enauirv-Based		
Approach. etc.		
h) Mathematics	h) Mathematics	
i Activity	Demonstration etc	
ii Demonstration	Demonstration, etc.	
iii. Brohlam Solving atc		
III. FIODIEIII SOlving, etc.	a) English	
C) English	C) English	
i. Branwriting	Bruinwriting, etc.	
II. Discussion		
III. Drill, etc.		
d) Graphic Design	d) Graphic Design	
a. Project-Based	Exhibition, etc.	
b. Demonstration		
c. Exhibition, etc.		
2.3 Ask teachers to discuss an	2.3 Discuss an example of	
example of appropriate	appropriate pedagogies used	
pedagogies used across the	across the SHS/TVET curriculum	
SHS/TVET curriculum (NTS 2c,	(NTS 2c, 3e and 3g).	
3e and 3g).		
E.g.	E.q.	
a) Science	a) Science	
i. Demonstration:	Demonstration:	
A method of	A method of	
teaching concents	teaching concents	
through showing	through showing	
stans and processes	steps and processes	
It is apparally used	It is apparally used	
it is generally used	it is generally used	
	when processes unu	
steps are complex,	steps are complex,	
dangerous and	aangerous and	
materials are	materials are	
inadequate. When	inadequate. When	
demonstrating, the	demonstrating, the	_

teacher can direct	teacher can direct	
the learners'	the learners'	
attention to the	attention to the	
relevant facts and	relevant facts and	
application of	applications of	
scientific principles.	scientific principles.	
This can be done	This can be done	
using real or virtual	using real or virtual	
instances	instances, etc.	
ii. Practical method: A		
hands-on approach		
used to teach		
concepts-which		
interdependently		
connects theory with		
practical task		
iii. Enquiry-Based		
Approach:		
This is an		
instructional method		
which enables the		
learners to seek		
knowledge through		
their own effort by		
means of		
investigations, etc.		
b) Mathematics	b) Mathematics	
i. Activity:	Activity:	
It involves assigning	It involves assigning	
learners tasks and	learners tasks and	
allowing them to	allowing them to either	
either perform them	perform them individually	
individually or in	or in groups, etc.	
groups		
ii. Demonstration:		
It shows the		
processes involved in		
carrying out		
activities, and		
formulation of		
theorems either by		
the learner or the		
teacher		
iii. Problem Solving:		
It involves presenting		
scenarios or		
problems to learners		

с)	and provide opportunities and support (when necessary) for them to find out varied solutions to the scenarios or problems, etc. English i. Brainwriting: It	с)	English Brainwriting:	
	involves writing or documenting thoughts and ideas about a particular concept or issue ii. Discussion: It involves expressing one's view or ideas about an issue or a concept orally or in writing. It could be in smaller groups or whole class iii. Drill: It is a systematic repetition of		It involves writing or documenting thoughts and ideas about a particular concept or issue, etc.	
	concepts that aim at the learner retaining the concept in a planned way, etc.			
<i>d</i>)	Graphic Design i. Exhibition: It involves displaying artifacts or objects for the purpose of helping learners to identify key features of such objects ii. Project-Based: It involves carrying out given tasks in the form of projects iii. Demonstration: It shows how things are done using real or virtual instances, etc.	d)	Graphic Design Exhibition: It involves displaying artifacts or objects for the purpose of helping learners to identify key features of such objects, etc.	

2.4 Ask teachers in groups to	2.4 In groups, discuss the
discuss the benefits of using	benefits of using appropriate
appropriate and varied	and varied pedagogies in the
pedagogies in the planning of	planning of your lessons (NTS
lessons (NTS 3e - 3g).	3e - 3g).
F.a.	<i>F.a.</i>
a) It provides room to	It provides room to attend to
attend to the needs of	the needs of all learners at the
all learners at the right	right level etc
level	light levely etc.
b) It enables teachers to	
effectively deliver	
lessons that suit varied	
learnina styles	
c) The teacher has the	
opportunity to create a	
suitable learnina	
environment for the	
chosen pedagogies	
d) It informs the teacher of	
the appropriate teaching	
and learning resources	
needed for the lesson at	
the right level, etc.	
5	
2.5 Ask teachers in subject	2.5 In your subject groups,
groups to identify two factors to	identify two factors to consider
consider when integrating	when integrating appropriate
appropriate varied pedagogies	varied pedagogies in lesson
in lesson delivery (NTS 3f, 3j and	delivery (NTS 3f, 3j and 3k).
3k).	
E.g.	E.g.
a) Nature of the topic	Nature of the topic, etc.
b) Expected lesson	
outcomes	
c) Abilities of learners	
d) Available teaching	
and learning	
resources	
e) Learning	
environment	
f) Assessment (as, for	
and of), etc.	
2.6 Ask teachers to discuss two	2.6 Discuss two factors to
factors to consider when	consider when integrating
integrating appropriate varied	appropriate varied pedagogies

pedagogies in lesson delivery	in lesson delivery (NTS 3f. 3i	
(NTS 3f 3i and 3k)	and $3k$	
F a	E a	
a) Natura of the topic: Some	L.y. Natura of the topic:	
d) Nature of the topic. Some	Nature of the topic.	
to the way of anotical	some topics may lean	
to the use of practical	themselves to the use of	
activities, while others may	practical activities, while	
favour the use of roleplay,	others may favour the use	
discussion, drills, etc.	of roleplay, discussion, drills,	
b) Expected lesson outcomes:	etc.	
This will influence the type		
of pedagogy or teaching		
strategies to employ		
c) Abilities of learners:		
Differences in learners'		
levels of abilities call for		
the use of differentiated		
tasks to cater for the		
individual learner needs		
d) Available teaching and		
learning resources		
Inadequate teaching and		
learning resources will		
make the teacher recort to		
the use of demonstrations		
or group work		
e) Learning environment:		
Large class sizes may make		
the teacher use whole class		
discussion, and lecture		
methods		
f) Assessment (as, for and of):		
The purpose of assessment		
strategies will influence the		
type of teaching pedagogy		
to use in a lesson delivery.		
For instance, if the purpose		
of assessment is to provide		
feedback to learners, a		
teacher may ask learners		
to demonstrate an activity		
for the teacher and other		
learners to make inputs,		
etc.		

	2.7 Ask teachers to discuss a sample lesson plan in ICT and show how it can be taught using relevant pedagogies that can support the delivery of the SHS/TVET curriculum (NTS 1d, 2b - 2f, 3a, 3c, 3d and 3f - 3l).	2.7 Discuss a sample lesson plan in ICT and show how it can be taught using relevant pedagogies that can support the delivery of the SHS/TVET curriculum (NTS 1d, 2b - 2f, 3a, 3c, 3d and 3f - 3l).	
	<i>Refer to Appendix 1 for a sample lesson plan in ICT in SHS 1.</i>	Refer to Appendix 1 for a sample lesson plan in ICT in SHS 1.	
	2.8 Ask teachers to indicate how the lesson will be taught using other appropriate pedagogies (NTS 2c, 2e, 2f, 3a and 3c-3l).	2.8 Indicate how the lesson will be taught using other appropriate pedagogies (NTS 2c, 2e, 2f, 3a and 3c-3l).	
3.	3.1 Ask teachers to identify in	3.1 Identify in the sample lesson	30
Modelling a	, the sample lesson plan,	plan, activities that could	mins
teaching	activities that could promote	promote ICT, Gender Equality	
activity,	ICT, Gender Equality and Social	and Social Inclusion (GESI), 21 st	
making	Inclusion (GESI), 21 st century	century skills, differentiation	
links with	skills, differentiation and Social	and Social and Emotional	
the Pre-	and Emotional Learning (SEL)	Learning (SEL) responsiveness	
Tertiary	responsiveness (NTS 2e, 2f, 3c,	(NTS 2e, 2f, 3c, 3d, 3f and 3g).	
(standards-	3d, 3f and 3g).		
based)	E.g.	E.g.	
Curriculum	a) Learners were put in mixed-	Learners were put in mixed-	
and using	ability and heterogenous	ability and heterogenous groups	
GESI, SEL,	groups to research and	to research and write on the	
ICT and 21 st	write on the meaning of	meaning of terminologies given,	
century	terminologies given	etc.	
skills	(GESI/SEL/21 st century		
	skills/ differentiation)		
	b) Teacher used mixed-gender		
	groups during the activities		
	nossible) to encourage		
	collaboration between		
	males and females		
	including SEN learners		
	(GESI/SEL/21 st century		
	skills)		
	c) Teacher provided one-on-		
	one support to learners		
	who struggled with		
	associating the terms with		

their future learning		
expectations		
(GESI/SEL/differentiation)		
d) Differentiated activities		
were used to cater for		
individual learners' needs		
and learning styles		
(GESI/SEL/differentiation)		
e) The teacher used the		
Internet and computers to		
aid in developing the ICT		
skills of learners (ICT)		
f) The teacher asked the		
learners to summarise the		
lesson, aiding in developing		
communication and		
contury skills)		
a) Learners were asked to		
identify and record key		
terms that can assist in		
their future learning, and		
this helped in the individual		
learners reflecting on the		
topic and relating it to		
future learning		
expectations to develop		
critical thinking abilities,		
etc. (21 st century skills)		
3.2 Ask teachers to recommend	3.2 Recommend other	
other appropriate	appropriate	
assessment strategies that	assessment strategies that could	
could be used to assess	be used to assess learning in the	
learning in the sample lesson	sample lesson plan (NTS 3k - 3n,	
plan (NTS 3K - 3n, 3p).	3p).	
E.y.	E.y.	
a) Peer reduing	Peer redding, etc.	
c) Role-play		
d) Debate		
e) Dramatization		
f) Presentation etc.		
<i>j,</i>		
3.3 Ask a teacher to model a	3.3 Model a teaching activity	
teaching activity based on the	based on the sample lesson plan	
sample lesson plan that could	that could support learners who	

		support learners who may	may struggle with developing	
		struggle with developing basic	basic numeracy skills that can	
		numeracy skills that can assist	assist in their future learning	
		in their future learning taking	taking into consideration GESI,	
		into consideration GESI, SEL	SEL and 21 st century skills (NTS	
		and 21 st century skills (NTS 1d,	1d, 2b, 2c, 2e, 2f, 3a and 3c- 3l).	
		2b, 2c, 2e, 2f, 3a and 3c- 3l).		
4.	Evaluati	4.1 Ask teachers in groups to	4.1 In your group, reflect, write	10
	on and	reflect, write and share what	and share what you have	mins
	review	they have learned with the	learned with the larger group	
	of	larger group with regard to the	with regard to the relevant	
	session:	relevant pedagogies that can	pedagogies that can support	
		support the delivery of the	the delivery of the SHS/TVET	
\triangleright	Noting	SHS/TVET curriculum (NTS 1a,	curriculum (NTS 1a, 1b).	
	that	1b).		
	teachers			
	need to	4.2 Remind teachers to, where	4.2 Where possible, identify a	
	identify	possible, identify a critical	critical friend to observe your	
	critical	friend to observe their lesson in	lesson in relation to PLC Session	
	friends	relation to PLC Session 1 and	1 and provide feedback to you	
	to	provide feedback to them (NTS	(NTS 3n, 3o).	
	observe	3n, 3o).		
	lessons			
	and	4.3 Remind teachers to read	4.3 Read PLC Session 2 in	
	report	PLC Session 2 in preparation for	preparation for the next	
	at next	the next session.	session.	
	session			
Ар	pendix 1	a) Topic:	a) Topic:	
		Basic ICT Concepts	Basic ICT Concepts	
		b) Sub-Topic:	b) Sub-Topic:	
		Definition of key	Definition of key	
		terminologies and related	terminologies and related	
		concepts	concepts	
		c) Objectives:	c) Objectives:	
		By the end of the lesson,	By the end of the lesson,	
		learner will be able to	learner will be able to	
		explain at least four ICI	explain at least four ICI	
		related terminologies	related terminologies	
		without referring to any	without referring to any	
		material.	material.	
		a) Relevant Previous	a) Relevant Previous	
		Knowledge:	knowledge:	
		Learners can mention some	Learners can mention some	
		ICI terminologies.	ICI terminologies.	
		e) Teaching and Learning	e) Teaching and Learning	
		Resources:	Resources:	

	Internet as a resource, flash		Internet as a resource, flash
	cards, computer, projector,		cards, computer, projector,
	etc.		etc.
f)	Core Competencies:	f)	Core Competencies:
,,	, Creativity, innovation,	,,	Creativity, innovation.
	communication skills.		communication skills.
	collaboration leadershin		collaboration leadershin
	and personal development		and personal development
	critical thinking and		critical thinking and problem
	problem solving		coluing
~	Kouwords:	~)	Solving Kouwords:
g)	Reywords.	y)	Neywords.
	injoinduon,		injoiniulion,
	communication, technology,		communication, technology,
	mobile phone, computer,		mobile phone, computer,
	internet, social media,		internet, social media,
	projector, camera		projector, camera
h)	Introduction:	h)	Introduction:
	Play the game of win-win.		Play the game of win-win.
	Students are given flash		Students are given flash
	cards with terminologies on		cards with terminologies on
	them, and asked in mixed-		them, and asked in mixed-
	gender groups of four to		gender groups of four to
	mention one terminology		mention one terminology
	each. Each group has the		each. Each group has the
	opportunity to nominate the		opportunity to nominate the
	next group to mention the		next group to mention the
	next term on a flash card in		next term on a flash card in
	their possession and the		their possession and the
	game goes on till all flash		game goes on till all flash
	cards are used.		cards are used.
i)	Teachina and Learnina	i)	Teachina and Learnina
,	Activities:	,	Activities:
	i. In aroups of four.		i. In aroups of four.
	takina into account		takina into account
	ability levels and		ability levels and
	aender teacher drills		gender, teacher drills
	learners on the right		learners on the right
	spelling of keywords		spelling of keywords
	their relationship with		their relationship with
	the tonic and future		the tonic and future
	avportation in terms of		avpactation in terms of
	their future learning		their future learning
	iii llee gegeneriste		inen juture learning.
	II. Use appropriate		n. Use appropriate
	questioning techniques		questioning techniques
	ana linkages of word		and linkages of word
	roots to assist all		roots to assist all
	learners to come out		learners to come out

	with the meaning of			with the meaning of
	the terminologies			the terminologies
	given.			given.
iii.	Demonstrate how to		iii.	Demonstrate how to
	search for a word on			search for a word on
	the Internet with the			the Internet with the
	help of a computer and			help of a computer and
	a projector for learners			a projector for learners
	to observe.			to observe.
iv	In mixed-ability arouns		iv	In mixed-ahility arouns
	of four assist learners			of four assist learners
	to use the Internet to			to use the Internet to
	search for the meaning			search for the meaning
	of at least four			of at least four
	by ut least jour			by ut least jour
i) Corr	Reyworus identijied.	a	Con	Reywords identified.
j) Core]]	:	
Ι.	Computer Security:		Ι.	Computer Security:
	Measures and controls			Measures and controls
	that ensure the			that ensure the
	confidentiality of			confidentiality of
	information. It includes			information. It includes
	antivirus, spyware			antivirus, spyware
	protection, passwords			protection and firewalls.
	and firewalls.			
ii.	System Maintenance:		ii.	System Maintenance:
	The processes and			The processes and
	methods of ensuring			methods of ensuring the
	the health of the			health of the computer
	computer which			which includes system
	includes system			information and
	information and			diagnosis, system clean
	diagnosis, system clean			up tools and automatic
	up tools and automatic			updating.
	updating.			
iii.	Antivirus:		iii.	Antivirus:
This	s is a software that		Thi	s is a software that
	searches for. detects			searches for. detects
	and destrovs viruses			and destrovs viruses
	which could damage or			which could damage or
	corrupt the computer			corrunt the computer
	system			system
iv	Snyware Protection		iv	Snyware Protection
<i>iv</i> .	This stons nearly from			This stons neonle from
	hoing able to illegally			hoing able to illegally
	monitor other poonlo's			monitor other poople's
	use of their computer			use of their computer
	use of their computer,			use of their computer,
	incluaing the keys the	1		incluaing the keys the

user types in, which	user types in, which	
could disclose personal	could disclose personal	
banking details and	banking details and	
passwords.	passwords.	
v. Disk Formatting:		
It is used to prepare a	v. Disk Formatting:	
storage device so that it	It is used to prepare a	
is ready to be used for	storage device so that it	
the first time.	is ready to be used for	
vi. Firewalls:	the first time.	
They restrict the incoming	vi. Firewalls:	
and outgoing access to	They restrict the incoming	
a network.	and outgoing access to	
vii. Operating System:	a network.	
The low-level software that	vii. Operating System:	
supports a computer's	The low-level software that	
basic functions.	supports a computer's	
viii. Utilities Programs:	basic functions.	
These assist in making	viii. Utilities Programs:	
hardware and devices	These assist in making	
work and communicate	hardware and devices	
with one another.	work and communicate	
ix. Disk organisation:	with one another.	
This includes formatting, file	ix. Disk organisation:	
transfer and	includes formatting, file	
defragmentation	transfer and	
software which assist in	defragmentation	
moving files from one	software which assist in	
location to another.	moving files from one	
x. AYO: Acronym for "As	location to another.	
You Organise"	x. AYO: Acronym for "As	
	You Organise"	
k) Conclusion:	k) Conclusion:	
Learners are made to	Learners are made to	
summarise the lesson based	summarise the lesson based	
on the expected learning	on the expected learning	
outcomes.	outcomes.	
l) Evaluation:	l) Evaluation:	
Solve the word puzzle given	Solve the word puzzle given	
below and return them	below and return them	
before the start of next	before the start of next	
lesson.	lesson.	
Note:	Note:	
Level 1 learners to solve at	Level 1 learners to solve	
least three of the puzzle	at least three of the	
items, Level 2 to solve at	puzzle items, Level 2 to	



PLC Sess	ion 2: The concept of	PLC Session 2: The concept of teaching at the right level			
using dif	ferentiation				
Focus: the bullet points provide the frame for what is to be done in the session. The writer should use the bullets to guide what they write for the PLC Coordinato rs and teachers to do and say during each session. Each bullet needs to be	Guidance notes on Leading the session. What the PLC Coordinator will have to say during each stage of the session	Guidance Notes on Teacher Activity during the PLC Session. What teachers will do during each stage of the session	Time in session		
1. Introduction	 1.1 Start the PLC session by asking teachers to share what they did differently in the classroom or elsewhere based on PLC Session 1, on <i>relevant</i> <i>pedagogies that support the</i> <i>delivery of secondary</i> <i>education curriculum</i>, which they think impacted learning positively. 1.2 Ask teachers to discuss and summarise in a single sentence why they think what a colleague did by way of application of what they learned in Session 1, on relevant pedagogies that support the delivery of secondary education 	 1.1 Share what you did differently in the classroom or elsewhere based on PLC Session 1, on relevant pedagogies that support the delivery of secondary education curriculum, which you think impacted learning positively. 1.2 Discuss and summarise in a single sentence why you think what your colleague did by way of application of what you learned in Session 1, on relevant pedagogies that support the delivery of secondary education curriculum, supported learning. 	20 mins		

	curriculum, supported		
	learning.		
2. Planning	2.1 Ask a teacher to read the	2.1 Read the Purpose, Learning	30 mins
for	Purpose, Learning Outcomes	Outcomes (LOs) and Learning	
teaching,	(LOs) and Learning Indicators	Indicators (LIs) for the session.	
learning	(LIs) for the session.		
and			
assessment	Purpose:	Purpose:	
activities,	The purpose of the session is	The purpose of the session is	
making	to discuss the concept of	to discuss the concept of	
links with	teaching at the right level	teaching at the right level using	
the Pre-	using differentiation.	differentiation.	
Tertiary			
(standards-	LO 1: Demonstrate	LO 1: Demonstrate knowledge,	
based)	knowledge,	understanding and	
Curriculum	understanding and	application of the	
and using	application of the	concept of teaching at	
GESI, SEL,	concept of teaching at	the right level using	
ICI and 21 st	the right level using	differentiation (NTS 3e	
century	differentiation (NTS 3e	- 3j).	
SKIIIS	- 3j).		
	LI 1.1 Explain the concept of teaching at the right level.	LI 1.1 Explain the concept of teaching at the right level.	
	LI 1.2 Explain the concept and aspects of differentiation.	LI 1.2 Explain the concept and aspects of differentiation.	
	I O 2: Demonstrate	IO 2. Demonstrate	
	understanding of	understanding of	
	planning multi-level	planning multi-level	
	lessons using	lessons using	
	differentiation (NTS	differentiation (NTS 3a,	
	3a, 3c - 3p).	3c - 3p).	
	LI 2.1 Identify and discuss the	LI 2.1 Identify and discuss the	
	strategies of teaching at the	strategies of teaching at the	
	right level.	right level.	
	LI 2.2 Give examples of	LI 2.2 Give examples of	
	planning, teaching and	planning, teaching and	
	assessing multi-level lessons	assessing multi-level lessons	
	using differentiation.	using differentiation.	
	2.2 Ask teachers in pairs to	2.2 In pairs explain to your	
	explain to their partners and	partner and share with the	
	share with the larger group	larger group the concept and	
	the concept and aspects of	aspects of differentiation	
		across the curriculum (NTS 3i).	

differentiation across the curriculum (NTS 3i). *E.g.*

a) Concept:

i. Differentiation is the process by which differences between learners are accommodated so that all learners in a group have best chances of learning. Differentiation can be achieved by task, outcome, learning activity, pace and learning needs. It also ensures that each *learner* benefits adequately from the delivery of the curriculum ii. Differentiation is the use of a variety of teaching methods, strategies, activities and assessment during a single lesson to ensure that all learners achieve equitable learning outcomes, etc.

b) Aspects:

- Differentiation by task involves setting different assignments for learners of different abilities. One way to achieve this may be to produce different sets of exercises depending on learners' abilities
- ii. Differentiation by outcome is where the teacher sets a task and instead of working

E.g.

a) Concept: Differentiation is the process by which differences between learners are accommodated so that all learners in a group have best chances of learning. Differentiation can be achieved by task, outcome, learning activity, pace and learning needs. It also ensures that each learner benefits adequately from the delivery of the curriculum, etc.

b) Aspects:

Differentiation by task involves setting different assignments for learners of different abilities. One way to achieve this may be to produce different sets of exercises depending on learners' abilities, etc.

towards a single right		
answer, learners arrive		
at a personalised		
outcome depending on		
their abilities		
iii. Differentiation by		
learning activity is a		
teaching approach		
that involves offering		
learners different ways		
to learn and		
demonstrate their		
understanding of a		
concept or skill		
iv. Differentiation by pace		
is a teaching approach		
where teachers adjust		
the speed at which		
they deliver content or		
assign tasks based on		
individual learner		
needs		
v. Differentiation by		
learning needs refers		
to a teaching approach		
that tailors teaching to		
all learners' learning		
needs, etc.		
2.3 Ask teachers to discuss at	2.3 Discuss at least three	
least three benefits of	benefits of differentiation	
differentiation across the	across the curriculum (NTS 2b -	
curriculum (NTS 2b - 2f, 3a	2f, 3a and 3f - 3j).	
and 3f - 3j).	_	
E.g.	E.g.	
a) Encourages maximum	Encourages maximum	
learner engagements	learner engagements, etc.	
b) Provides learners with		
the opportunity to		
engage with the		
content and improve in		
their learning		
c) Allows learners to		
learn in their own ways		
at their own pace		
a) Encourages social and		
academic inclusivity		

	e) Promotes greater confidence for learners		
	f) Addresses issues by		
	dealing with learners		
	of varied abilities and		
	responds to their		
	Individual heeds (Konstantinou Katzia		
	(Konstantinou-Katzia, 2013) etc		
	2.4 Ask teachers to discuss a sample lesson plan in	2.4 Discuss a sample lesson plan in integrated science and	
	integrated science and show	show how it can be taught	
	how it can be taught using	using differentiation to cater	
	learners who may struggle	with the concepts of diffusion	
	with the concepts of diffusion	and osmosis (NTS 2b, 2e, 2f	
	and osmosis (NTS 2b, 2e, 2f	and 3c - 3p).	
	and 3c - 3p).	Refer to Appendix 2 for a	
	Refer to Appendix 2 for a	sample lesson plan in	
	Integrated Science for SHS	(Basic 10)	
	1(Basic 10)		
	2.5 Ask teachers to indicate	2.5 Indicate how the lesson will	
	how the lesson will be taught	be taught using other	
	using other appropriate methods.	appropriate methods.	
	E.g.	E.g.	
	a) Scaffolding	Scaffolding, etc.	
	b) Subject Portfolio		
-	Activity, etc.		
3. Modelling c	3.1 Ask teachers to identify in	3.1 Identify in the sample	30 mins
teaching a	activities that could promote	could promote GESL SEL	
activity,	GESI, SEL responsiveness, ICT,	responsiveness, ICT,	
making	differentiation and 21 st	differentiation and 21 st century	
links with	century skills (NTS 3f).	skills (NTS 3f).	
the Pre-	E.g.	E.g.	
Tertiary	a) Learners worked in	Learners worked in	
(standards-	pairs, mixed-gender	pairs, mixed-gender	
uaseu) Curriculum	arouns to perform the	arouns to perform the	
and using	experiment on	experiment on	
GESI, SEL,	diffusion (GESI)	diffusion, etc.	
ICT and 21 st	b) Teacher engaged		
	learners to work in		

		E.g.	E.g.	
		a) Watching	Watching YouTube/Pre-	
		YouTube/Pre-recorded	recorded videos and	
		videos and podcast	podcast with questions	
		with questions	embedded on how	
		embedded on how	osmosis and diffusion	
		osmosis and diffusion	occur, etc.	
		occur	· · · · , · · · ·	
		b) Giving learners		
		assianments to be		
		presented in		
		, PowerPoint		
		c) Giving learners		
		projects to search		
		online for information		
		d) Using google forms to		
		quiz learners, etc.		
		3.4 Ask a teacher to model a	3.4 Model a teaching activity	
		teaching activity based on the	based on the sample lesson	
		sample lesson plan that can	plan that can support learners	
		support learners who may	who may struggle with the	
		struggle with the concepts of	concepts of diffusion and	
		diffusion and osmosis taking	osmosis taking into	
		into consideration GESI, SEL,	consideration GESI, SEL, ICT,	
		ICT, 21 st century skills and	21 st century skills and	
		differentiation for feedback	differentiation for feedback	
		from their colleagues (NTS 1a,	from your colleagues (NTS 1a,	
		2c and 3e).	2c and 3e).	
4.		4.1 Ask teachers in groups to	4.1 In your group, reflect, write	10 mins
Eva	aluation	reflect, write and share what	and share what you have	
an	d review	they have learned with the	learned with the larger group	
of	session:	larger group with regard to	with regard to the concept of	
		the concept of teaching at the	teaching at the right level using	
	Noting	right level using	differentiation (NTS 1a, 1b).	
	that	differentiation (NTS 1a, 1b).		
	teacher			
	s need	4.2 Remind teachers to,	4.2 where possible, identify a	
	(O	where possible, identify a	critical friend to observe your	
	aentity	critical friend to observe their	lesson in relation to PLC	
	friorde	Lesson in relation to PLC	Session 2 and provide	
	to	foodback to them (NTS 2n	12200000 10 YOU (NTS 31, 30).	
	obcorrio			
		50).		
	and	13 Remind teachers to road	A 3 Read and bring along any	
	anu	and bring along any relevant	rolovant materials for DLC	
	report	and bring along any relevant	relevant materials for PLC	

at next	materials for PLC Session 3 in	Session 3 in preparation for the	
session	preparation for the next	next session.	
	session.		
Appendix 2	A sample lesson plan for	A sample lesson plan for	
••	teachina Intearated Science	teaching Integrated Science	
	using differentiation to	using differentiation to	
	learners who may strugale	learners who may struggle	
	with the concents of diffusion	with the concents of diffusion	
	and osmosis:	and osmosis:	
	a) Topic:	a) Tonic:	
	u) Topic.	u) Topic.	
	whoteness into and	whoteness into and out	
	b) Cut tania	b) Sub tania	
	b) Sub-topic:	b) SUB-tOPIC:	
	Diffusion and Osmosis	Diffusion and Osmosis	
	c) Objectives:	c) Objectives:	
	By the end of the	By the end of the	
	lesson, the learner will	lesson, the learner will	
	be able to:	be able to:	
	i. Explain the term	i. Explain the term	
	'diffusion' correctly	'diffusion' correctly	
	ii. Demonstrate how	ii. Demonstrate how	
	diffusion occurs in	diffusion occurs in	
	liquids	liquids	
	iii. Explain the term	iii. Explain the term	
	'osmosis' correctly	'osmosis' correctly	
	iv. Discuss the	iv. Discuss the	
	differences among	differences among	
	hypertonic,	hypertonic,	
	hypotonic and	hypotonic and	
	isotonic solutions	isotonic solutions	
	d) Teaching and Learning	d) Teaching and Learning	
	Resources (TLRs):	Resources (TLRs):	
	Highly scented bottle	Hiahly scented bottle of	
	of perfume. water.	perfume, water.	
	potassium	potassium	
	permanaanate.	permangangte, begker,	
	heaker stirrer	stirrer projector	
	nrojector worksheets	worksheets	
	anton/computer and	lanton/computer and	
	nre-recorded /VouTube	nre-recorded/VouTube	
	videos on diffusion and	videos on diffusion and	
		osmosis	
	a) Palayant Dravious	a) Palayant Providur	
	ej nelevulli rievious	Knowledge (DDK)	
	i Lograno detect	i Lographic detect the	
	i. Learners aetect	i. Learners detect the	
	the aroma of	aroma of stew/soup	

stew/soup being	being prepared in
prepared in the	the kitchen.
kitchen.	
ii. Some learners	ii. Some learners
observe water	observe water
dronlets on	dronlets on surfaces
surfaces of leaves	of leaves
f) Introduction:	f) Introduction:
J) Introduction. Doviso logrnors' DDK	J) Introduction. Douise Learners' DDK
Nevise learners RPR	Nevise leuriners RPR
using the johowing	using the jonowing
questions;	questions;
i. what process	i. what process
makes it possible	makes it possible
for you to detect	for you to detect
the aroma of	the aroma of
stew/soup being	stew/soup being
prepared in the	prepared in the
kitchen as you	kitchen as you pass
pass by.	by. (Expected
(Expected	answers: wind,
answers: wind,	diffusion)
diffusion)	
ii. name the main	ii. name the main
process that	process that makes
makes it possible	it possible for
for water to mov	e water to move
from one cell to	from one cell to
another in plant	another in plants
(Expected	(Expected answer:
answer: osmosis	osmosis)
Moto:	031103137
Note.	Nata
Share specific objectives with	Note:
leurners	
	learners
g) lasks/Activities:	g) Tasks/Activities:
Activity 1:	Activity 1:
Learners work	Learners work
individually, in mixed-	individually, in mixed-
gender and mixed-	gender and mixed-
ability groups to	ability groups to
perform the following	perform the following
activity to establish	activity to establish
diffusion.	diffusion.
Step 1:	Step 1:
Pick up a bottle of	Pick up a bottle of
highly scented perfur	e highly scented perfume

and move to one corner of the classroom closing all doors and windows and smell the initial scent in the class.

Note:

Take precaution to protect learners who are allergic to strong smell.

Step 2: Put few drops of the scented perfume on the floor.

Step 3:

Move to the opposite corner of the classroom and ask learners to tell their observation and draw a conclusion. Observation: Learners will observe that:

- i. The scent of the perfume was intense at the spot where it was initially sprayed (region of higher molecular concentration) than the rest of the class.
- ii. After five (5) minutes, the smell of the perfume was evenly distributed throughout the classroom.

and move to one corner of the classroom closing all doors and windows and smell the initial scent in the class.

Note:

Take precaution to protect learners who are allergic to strong smell.

Step 2:

Put few drops of the scented perfume on the floor.

Step 3:

Move to the opposite corner of the classroom and ask learners to tell their observation and draw a conclusion. Observation: Learners will observe that:

- i. The scent of the perfume was intense at the spot where it was initially sprayed (region of higher molecular concentration) than the rest of the class.
- ii. After five (5) minutes, the smell of the perfume was evenly distributed throughout the classroom.

Activity 2:

Learners work in pairs and in mixed-ability, mixed-gender groups (where possible) to perform the following activities to determine diffusion in liquids:

Step 1: Half fill 250cm³ beaker with water.

Step 2: Put few grains of potassium permanganate into the water that is in the beaker.

Step 3: Leave the beaker on a flat table/surface for about 20 minutes.

Step 4:

Stir the mixture with a stirrer for about two (2) minutes for easy spread of the potassium permanganate.

Step 5:

Critically observe the water in the beaker every 5 minutes and share your observation and draw a conclusion. Observation: Learners note that:

i. The grains of potassium permanganate spreads slowly in the water and eventually attains a

Activity 2:

Learners work in pairs and in mixed-ability, mixed-gender groups (where possible) to perform the following activities to determine diffusion in liquids:

Step 1: Half fill 250cm³ beaker with water.

Step 2:

Put few grains of potassium permanganate into the water that is in the beaker.

Step 3:

Leave the beaker on a flat table/surface for about 20 minutes.

Step 4:

Stir the mixture with a stirrer for about two (2) minutes for easy spread of the potassium permanganate.

Step 5:

Critically observe the water in the beaker every 5 minutes and share your observation and draw a conclusion. Observation: Learners note that: i. The grains of

i. The grains of potassium permanganate spreads slowly in the water and

state of	eventually attains a	
equilibrium.	state of equilibrium.	
ii. The water turns to	ii. The water turns to	
purplish colour.	purplish colour.	
Activity 3:	Activity 3:	
Learners think-pair-	Learners think-pair-	
share the meaning of	share the meaning of	
the terms hypertonic,	the terms hypertonic,	
hypotonic and isotonic	hypotonic and isotonic	
solutions in groups of	solutions in groups of	
six (6).	six (6).	
Activity 4:	Activity 4:	
Using talking points	Using talking points	
strategy, ask learners	strategy, ask learners	
to explain the concept	to explain the concept	
of osmosis in their	of osmosis in their	
groups.	groups.	
Activity 5:	Activity 5:	
In mixed-ability	In mixed-ability groups,	
groups, learners	learners discuss the	
discuss the differences	differences among the	
among the terms:	terms: hypertonic,	
hypertonic, hypotonic	hypotonic and isotonic	
and isotonic solutions.	solutions.	
Activity 6:	Activity 6:	
Learners watch pre-	Learners watch pre-	
recorded/YouTube	recorded/YouTube	
videos on diffusion and	videos on diffusion and	
osmosis to consolidate	osmosis to consolidate	
knowledge.	knowledge.	
Note:	Note:	
The video should have	The video should have	
background commentary to	background commentary to	
help SEN learners.	help SEN learners.	
h) Core Points:	h) Core Points:	
i. Keywords:	i. Keywords:	
Diffusion	Diffusion	
Osmosis	Osmosis	
> Hypertonic	Hypertonic	
solution	solution	

	Hypotonic		Hypotonic	
	solution		solution	
	Isotonic solution		Isotonic solution	
ii.	Explanation of the		ii. Explanation of the	
	term diffusion:		term diffusion:	
	Diffusion is the		Diffusion is the	
	movement of		movement of	
	molecules or		molecules or	
	particles from a		particles from a	
	region of higher		region of higher	
	molecular		molecular	
	concentration to a		concentration to a	
	region of lower		region of lower	
	molecular		molecular	
	concentration until		concentration until	
	the particles are		the particles are	
	evenly distributed		evenly distributed	
	and a dynamic		and a dynamic	
	equilibrium		equilibrium	
	established.		established.	
	Diffusion can only		Diffusion can only	
	occur if a		occur if a	
	concentration		concentration	
	gradient is		gradient is	
	established.		established.	
iii.	Explanation of the	iii.	Explanation of the	
	term osmosis:		term osmosis:	
	Osmosis is the		Osmosis is the	
	movement of water		movement of water	
	(solvent) molecules		(solvent) molecules	
	from a region of		from a region of	
	higher molecular		higher molecular	
	concentration to a		concentration to a	
	region of lower		region of lower	
	molecular con		molecular con	
	centration through a		centration through a	
	semi-permeable		semi-permeable	
	, membrane. Osmosis		, membrane. Osmosis	
	can only take place if		can only take place if	
	osmotic gradient is		osmotic gradient is	
	established.		established.	
iv.	Hypertonic Solution is	iv.	Hypertonic Solution is a	
-	a solution which has a		solution which has a	
	higher solute		higher solute	
	concentration than		concentration than that	

that of the cell being	of the cell being			
compared with.	compared with.			
v. Hypotonic Solution is	v. Hypotonic Solution is a			
a solution which has a	solution which has a			
lower solute	lower solute			
concentration than	concentration than that			
that of the cell being	of the cell being			
compared with.	compared with.			
vi. Isotonic Solution is a	vi. Isotonic Solution is a			
solution which has an	solution which has an			
equal/the same solute	equal/the same solute			
concentration as that	concentration as that of			
of the coll being	the cell being compared			
of the cell being	the cell being compared			
compared with.	with.			
i) Coro Compotonoios:	il Coro Compotencias:			
i) Core competencies:	i) core competencies:			
I. Problem-solving skills	I. Problem-solving skills			
ii. Critical thinking	ii. Critical thinking			
iii. Collaborative learning	iii. Collaborative learning			
skills	skills			
iv. Communication skills	iv. Communication skills			
v. Leadership skills	v. Leadership skills			
j) Conclusion:	j) Conclusion:			
Draw learners' attention	Draw learners' attention			
to the end of the lesson	to the end of the lesson			
Summarise the lesson by	Summarice the lessen by			
Summunse the lesson by	Summarise the lesson by			
asking learners in their	asking learners in their			
groups to tell what they	groups to tell what they			
have learned.	have learned.			
Give exercise, mark and	Give exercise, mark and			
provide feedback to the	provide feedback to the			
learners individually.	learners individually.			
Assian an activity for the	Assian an activity for the			
next lesson	next lesson			
i Learners carry out	i learners carry out			
the activities on the	the activities on the			
the activities on the	the activities on the			
worksheets given	worksheets given out			
out to the class	to the class			
demonstrating how	demonstrating how			
diffusion occurs	diffusion occurs			
(Level 1)	(Level 1)			
ii Learners further	ii. Learners further			
evolain what is	evolain what is			
explain what is	expluit what is			
meant by	meant by			
concentration and	concentration and			
osmotic gradients.	osmotic gradients.			
	(Level 2)		(Level 2)	
-----------	------------------------	--------	------------------------	--
iii.	Additionally,	iii.	Additionally, learners	
	learners explain the		explain the effect of	
	effect of stirring on		stirring on the	
	the mixture of water		mixture of water and	
	and potassium		potassium	
	permanganate.		permanganate.	
	(Level 3)		(Level 3)	
k) Evo	aluation:	k) Eva	aluation:	
<i>i.</i>	Explain the term	i.	Explain the term	
	diffusion.		diffusion.	
ii.	Demonstrate how	ii.	Demonstrate how	
	diffusion occurs in		diffusion occurs in	
	liquids.		liquids.	
iii.	Differentiate among	iii.	Differentiate among	
	Hypertonic,		Hypertonic,	
	Hypotonic and		Hypotonic and	
	Isotonic Solutions.		Isotonic Solutions.	
iv.	Explain the effect of	iv.	Explain the effect of	
	osmosis on a plant		osmosis on a plant	
	cell when it is placed		cell when it is placed	
	in a hypertonic,		in a hypertonic,	
	hypotonic and		hypotonic and	
	isotonic solutions.		isotonic solutions.	
V.	Explain the effect of	ν.	Explain the effect of	
	osmosis on an		osmosis on an	
	animal cell when it		animal cell when it is	
	is placed in a		placed in a	
	hypertonic,		hypertonic,	
	hypotonic and		hypotonic and	
	isotonic solutions.		isotonic solutions.	
l) Re	marks:	l) Rei	marks:	

PLC Session 3: Social and Emotional Learning (SEL)			
Focus: the bullet points provide the frame for what is to be done in the session. The writer should use the bullets to guide what they write for the PLC Coordinators and teachers to do or say during each session. Each bullet needs to be addressed	Guidance Notes on Teacher Activity during the PLC Session. What teachers will do during each stage of the session	Guidance Notes on Teacher Activity during the PLC Session. What teachers will do during each stage of the session	Time in session
1. Introduction	1.1 Start the PLC session by asking teachers to share what they did differently in the classroom or elsewhere based on PLC Session 2, on the concept of teaching at the right level using differentiation, which they think impacted learning positively.	1.1 Share what you did differently in the classroom or elsewhere based on PLC Session 2, on <i>the concept</i> <i>of teaching at the right</i> <i>level using differentiation,</i> which you think impacted learning positively.	20 mins
	1.2 Ask teachers to discuss and summarise in a single sentence, why they think what their colleague did by way of application of what they learned in Session 2, on the concept of teaching at the right level using differentiation, supported learning.	1.2 Discuss and summarise in a single sentence, why you think what your colleague did by way of application of what you learned in Session 2, on the concept of teaching at the right level using differentiation, supported learning.	
2. Planning for teaching, learning and assessment activities, making links with the Pre- Tertiary (standards-based) Curriculum and using GESI, SEL,	2.1 Ask a teacher to read the purpose, introduction to Social and Emotional Learning (SEL), the Learning Outcomes (LOs) and Learning Indicators (LIs) for the session.	2.1 Read the purpose, introduction to Social and Emotional Learning (SEL), the Learning Outcomes (LOs) and Learning Indicators (LIs) for the session.	30 mins

ICT and 21 st	Purpose:	Purpose:	
century skills	The purpose of the session is	The purpose of the session	
	to guide teachers to;	is to guide teachers to;	
	a) have a clear	a) have a clear	
	understanding of SEL	understanding of	
	competencies	SEL competencies	
	b) take SEL	b) take SEL	
	competencies into	competencies into	
	account in the	account in the	
	teaching and	teaching and	
	learning process	learning process	
	c) implement SEL in	c) implement SEL in	
	other aspects of	other aspects of	
	school life	school life	
	d) engage teachers on	d) engage teachers on	
	how to encourage	how to encourage	
	learners to take SEL	learners to take SEL	
	into account in their	into account in	
	learning.	their learning.	
	Introduction to SEL:	Introduction to SEL.	
	Social and emotional	Social and emotional	
	learning refers to the	learning refers to the	
	process through which	process through which	
	learners learn to understand	learners learn to	
	and manage emotions; set	understand and manage	
	and achieve positive goals;	emotions; set and achieve	
	feel and show empathy for	positive goals; feel and	
	others; establish and	show empathy for others;	
	maintain positive	establish and maintain	
	relationships; and make	positive relationships; and	
	responsible decisions	make responsible decisions	
	(Weissberg, <i>et al.,</i> 2015).	(Weissberg, et al., 2015).	
	Teaching involves	Teaching involves	
	addressing learners'	addressing learners'	
	emotional, social and	emotional, social and	
	behavioural needs. With the	behavioural needs. With	
	right support, learners learn	the right support, learners	
	to articulate and manage	learn to articulate and	
	their own emotions. They	manage their own	
	are able to deal with conflict	emotions. They are able to	
	and solve problems if they	deal with conflict and solve	
	are given the appropriate	problems if they are given	
	guidance. Also, learners are	the appropriate guidance.	
	able to understand things	Also, learners are able to	
	rrom otner people's	understand things from	
	perspective and	other people's perspective	

communicate in appropriate	and communicate in	
ways if teachers make a	appropriate ways if	
deliberate effort to	teachers make a deliberate	
encourage them to do so.	effort to encourage them	
These social and emotional	to do so.	
skills are essential for	These social and emotional	
learners' development. They	skills are essential for	
support effective learning	learners' development.	
and are linked to positive	They support effective	
outcomes in later life. Social	learning and are linked to	
and emotional learning can	positive outcomes in later	
enhance mental health and	life. Social and emotional	
well-being, positive learner	learning can enhance	
behaviour and academic	mental health and well-	
performance.	being, positive learner	
	behaviour and academic	
	performance.	
LO 1: Demonstrate	LO 1: Demonstrate	
knowledge and	knowledge and	
understanding of	understanding of	
concepts related to SEL	concepts related to	
(NTS 2e, 2f, 3c, 3d, 3f,	SEL (NTS 2e, 2f, 3c,	
3g and 3k).	3d, 3f, 3g and 3k).	
LI 1.1 Explain the term SEL.	LI 1.1 Explain the term SEL.	
LI 1.2 List and explain at	LI 1.2 List and explain at	
least three competencies	least three competencies	
associated with SEL.	associated with SEL.	
LO 2: Demonstrate	LO 2: Demonstrate	
knowledge,	knowledge,	
understanding and	understanding and	
application of SEL	application of SEL	
across the SHS/TVET	across the SHS/TVET	
curriculum (NTS 2e,	curriculum (NTS 2e,	
2f, 3c, 3d, 3f, 3g and	2f, 3c, 3d, 3f, 3g and	
3k).	3k).	
LI 2.1 Mention and explain	LI 2.1 Mention and explain	
at least two benefits of SEL	at least two benefits of SEL	
competencies.	competencies.	
LI 2.2 Discuss how to	LI 2.2 Discuss how to	
promote SEL competencies	promote SEL competencies	
in the school environment	in the school environment	
including the classroom.	including the classroom.	
-	-	

2.2 Ask teachers in	2.2 In pairs/groups, explain	
pairs/groups to explain the	the term SEL in your own	
term SEL in their own words	words (NTS 2c, 2e).	
(NTS 2c, 2e).	. , ,	
Note:		
Refer to the introduction		
· · · · · · · · · · · · · · · · · · ·		
2.3 Ask teachers to list and	2.3 List and explain at least	
explain at least three	three competencies	
competencies associated	associated with SEL (NTS	
with SEL (NTS 2e, 2f).	2e, 2f).	
E.g.	E.g.	
a) Self-awareness:	Self-awareness:	
Ability to consider and	Ability to consider and	
understand one's	understand one's	
emotions, thoughts,	emotions, thoughts,	
values and experiences,	values and experiences,	
and how these can	and how these can	
influence one's actions	influence one's actions,	
b) Self-management:	etc.	
Ability to regulate and		
control one's emotions,		
thoughts and behaviours		
c) Responsible decision		
making: Ability to make		
positive and constructive		
choices based on ethical		
standards, safety		
concerns and social		
norms		
d) Social awareness: Ability		
to empathise with others		
and treat them fairly		
e) Relationship skills: Ability		
to make positive		
connections with others,		
taking their emotions		
into account, etc.		
	.	
2.4 Ask teachers in	2.4 In pairs/groups,	
pairs/groups to mention and	mention and explain at	
explain at least two benefits	least two benefits of any of	
of any of the competencies	the competencies of SEL	
ot SEL (NTS 2e, 2t, 3c, 3f, 3g,	(NTS 2e, 2t, 3c, 3t, 3g, 3k	
3k and 3l).	and 3I).	

Е. д.	E.g.	
a) Self-awareness:	Self-awareness:	
i. Helps to identify one's	Helps to identify one's	
strengths and	strengths and	
limitations	limitations, etc.	
ii. Improves self-		
management and		
decision making		
b) Self-management:		
<i>i.</i> Helps to control		
one's impulses		
ii. Helps one to set		
goals and cultivate		
self-discipline		
c) Responsible decision		
making:		
Helps one to make		
positive choices and		
avoid negative ones		
d) Social awareness:		
Helps one to establish		
and maintain healthy		
relationships and social		
interactions		
e) Relationship skills:		
Helps one to establish		
and maintain healthy,		
mutually rewarding		
relationships, etc.		
2.5 Ask teachers to discuss	2.5 Discuss how you will	
how they will promote SEL	promote SEL competencies	
competencies in their	in your classroom and the	
classroom and the school as	school as a whole (NTS 3c).	
a whole (NTS 3c).		
E. g.	E.g.	
a) Self-awareness:	Self-awareness:	
Expand learners'	Expand learners'	
emotional vocabulary	emotional vocabulary	
and support them to	and support them to	
express emotions	express emotions, etc.	
b) Self-management:		
i. Encourage learners to		
use self-calming		
strategies and positive		
self-talk to help deal		
with intense emotions		

ii. Model the social and		
emotional behaviour		
you want learners to		
emulate		
c) Social awareness:		
i. Use stories to discuss		
others' emotions and		
perspectives		
ii. Give specific and		
focused praise when		
learners display SEL		
skills		
d) Relationship skills: Role		
play good		
communication and		
listening skills		
e) Responsible decision-		
making:		
i. Get learners to		
practise problem		
solving strategies		
ii. Embed SEL in teaching		
across a range of		
subject areas (literacy,		
history, drama and		
PE), etc.		
2.6 Ask teachers to reflect	2.6 Reflect individually.	
individually, share their	share your ideas with a	
ideas with a colleague and	colleague and then with	
then with the larger group	the larger group (i.e. think-	
(i.e. think-pair-share) to	pair share) possible	
identify possible barriers to	barriers to applying	
applying concepts of SEL to	concepts of SEL to teaching	
teaching and learning and	and learning and how to	
how to address them (NTS	address them (NTS 2f, 3m).	
2f <i>,</i> 3m).		
E.g.	E.g.	
Misconceptions:	Misconception:	
a) Many people think that	Many people think that	
reserved and shy	reserved and shy	
learners are	learners are	
academically weak	academically weak, etc.	
To address this, teachers	To address this,	
can use whole-class	teachers can use	
dialogue, questions,	whole-class dialogue,	

 think-pair-share in their lessons which will encourage reserved learners to participate fully in lessons b) Friendship between boys and girls in school is misconstrued as sexual relationship 	questions, think-pair- share in their lesson which will encourage reserved learners to participate fully in lessons, etc.	
To address this, learners should be educated on healthy gender relationships, etc.		
 2.7 Ask teachers to identify at least four ways of making assessment SEL responsive (NTS 3k, 3n - 3p). E.g. a) Provide constructive feedback to all learners b) Give male and female learners equal opportunity to ask and answer questions c) Use self and peer assessment activities d) Use differentiated assessment to cater for different learning needs of learners e) Respect and appreciate learners' feedback, etc. 	2.7 Identify at least four ways of making assessment SEL responsive (NTS 3k, 3n - 3p). <i>E.g.</i> <i>Provide constructive</i> <i>feedback to all</i> <i>learners, etc.</i>	
2.8 Ask teachers to write and share at least four SEL responsive practices that can help make the learning environment conducive and non-threatening (NTS 3a -3c, 3e - 3g).	2.8 Write and share at least four SEL responsive practices that can help make the learning environment conducive and non-threatening (NTS 3a -3c, 3e - 3g).	

	 E.g. a) Provide suitable seating arrangement to meet all types of learners' needs b) Avoid negative expressions or language that can demean or exclude learners c) Avoid labelling learners based on their background and physical appearance d) Assign roles fairly to all learners e) Respect learners' views at all times f) Identify/call learners by their official names g) Provide psychological safety that makes the learning environment non-threatening, etc. 	E.g. Provide suitable seating arrangements to meet all types of learners' needs, etc.	
	Refer to Appendix 3 for a	Refer to Appendix 3 for a	
	sample lesson plan in social studies	sample lesson plan in social studies	
3. Modelling a teaching activity, making links with the Pre-Tertiary (standards-based) Curriculum and using GESI, SEL, ICT and 21 st century skills	studies3.1 Ask teachers to identifyin the sample lesson plan,activities that could promoteSEL, GESI, ICT, 21 st centuryskills and differentiation(NTS 3c, 3e - 3g).E.g.a) Learners wereencouraged to saypositive things abouttheir colleagues (SEL,21 st century skills)b) Mixed-ability andmixed-gender groupswere used in thelesson(GESI/Differentiation)c) Teacher used all-inclusive classdiscussion (GESI/	studies 3.1 Identify in the sample lesson plan, activities that could promote SEL, GESI, ICT, 21 st century skills and differentiation (NTS 3c, 3e - 3g). <i>E.g.</i> <i>Learners were</i> <i>encouraged to say</i> <i>positive things</i> <i>about their</i> <i>colleagues (SEL, 21st</i> <i>century skills), etc.</i>	30 mins

	SEL/21st contury		
	sel/21 ^m century		
d)	SKIIIS) Toachar identified		
u)	learners by their		
	official names		
	ojjiciui numes making reference to		
	making rejerence to		
- 1	the class list (SEL)		
e)	Conscious effort was		
	made to encourage		
	those who were		
	reserved to		
	contribute to		
	discussions (SEL)		
f)	Leaders were elected		
	by learners during		
	group work (21 st		
	Century)		
g)	PowerPoint were		
	used in presentation		
	(ICT)		
h)	Appropriate praises		
	were given to		
	complement		
	learners' efforts		
	(SEL/Differentiation)		
i)	Teacher moved		
	around the class to		
	encourage and		
	support all learners		
	(GESI/SEL/		
	Differentiation)		
j)	Learners were		
	reminded to be		
	guarded in their		
	comments while the		
	teacher intervened to		
	correct unguarded		
	remarks(SEL)		
3.2 Asl	< teachers to	3.2 Recommend other	
recom	mend other	appropriate assessment	
approp	priate assessment	strategies that are SEL	
strates	gies that are SEL	responsive (NTS 1a, 2e, 3f	
respor	sive (NTS 1a, 2e, 3f	and 3m).	
and 3n	n).	•	
E.q.		E.g.	
a) I	Peer assessment	Peer assessment, etc.	

	 b) Self-assessment, c) Using games d) Riddles, etc. 3.3 Ask teachers to suggest two ways in which ICT can be used in promoting SEL during lessons (NTS 3j). E.g. a) Using print material/pictures that depict friendliness, collaboration and inclusiveness b) Using YouTube videos that show empathy, support, self- management c) Using virtual games that have motivational feedback embedded, etc. 	3.3 Suggest two ways in which ICT can be used in promoting SEL during lessons (NTS 3j). <i>E.g.</i> <i>Using print</i> <i>material/pictures that</i> <i>depict friendliness,</i> <i>collaboration and</i> <i>inclusiveness, etc.</i>	
	3.4 Ask a teacher to model a teaching activity based on the sample lesson plan that can support learners who may struggle identifying the steps that can be taken to	3.4 Model a teaching activity based on the sample lesson plan that can support learners who may struggle identifying the steps that can be taken	
	reduce environmental degradation at the	to reduce environmental degradation at the	
	appropriate level, taking	appropriate level, taking	
	INTO CONSIDERATION SEL, GESI, ICT, 21 st century skills and	INTO CONSIDERATION SEL, GESI, ICT, 21 st century skills	
	differentiation (NTS 1a, 2c).	and differentiation (NTS	
		1a, 2c).	
	3.5 Ask teachers to provide	3.5 Provide feedback on	
	feedback on the lesson	the lesson delivered (NTS	
	delivered (NTS 3n, 3o).	3n, 3o).	
4. Evaluation and	4.1 Ask teachers in groups to	4.1 In your group, reflect,	10 mins
review of session:	reflect, write and share what	write and share what you	
	they have learned with the	have learned with the	
 Noting that 	larger group with regard to	larger group with regard to	
teachers need	the concept, benefits and	the concept, benefits and	
to identify	application of SEL in the	application of SEL in the	

colleagues to	school environment (NTS 1a,	school environment (NTS
observe	1b).	1a, 1b).
lessons and		
report at the	4.2 Remind teachers to,	4.2 Where possible,
next session	where possible, identify a	identify a critical friend to
	critical friend to observe	observe your lesson and
	their lesson and provide	provide feedback to you on
	feedback to them on how	how you have used SEL in
	they have used SEL in their	your lesson. (NTS 1a, 3I and
	lesson (NTS 1a, 3I and 3n).	3n).
	4.3 Remind teachers to read	4.3 Read PLC Session 4 in
	PLC Session 4 in preparation	preparation for the next
	for the next session.	session.
Appendix 3	Sample lesson plan based on	Sample lesson plan based
	Social Studies SHS Three	on Social Studies SHS Three
	2010 Syllabus	2010 Syllabus
	a) Topic:	a) Topic:
	Environmental	Environmental
	challenges	challenges
	b) Sub-Topic:	b) Sub-Topic:
	Environmental	Environmental
	degradation	degradation
	c) Objectives:	c) Objectives:
	By the end of the lesson,	By the end of the
	the learner will be able	lesson, the learner will
	to:	be able to:
	i. Describe at least	i. Describe at least
	three activities that	three activities that
	degrade the	degrade the
	environment	environment
	ii. Describe at least	ii. Describe at least
	three effects of	three effects of
	degradational	degradational
	activities on human	activities on human
	life	life
	iii. Identify at least three	iii. Identify at least
	steps that can be	three steps that can
	taken to reduce	be taken to reduce
	environmental	environmental
	degradation	degradation
	d) Tanahing and Lamming	d) Teaching and Learning
	a) reaching and Learning	u) reaching ana Learning
	Resources (ILRS):	Resources (ILKS):
	Computer, projector,	Computer, projector,
	pictures,	pictures,

	flipcharts/cardboards		flipcharts/cardboards	
	etc.		etc.	
e)	Relevant Previous	e)	Relevant Previous	
-	Knowledge (RPK):	-	Knowledge (RPK):	
	Learners can mention		Learners can mention	
	the components of the		the components of the	
	environment.		environment.	
f)	Introduction:	f)	Introduction:	
,,	i Ask learners to count	,,	i Ask learners to	
	the number of		count the number of	
	colleggues in the		colleggues in the	
	class from wherever		class from wherever	
	they sit in the		thou sit in the	
	check sit in the		check she had write	
	the number down		the number down	
	the number down.		the number down.	
			Call some of the	
	learners to tell you		learners to tell you	
	any number they like		any number they	
	between one and the		like between one	
	number they have		and the number	
	written down. For		they have written	
	each number that a		down. For each	
	learner mentions,		number that a	
	refer to your class list		learner mentions,	
	and mention the		refer to your class	
	name of the learner		list and mention the	
	that corresponds to		name of the learner	
	that number and ask		that corresponds to	
	the learner who		that number and	
	chose that number to		ask the learner who	
	say something		chose that number	
	positive about the		to say something	
	colleague whose		positive about the	
	name was		colleague whose	
	mentioned.		name was	
			mentioned.	
	ii. In an all-inclusive		ii. In an all-inclusive	
	class discussion,		class discussion,	
	quide learners to		guide learners to	
	mention the		mention the	
	components of the		components of the	
	environment. Make		environment. Make	
	conscious effort to		conscious effort to	
	encourage those who		encourane those	
	are received to		who are recorved to	
	contribute to the		contribute to the	
	discussion		discussion	
	uiscussion.		uiscussion.	

g) Task/Activities:	g) Task/Activities:
i. Ask learners to form	i. Ask learners to form
mixed-gender/mixe	d- mixed-
ability groups of thr	ee gender/mixed-
to five learners	ability groups of
(consider class size).	three to five
In each group let	learners (consider
them elect a leader	class size). In each
and a secretary. Sho	w group let them elect
PowerPoint slides og	f a leader and a
some activities that	secretary. Show
degrade the	PowerPoint slides of
environment for the	m some activities that
to observe and	degrade the
discuss. Call each	environment for
group to pick any of	them to observe
the activities and	and discuss. Call
describe how it	each group to pick
contributes to	any of the activities
environmental	and describe how it
degradation. Provid	e contributes to
appropriate measur	e environmental
of praise for effort.	degradation.
	Provide appropriate
	measure of praise
	for effort.
ii. Guide learners in	ii. Guide learners in
groups to discuss th	e groups to discuss
effects of	the effects of
environmental	environmental
degradation. Each	degradation. Each
group should be giv	en group should be
a flip-chart /card	given a flip-chart
board to write their	/card board to write
findings and appoin	t their findings and
among themselves	appoint among
one to present their	themselves one to
points in class.	present their points
	in class.
iii. Ask learners in grou	ps iii. Ask learners in
to identify themselv	es groups to identify
as political parties	themselves as
with their own name	es political parties with
(Let them use non-	their own names
existent names). Let	(Let them use non-
them discuss and	existent names). Let
prepare a manifesto	them discuss and

on steps that they	prepare a manifesto	
would take to reduce	on steps that they	
the degradation of	would take to	
the environment if	reduce the	
they are elected.	degradation of the	
Move round the	environment if they	
aroups to encourage	are elected. Move	
and support them	round the aroups to	
annronriately	encourage and	
appropriately	support them	
	appropriately	
iv Ask the groups to	iv Ask the groups to	
N. Ask the groups to	IV. Ask the groups to	
present then	present then	
manijestoes using	munijestoes using	
	media as	
and ask learners to	appropriate and ask	
critique them.	learners to critique	
Remind learners to	them. Remind	
be guarded in their	learners to be	
comments and	guarded in their	
intervene to correct	comments and	
unguarded remarks.	intervene to correct	
	unguarded remarks.	
h) Core Points:	h) Core Points:	
h) Core Points: i. Activities that	h) Core Points: i. Activities that	
h) Core Points: i. Activities that degrade the	h) Core Points: i. Activities that degrade the	
h) Core Points: i. Activities that degrade the environment:	h) Core Points: i. Activities that degrade the environment:	
 h) Core Points: i. Activities that degrade the environment: > Bush burning 	 h) Core Points: i. Activities that degrade the environment: ➢ Bush burning 	
 h) Core Points: i. Activities that degrade the environment: > Bush burning > Deforestation 	 h) Core Points: i. Activities that degrade the environment: > Bush burning > Deforestation 	
 h) Core Points: i. Activities that degrade the environment: > Bush burning > Deforestation > Sand winning 	 h) Core Points: i. Activities that degrade the environment: > Bush burning > Deforestation > Sand winning 	
 h) Core Points: i. Activities that degrade the environment: > Bush burning > Deforestation > Sand winning > Improper mining 	 h) Core Points: i. Activities that degrade the environment: > Bush burning > Deforestation > Sand winning > Improper mining 	
 h) Core Points: i. Activities that degrade the environment: > Bush burning > Deforestation > Sand winning > Improper mining practices 	 h) Core Points: i. Activities that degrade the environment: > Bush burning > Deforestation > Sand winning > Improper mining practices 	
 h) Core Points: i. Activities that degrade the environment: > Bush burning > Deforestation > Sand winning > Improper mining practices > Improper disposal 	 h) Core Points: i. Activities that degrade the environment: > Bush burning > Deforestation > Sand winning > Improper mining practices > Improper 	
 h) Core Points: i. Activities that degrade the environment: > Bush burning > Deforestation > Sand winning > Improper mining practices > Improper disposal of refuse 	 h) Core Points: i. Activities that degrade the environment: > Bush burning > Deforestation > Sand winning > Improper mining practices > Improper disposal of 	
 h) Core Points: i. Activities that degrade the environment: > Bush burning > Deforestation > Sand winning > Improper mining practices > Improper disposal of refuse 	 h) Core Points: Activities that degrade the environment: Bush burning Deforestation Sand winning Improper mining practices Improper disposal of refuse 	
 h) Core Points: i. Activities that degrade the environment: > Bush burning > Deforestation > Sand winning > Improper mining practices > Improper disposal of refuse ii. Effects of 	 h) Core Points: Activities that degrade the environment: Bush burning Deforestation Sand winning Improper mining practices Improper disposal of refuse ii. Effects of 	
 h) Core Points: Activities that degrade the environment: Bush burning Deforestation Sand winning Improper mining practices Improper disposal of refuse ii. Effects of environmental 	 h) Core Points: Activities that degrade the environment: Bush burning Deforestation Sand winning Improper mining practices Improper disposal of refuse Effects of environmental 	
 h) Core Points: Activities that degrade the environment: Bush burning Deforestation Sand winning Improper mining practices Improper disposal of refuse ii. Effects of environmental degradation: 	 h) Core Points: Activities that degrade the environment: Bush burning Deforestation Sand winning Improper mining practices Improper disposal of refuse ii. Effects of environmental degradation: 	
 h) Core Points: Activities that degrade the environment: Bush burning Deforestation Sand winning Improper mining practices Improper disposal of refuse ii. Effects of environmental degradation: Diseases 	 h) Core Points: Activities that degrade the environment: Bush burning Deforestation Sand winning Improper mining practices Improper disposal of refuse Effects of environmental degradation: Diseases 	
 h) Core Points: Activities that degrade the environment: Bush burning Deforestation Sand winning Improper mining practices Improper disposal of refuse ii. Effects of environmental degradation: Diseases Destruction of 	 h) Core Points: Activities that degrade the environment: Bush burning Deforestation Sand winning Improper mining practices Improper disposal of refuse Effects of environmental degradation: Diseases Destruction of 	
 h) Core Points: Activities that degrade the environment: Bush burning Deforestation Sand winning Improper mining practices Improper disposal of refuse ii. Effects of environmental degradation: Diseases Destruction of plant and animal 	 h) Core Points: Activities that degrade the environment: Bush burning Deforestation Sand winning Improper mining practices Improper disposal of refuse Effects of environmental degradation: Diseases Destruction of plant and 	
 h) Core Points: Activities that degrade the environment: Bush burning Deforestation Sand winning Improper mining practices Improper disposal of refuse ii. Effects of environmental degradation: Diseases Destruction of plant and animal life 	 h) Core Points: Activities that degrade the environment: Bush burning Deforestation Sand winning Improper mining practices Improper disposal of refuse Effects of environmental degradation: Diseases Destruction of plant and animal life 	
 h) Core Points: Activities that degrade the environment: Bush burning Deforestation Sand winning Improper mining practices Improper disposal of refuse ii. Effects of environmental degradation: Diseases Destruction of plant and animal life Floods 	 h) Core Points: Activities that degrade the environment: Bush burning Deforestation Sand winning Improper mining practices Improper disposal of refuse Effects of environmental degradation: Diseases Destruction of plant and animal life Floods 	
 h) Core Points: Activities that degrade the environment: Bush burning Deforestation Sand winning Improper mining practices Improper disposal of refuse ii. Effects of environmental degradation: Diseases Destruction of plant and animal life Floods Occupational and 	 h) Core Points: Activities that degrade the environment: Bush burning Deforestation Sand winning Improper mining practices Improper disposal of refuse Effects of environmental degradation: Diseases Destruction of plant and animal life Floods Occupational 	
 h) Core Points: Activities that degrade the environment: Bush burning Deforestation Sand winning Improper mining practices Improper disposal of refuse ii. Effects of environmental degradation: Diseases Destruction of plant and animal life Floods Occupational and industrial 	 h) Core Points: Activities that degrade the environment: Bush burning Deforestation Sand winning Improper mining practices Improper disposal of refuse Effects of environmental degradation: Diseases Destruction of plant and animal life Floods Occupational and industrial 	
 h) Core Points: Activities that degrade the environment: Bush burning Deforestation Sand winning Improper mining practices Improper disposal of refuse ii. Effects of environmental degradation: Diseases Destruction of plant and animal life Floods Occupational and industrial accidents 	 h) Core Points: Activities that degrade the environment: Bush burning Deforestation Sand winning Improper mining practices Improper disposal of refuse ii. Effects of environmental degradation: Diseases Destruction of plant and animal life Floods Occupational and industrial accidents 	

	Global warming	Global warming	
i	ii. Steps to reduce	iii. Steps to reduce	
	environmental	environmental	
	degradation:	degradation:	
	Sanctions should	Sanctions	
	be imposed on	should be	
	offenders	imposed on	
	Public education	offenders	
	National policy to	Public education	
	protect the	National policy	
	environment	to protect the	
	Appropriate	environment	
	technology usage	Appropriate	
	5, 5	technology	
		usage	
		5	
i)	Core Competencies:	i) Core Competencies:	
	i. Digital literacy	i. Digital literacy	
	ii. Problem solving	ii. Problem	
	skills	solving skills	
	iii. Collaboration skills	iii. Collaboration	
	iv. Critical thinking	skills	
	skills	iv. Critical thinking	
	v. Personal	skills	
	development	v. Personal	
		development	
j)	Conclusion:	j) Conclusion:	
	Review lesson with	Review lesson with	
	learners by asking them	learners by asking	
	in their various groups	them in their various	
	to summarise what they	groups to summarise	
	learned. Commend	what they learned.	
	learners for their	Commend learners for	
	participation.	their participation.	
k)	Evaluation:	k) Evaluation:	
	i. Class Exercise	i. Class Exercise	
	Describe at least	Describe at least	
	three activities	three activities	
	that degrade the	that degrade the	
	environment	environment	
	Describe at least	Describe at least	
	three effects of	three effects of	
	degradational	degradational	
	activities on	activities on	
	human life	human life	

Identify at least	Identify at least
three steps that	three steps that
can be taken to	can be taken to
reduce	reduce
environmental	environmental
degradation	degradation
ii. Assignment:	ii. Assignment:
Write an article on	Write an article on the
the topic "solving	topic "solving
environmental	environmental
degradation	degradation problems
problems in my	in my community" for
community" for	publication in the
publication in the	Junior Graphic.
Junior Graphic.	
iii. Group Project	iii. Group Project
In your groups,	In your groups, identify
identify an	an environmental
environmental	challenge in the school.
challenge in the	Plan strategies for
school. Plan	solving it, implement
strategies for solving	the strategy and
it, implement the	present your report
strategy and present	using varied media at
your report using	the end of the term.
varied media at the	-
end of the term.	
-	
l) Remarks:	I) Remarks:
•	

PLC Session 4: The concept and importance of numeracy				
across the curriculum				
Focus: the bullet points provide the frame for what is to be done in the session. The writer should use the bullets to guide what they write for the PLC Coordinators and teachers to do and say during each session. Each bullet needs to be addressed	Guidance notes on Leading the session. What the PLC Coordinator will have to say during each stage of the session	Guidance Notes on Teacher Activity during the PLC Session. What teachers will do during each stage of the session	Time in session	
1. Introduction	1.1 Start the PLC session by asking teachers to share what they did differently in the classroom or elsewhere based on PLC Session 3, on <i>social and emotional</i> <i>learning (SEL)</i> , which they think impacted learning positively.	1.1 Share what you did differently in the classroom or elsewhere based on PLC Session 3, on <i>social and</i> <i>emotional learning (SEL),</i> which you think impacted learning positively.	20 mins	
	1.2 Ask teachers to discuss and summarise in a single sentence, why they think what their colleague did by way of application of what they learned in Session 3, on social and emotional learning (SEL), supported teaching and learning.	1.2 Discuss and summarise in a single sentence, why you think what a colleague did by way of application of what you learned in Session 3, on <i>social and emotional</i> <i>learning (SEL)</i> , supported teaching and learning.		
2. Planning for teaching, learning and assessment activities, making links with the Pre-	2.1 Ask a teacher to read the Purpose, Learning Outcomes (LOs) and Learning Indicators (LIs) for the session.	2.1 Read the Purpose, Learning Outcomes (LOs) and Learning Indicators (LIs) for the session.	30 mins	

Tertiary	Purpose:	Purpose:	
(standards-	The purpose of the session	The purpose of the session	
based)	is to discuss the concept	is to discuss the concept	
Curriculum and	and importance of	and importance of	
using GESI, SEL,	numeracy across the	numeracy across the	
ICT and 21 st	SHS/TVET curriculum.	SHS/TVET curriculum.	
century skills			
-	LO 1: Demonstrate	LO 1: Demonstrate	
	knowledge,	knowledge,	
	understanding and	understanding and	
	application of the	application of the	
	concept of numeracy	concept of numeracy	
	across SHS/TVET	across the SHS/TVET	
	curriculum (NTS 2c -	curriculum (NTS 2c -	
	2f, 3f, 3g and 3i).	2f, 3f, 3g and 3i).	
	LI 1.1 Explain the concept	LI 1.1 Explain the concept of	
	of numeracy across the	numeracy across the	
	SHS/TVET curriculum.	SHS/TVET curriculum.	
	LI 1.2 Discuss the likely	LI 1.2 Discuss the likely	
	challenges of integrating	challenges of integrating	
	numeracy across the	numeracy across the	
	SHS/TVET curriculum.	SHS/TVET curriculum.	
	LO 2: Demonstrate	LO 2: Demonstrate	
	knowledge and	knowledge and	
	understanding of the	understanding of the	
	importance of	importance of	
	numeracy across the	numeracy across the	
	SHS/IVEI curriculum	SHS/IVEI curriculum	
	(NTS 2C - 2T, 3T, 3g	(NTS 2C - 21, 31, 3g	
	and 3i).	and 3i).	
	LI 2.1 Discuss the strategies	LI 2.1 Discuss the strategies	
	for integrating numeracy at	for integrating numeracy at	
	SHS/IVEI CUITCUIUIII.	SH3/IVET curriculuiti.	
	LI 2.2 Analyse at least two	LI 2.2 Analyse at least two	
	pumoracy at the right lovel	pumoracy at the right level	
	across the SHS/TV/ET	across the SHS/TV/ET	
		curriculum	
	2.2 Ask teachers in pairs to	2.2 In pairs, explain to your	
	explain to their partners	partner and share with the	
	and share with the larger	larger group the concept of	
	group the concept of	numeracy across the	
	numeracy across the	SHS/TVET curriculum (NTS	
	-	2c, 3i).	

SHS/TVET curriculum (NTS		
2c, 3i).		
E.g.	E.g.	
Numeracy is the	Numeracy is the	
knowledge, skills and	knowledge, skills and	
ability to recognise,	ability to recognise,	
understand and apply	understand and apply	
mathematical concepts	mathematical concepts	
in solving problems in	in solving problems in	
all areas of life.	all areas of life.	
Mathematics is a tool	Mathematics is a tool	
used in finding answers	used in finding answers	
to questions and	to questions and	
problems, which arise	problems, which arise in	
in everyday life, trades	everyday life, trades	
and profession (Paling,	and profession (Paling,	
1982). Different subject	1982). Different subject	
learners need to	learners need to	
understand how	understand how	
different mathematical	different mathematical	
concepts might be	concepts might be	
applied in different	applied in different	
situations. The	situations. The	
integration of	integration of numeracy	
numeracy will improve	will improve learners'	
learners' ability to	ability to relate	
relate numeracy skills	numeracy skills to other	
to other subjects and	subjects and topics	
topics effectively and	effectively and	
appropriately	appropriately	
2.3 Ask teachers to discuss	2.3 Discuss at least three	
at least three likely	likely challenges of	
challenges of integrating	integrating numeracy	
numeracy across the	across the SHS/TVET	
SHS/TVET curriculum (NTS	curriculum (NTS 2b, 2c).	
2b, 2c).		
E.g.	E.g.	
a) The tendency to	The tendency to	
focus on teaching	focus on teaching	
mathematics	mathematics	
instead of its	instead of its	
application	application, etc.	
b) Focusing on		
numeracy simply as		
numbers and not		
recognising		

patterns and making sense of information c) Lack of numeracy skills or strategies on the part of teachers prohibits them from applying these skills appropriately d) The teacher's inability to develop numeracy skills within a lesson, etc.		
 2.4. Ask teachers to discuss the strategies for integrating numeracy at the right level across the SHS/TVET curriculum (NTS 2c - 2f, 3a, 3e, and 3g). E.g. a) Identifying opportunities for using mathematical concepts such as data collection, number, addition, subtraction and measurement of time in other subjects b) Giving remediation to learners with challenges in numeracy c) Using mathematical concepts to solve problems in other subject areas such as science, business management, economics, food and nutrition, etc. d) Building cross-curricula links to 	 2.4. Discuss the strategies for integrating numeracy at the right level across the SHS/TVET curriculum (NTS 2c - 2f, 3a, 3e, and 3g). <i>E.g.</i> Identifying opportunities for using mathematical concepts such as data collection in other subjects, etc. 	

 bridge the gaps between subjects e) Developing activities that will enable learners to recognise patterns and make sense of information knowing that numeracy is not simply about numbers f) Having clear teaching goals that include numeracy objectives g) Encouraging children to spot opportunities to practise their numeracy skills, etc. 2.5 Ask teachers to discuss at least three benefits of numeracy when used at the right level across the SHS/TVET curriculum (NTS 2c, 2d). E.g. a) It enhances the understanding of concepts in numeracy related subjects. The more numerate a learner is, the more likely they are to 	2.5 Discuss at least three benefits of numeracy when used at the right level across the SHS/TVET curriculum (NTS 2c, 2d). <i>E.g.</i> <i>It enhances the understanding of concepts in numeracy related subjects. The more numerate a learner is, the more likely they are to</i>	
numeracy related subjects. The more numerate a learner is, the more likely they are to contribute meaningfully to the learning of mathematics related subjects b) It takes some of the fear and stress away from learning mathematics	numeracy related subjects. The more numerate a learner is, the more likely they are to contribute meaningfully to the learning of mathematics related subjects, etc.	

	making it more		
	enjoyable		
c)	It helps learners to		
	develop appropriate		
	mathematics skills		
	in various disciplines		
	in their academic		
	work		
d)	Learner's academic		
	success to a large		
	extent depends on		
	how proficient they		
	are in numeracy		
e)	Numeracy helps to		
	equip learners to		
	develop		
	transferable skills		
	(critical thinking,		
	collaboration,		
	observation,		
	enquiry skills and		
	digital literacy, etc.)		
f)	Numeracy concepts		
	help learners to		
	make sense of their		
	world and connect		
	these concepts with		
	their environments		
	ana everyaay		
	activities such as		
	telling time, reading		
	maps, cooking and		
	setting tubles, etc.		
2 6 Asl	teachers to discuss	2 6 Discuss a sample lesson	
a samr	ole lesson nlan in	nlan in your subject area	
their s	ubject areas and	and show how it can be	
show h	now it can be taught	taught with the support of	
with th	ne support of	numeracy for learners who	
numer	acy for learners who	may struggle with numbers	
may st	ruggle with numbers	and computational skills	
and co	mputational skills	(NTS 3e – 3m).	
(NTS 3	e – 3m).	- /	
Refer t	o Appendix 4 for a	Refer to Appendix 4 for a	
sample	e lesson plan in	sample lesson plan in	
busine	ss studies for	business studies for learners	
learne	rs		

3. Modelling a	3.1 Ask teachers to identify	3.1 Identify in the sample	30 mins
teaching	in the sample lesson plan,	lesson plan, activities that	
activity, making	activities that could	could promote GESI, SEL,	
links with the	promote, GESI, SEL, ICT,	ICT, 21 st century skills and	
Pre-Tertiary	21 st century skills and	differentiation (NTS 3a-3c,	
(standards-	differentiation (NTS 3a-3c,	3e-3g).	
based)	3e-3g).		
Curriculum and	E.a.	E.a.	
using GESI. SEL.	a) Teacher used	Teacher used mixed-	
ICT and 21 st	, mixed-ability and	ability and mixed-	
century skills	mixed-aender	aender aroupinas	
	aroupinas durina	durina role play in	
	role play in	teaching population	
	teaching nonulation	census etc	
	census		
	(GESI/21 st century		
	skills		
	/Differentiation)		
	h) Teacher gave		
	nositive feedback to		
	all learners		
	especially SEN		
	learners		
	(GESI/SEL)		
	c) reacher assigned		
	(Differentiation)		
	(Differentiation)		
	a) Learners grouped		
	themselves into		
	nousenoias through		
	self-awareness and		
	Interests		
	(SEL)		
	ej reacher provided		
	one-on-one support		
	to learners who		
	struggled with		
	enumerating		
	demographic		
	characteristics		
	(SEL/ICT)		
	3.2 Ask teachers to discuss	3.2 Discuss how the lesson	
	how the lesson plan is	plan is linked to the use of	
	linked to the use of	formative assessment tools	
	tormative assessment tools	(assessment 'as' and	

(assessment 'as' and	assessment (for) and	
(assessment for') and	assessment for Janu	
assessment for) and	practices (NTS SK - SIII).	
	F a	
E.g.	E.g.	
a) Assessment as:	Assessment 'ds':	
Giving self-reflective	Giving self-reflective	
and problem-posing	and problem-posing	
class exercises based	class exercises based	
on population	on population census	
census terms	terms, etc.	
b) Assessment 'for':		
Learners in groups,		
work on more		
examples on		
population census		
and get feedback		
from their peers		
3.3 Ask teachers to	3.3 Recommend other	15 mins
recommend other	appropriate assessment	
appropriate	strategies that could aid in	
assessment strategies that	the development of	
could aid in the	numeracy skills in learners	
development of numeracy	who may have weak	
skills in learners who may	number sense and	
have weak number sense	computational skills (NTS	
and computational skills	1a $2e$ $3f$ $3k$ and $3m$	
(NTS 1a, 2a, 3f, 3k, and 3m)	10, 20, 51, 5K and 5mj.	
F_{α}	Fa	
L.y.	L.y. Mantal activitias atc	
b) Deer teaching	Mental activities, etc.	
b) Peer leaching		
c) Self-practice		
a) Presentation, etc.		
2.4. Ask too shows to swalp in	2.4 Eveloin how ICT con ho	
3.4 ASK leachers to explain	3.4 Explain now ICT can be	
now ICT can be used in	used in assessing learners	
assessing learners of	of different abilities in	
different abilities in	business studies (NTS 3J).	
business studies (NTS 3J).	-	
E.g.	E.g.	
a) Watching	Watching	
YouTube/Pre-recorded	YouTube/Pre-recorded	
videos and podcast and	videos and podcast and	
writing a report on the	writing a report on the	
conduct of population	conduct of population	
census	census, etc.	

	 b) Giving learners assignments that would involve numeracy on household census to be presented in PowerPoint c) Giving learners projects to search online for 		
	information d) Using google forms to quiz learners, etc.		
	3.5 Ask a teacher to model a teaching activity based on the sample lesson plan that can support learners who may have weak number sense and computational skills in the lesson taking into consideration GESI, SEL, ICT, 21 st century skills and differentiation (NTS 1a, 1b).	3.5 Model a teaching activity based on the sample lesson plan that can support learners who may have weak number sense and computational skills in the lesson taking into consideration GESI, SEL, ICT, 21 st century skills and differentiation (NTS 1a, 1b).	
	3.6 Ask teachers to give feedback on the lesson delivered (NTS 1a, 2c).	3.6 Give feedback on the lesson delivered (NTS 1a, 2c).	
 4. Evaluation and review of session: Noting that teachers need to identify critical friends to observe lessons and report at 	 4.1 Ask teachers in groups to reflect, write and share what they have learned with the larger group with regard to the concept and benefits of numeracy across the SHS/TVET curriculum (NTS 1a, 1b). 4.2 Remind teachers to, where possible, identify a critical friend to observe their lesson in relation to 	 4.1 In your group, reflect, write and share what you have learned with the larger group with regard to the concept and benefits of numeracy across the SHS/TVET curriculum (NTS 1a, 1b). 4.2 Where possible, identify a critical friend to observe your lesson in relation to PLC Session 4 	10 mins
next session	PLC Session 4 and provide feedback to them (NTS 3I, 3n and 3o).	and provide feedback to you (NTS 3I, 3n and 3o).	

	4.3 Remind teachers to	4.3 Read PLC Session 5 in
	read PLC Session 5 in	preparation for the next
	preparation for the next	session.
	session.	
Appendix 4	A sample lesson plan for	A sample lesson plan for
	teaching population census	teaching population census
	to learners in SHS 2:	to learners in SHS 2:
	a) Topic:	a) Topic:
	Population	Population
	b) Sub-topic:	b) Sub-topic:
	Population Census	Population Census
	c) Obiectives:	c) Objectives:
	By the end of the	By the end of the
	lesson. the learner will	lesson, the learner will
	be able to:	be able to:
	i. Enumerate a	i. Fnumerate a
	household size of a	household size of a
	population	population
	ii. Take class census	ii. Take class census
	based on at least	based on at least
	three demographic	three demographic
	characteristics of a	characteristics of a
	nonulation	nonulation
	d) Teaching and Learning	d) Teaching and Learning
	Resources (TLRs):	Resources (TLRs):
	Posters (household	Posters (household
	nicture) calculator	nicture) calculator
	computer and	computer and projector
	projector	
	e) Relevant Previous	e) Relevant Previous
	Knowledge (RPK)	Knowledge (RPK):
	Learners identify	Learners identify
	colleggues in their	collegaues in their
	dormitory with respect	dormitory with respect
	to their various levels	to their various levels
	f) Introduction:	f) Introduction:
	Ask learners to	Ask learners to mention
	mention the numbers	the numbers of SHS1
	of SHS1_SHS2 and	SHS2 and SHS3 students
	SHS3 students in their	in their various
	various dormitories	dormitories (hoarding
	(hoarding students) or	students) or the
	the numbers of males	numbers of males and
	and females in their	females in their various
	various homes (day	homes (day students)
	students)	nomes judy studentsj.
	a) Tasks/Activitios	a) Tasks/Activities:
	y iusks/Activities:	y iusks/Activities.

household to household to	
learners and let learners and let	
them discuss the them discuss the	
approximate ages approximate ages of	
of the household the household	
members. members.	
ii. Guide learners in ii. Guide learners in	
mixed-ability mixed-ability groups,	
groups, representing a	
representing a household, to	
household, to prepare a	
prepare a questionnaire for a	
questionnaire for a census in the class.	
census in the class.	
iii. Ask learners to iii. Ask learners to	
nominate two of nominate two of	
their group their group	
members (male members (male and	
and female) as female) as census	
census enumerators to	
enumerators to count and record	
count and record each member of a	
each member of a household in terms	
household in terms of age, sex, level of	
of age, sex, level of education, etc.	
education, etc.	
iv. Guide learners to iv. Guide learners to	
represent their represent their	
records in tables records in tables	
and/or charts (They and/or charts, e.g.	
may use the Excel bar chart.	
Spreadsheet), e.g.	
bar chart	
v. Ask all groups to post v. Ask all groups to	
their work on the post their work on	
walls for gallery walk the walls for gallery	
and project the bar walk and project the	
chart of one group bar chart of one	
for appreciation. group on the wall for	
appreciation.	
vi. identijy individuals vi. identijy individuals	
who have challenges who have challenges	
in numeracy skills	
unu yive unu yive	

h) Core points:	h) Core points:	
i. Population census is	i. Population census is	
the official	the official headcount	
headcount and the	and the collection of	
collection of data on	data on various	
various	characteristics of the	
characteristics of the	population of all	
population of all	residents in a	
residents in a	particular area over a	
particular area over	given period of time,	
a given period of	usually every ten	
time, usually every	years.	
ten years.		
<i>ii.</i> Population size is the	ii. Population size is the	
total number of	total number of	
people in a defined	people in a defined	
geographical area at	geographical area at	
a particular time.	a particular time.	
iii. A census involves	iii. A census involves	
preparation,	preparation,	
implementation and	implementation and	
data processing	data processing	
stages.	stages.	
iv. Demographic	iv. Demographic	
characteristics of a	characteristics of a	
population include	population include	
name, age, sex,	name, age, sex,	
height, occupation,	height, occupation,	
etc.	etc.	
i) Cora compatancias:	i) Cora compatancias:	
i Critical thinking	i Critical thinking and	
and problem-	nrohlem-solving	
solvina skills	skills	
ii. Numeracy skills	ii. Numeracy skills	
iii. Communication	iii. Communication and	
and Collaborative	Collaborative skills	
skills	iv. Innovation and	
iv. Innovation and	creativity	
creativity	v. Cultural identity and	
v. Cultural identity	global citizenship	
and global	vi. Leadership skills	
citizenship		
vi. Leadership skills		

	i) Conclusion:	j) Conclusion:	
	Ask the various groups	Ask the various groups	
	to come out with what	to come out with what	
	they have learnt from	they have learnt from	
	the lesson and how	the lesson and how	
	they intend to apply it	they intend to apply it	
	at home.	at home.	
	k) Evaluation:	k) Evaluation:	
· · · · · · · · · · · · · · · · · · ·	Drojact work: Eind the	Droject work: Find the	
	total population of	Project work. Find the	
	male and famale	male and female	
	students in any three	students in any three	
	solastad programmas	solocted programmes	
	of your choice in the	of your choice in the	
	of your choice in the	of your choice in the	
	school taking into	school taking into	
	range, month of birth	range, month of birth	
	and any other	ana any other	
	demographic	demographic	
	characteristics.	characteristics.	
	l) Remarks:	l) Remarks:	

PLC Sess	ion 5: Supporting the t	eaching and learning of	F
numera	cy at the right level in I	nformation and	
Commur	nication Technology (IC	CT)	
Focus: the bullet points provide the frame for what is to be done in the session. The writer should use the bullets to guide what they write for the PLC Coordinato rs and teachers to do and say during each session. Each bullet needs to be addressed	Guidance notes on Leading the session. What the PLC Coordinator will have to say during each stage of the session	Guidance Notes on Teacher Activity during the PLC Session. What teachers will do during each stage of the session	Time in session
1. Introduction	 1.1 Start the PLC session by asking teachers to share what they did differently in the classroom or elsewhere based on PLC Session 4, on the concept and importance of numeracy across the secondary school curriculum, which they think impacted learning positively. 1.2 Ask teachers to discuss and summarise in a single sentence, why they think what a colleague did by way of application of what they learned in Session 4, on the concept and importance of 	 1.1 Share what you did differently in the classroom or elsewhere based on PLC Session 4, on the concept and importance of numeracy across the secondary school curriculum, which you think impacted learning positively. 1.2 Discuss and summarise in a single sentence, why you think what a colleague did by way of application of what they learned in Session 4, on the concept and importance of numeracy across 	20 mins

school curriculum, supported learning.supported learning.2. Planning for2.1 Ask a teacher to read the Purpose, Learning Outcomes (LOs) and Learning Indicators (LIs) for the session.2.1 Read the Purpose, Learning Outcomes (LOS) and Learning Indicators (LIs) for the session.30teaching, learning and assessment activities, making links with the Pre- Tertiary (Standards- based) Curriculum and using GESI, SEL, ICT and 21stPurpose: The purpose of the session is to discuss how to support the teaching and learning of numeracy at the right level in Information and Communication Technology (ICT), and vice versa.Purpose: The purpose of the session is to discuss how to support the teaching and learning of numeracy to support the teaching and learning of LO 1: Demonstrate knowledge, understanding and application of the use of numeracy to support the teaching and learning of LI 1.1 Identify areas in numeracy that can support the teaching and learning of LI 1.1 Identify areas in numeracy that can support the teaching and learning of LI 1.1 Identify areas in numeracy that can support the teaching and learning of LI 1.1 Identify areas in numeracy that can support the teaching and learning of LI 1.1 Identify areas in numeracy that can support the teaching and learning of LI 1.1 Identify areas in numeracy that can support the teaching and learning of LI 1.1 Identify areas in numeracy that can support the teaching and learning of LI 1.1 Identify areas in numeracy that can support the that can support the teaching
learning.It is the set of the
2. Planning for teaching, learning and assessment activities, making links with the Pre- Curriculum and using GESI, SEL, ICT and 21st2.1 Ask a teacher to read the Purpose, Learning Outcomes (LOS) and Learning Indicators (LIS) for the session. Purpose: The purpose of the session is to discuss how to support the teaching and learning of numeracy at the right level in Information and (Standards- GESI, SEL, ICT and 21st2.1 Read the Purpose, Learning Outcomes (LOS) and Learning Indicators (LIS) for the session.30 mins2.1 Read the Purpose, Learning Outcomes (LOS) and Learning dicators (LIS) for the session.30 minsactivities, making links with the Pre- Information and Communication Technology (ICT), and vice versa.2.1 Read the Purpose, Learning Outcomes (LOS) and Learning Indicators (LIS) for the session.30 minsCurriculum and using skills10 1: Demonstrate knowledge, understanding and application of the use of numeracy to support the teaching and learning of ICT (NTS 2b - 2d, 3j).2.1 Read the Purpose, Learning Outcomes (LOS) and Learning Indicators (LIS) for the session.30 mins011 1.1 Identify areas in numeracy that can support the that can support the teaching2.1 Read the Purpose. Outcomes (LOS) and Learning Indicators (LIS) for the session.30 mins11.1 Identify areas in numeracy that can support the that can support the teaching2.1 Read the Purpose. Indicators (LOS) and Learning of Information and Communication11.1 Identify areas in numeracy that can support the teaching and learning of2.1 Read the Purpose: Purp
for teaching, learning and assessmentPurpose, Learning Indicators (LOs) and Learning Indicators (LIs) for the session.Outcomes (LOs) and Learning Indicators (LIs) for the session.Purpose activities, making links with teaching and learning of the Pre- Tertiary (standards- based) (ICT), and vice versa.Purpose: Purpose the right level in Information and Communication Technology (ICT), and vice versa.Purpose: The purpose of the session is to discuss how to support the teaching and learning of numeracy at the right level in Information and Communication Technology (ICT), and vice versa.Purpose: The purpose of the session is to discuss how to support the teaching and learning of numeracy to support the teaching and learning of numeracy to support the teaching and learning of ICT (NTS 2b - 2d, 3j).Outcomes (LOs) and Learning Indicators (LIs) for the session.Indicators discuss how to support the teaching and learning of numeracy to support the teaching and learning of ICT (NTS 2b - 2d, 3j).Outcomes (LOs) and Learning Indicators (LIs) for the session.Indicators discuss how to support the teaching and learning of ICT (NTS 2b - 2d, 3j).Outcomes (LOs) and Learning Indicators (LIs) for the session.Indicators (SESI, SEL, ICT (NTS 2b - 2d, 3j).Outcomes (LOs) and Learning Information of the use of numeracy that can support the teaching and learning of ICT ICT (NTS 2b - 2d, 3j).Outcomes (LOs) and Learning ICT Information and Dumeracy that can support the teaching and learning of ICT (NTS 2b - 2d, 3j).
teaching, learning and assessment activities, making links with teaching and learning of the Pre- Tertiary (Standards- based) Curriculum and using GESI, SEL, ICT and 21st skillsPurpose: The purpose of the session is to discuss how to support the teaching and learning of numeracy at the right level in Information and Communication Technology (ICT), and vice versa.Purpose: Purpose: The purpose of the session is to discuss how to support the teaching and learning of numeracy at the right level in Information and Communication Technology (ICT), and vice versa.Purpose: The purpose of the session is to discuss how to support the Information and Communication Technology (ICT), and vice versa.LO 1: Demonstrate knowledge, understanding and application of the use of numeracy to support the teaching and learning of ICT (NTS 2b - 2d, 3j).LO 1: Demonstrate knowledge, understanding of ICT (NTS 2b - 2d, 3j).LI 1.1 Identify areas in numeracy that can support the teaching and learning of ICT (NTS 2b - 2d, 3j).LI 1.1 Identify areas in numeracy that can support the teaching
learning and assessment activities, making(LIs) for the session.Purpose: activities, making links with teaching and learning of numeracy at the right level in Information and (standards- based) Curriculum and using GESI, SEL, ICT and 21st skillsPurpose: The purpose of the session is to discuss how to support the teaching and learning of numeracy at the right level in Information and Communication Technology (ICT), and vice versa.Purpose: The purpose of the session is to discuss how to support the teaching and learning of numeracy at the right level in Information and Communication Technology (ICT), and vice versa.LO 1: Demonstrate knowledge, understanding and application of the use of numeracy to support the teaching and learning of ICT (NTS 2b - 2d, 3j).LO 1: Demonstrate knowledge, understanding of ICT (NTS 2b - 2d, 3j).LI 1.1 Identify areas in numeracy that can support the teachingLI 1.1 Identify areas in numeracy that can support the teaching
and assessment activities, makingPurpose: The purpose of the session is to discuss how to support the teaching and learning of numeracy at the right level in Information and (standards- (standards- Curriculum and using GESI, SEL, ICT and 21st skillsPurpose: The purpose of the session is to discuss how to support the teaching and learning of numeracy at the right level in Information and Communication Technology (ICT), and vice versa.Purpose: The purpose of the session is to discuss how to support the teaching and learning of numeracy at the right level in Information and Communication Technology (ICT), and vice versa.LO 1: Demonstrate knowledge, understanding and application of the use of numeracy to support the teaching and learning of ICT (NTS 2b - 2d, 3j).LO 1: Demonstrate knowledge, understanding and application of the use of numeracy to support the teaching and learning of ICT (NTS 2b - 2d, 3j).LI 1.1 Identify areas in numeracy that can support the that can support the teaching
assessment activities, makingPurpose: The purpose of the session is to discuss how to support the teaching and learning of numeracy at the right level in Information andPurpose: The purpose of the session is to discuss how to support the teaching and learning of numeracy at the right level in Information andPurpose: The purpose of the session is to discuss how to support the teaching and learning of numeracy at the right level in Information andPurpose: The purpose of the session is to discuss how to support the teaching and learning of numeracy at the right level in Information andTertiary (standards- based) (ICT), and vice versa.Communication Technology (ICT), and vice versa.Purpose: The purpose of the session is to discuss how to support the Information and Communication Technology (ICT), and vice versa.Curriculum and using GESI, SEL, ICT and 21st skillsLO 1: Demonstrate knowledge, understanding and application of the use of numeracy to support the teaching and learning of ICT (NTS 2b - 2d, 3j).LO 1: Demonstrate knowledge, understanding and application of the use of numeracy to support the teaching and learning of ICT (NTS 2b - 2d, 3j).LI 1.1 Identify areas in numeracy that can support the that can support the teaching
activities, makingThe purpose of the session is to discuss how to support the teaching and learning of numeracy at the right level in Information and (standards- discuss how to support the information and (standards- discuss how to support the information and (ICT), and vice versa.The purpose of the session is to discuss how to support the teaching and learning of numeracy at the right level in Information and Communication Technology (ICT), and vice versa.The purpose of the session is to discuss how to support the teaching and learning of numeracy at the right level in Information and Communication Technology (ICT), and vice versa.Curriculum and using GESI, SEL, ICT and 21st skillsLO 1: Demonstrate knowledge, understanding and application of the use of numeracy to support the teaching and learning of ICT (NTS 2b - 2d, 3j). LI 1.1 Identify areas in numeracy that can support theLO 1: Demonstrate versa.
activities,The purpose of the session is tomakingdiscuss how to support the teaching and learning of numeracy at the right level in Information andThe purpose of the session is tolinks with the Pre- Tertiaryteaching and learning of numeracy at the right level in Information andThe purpose of the session is toTertiary (standards- based) (ICT), and vice versa.Information and Communication Technology (ICT), and vice versa.Information and Communication Technology (ICT), and vice versa.Curriculum and using GESI, SEL, ICT and 21st skillsLO 1: Demonstrate knowledge, understanding and application of the use of numeracy to support the teaching and learning of ICT (NTS 2b - 2d, 3j).LO 1: Demonstrate knowledge, understanding and application of the use of numeracy that can support the that can support the that can support the
InduingLiscuss now to support the teaching and learning of numeracy at the right level in Information andLiscuss now to support the teaching and learning of numeracy at the right level in Information and Communication Technology (ICT), and vice versa.Lo support the teaching and learning of numeracy at the right level in Information and Communication Technology (ICT), and vice versa.Lo support the teaching and vice versa.Curriculum and using GESI, SEL, ICT and 21st skillsLO 1: Demonstrate knowledge, understanding and application of the use of numeracy to support the teaching and learning of ICT (NTS 2b - 2d, 3j).LO 1: Demonstrate knowledge, understanding and application of the use of numeracy to support the teaching and learning of ICT (NTS 2b - 2d, 3j).LO 1: Demonstrate knowledge, understanding and application of the use of numeracy to support the teaching and learning of ICT (NTS 2b - 2d, 3j).LI 1.1 Identify areas in numeracy that can support the that can support the teaching
Inits withIteaching and itearning ofIteaching and itearning ofthe Pre-numeracy at the right level innumeracy at the right level inTertiaryInformation andInformation andInformation and Communication(standards- based)Communication Technology (ICT), and vice versa.Information and CommunicationCurriculum and usingLO 1: Demonstrate knowledge, understanding and application of the use of numeracy to support the skillsLO 1: Demonstrate knowledge, understanding and application of the use of numeracy to support the ICT (NTS 2b - 2d, 3j).LO 1: Demonstrate knowledge, understanding of ICT (NTS 2b - 2d, 3j).LI 1.1 Identify areas in pumeracy that can support theLI 1.1 Identify areas in numeracy that can support the that can support theLI 1.1 Identify areas in numeracy that can support the that can support the
TertiaryInformation andInformation and(standards- based)Communication Technology (ICT), and vice versa.Information and Communication Technology (ICT), and vice versa.Curriculum and using GESI, SEL, ICT and 21st skillsLO 1: Demonstrate knowledge, understanding and application of the use of numeracy to support the teaching and learning of ICT (NTS 2b - 2d, 3j).LO 1: Demonstrate knowledge, understanding and application of the use of numeracy to support the teaching and learning of ICT (NTS 2b - 2d, 3j).LO 1: Demonstrate knowledge, understanding and application of the use of numeracy to support the teaching and learning of ICT (NTS 2b - 2d, 3j).LI 1.1 Identify areas in numeracy that can support the that can support the teaching
TertialyInformation andInformation and communication(standards- based)Communication Technology (ICT), and vice versa.Technology (ICT), and vice versa.Curriculum and using GESI, SEL, ICT and 21st skillsLO 1: Demonstrate knowledge, understanding and application of the use of numeracy to support the teaching and learning of ICT (NTS 2b - 2d, 3j).LO 1: Demonstrate knowledge, understanding and application of the use of numeracy to support the teaching and learning of ICT (NTS 2b - 2d, 3j).LO 1: Demonstrate knowledge, understanding and application of the use of numeracy to support the teaching and learning of ICT (NTS 2b - 2d, 3j).LI 1.1 Identify areas in numeracy that can support the teachingLI 1.1 Identify areas in numeracy that can support the that can support the that can support the
(standards- based)(ICT), and vice versa.Technology (ICT), and vice versa.Curriculum and using GESI, SEL, ICT and 21st skillsLO 1: Demonstrate knowledge, understanding and application of the use of numeracy to support the teaching and learning of ICT (NTS 2b - 2d, 3j).LO 1: Demonstrate knowledge, understanding and application of the use of numeracy to support the teaching and learning of LI 1.1 Identify areas in numeracy that can support the that can support the teaching
Dased)(ICT), and vice versa.Curriculumand usingLO 1: Demonstrate knowledge,GESI, SEL,understanding andICT and 21stapplication of the use ofnumeracy to support thenumeracy to support theskillsteaching and learning ofICT (NTS 2b - 2d, 3j).LI 1.1 Identify areas inLI 1.1 Identify areas inLI 1.1 Identify areas in numeracy
Curriculumand usingLO 1: Demonstrate knowledge, understanding andLO 1: Demonstrate knowledge, understanding andGESI, SEL,understanding andunderstanding andICT and 21stapplication of the use of numeracy to support the teaching and learning ofapplication of the use of numeracy to support the teaching and learning of ICT (NTS 2b - 2d, 3j).LI 1.1 Identify areas in numeracy that can support the teachingLI 1.1 Identify areas in numeracy that can support the teaching
and using GESI, SEL, ICT and 21stLO 1: Demonstrate knowledge, understanding and application of the use of numeracy to support the teaching and learning of ICT (NTS 2b - 2d, 3j).LO 1: Demonstrate knowledge, understanding and application of the use of numeracy to support the teaching and learning of ICT (NTS 2b - 2d, 3j).LI 1.1 Identify areas in numeracy that can support the teachingLO 1: Demonstrate knowledge, understanding and application of the use of numeracy to support the teaching and learning of ICT (NTS 2b - 2d, 3j).
GESI, SEL,understanding andunderstanding andICT and 21stapplication of the use ofapplication of the use ofnumeracy to support thenumeracy to support theskillsteaching and learning ofICT (NTS 2b - 2d, 3j).(NTS 2b - 2d, 3j).LI 1.1 Identify areas inLI 1.1 Identify areas in numeracynumeracy that can support thethat can support the teaching
ICI and 21stapplication of the use of numeracy to support the teaching and learning of ICT (NTS 2b - 2d, 3j).application of the use of numeracy to support the teaching and learning of ICT (NTS 2b - 2d, 3j).LI 1.1 Identify areas in numeracy that can support the teachingLI 1.1 Identify areas in numeracy that can support the that can support the that can support the
centurynumeracy to support the teaching and learning of ICT (NTS 2b - 2d, 3j).numeracy to support the teaching and learning of ICT (NTS 2b - 2d, 3j).LI 1.1 Identify areas in numeracy that can support the that can support theLI 1.1 Identify areas in numeracy that can support the that can support the
skillsteaching and learning of ICT (NTS 2b - 2d, 3j).teaching and learning of ICT (NTS 2b - 2d, 3j).LI 1.1 Identify areas in numeracy that can support the that can support theLI 1.1 Identify areas in numeracy that can support the that can support the
ICT (NTS 2b - 2d, 3j).(NTS 2b - 2d, 3j).LI 1.1 Identify areas inLI 1.1 Identify areas in numeracynumeracy that can support thethat can support the teaching
LI 1.1 Identify areas in LI 1.1 Identify areas in numeracy numeracy that can support the that can support the teaching
numeracy that can support the 1 that can support the teaching
indicated, that can support the indicated support the featuring
teaching and learning of ICT. and learning of ICT.
LI 1.2 Explain how the areas in LI 1.2 Explain how the areas in
numeracy can be applied in the numeracy can be applied in the
teaching and learning of ICT. teaching and learning of ICT.
LO 2: Demonstrate knowledge, LO 2: Demonstrate knowledge,
understanding and understanding and
application of using ICT application of using ICT to
to support the support the development
development of of numeracy (NTS 2c - 2e,
numeracy (NTS 2c - 2e, 3j).
3j).
LI 2.1 Identify ICT tools that can LI 2.1 Identify ICT tools that can
support the development of support the development of
numeracy.
LI 2.2 Describe how ICT tools LI 2.2 Describe how ICT tools can
can be applied in the be applied in the development of
development of numeracy.
2.2 Ask teachers in pairs to 2.2 Identify areas in numeracy
identify areas in numeracy that that can support the teaching
can support the teaching and

learn	ing of ICT (NTS 2b - 2d, 3h	and learning of ICT (NTS 2b - 2d,	
and 3	ij).	3h and 3j).	
E.g.		E.g.	
a, b) Arithmetic operations) numeration	Arithmetic operations, etc.	
C	Seriation		
d) Mensuration		
e	Representation		
f)	, Geometry, etc.		
2.3 A areas appli	sk teachers to explain how in numeracy can be ed in the teaching and	2.3 Explain how areas in numeracy can be applied in the teaching and learning of ICT (NTS	
learn	ing of ICT (NTS 3d, 3i and	3d, 3i and 3j).	
3j). <i>E.g.</i>		E.g.	
a, b, c,	 Arithmetic operations: Operations symbols (+,×, ÷, -, =, etc.) could be used to create formulae in spreadsheets Numeration: Counting, tallying, numbering, etc., could be used in the entry of data Seriation: Arranging data or objects in a specific order such as size, position and location could be used in graphic designing and data analysis 	Arithmetic operations: Operations symbols (+, ×, etc.) could be used to create formulae in spreadsheets, etc.	
d, e,	 Mensuration: Measurement could be used to take lengths of ICT tools, format word documents, plot diagrams/charts and quantify data Representation: Various forms of mathematical 		

patterns, etc.) can be used to display data, etc. 2.4 Ask teachers to identify ICT tools that can support the development of numeracy (NTS 2c - 2e, 3a, 3e and 3j). E.g. a) ICT Devices: i. Calculator ii. Smartphones iii. Laptop/Desktop iv. Projectors v. Charts vi. Smartboards vii. Braille, etc.	2.4 Identify ICT tools that can support the development of numeracy (NTS 2c - 2e, 3a, 3e and 3j). <i>E.g.</i> <i>a) ICT Devices:</i> <i>Calculator, etc.</i>	
 b) ICT Applications: Spreadsheets Microsoft maths solver Photomath Photomath Malmath Math CAD Graphmatica Math editor Geometry pad, etc. 	b) ICT Applications: Spreadsheets, etc.	
 2.5 Ask teachers to describe how ICT concepts and tools can be applied in the development of numeracy (NTS 2c - 2e, 3a, 3e and 3j). E.g. a) Spreadsheets: They can be used as a mathematical tool for calculations and graphical representations b) Photomath: It is a quick mathematical solution application tool that gives a step by step 	2.5 Describe how ICT concepts and tools can be applied in the development of numeracy (NTS 2c - 2e, 3a, 3e and 3j). <i>E.g.</i> <i>Spreadsheets:</i> <i>They can be used as a</i> <i>mathematical tool for</i> <i>calculations and</i> <i>graphical</i> <i>representations, etc.</i>	

colution to a mathe		
solution to a maths		
problem that has been		
support the learning of		
support the learning of		
numeracy at learner's		
own pace		
c) Geometry pad:		
This mathematical		
application will help the		
learner to practise vital		
constructions. It is a		
learner friendly tool		
that helps in the		
presentation of		
geometric		
constructions, taking		
measurements,		
compass use and		
experimentation of		
different geometric		
shapes in an easier		
manner		
d) Malmath:		
It is a maths problem		
solver that supports		
learners with step by		
step description and		
analysis of graph. It		
works online and offline		
e) Microsoft mathematics		
solver:		
The application is used		
to help learners solve		
complicated maths		
problems in a step by		
step manner. It has		
graphing calculator,		
unit convertor, and		
equation and triangle		
solver, etc. that can		
support the		
development of		
numeracy in learners,		
etc.		
2.6 Ask teachers to discuss the	2.6 Discuss the sample lesson	
sample lesson plan in ICT and	plan in ICT and show how it can	

	show how it can be taught to	be taught to help develop	
	help develop numeracy in	numeracy in learners (NTS 3e -	
	learners (NTS 3e - 3I).	3I).	
	Refer to Appendix 5 for a	Refer to Appendix 5 for a sample	
	sample lesson plan in ICT	lesson plan in ICT	
	2.7 Ask teachers to indicate	2.7 Indicate how the lesson will	
	how the lesson will be assessed	be assessed using other	
	using other appropriate	appropriate methods.	
	methods.		
	E.g.	<i>E.g.</i>	
	a) Number riddles	Number riddles, etc.	
	b) Maths quiz		
	c) Maths projects		
	d) Partner/Peer quizzes		
	e) Self-assessment, etc.		
3.	3.1 Ask teachers to identify in	3.1 Identify in the sample lesson	30
Modelling	the sample lesson plan,	plan, activities that could	mins
a teaching	activities that could promote	promote GESI, SEL, ICT, 21 st	
activity,	GESI, SEL, ICT, 21 st century skills	century skills and differentiation	
making	and differentiation (NTS 3c, 3e -	(NTS 3c, 3e - 3g).	
links with	3g).		
the Pre-	E.g.	E.g.	
Tertiary	a) Mixed-ability groups	Mixed-ability groups	
(standards-	were used in the lesson	were used in the lesson,	
based)	(GESI/ SEL/21 st century	etc.	
Curriculum	skills)		
and using	b) Soft ball was used as a		
GESI, SEL,	game to select groups to		
ICT and 21 st	participate in class		
century	activities (SEL/21 st		
skills	century skills)		
	c) Learners were		
	encouraged to support		
	each other to perform		
	tasks on their computers		
	(GESI/SEL/ICT)		
	d) Teacher moved around		
	the class to encourage		
	the participation of		
	learners with diverse		
	abilities to construct		
	spreadsheets		
	(ICT/GESI/SEL)		
	e) Learners were		
	encouraged to respect		
	the views of others		
	(GESI/SEL)		
	 f) Learners were encouraged to say positive things to colleagues to support their learning (SEL) g) Levels were used to cater for differentiation at all levels of learning 		
----------------------------	---	--	--
3	<i>SEL/Differentiation)</i> 8.2 Ask teachers to recommend	3.2 Recommend other	
o a c n s 2	other assessment strategies that could aid in the development of numeracy in learners who truggle with numbers (NTS 1a, 2e, 3f and 3m).	assessment strategies that could aid in the development of numeracy in learners who struggle with numbers (NTS 1a, 2e, 3f and 3m).	
E	 a) Peer assessment b) Playing number games (cards, ludo, dominoes, etc.) c) Number riddles d) Maths quiz e) Maths projects f) Partner/Peer quizzes g) Self-assessment, etc. 	E.g. Peer assessment, etc.	
3 10 11 11	B.3 Ask teachers to show how CT can be used in assessing numeracy in learners (NTS 3j). E.a.	3.3 Show how ICT can be used in assessing numeracy in learners (NTS 3j). <i>E.g.</i>	
	a) Tasking learners to use spreadsheets to compute and analyse data b) Using ICT application	Tasking learners to use spreadsheets to compute and analyse data, etc.	
	tools such as socrative, poll everywhere, kahoot, and mentimeter to assess learners c) Using mathematical games such as Dominoes and Sudoku		

	d) Giving learners projects to search online for		
	information		
	e) Using google joints to auiz learners, etc		
	quiz learners, etc.		
	3.4 Ask a teacher to model a	3.4 Model a teaching activity	
	teaching activity based on the	based on the sample lesson plan	
	sample lesson plan that can	that can support learners who	
	with constructing and inserting	inserting simple formulae at the	
	simple formulae at the	appropriate level, taking into	
	appropriate level, taking into	consideration GESI, SEL, ICT, 21 st	
	consideration GESI, SEL, ICT,	century skills and differentiation	
	differentiation	(NTS 1a, 2C).	
	(NTS 1a, 2c).		
	3.5 Ask teachers to provide	3.5 Provide feedback on the	
	delivered (NTS 3n - 3o)	lesson delivered (NTS 3n, 30).	
4.	4.1 Ask teachers in groups to	4.1 In groups, reflect, write and	10
Evaluation	reflect, write and share what	share what you have learned	mins
and review	they have learned with the	with the larger group with	
of session:	larger group with regard to	regard to supporting the	
> Noting	learning of numeracy at the	numeracy at the right level in	
that	right level in Information and	Information and Communication	
teacher	Communication Technology	Technology (ICT) (NTS 1a, 1b).	
s need	(ICT) (NTS 1a, 1b).		
to			
critical	4.2 Remind teachers to, where	4.2 where possible, identify a	
friends	friend to observe their lesson in	lesson in relation to PLC Session	
to	relation to PLC Session 5 and	5 and provide feedback to them.	
observe	provide feedback to them (NTS	(NTS 3n, 3o).	
lessons	3n, 3o).		
and	13 Remind teachers to read	4.3 Read PLC Session 6 in	
at next	PLC Session 6 in preparation for	preparation for the next session.	
session	the next session.		
Appendix 5	A sample lesson plan for	A sample lesson plan for	
	teaching ICT to develop	teaching ICT to develop learners'	
	learners' numeracy skills:	numeracy skills:	
	aj Topic: Spreadsheet Application	a) TOPIC: Spreadsheet Application	
	b) Sub-Topic:	b) Sub-Topic:	
L	, r	, , ,	1

Application of selected
formulae and functions
Objectives:
By the end of the lesson,
the learner will be able to:
i. Construct and insert
simple formulae in a
spreadsheet
<i>ii. Use function tools in</i>
analysing data
) Teaching and Learning
Resources (TLRs):
Computer, Microsoft Office
Excel spreadsheet,
projector, cards with
arithmetic symbols, etc.
) Relevant Previous
Knowledge (RPK):
Learners can mention some
basic parts of a spreadsheet
and can identify and
interpret arithmetic
operations.
Introduction:
i. In mixed-ability
groups, learners are
presented cards with
arithmetic symbols
placed face down.
leacher throws a soft
ball to a group. A
learner in the group
catches the ball, picks
symbol on it. The
the ball to another
the ball to another
group and the group
evolains what the
symbol does The
nracess is repeated to
exhaust all the cards
ii In an all-inclusive class
discussion quide
learners to mention
some basic parts of a

Application of selected formulae and functions

- c) Objectives: By the end of the lesson, the learner will be able to:
 - *i.* Construct and insert simple formulae in a spreadsheet
 - *ii.* Use function tools in analysing data
- d) Teaching and Learning Resources (TLRs): Computer, Microsoft Office Excel spreadsheet, projector, cards with arithmetic symbols, etc.
- e) Relevant Previous Knowledge (RPK): Learners can mention some basic parts of a spreadsheet and can identify and interpret arithmetic operations.
- f) Introduction:
 - In mixed-ability groups, i. learners are presented cards with arithmetic symbols placed face down. Teacher throws a soft ball to a group. A *learner in the group* catches the ball, picks one card and tells the symbol on it. The *learner then throws the* ball to another group and the group that catches it, explains what the symbol does. The process is repeated to exhaust all the cards. ii. In an all-inclusive class

ii. In an all-inclusive class discussion, guide learners to mention some basic parts of a spreadsheet and explain that the lesson will be making use of

	spreadsneet and			arithmetic operations	
	explain that the lesson			to construct formulae	
	will be making use of			in spreadsheets.	
	arithmetic operations				
	to construct formulae				
	in spreadsheets.				
<i>a</i>)	Tasks/Activities:	a)	Task	s/Activities:	
91	i. With the aid of a	91	i.	With the aid of a	
	computer and a			computer and a	
	projector, quide			projector, quide	
	learners in their			learners in their various	
	various arouns to			aroups to launch a	
	launch a snreadsheet			spreadsheet annlication	
	annlication on their			on their computers let	
	computers let them			them noint out the	
	noint out the			features/narts/tools	
	features/narts/tools			identified on the	
	identified on the			interface of the	
	interface of the			snreadsheet	
	snreadsheet			Encourage neers to	
	Encourage neers to			support pack other to	
	support each other			norform the task	
	to perform the tack				
	ii Present alaba-		ii	Present alpha-numeric	
	numeric data and			data and auide learners	
	auide learners to			to construct a table on	
	guide learners lo			the snreadsheet with	
	the spreadsheat with			the data Move around	
	the data Move			the arouns and	
	around the groups			encourage the	
	and ancourage the			narticipation of all	
	und encourage the			pur licipulion of an	
	pur incipution of an			abilitios	
	abilition				
				LEVEL 1. Accort data antrica	
				Accept unit entries	
	Accept data entries			from logrance	
	containing 10 items			jrom learners.	
	Jrom learners.			Level Z:	
	Level 2:			Accept data entries	
	Accept data entries			containing 15 items	
	containing 15 items			from learners.	
	from learners.			Level 3:	
	Level 3:			Accept data entries	
	Accept data entries			containing 20 items	
	containing 20 items			and above from	
				learners.	

	and the surge fragment			
	and above from			
	learners.			
<i>III.</i>	Discuss with learners	<i>III.</i>	Discuss with learners	
	how to create		how to create formulae	
	formulae using		using arithmetic	
	arithmetic		operational signs (+, ×,	
	operational signs (+, ×		÷, ≥, =, etc.). Encourage	
	÷, ≥, =, etc.).		learners to respect the	
	Encourage learners to		contributions of others.	
	respect the		Let learners be aware	
	contributions of		the things they say	
	others. Let learners		either positive or	
	be aware the things		negative affect their	
	they say either		colleagues' learning.	
	positive or negative		Level 1:	
	affect their		Create spreadsheet	
	colleagues' learning.		formulae involving one	
	Level 1:		operational sign.	
	Create spreadsheet		Level 2:	
	, formulae involvina		Create spreadsheet	
	one operational sian.		formulae involvina two	
	Level 2:		operational signs.	
	Create spreadsheet		level 3:	
	formulae involvina		Create spreadsheet	
	two operational signs		formulae usina	
			multinle operational	
	Create spreadsheet		cians	
	formulae using		signs.	
	joinnulue using multiple operational			
	cians			
<i>.</i>	SIGHS.	<i></i>	la vaiva da abilitu	
IV.	in mixed-ability	IV.	In mixed-ability	
	groups, discuss with		groups, discuss with	
	learners the		learners the	
	spreadsneet function		spreadsneet function	
	tools and guide them		tools and guide them	
	to use these tools to		to use these tools to	
	analyse and interpret		analyse and interpret	
	a given data.		a given data.	
	Level 1:		Level 1:	
	Use one spreadsheet		Use one spreadsheet	
	function tool, for		function tool, for	
	example Autosum, to		example Autosum, to	
	compute and analyse		compute and analyse	
	data.		data.	
	Level 2:		Level 2:	
	Use two spreadsheet		Use two spreadsheet	
	function tools, for		function tools, for	

	example Autosum	example Autosum and
	and Percentages, to	Percentages, to
	compute and analyse	compute and analyse
	data.	data.
	Level 3:	Level 3:
	Use at least three	Use at least three
	spreadsheet function	spreadsheet function
	tools, for example	tools, for example
	Autosum.	Autosum. Percentaaes.
	Percentages.	Averages, Max, Min,
	Averages, Max. Min.	etc., to compute and
	etc., to compute and	analyse data.
	analyse data	
	h) Core Points:	h) Core Points:
	i Constructing or creating	i Constructing or creating
	formulae on	formulae on
	spraadshaats	spragdshaats
	spreuusneets.	spieuusiieets.
	Luunich un Excel Coloct an armsty as!!	
	Select an empty cell	Select an empty cell
	I ype an equal sign	Type an equal sign
	(=) then type a	(=) then type a
	function. For	function. For
	example =Sum	example =Sum
	Type an opening	Type an opening
	parenthesis	parenthesis
	Select the range of	Select the range of
	cells and type a	cells and type a
	closing parenthesis	closing parenthesis
	Press enter to get	Press enter to get
	the result	the result
	ii. Using function tool to	<i>ii. Using function tools to</i>
	analyse data:	analyse data:
	Autosum to find	Autosum to find
	totals	totals
	Average function to	Average function to
	find the mean of a	find the mean of a
	given data, etc.	given data, etc.
	 Percentage function 	Percentage function
	to interpret	to interpret
	frequencies	frequencies
	> Max and Min	Max and Min
	functions to	functions to
	determine the	determine the highest
	highest and lowest	and lowest values
	values etc	etr
L		

i) Cc i. ii. iii. iv. v.	re Compet Digital Problen Collabo Critical Persond	rencies: literacy n solving ration sl thinking al develo	skills kills skills pment	j	i) Col i. ii. iii. iv. v.	re Compete Digital lit Problem Collabord Critical tl Personal	encies: teracy solving s ation skil hinking s develop	kills ls kills ment
J) Co Re by va su leo	nclusion: view lesso asking the rious grou mmarise w arned in the	n with le em in the os to vhat they e lesson.	arners ir v have	J	r) Col Rev by vai vai wh the	nclusion: view lessor asking the rious group at they hav e lesson.	n with lea m in thei os to sum ve learne	arners ir amarise ed in
k) Ev Us an foi	aluation: e the follor swer the q llow:	wing dat uestions	a to that	I	k) Eve Use an: fol	aluation: e the follov swer the qu low:	ving data uestions	a to that
S/N	Name	Class Score	Exams Score		S/N	Name	Class Score	Exams Score
1	Esther	25	50		1	Esther	25	50
2	Aaron	22	58		2	Aaron	22	58
3	Kwaku	26	46		3	Kwaku	26	46
4	Ansbert	22	55		4	Ansbert	22	55
5	Dedey	20	60		5	Dedey	20	60
6	Beryl	24	61		6	Beryl	24	61
7	Fletcher	16	68		7	Fletcher	16	68
ii. iii.	with the (Level 1) Find the each stu Excel for (Level 2) Apply th function compute	data. total sco dent usi mulae. e Excel tools to e the ave	ore for ng trage,		ii. iii.	with the (Level 1) Find the each stud formulae (Level 2) Apply the tools to c average,	data. total sco dent usin 2. e Excel fu compute maximu	re for og Excel inction the im and
	maximu minimur	m and n scores.				minimun (Level 3	n scores. 3)	
n -	(Level 3)					D		

PLC Sessio	PLC Session 6: Supporting the teaching and learning of					
numeracy at the right level in Technical and Vocational						
Educatior	n and Training.					
	0					
TVET Domain:						
1. Agricultural	Science					
2. Home Econo	omics					
3. Technical						
4. Visual Art	.					
Focus: the	Guidance notes on Leading	Guidance Notes on Teacher	Time in			
bullet points	the session. What the PLC	Activity during the PLC Session.	session			
provide the	Coordinator will have to say	What teachers will do during				
frame for	auring each stage of the	each stage of the session				
what is to be	session					
aone in the						
session. The						
should use						
the bullets						
to quide						
what they						
write for the						
PIC						
Coordinators						
and teachers						
to do and						
say during						
each session.						
Each bullet						
needs to be						
addressed						
1.	1.1 Start the PLC session by	1.1 Share what you did	20			
Introduction	asking a teacher to share what	differently in the classroom or	mins			
	they did differently in the	elsewhere based on PLC				
	classroom or elsewhere based	Session 5, on supporting the				
	on PLC Session 5, on	teaching and learning of				
	supporting the teaching and	numeracy at the right level in				
	learning of numeracy at the	ICI, which you think impacted				
	right level in ICI, which they	learning positively.				
	think impacted learning					
	positively.					
	1.2 Ask teachers to discuss and	1.2 Discuss and summarise in a				
	summarise in a single sentence	single sentence why you think				
	why they think what a	what your colleague did by way				
	colleague did by way of	of application of what you				

	application of what they	learned in Session 5, on	
	learned in Session 5, on	supporting the teaching and	
	supporting the teaching and	learning of numeracy at the	
	learning of numeracy at the	right level in ICT, supported	
	right level in ICT, supported	learning (NTS 1a).	
	learning (NTS 1a).		
2. Planning	2.1 Ask a teacher to read the	2.1 Read the Purpose, Learning	30
for teaching,	Purpose, Learning Outcomes	Outcomes (LOs) and Learning	mins
learning and	(LOs) and Learning Indicators	Indicators (LIs) for the session	
assessment	(LIs) for the session (NTS 1b,	(NTS 1b, 2b - 2d, and 3i).	
activities,	2b - 2d, and 3i).		
making links			
with the Pre-	Purpose:	Purpose:	
Tertiary	The purpose of the session is	The purpose of the session is to	
(standards-	to discuss how to support the	discuss how to support the	
based)	teaching and learning of	teaching and learning of	
, Curriculum	numeracy at the right level	numeracy at the right level	
and using	across the TVET/SHS	across the TVET/SHS curriculum	
GESI. SEL. ICT	curriculum and how numeracy	and how numeracy can support	
and 21 st	can support the teaching and	the teaching and learning of	
century skills	learning of TVET.	TVET.	
,			
	Note:	Note:	
	Numeracy across the	Numeracy across the	
	curriculum is a way of	curriculum is a way of	
	integrating mathematical skills	integrating mathematical skills	
	into different subjects across	into different subjects across	
	the curriculum. Numeracy skills	the curriculum. Numeracy skills	
	involve understandina	involve understandina	
	numbers. countina. solvina	numbers. countina. solvina	
	number problems, measurina.	number problems, measurina.	
	estimatina. sortina. noticina	estimatina, sortina, noticina	
	patterns, addina and	patterns. addina and	
	subtracting numbers.	subtracting numbers. Improving	
	Improving numeracy skills	numeracy skills amona learners	
	amona learners leads to better	leads to better understanding	
	understanding of concepts and	of concepts and skill	
	skill development, areater	development, areater wellbeing	
	wellbeing and a less stressful	and a less stressful life	
	life		
	LO 1: Demonstrate	LO 1: Demonstrate knowledge	
	knowledge and	and understanding of	
	understanding of how	how to apply numeracy	
	to apply numeracy at	at the right level across	
	the right level across	the TVET/SHS	
	the TVET/SHS	curriculum (NTS 1a. 2c -	
	,	2f, 3a and 3e – 3k).	

curriculum (NTS 1a, 2c -		
2f, 3a and 3e – 3k).	LI 1.1 Identify three ways of	
	applying numeracy at the right	
LI 1.1 Identify three ways of	level across the TVET/SHS	
applying numeracy at the right	curriculum.	
level across the TVET/SHS	LI 1.2 Discuss the various	
curriculum.	numeracy strategies that can	
LI 1.2 Discuss the various	be used to develop TVET	
numeracy strategies that can	concepts at the right level.	
be used to develop TVET		
concepts at the right level.	LO2: Demonstrate knowledge	
	and understanding of	
LO2: Demonstrate knowledge	how to apply TVET	
and understanding of	concepts to support	
how to apply TVET	numeracy across the	
concepts to support	curriculum (NTS 1a, 2c -	
numeracy across the	2f, 3a and 3e – 3k).	
curriculum (NTS 1a, 2c -	LI 2.1 Identify three ways TVET	
2f, 3a and 3e – 3k).	can support numeracy at the	
LI 2.1 Identify three ways TVET	right level across the	
concepts can support	curriculum.	
numeracy at the right level		
across the curriculum.	LI 2.2 Prepare a sample lesson	
	plan to show practical activities	
LI 2.2 Prepare a sample lesson	of how TVET supports the	
plan to show practical	teaching and learning of	
activities of how TVET	numeracy at the right level	
supports the teaching and	across the TVET/SHS	
learning of numeracy at the	curriculum.	
right level across the TVET/SHS		
curriculum.	2.2 In your TVET domain,	
	groups identify ways of	
2.2 Ask teachers in their TVET	applying numeracy at the right	
domain groups to identify	level across the TVET/SHS	
ways of applying numeracy at	curriculum (NTS 2c, 2d and 3i).	
the right level across the		
IVEI/SHS CURRICUIUM (NTS 2C,	E.g.	
2u, and 3i).	Use of varied activities	
E.G.	such as sorting and	
a) Use of varied activities	grouping, etc.	
such as sorting,		
grouping, mapping,		
tunying ana plotting		
yruphs b) Use of varied teaching		
and loarning resources		
such as manipulatives		
such as manipulatives,		

flow charts, flash cards,	
and videos	
c) Use cooperative	
learning strategies to	
enable learners think	
outside the hox etc	2 3 Discuss at least two
	numeracy strategies that can
2.2. Ask too share to discuss at	he wood to downlow TV(FT
2.3 Ask teachers to discuss at	be used to develop TVET
least two numeracy strategies	concepts at the right level (NTS
that can be used to develop	1b, 2c- 2e, 3f and 3g).
TVET concepts at the right	
level (NTS 1b, 2c- 2e, 3f and	E.g.
3g).	Using concepts in maths
E.g.	such as: Subtraction can be
a) Using concepts in	described as 'takeaway' or
maths such as:	'removing', etc.
Subtraction can be	
described as	
'takeaway' or	
'removing'	
b) Combining words and	
numbers to provide a	
complete	
understanding such as	
four (4)	
c) Using visual images	
and shapes to reflect	
the meaning of	
concents	
d) Measuring quantities in	
u) Weusunny quantities in	
grammes, etc.	2.4 Identify three (3) ways IVEI
	concepts can support numeracy
2.4 Ask teachers to identify	at the right level across the
three (3) ways TVET concepts	curriculum (NTS 2c, 2d).
can support numeracy at the	
right level across the	E.g.
curriculum (NTS 2c, 2d).	Use of classification to
<i>E.g.</i>	group tools and equipment
a) Use of classification to	as in sets, etc.
group tools and	
equipment as in sets	
b) Measuring, recording	
and charting figures	
c) Recognising shapes of	
tools and equipment.	2.5 In your TVET domain
etc.	prepare a sample lesson plan to

	2.5 Ask teachers in their TVET	show practical activities of how	
	domain to prepare a sample	TVET supports the teaching and	
	lesson plan to show practical	learning of numeracy at the	
	activities of how TVET	right level across the TVET/SHS	
	supports the teaching and	curriculum (NTS 2a - 2c. 3a and	
	learning of numeracy at the	3f - 3k).	
	right level across the TVFT/SHS		
	curriculum (NTS 2a - 2c, 3a and	Refer to the sample lesson plan	
	3f - 3k).	in Annendix 6	
	Refer to the sample lesson plan	in appendix e	
	in Annendix 6		
3. Modelling a	3.1 Ask teachers in their TVFT	3.1 In your TVFT domain	30
teaching	domain groups to identify in	groups identify in your sample	mins
activity	their sample lesson plan	lesson plan activities that could	
making links	activities that could promote	promote GESLSEL_ICT	
with the Pre-	GESL SEL ICT differentiation	differentiation and 21 st Century	
Tortiary	and 21 st century skills	skills responsiveness (NTS 3f)	
(standards-	responsiveness (NTS 2f)		
(stanuarus-		Fa	
Daseu)	L.y.	L.y.	
and using	u) Learners were engaged	mixed ability/mixed	
	ander/mixed culture	ander/mixed sulture	
GESI, SEL, ICI		genuer/mixed-culture	
	groups to encourage	groups to encourage	
century skills		active participation of	
	males/jemales and	males/jemales and SEN	
	SEN learners	learners, etc.	
	(GESI/SEL)		
	b) Learners were given		
	the opportunity to		
	share their ideas to the		
	whole class using		
	different presentation		
	modes		
	(SEL/Differentiation)		
	c) Learners were given		
	differentiated activities		
	(Differentiation)		
	d) Learners were engaged		
	in critical thinking,		
	communication,		
	collaborative skills,		
	leadership skills		
	through pair and group		
	work (21 st century		
	skills)		
	e) Learners were engaged		
	to watch pre-		

prepared/YouTube videos on TVET tools		
and equipment (ICT) 3.2 Ask teachers to recommend other appropriate strategies that could aid in the development of numeracy skills in learners (NTS 1a, 2e, 3f and 3m). E.g. a) Peer matching b) Project work c) Description of shapes d) Games/puzzles e) Graph presentation,	 3.2 Recommend other appropriate strategies that could aid in the development of numeracy skills in learners (NTS 1a, 2e, 3f and 3m). E.g. Peer matching, etc. 	
 etc. 3.3 Ask teachers to show how ICT can be used to support the teaching and learning of numeracy across the TVET/SHS curriculum (NTS 3j). E.g. a) Showing YouTube/Pre- recorded videos and podcast on data on TVET tools and equipment b) Using interactive whiteboard to present TVET tools and equipment for learners to group according to their weights and shapes c) Giving learners assignments to be presented in charts and figures using PowerPoint d) Giving learners projects to search online for dimensions of TVET tools and equipment, etc. 	 3.3 Show how ICT can be used to support the teaching and learning of numeracy across the TVET/SHS curriculum (NTS 3j). E.g. Showing YouTube/Prerecorded videos and podcast on data on TVET tools and equipment, etc. 	

	3.4 Ask a teacher to model a	3.4 Model a teaching activity	
	teaching activity based on the	based on the sample lesson	
	sample lesson plan that can	plan that can support learners	
	support learners to develop	to develop numeracy skills at	
	numeracy skills at the right	the right level, taking into	
	level, taking into consideration	consideration GESI, SEL, ICT,	
	GESI, SEL, ICT, 21 st century	21 st century skills and	
	skills and differentiation (NTS	differentiation (NTS 1a, 2c).	
	1a, 2c).		
	, ,	3.5 Give feedback on the lesson	
	3.5 Ask teachers to give	observed (NTS 1a. 2c).	
	feedback on the lesson		
	observed (NTS 1a. 2c).		
4. Evaluation	4.1 Ask teachers to reflect.	4.1 Reflect. write and share	10
and review	write and share what they	what you have learnt with the	mins
of session:	have learned with the larger	larger group on how to support	
	group on how to support the	the teaching and learning of	
Noting that	teaching and learning of	numeracy across the TVET/ SHS	
teachers	numeracy across the TVET/	curriculum (NTS 1a. 1b).	
need to	SHS curriculum (NTS 1a, 1b).		
identify			
critical	4.2 Remind teachers to, where	4.2 Where possible, identify a	
friends to	possible, identify a critical	critical friend to observe your	
observe	friend to observe their lesson	lesson in relation to PLC Session	
lessons and	in relation to PLC Session 6 and	6 and provide feedback to you	
report at	provide feedback to them (NTS	(NTS 1a, 3n and 3o).	
next session	1a, 3n and 3o).		
	4.3 Remind teachers to read	4.3 Read PLC Session 7 in	
	PLC Session 7 in preparation	preparation for the next	
	for the next session.	session.	
Appendix 6	A sample TVET lesson plan to	A sample TVET lesson plan to	
	support the teaching and	support the teaching and	
	learning of numeracy at the	learning of numeracy at the	
	right level.	right level.	
	a) Topic:	a) Topic:	
	Tools and Equipment in	Tools and Equipment in	
	Technical, Agriculture,	Technical Skills, Agriculture,	
	Visual Arts and Home	Visual Arts and Home	
	Economics.	Economics.	
	b) Sub-Topic:	b) Sub-Topic:	
	Classification of tools and	Classification of tools and	
	equipment in Technical,	equipment in Technical,	
	Agriculture, Visual Arts and	Agriculture, Visual Arts and	
	Home Economics.	Home Economics.	
	Refer to MoE (2010) teaching	Refer to MoE (2010) teaching	
	syllabus for TVET	syllabus for TVET	

c) Lesson Obiectives:	c) Lesson Objectives: By the
By the end of the lesson	end of the lesson learners
learners will be able to:	will be able to:
i. List at least 4 tools and	i. List at least 4 tools and
equipment used in	equipment used in
technical, gariculture	technical, gariculture.
visual arts and home	visual arts and home
economics	economics
ii Discuss at least 4 uses	ii Discuss at least 4 uses
of tools and equipment	of tools and equipment
in technical	in technical
in technicul,	agriculture visual arts
and home economics	and home economics
and present the	and present the
information in charts	information in charts
injormation in charts.	injormation in charts.
III. Classify the tools and	III. Classify the tools and
equipment in tecnnical,	equipment in
agriculture, visual arts	tecnnical, agriculture,
and nome economics	visual arts and home
according to their uses	economics according
and present the	to their uses and
information, using	present the
charts, figures and	information, using
tables.	charts, figures and
	tables.
d) Teaching and learning	d) Teaching and learning
resources (TLRs):	resources (TLRs) :
i. Videos/pictures on	i. Videos/pictures on
tools and equipment	tools and equipment
ii. Sample tools and	ii. Sample tools and
equipment,	equipment,
manipulatives, charts	manipulatives,
and concept maps	charts and concept
iii. Laboratories/worksho	maps
ps/studios and farms	iii. Laboratories/worksh
iv. Laptops, projectors,	ops/studios and
and mobile phones	farms
where possible, etc.	iv. Laptops, projectors,
• •	and mobile phones
	where possible, etc.
e) Relevant Previous	e) Relevant Previous
Knowledae (RPK):	Knowledae (RPK):
Learners use tools and	Learners use tools and
equinment in their daily	equipment in their daily
activities	activities

ГГ			
	f) Introduction:	f) Introduction:	
	Introduce the lesson	Introduce the lesson	
	using starters such as	using starters such as	
	mapping activities,	mapping activities,	
	stories, riddles,	stories, riddles,	
	narratives related to	narratives related to the	
	the topic e.g., I am a	topic e.g., I am a tool	
	tool used for cutting,	used for cutting, what	
	what am I? (Knife,	am I? (Knife, scissors,	
	scissors, blade, shears	blade, shears etc.)	
	etc.)	g) Teaching and Learning	
	g) Teaching and Learning	activities:	
	activities:	i. In mixed-	
	i. In mixed-	ability/mixed-	
	ability/mixed-	gender/mixed-	
	gender/mixed-	cultural groups,	
	cultural groups,	learners visit/watch	
	learners visit/watch	videos of local and	
	videos of local and	modern TVET	
	modern TVET	industries to explore	
	industries to explore	the different tools	
	the different tools	and equipment used	
	and equipment used	technical,	
	in technical,	agriculture, visual	
	agriculture, visual	arts and home	
	arts and home	economics.	
	economics.		
	ii. Level 1	ii. Level 1	
	Ask learners to write	Ask learners to	
	the names of five	write the names of	
	tools and equipment	five tools and	
	they observed.	equipment they	
	Level 2	observed.	
	Ask learners to	Level 2	
	sketch at least 2	Ask learners to	
	different tools and	sketch at least 2	
	equipment they	different tools and	
	observed.	equipment they	
	Level 3	observed.	
	Ask learners to	Level 3	
	classify, count the	Ask learners to	
	tools and equipment	classify, count the	
	and present the	tools and	
	result in a chart.	equipment and	
		present the result	
		in a chart.	

iii. Ask learners in	iii. Ask learners in	
pairs/groups to	pairs/groups to	l
discuss and state the	discuss and state	l
number of uses of	the number of uses	l
tools and equipment	of the tools and	l
they have found and	equipment they	l
present the	found and present	l
information in a table	the information in	l
form.	a table form.	l
-	iv. Ask learners in	l
iv. Ask learners in	pairs/pyramid	l
pairs/pyramid	groupings to	l
groupings to classify	classify sample	l
sample tools and	tools and	l
equipment used in the	equipment used in	l
various TVET domains	the various TVET	l
and present the	domains and	l
information. usina	present the	l
mappina, charts.	information. usina	l
figures and tables.	mappina, charts,	l
Monitor to provide	figures and tables.	l
support to learners	Monitor to provide	l
where necessary.	support to learners	l
	where necessary.	l
Note [.]	Note:	1
Guide learners to	Guide learners to count.	l
count tally or chart the	tally or chart the tools	l
tools and equinment	and equinment under	l
under the various	the various arouns	l
arouns	the various groups	l
Fa	Fa	l
Small tools and equipment	Small tools and equinment	l
//////////////////////////////////////	//////////////////////////////////////	l
//////////////////////////////////////		l
h) Core points:	h) Core points:	1
<i>i.</i> Tools and Equipment:	<i>i.</i> Tools and Equipment:	l
Technical:	Technical:	l
Tape measure	Tape measure	l
trowel, wooden	trowel, wooden	l
float, drawing	float, drawing	l
instruments	instruments	1
concrete mixture	concrete mixture	1
and snirit level etc	snirit level etc	1
$ \Delta ariculture $	$ \Delta ariculture $	1
Hop machata rong	Hop rack machate	1
wheelbarrow	rone wheelharrow	1
wheelburrow,		

pruning shears,	pruning shears,
tractor, etc.	tractor, etc.
Visual Arts:	Visual Arts:
Painting brush,	Painting brush,
paper cutter,	paper cutter,
scissors, computer,	scissors, computer,
tables, sand paper,	tables, sand paper,
chisel, Digital	chisel, Digital
printing machine,	printing machine,
loom, binding	loom, binding
machine, etc.	machine, etc.
Home Economics:	Home Economics:
Sewing machine,	Sewing machine,
knife, saucepans,	knife, saucepans,
coalpot, mortar,	coalpot, mortar,
scissors, tape	scissors, tape
measure, broom,	measure, sweeping
mop, electric stove	broom, mop,
industrial sewing	electric stove,
machine, etc.	industrial sewing
,	machine, etc.
ii. Uses of some of the	ii. Uses of some of the
tools and equipment	tools and equipment
These are used to	These are used to
perform different	perform different
activities such as;	activities such as;
knife for cutting	knife for cutting
tape measure for	tape measure for
measuring	measuring
binding machine for	binding machine for
binding,	binding,
brush for painting,	brush for painting,
mop for cleaning,	mop for cleaning,
Ioom for weaving	loom for weaving
spirit-level for	spirit-level for laying,
laying, etc.	etc.
\checkmark	
iii. Classification based on	iii. Classification based on
size of tools and	size of tools and
equipment:	equipment:
Small tools and	Small tools and
equipment; tape	equipment; tape
measure, trowel,	measure, trowel,
wooden float,	wooden float,
pruning shears,	pruning shears,
painting brush,	painting brush,
paper cutter, chisel,	paper cutter, chisel,

knife, saucepans,	knife, saucepans,
coal pots, mortar,	coal pots, mortar,
scissors, tape	scissors, tape
measure, sweeping	measure, sweeping
broom, mop, etc.	broom, mop, etc.
Large tools and	Large tools and
equipment; big	equipment;
tables, big mortar,	big tables, big
concrete mixture,	mortar, concrete
tractor, digital	mixture, tractor,
printing machine,	digital printing
loom, industrial	machine, loom,
sewing machine,	industrial sewing
etc.	machine. etc.
iv. Classification based on	iv. Classification based on
function of tools and	function of tools and
equinment:	equinment:
 Cutting tools: 	 Cutting tools: knife
knife scissors drill	scissors drill ninking
ninking shears	shears machete etc
machete etc	 Measuring tools:
 Measuring tools: 	tane measure
tane measure	drawing instrument
drawina	rone scale etc
instrument rone	Tope, seule, etc.
scale etc	
i) Core competencies:	i) Core competencies:
i Critical thinking	i Critical thinking
ii Communication	ii Communication
skills	skills
iii Collaboration	iii Collaboration skills
skills	iv Counting skills
iv Counting skills	v Leadershin skills
v Leadershin skills	v. Leadership skins
i) Conclusion:	i) Conclusion:
I se the question-and-	I se the question-and-
answer method to find	answer method to find
out from learners what	out from learners what
they have learned	they have learned
k) Evaluation	k) Evaluation
i Level 1:	i level 1:
i. Levei 1. List four (1) tools	1. LEVEL 1. List four (1) tools
List jour (4) tools	and equinment used
und equipment	in technical
agriculture visual	
arts and home	arts and home
aconomics	aconomics
economics.	economics.

ii.	Level 2:	ii.	Level 2:	
	Discuss the uses of		Discuss the uses of	
	four (4) tools and		four (4) tools and	
	equipment in		equipment in	
	technical,		technical,	
	agriculture, visual		agriculture, Visual	
	arts and home		arts and Home	
	economics.		Economics.	
iii.	Level 3:			
	Classify the tools	iii.	Level 3:	
	and equipment		Classify the tools	
	according to their		and equipment	
	uses using tables/		according to their	
	charts/concept		uses using tables/	
	mapping in		charts/concept	
	technical,		mapping in	
	agriculture, visual		technical,	
	arts and home		agriculture, visual	
	economics.		arts and home	
			economics.	
l) Rei	marks:	l) Rem	narks:	

Session 7: Supporting the teaching and learning of				
numeracy at the right level in business studies				
Focus: the bullet points provide the frame for what is to be done in the session. The writer should use the bullets to guide what they write for the PLC Coordinators and teachers to do and say during each session. Each bullet needs to be addressed	Guidance notes on Leading the session. What the PLC Coordinator will have to say during each stage of the session	Guidance Notes on Teacher Activity during the PLC Session. What teachers will do during each stage of the session	Time in session	
1. Introduction	1.1 Start the PLC session by asking teachers to share what they did differently in the classroom or elsewhere based on PLC Session 6, on supporting the teaching and learning of numeracy at the right level in Technical and Vocational Education and Training (TVET), which they think impacted learning positively.	1.1 Share what you did differently in the classroom or elsewhere based on PLC Session 6, on supporting the teaching and learning of numeracy at the right level in Technical and Vocational Education and Training (TVET), which you think impacted learning positively.	20 mins	
	1.2 Ask teachers to discuss and summarise in a single sentence why they think what their colleague did by way of application of what they learned in Session 6, on supporting the teaching and learning of numeracy at the right level in TVET, supported learning.	1.2 Discuss and summarise in a single sentence why you think what your colleague did by way of application of what you learned in Session 6, on supporting the teaching and learning of numeracy at the right level in TVET, supported learning.		

2. Planning for	2.1 Ask a teacher to read	2.1 Read the Purpose,	30 mins
teaching, learning	the Purpose, Learning	Learning Outcomes	
and assessment	Outcomes (LOs) and	(LOs) and Learning	
activities, making	Learning Indicators (LIs)	Indicators (LIs) for the	
links with the Pre-	for the session.	session.	
Tertiary			
(standards-based)	Purpose:	Purpose:	
Curriculum and	The purpose of the	The purpose of the	
using GESI, SEL, ICT	session is to discuss the	session is to discuss the	
and 21 st century	identification and	identification and	
skills	strategies for using	strategies for using	
	numeracy skills to	numeracy skills to	
	support the teaching and	support the teaching	
	learning of business	and learning of	
	studies, and vice versa.	business studies, and	
		vice versa.	
	LO 1: Demonstrate	LO 1: Demonstrate	
	knowledge.	knowledge.	
	understanding and	understanding	
	application of the	and application	
	numeracy skills in	of the concept of	
	, business studies	numeracy skills	
	(NTS 1b, 2c - 2f, 3g	in business	
	and 3i).	studies (NTS 1b,	
		2c -2f, 3g and 3i).	
	LI 1.1 Identify	LI 1.1 Identify	
	mathematical concepts in	mathematical concepts	
	teaching and learning of	in teaching and	
	business studies.	learning of business	
		studies.	
	LI 1.2 Analyse at least	LI 1.2 Analyse at least	
	three strategies of	three strategies of	
	applying numeracy in	applying numeracy in	
	teaching and learning of	teaching and learning	
	business studies at the	of business studies at	
	right level.	the right level.	
	LO 2: Demonstrate	LO 2: Demonstrate	
	knowledge and	knowledge and	
	understanding of	understanding of	
	how concepts in	how concepts in	
	business studies	business studies	
	support the	support the	
	teaching and	teaching and	
	learning of	learning of	
	numeracy skills	numeracy skills	

LI 2.1 Identify concepts in business studies that support the teaching and support the teaching and	 LI 2.1 Identify concepts in business studies that support the teaching and learning of numeracy skills. LI 2.2 Analyse how business studies as a discipline provides opportunities for the teaching and learning of numeracy. 2.2 Ask teachers in pairs, to mention at least three mathematical concepts that can be used in the teaching and learning of business studies (NTS 2c). <i>E.g.</i> a) counting, addition, subtraction, multiplication, division of numbers as used in cost accounting and financial accounting b) investigation and problem solving in business management c) data collection and noticing patterns in economics d) estimation in financial accounting e) analysing and making sense of information in business management, etc. 	LI 2.1 Identify concepts in business studies that support the teaching and learning of numeracy skills. LI 2.2 Analyse how business studies as a discipline provides opportunities for the teaching and learning of numeracy. 2.2 In pairs, mention at least three mathematical concepts that can be used in the teaching and learning of business studies (NTS 2c). <i>E.g.</i> <i>counting,</i> <i>addition,</i> <i>subtraction,</i> <i>multiplication,</i> <i>division of</i> <i>numbers as used</i> <i>in cost accounting</i> <i>and financial</i> <i>accounting, etc.</i>	
	learning of numeracy skills. LI 2.2 Analyse how	and learning of numeracy skills. LI 2.2 Analyse how	
learning of numeracy skills.and learning of numeracy skills.LI 2.2 Analyse howLI 2.2 Analyse how	business studies as a discipline provides opportunities for the teaching and learning of numeracy.	business studies as a discipline provides opportunities for the teaching and learning of numeracy.	
learning of numeracy skills.and learning of numeracy skills.LI 2.2 Analyse how business studies as a discipline provides opportunities for the teaching and learning of numeracy.LI 2.2 Analyse how business studies as a discipline provides opportunities for the teaching and learning of numeracy.	2.2 Ask teachers in pairs, to mention at least three mathematical concepts that can be used in the teaching and learning of business studies (NTS 2c).	2.2 In pairs, mention at least three mathematical concepts that can be used in the teaching and learning of business studies (NTS 2c).	
 learning of numeracy skills. LI 2.2 Analyse how business studies as a discipline provides opportunities for the teaching and learning of numeracy. 2.2 Ask teachers in pairs, to mention at least three mathematical concepts that can be used in the teaching and learning of business studies (NTS 2c). LI 2.2 Analyse how business studies as a discipline provides opportunities for the teaching and learning of numeracy. 2.2 Ask teachers in pairs, to mention at least three mathematical concepts that can be used in the teaching and learning of business studies (NTS 2c). 	E.g. a) counting, addition, subtraction, multiplication, division of numbers as used in cost accounting and financial accounting	E.g. counting, addition, subtraction, multiplication, division of numbers as used in cost accounting	
Iearning of numeracy skills.and learning of numeracy skills.LI 2.2 Analyse how business studies as a discipline provides opportunities for the teaching and learning of numeracy.LI 2.2 Analyse how business studies as a discipline provides opportunities for the teaching and learning of numeracy.2.2 Ask teachers in pairs, to mention at least three mathematical concepts that can be used in the teaching and learning of business studies (NTS 2c).2.2 In pairs, mention at least three mathematical concepts that can be used in the teaching and learning of business studies (NTS 2c).E.g. a) counting, addition, subtraction, multiplication, division of numbers as used in cost accounting and financial accounting2.2 In pairs, mention at least three mathematical concepts that can be used in the teaching and learning of business studies (NTS 2c).	 b) investigation and problem solving in business management c) data collection and 	and financial accounting, etc.	
learning of numeracy skills.and learning of numeracy skills.LI 2.2 Analyse how business studies as a discipline provides opportunities for the teaching and learning of numeracy.LI 2.2 Analyse how business studies as a discipline provides opportunities for the teaching and learning of numeracy.2.2 Ask teachers in pairs, to mention at least three mathematical concepts that can be used in the teaching and learning of business studies (NTS 2c).2.2 In pairs, mention at least three mathematical concepts that can be used in the teaching and learning of business studies (NTS 2c).E.g. a) counting, addition, subtraction, multiplication, division of numbers as used in cost accounting and financial accounting b) investigation and problem solving in business management c)2.2 In pairs, mention at least three mathematical concepts that can be used in the teaching and learning of business studies (NTS 2c).E.g. a) counting, addition, subtraction, division of numbers accounting and financial accounting b) investigation and problem solving in business management c)2.2 In pairs, mention at least three mathematical concepts that can be used in the teaching and learning of business studies (NTS 2c).	noticing patterns in economics d) estimation in financial accounting and cost accountina		
learning of numeracy skills.and learning of numeracy skills.L1 2.2 Analyse how business studies as a discipline provides opportunities for the teaching and learning of numeracy.L1 2.2 Analyse how business studies as a discipline provides opportunities for the teaching and learning of numeracy.2.2 Ask teachers in pairs, 	e) analysing and making sense of information in business management, etc.		

2.3 Ask teachers in pairs	2.3 In pairs, enumerate	
to enumerate how useful	how useful the	
the application of	application of	
numeracy skills is to the	numeracy skills is to the	
teaching and learning of	teaching and learning	
business studies (NTS 2c-	of business studies	
2f, 3f and 3g).	(NTS 2c-2f, 3f and 3g).	
E.g.	E.g.	
a) The acquisition of	The acquisition	
numeracy skills	of numeracy	
helps learners to	skills helps	
improve their	learners to	
speed and	improve their	
performance in	speed and	
solving problems	performance in	
in business studies	solving	
b) Numeracy helps	problems in	
learners to reduce	business	
the number of	studies, etc.	
computational		
errors during		
accounting lessons		
c) It helps learners to		
understand the		
principles of		
financial		
management		
d) It helps learners to		
make informed		
judgement in		
logical reasoning		
in business		
management, etc.		
2.4 Ask teachers to	2.4 Analyse at least	
analyse at least three	three strategies for	
strategies for applying	applying numeracy	
numeracy skills in	skills in teaching and	
teaching and learning of	iearning of business	
pusiness studies at the	studies at the right	
ngnt level (NTS 2C - 2T, 3T	ever(1015 2C - 2T, 3T)	
anu 3g). E a	anu sgj.	
E.y.	E.y.	
uj Developilig	Developing	
boln logrnors	help learners	
identify nymeracy	identify numeroov	
identijy numeracy	identijy numeracy	

 concepts such as number, addition, subtraction, patterns, time and data collection during business studies b) Guiding learners to identify the numeracy skills necessary for solving problems during business studies lessons c) Giving remediation to learners with challenges in the application of numeracy skills d) Having clear teaching goals that include numeracy objectives e) Encouraging learners to spot opportunities to practise their numeracy skills, etc. 	concepts, such as number, during business studies, etc.	
etc. 2.5 Ask teachers in their departmental groups to identify concepts in business studies that support the teaching and learning of numeracy skills (NTS 2c-2f). E.g. a) The use of diagrams in economics b) Balancing accounts in	2.5 In your departmental group, identify concepts in business studies that support the teaching and learning of numeracy skills (NTS 2c-2f). E.g. The use of diagrams in economics, etc.	

3 Modelling a	financial accounting c) Case studies under business management, etc. 2.6 Ask teachers to discuss a sample lesson plan in business studies and show how it can be taught with the support of numeracy for learners who may struggle with numbers and computational skills (NTS 3e - 3l). Refer to Appendix 7 for a sample lesson plan in business studies for learners at the appropriate level 3.1 Ask teachers to	2.6 Discuss a sample lesson plan in business studies and show how it can be taught with the support of numeracy for learners who may struggle with numbers and computational skills (NTS 3e - 3l). Refer to Appendix 7 for a sample lesson plan in business studies for learners at the appropriate level 3.1 Identify in the	30 mins
3. Modelling a teaching activity,	3.1 Ask teachers to identify in the sample	3.1 Identify in the sample lesson plan,	30 mins
making links with	lesson plan, activities that	activities that could	
the Pre-Tertiary	could promote GESI, SEL,	promote GESI, SEL, ICT,	
(standards-based)	ICT, 21 st century skills,	21 st century skills, and	
Curriculum and	and differentiation (NTS	differentiation (NTS 3a	
using GESI, SEL, ICT	3a - 3c, 3e - 3g).	- 3c, 3e - 3g).	
and 21 st century	L.g.	E.g.	
SKIIIS	a) reacher usea mixed-ability and	reacner usea	
	mixed-aender	mixed-aender	
	groupings during	groupings during	
	role play in	small group	
	teaching the	discussion in	
	concept money	teaching the	
	(GESI/ SEN)	concept of money,	
	b) Positive feedback	etc.	
	learners esnecially		
	SEN learners		
	(21 st century		
	skills/SEL)		
	c) Teacher assigned		
	dífferentiated		

 (21^{s t} century skills/ Differentiation) d) Projected YouTube videos (21st century skills/ICT) 3.2 Ask teachers to recommend other appropriate assessment strategies in the lesson plan that could aid in the development of numeracy skills in learners who may struggle with developing computational skills and 	3.2 Recommend other appropriate assessment strategies in the lesson plan that could aid in the development of numeracy skills in learners who may struggle with developing	
logical reasoning (NTS 1a, 2e, 3f, 3k and 3m). E.g. a) Mental activities b) Peer teaching c) Self-practice d) Brainwriting e) Presentation f) Portfolio building, etc.	computational skills and logical reasoning (NTS 1a, 2e, 3f, 3k and 3m). <i>E.g.</i> <i>Mental activities,</i> <i>etc.</i>	
 3.3 Ask teachers to explain how ICT can be used in assessing learners of business studies (NTS 3j). E.g. a) Watching and reporting information on money and banking from YouTube/Pre- recorded videos and podcast b) Giving learners assignments on 	 3.3 Explain how ICT can be used in assessing learners of business studies (NTS 3j). E.g. Watching and reporting information on money and banking from YouTube/Pre-recorded videos and podcast, etc. 	

	the concept of money that would involve numeracy to be presented in PowerPoint c) Giving learners projects to search online for information on a topic in business studies d) Using google forms to quiz learners, etc.		
	3.4 Ask a teacher to model a teaching activity based on the sample lesson plan that can support all learners taking into consideration GESI, SEL, ICT, 21 st century skills and differentiation (NTS 1a, 1b, 2c and 3c).	3.4 Model a teaching activity based on the sample lesson plan that can support all learners taking into consideration GESI, SEL, ICT, 21 st century skills and differentiation (NTS 1a, 1b, 2c and 3c).	
	3.5 Ask teachers to give feedback on the lesson delivered (NTS 1a, 2c).	3.5 Give feedback on the lesson delivered (NTS 1a, 2c).	
4. Evaluation and review of session: Noting that teachers need to identify critical friends to observe lessons and report at next session	4.1 Ask teachers in groups to reflect, write and share what they have learned with the larger group with regard to the support numeracy gives in the teaching and learning of business studies (NTS 1a, 1b).	4.1 In your group, reflect, write and share what you have learned with the larger group with regard to the support numeracy gives in the teaching and learning of business studies (NTS 1a, 1b).	10 mins
	4.2 Remind teachers to, where possible, identify a critical friend to observe their lesson in relation to PLC Session 7 and provide feedback at the next PLC session (NTS 3I, 3n and 30).	4.2 Where possible, identify a critical friend to observe your lesson in relation to PLC Session 7 and provide feedback at the next PLC session (NTS 3I, 3n and 30).	

	4.3 Remind teachers to	4.3 Read PLC Session 8
	read PLC Session 8 in	in preparation for the
	preparation for the next	next session.
	session.	
Appendix 7	A sample lesson plan for	A sample lesson plan
	teaching the concept of	for teaching the
	money and banking (SHS	concept of money and
	2) from the MoE (2010)	banking (SHS 2) from
	SHS business	the MoE (2010) SHS
	manaaement svllabus is	business management
	provided below:	svllabus is provided
	,	below:
	a) Topic:	a) Topic:
	Money and Bankina	Money and Bankina
	b) Sub-topic:	b) Sub-topic:
	Characteristics and	Characteristics and
	Functions of money	Functions of money
	c) Objectives:	c) Objectives:
	By the end of the	By the end of the
	lesson, the learner will	lesson, the learner
	be able to:	will be able to:
	i. State at least	i. State at least
	three	three
	characteristics of	characteristics
	money	of money
	ii Explain at least	ii Explain at least
	two functions of	two functions of
	money	money
	d) Teaching and	d) Teaching and
	Learning Resources	Learning Resources
	(TLRs): Ghana cedi	(TIRs):
	coins and banknotes	Ghana cedi coins
	token currency notes	and hanknotes
	task shaats for nick	tokon surransu
	and role play	notes task sheets
	and role-pluy,	for nick and role
	culculator, computer	JOI DICK UNU TOIE-
	unu projector.	pidy, calculator,
		computer and projector
	a) Palayant Provinus	a) Palayant Provinus
	E) RELEVUIL PIEVIOUS	Knowledge (PDK):
	Kilowieuye (RPK):	Lograns can and
	Leurners see unu use	Leurriers see unu
	denominations for	use vultuus Gituliu
	transactions	for transactions
	transactions.	jor transactions.

f) Introduction:	f) Introduction:	
Ask learners to tell the	Ask learners to tell	
amount of money	the amount of	
they spend on food	money they spend	
and other items.	on food and other	
	items.	
g) Tasks/Activities:	g) Tasks/Activities:	
i. Guide learners	i. Guide learners	
through mixed-	through small	
ability groups to	mixed-ability	
categorise the	groups to	
various Ghana cedi	categorise the	
denominations	various Ghana	
according to type	cedi	
(coins and	denominations	
banknotes) and	according to type	
size (face value)	(coins and	
and state at least	banknotes) and	
three	size (face value)	
characteristics of	and state at least	
it.	three	
	characteristics of	
	it.	
ii. Provide learners	ii. Provide learners	
with token currency	with token currency	
notes and coins and	notes and coins and	
guide them in	guide them in	
groups to pick a task	groups to pick a	
sheet at random	task sheet at	
and role-play what	random and role-	
is on the sheet (task	play what is on the	
on banking, open	sheet (task on	
market or "susu"	banking, open	
collection settings).	market or "susu"	
Let learners	collection settings).	
appreciate their	Let learners	
peers' performance	appreciate their	
during the role-play.	peers' performance	
	during the role-	
	play.	
III. Ask learners to	III. Ask learners to	
mention as many as	mention as many	
possible, the	as possible, the	
functions of money	functions of money	
identified during the	identified during	

pick and role-play	the pick and role-	
activity.	play activity.	
iv. Project a YouTube	iv. Project a YouTube	
video in class to	video in class to	
show how the	show how the	
automated teller	automated teller	
machine operates.	machine	
	operates.	
h) Core points:	h) Core points:	
i. Characteristics of	i. Characteristics of	
money include:	money include:	
portability	portability	
> homogeneity	homogeneity	
divisibility	divisibility	
recognisability	recognisability	
durability	durability	
acceptability and	acceptability	
stability of value	and	
	stability of	
	value	
ii. Functions of money	ii. Functions of	
include:	money include:	
store of wealth or	store of wealth	
unit of account	or unit of	
➤ medium of	account	
exchange	medium of	
measure of value	exchange	
and	measure of	
Standard of	value and	
aeferrea payment	standard of	
	aejerrea	
	payment	
i) Core competencies:	i) Core	
i Numeracy skills	comnetencies	
are enhanced	i Numeracy skills are	
when learners	enhanced when	
count and add	learners count and	
money during	add money durina	
aroup work.	aroup work.	
ii. Critical thinkina	ii. Critical thinkina	
and problem-	and problem-	
solving skills are	, solving skills are	
developed when	developed when	
learners analyse	learners analyse	
and sort currency	and sort currency	
denominations.	, denominations.	

iii.	Communication	iii. C	Communication	
	and collaborative	C	ind collaborative	
	skills are	S	kills are developed	
	developed when	ν	vhen learners	
	learners engage in	e	ngage in group	
	group activities.	0	ictivities.	
j) Con	clusion:	j) C	onclusion:	
Ask	learners to	As	k learners to	
men	tion what they	me	ention what they	
have	e learned from the	ha	ve learned from	
lesso	on and how they	the	e lesson and how	
inter	nd to apply it at	the	ey intend to apply	
hom	е.	it d	at home.	
k) Eva	luation:	k) E	valuation:	
i.	Write three uses	i.	Write three uses	
	of money in a		of money in a	
	modern		modern	
	economy. (level		economy. (level	
	1)		1)	
ii.	Explain at least	ii.	Explain at least	
	two		two	
	characteristics of		characteristics of	
	money. (level 2)		money. (level 2)	
iii.	Discuss whether	iii.	Discuss whether	
	or not Ghana's		or not Ghana's	
	currency is		currency is	
	accepted as a		accepted as a	
	legal tender.		legal tender.	
	(level 3)		(level 3)	
l) Ren	narks:	1) R	emarks:	

PLC Session 8: Supporting the teaching and learning of			
numeracy at	the right level in lan	iguages	
Focus: the bullet	Guidance notes on Leading	Guidance Notes on Teacher	Time
points provide	the session. What the PLC	Activity during the PLC	in
the frame for	Coordinator will have to say	Session. What teachers will	session
what is to be	during each stage of the	do during each stage of the	
done in the	session	session	
session. The			
writer should use			
the bullets to			
guide what they			
write for the PLC			
Coordinators and			
teachers to do			
and say during			
each session.			
Each bullet needs			
to be addressed			
1. Introduction	1.1 Start the PLC session by	1.1 Share what you did	20
	asking teachers to share	differently in the classroom	mins
	what they did differently in	or elsewhere based on PLC	
	the classroom or elsewhere	Session 7, on supporting the	
	based on PLC Session 7, on	teaching and learning of	
	supporting the teaching and	numeracy at the right level in	
	learning of numeracy at the	<i>business studies,</i> which you	
	right level in business	think impacted learning	
	studies, which they think	positively.	
	impacted learning positively.		
	1.2 Ask teachers to discuss	1.2 Discuss and summarise	
	and summarise why they	why you think what a	
	think what a colleague did	colleague did by way of	
	by way of application of	application of lessons	
	lessons learned in Session 7,	learned in Session 7, on	
	on supporting the teaching	supporting the teaching and	
	and learning of numeracy at	learning of numeracy at the	
	the right level in business	right level in business	
	<i>studies</i> , supported learning.	<i>studies</i> , supported learning.	
2. Planning for	2.1 Ask a teacher to read the	2.1 Read the Purpose,	30
teaching,	Purpose, Learning Outcomes	Learning Outcomes (LOs)	mins
learning and	(LOs) and Learning	and Learning Indicators (LIs)	
assessment	Indicators (LIs) for the	for the session.	
activities, making	session.		
links with the			
Pre-Tertiary			
(standards-			

based)	Purpose:	Purpose:	
Curriculum and	The purpose of the session	The purpose of the session is	
using GESL SEL	is to discuss how to support	to discuss how to support	
ICT and 21 st	the teaching and learning of	the teaching and learning of	
contury skills	numeracy at the right level	numeracy at the right level in	
century skins	in languages, and vice vorsa	languages, and vice versa	
	in languages, and vice versa.	languages, and vice versa.	
	101: Domonstrato	101: Domonstrato	
	knowledge and	knowledge and	
	knowledge and		
	understanding of ways	understanding of ways	
	or applying numeracy	or applying numeracy	
	In the teaching,	In the teaching,	
	learning and	learning and	
	assessment of	assessment of	
	languages (NTS 2c - 2f,	languages (NTS 2c - 2f,	
	3a and 3c – 3j)	3a and 3c – 3j).	
	LI 1.1 Explain the concept of	LI 1.1 Explain the concept of	
	teaching languages at the	teaching languages at the	
	right level, embedding	right level, embedding	
	numeracy.	numeracy.	
	LI 1.2 Discuss ways of	LI 1.2 Discuss ways of	
	integrating numeracy into	integrating numeracy into	
	the planning, teaching,	the planning, teaching,	
	learning and assessment of	learning and assessment of	
	languages curriculum.	languages curriculum.	
	LO2: Demonstrate	LO2: Demonstrate	
	knowledge,	knowledge,	
	understanding and	understanding and	
	application of	application of language	
	language concepts to	concepts to support	
	support the teaching	the teaching and	
	and learning of	learning of numeracy	
	numeracy (NTS 2c - 2f.	(NTS 2c - 2f. 3a and 3c	
	3a and 3c - 3m).	– 3m).	
	LI 2.1 List three benefits of	LI 2.1 List three benefits of	
	using languages to support	using languages to support	
	the teaching and learning of	the teaching and learning of	
	numeracy	numeracy	
	LI 2.2 Discuss the	LI 2.2 Discuss the	
	application of language	application of language	
	concents in the teaching	concents in the teaching	
	and learning of numeracy	and learning of numeracy	
		and learning of numeracy.	
	2.2 Ask teachers to use	2.2 Using think-pair-share.	
	think-pair-share to explain	explain to your partner and	
	to their partners and share	share with the larger group	

with the larger group the	the concept of numeracy at
concept of numeracy at the	the right level in languages
right level in languages (NTS	(NTS 2c, 3i).
2c, 3i).	
F.a.	F.a.
a) It refers to the use of	Numeracy at the right
numerical concents	level in languages refers
in language lossons	to the use of numerical
In lunguage lessons	
	concepts in language
consideration the	lessons taking into
varied ability levels	consideration the varied
of the learners	ability levels of the
b) It refers to the use of	learners, etc.
logical reasoning in	
language lessons	
c) It refers to the	
identification of	
number sense by	
, learners durina a	
lanaugae lesson, etc	
language lesson, etc.	
2 3 Ask teachers to discuss	2.3 Discuss ways of
ways of integrating	integrating numeracy at the
numeracy at the right lovel	right lovel into the planning
into the planning tooching	togeting and learning of
into the planning, teaching	
and learning of languages	languages (NTS 2C - 2f, 3a
(NTS 2C - 2f, 3a and 3c –	and 3c – 3m).
3m).	
E.g.	E.g.
a) Planning activities	Planning activities
that require the use	that require the use
of numeracy	of numeracy registers
registers (for	(for instance,
instance, product,	product, multiples,
multiples,	differentiation,
differentiation,	fraction, etc.), and
fraction, etc.), and	point out the
point out the	, meanina in a
meanina in a	lanauaae context and
lanauaae context	that of numeracy
and that of a	context etc
numeracy context	
h) Acking lographics to	
bj Asking leurners lo	
give aifferent	
meanings of some	
keywords in	
numeracy context to	

support a language lesson c) Asking learners to count the number of keywords in a passage during a language lesson, etc.			
 2.4 Ask teachers to explain at least two ways of integrating numeracy into the assessment of languages (NTS 3a, 3e, 3f, 3i and 3k – 3n). 	2.4 Explain at least two ways of integrating numeracy into the assessment of languages (NTS 3a, 3e, 3f, 3i and 3k – 3n).		
 E.g. a) Identifying the number of vowels in a word during a class project b) Determining the percentage of words in a paragraph that are verbs c) Typing a passage and turning on the word count feature on a computer to identify the number of words typed, etc. 	E.g. Identifying the number of vowels in a word during a class project, etc.		
 2.5 Ask teachers to list three benefits of using languages to support the teaching and learning of numeracy (NTS 2c, 2d). E.g. a) It supports learners in practising how to organise data in charts 	 2.5 List three benefits of using languages to support the teaching and learning of numeracy (NTS 2c, 2d). <i>E.g.</i> It supports learners in practising how to organise data in charts, etc. 		
 b) It helps learners to build on numeracy registers c) It assists leaners to reason logically d) It helps learners to understand 			
	numerical concents		
-----	---------------------------	------------------------------	--
	hetter		
	e) It supports learners'		
	ahility to internret		
	number sense For		
	instance 'two' '2'		
	and 'an image of two		
	oranges'		
	communicate the		
	same meaning etc		
	sume meaning, etc.		
2.6	Ask teachers to discuss	2.6 Discuss how language	
ho	w language concepts will	concepts will be applied in	
be	applied in the teaching	the teaching and learning of	
and	l learning of numeracy	numeracy (NTS 2d, 3i).	
(N)	S 2d, 3i).	E.g.	
E.g		In a numeracy lesson,	
	a) In a numeracy	learners will be asked	
	lesson, learners will	to read word	
	be asked to read	problems and later	
	word problems and	translate them into	
	later translate them	an algebraic	
	into an algebraic	expression or linear	
	expression or linear	equation, etc.	
	equation		
	b) Numeracy registers		
	will be explained		
	both in numeracy		
	contexts and		
	language contexts		
	for learners		
	c) Learners will		
	interpret statistical		
	data orally or in		
	writing		
	d) Grammar and		
	spellings will be		
	checked in word		
	problems to make		
	sure learners use		
	them rightly, etc.		
2.7	Ask teachers to discuss a	2.7 Discuss a sample lesson	
sar	nple lesson plan in	plan in English language and	
Fn	lish language and show	show how it can be taught	
ho	w it can be taught with	with the support of	
the	support of numeracy for	numeracy for learners who	

	learners who may struggle	may struggle with identifying	
	with identifying attributive	attributive adjectives (NTS 3e	
	adjectives (NTS 3e - 3l).	- 31).	
	Refer to Appendix 8 for a	Refer to Appendix 8 for a	
	sample lesson plan in English	sample lesson plan in English	
	Language for SHS 1.	Language for SHS 1.	
	2.8 Ask teachers to indicate	2.8 Indicate at least two	
	at least two other	other appropriate	
	appropriate assessment	assessment methods that	
	methods that could be used	could be used to support the	
	to support the delivery of	delivery of the lesson on	
	the lesson on attributive and	attributive and predicative	
	predicative adjectives (NTS	adjectives (NTS 3k, 3l).	
	3k, 3l).	-	
	E.g.	E.g.	
	a) Self-assessment	Self-assessment, etc.	
	c) Portfolio atc		
3 Modelling a	3 1 Ask teachers to identify	3.1 Identify in the sample	30
teaching activity.	in the sample lesson plan.	lesson plan, activities that	mins
making links	activities that could promote	could promote GESI. SEL.	
with the Pre-	GESI, SEL, ICT, 21 st century	ICT, 21 st century skills and	
Tertiary	skills and differentiation	differentiation (NTS 3f, 3g).	
(standards-	(NTS 3f, 3g).		
based)	E.g.	E.g.	
Curriculum and	a) Learners were put	Learners were put	
using GESI, SEL,	into groups taking	into groups taking	
ICT and 21 st	GESI into	GESI into	
century skills	consideration	consideration, etc.	
	(GESI/SEL)		
	b) Teacher used mixed-		
	gender groups (where possible)		
	during the activities		
	on key words to		
	encourage		
	collaboration		
	between males and		
	females including		
	SEN learners		
	(GESI/SEL/SEN/21 st		
	century skills)		
	c) Teacher provided		
	individual support to		
	learners who		
	struggled to identify		

-		1
features of a dog,		
hence taking levels		
of learning in their		
class into		
consideration		
(Differentiation)		
d) Teacher used		
differentiated		
activities in the		
presentation of		
lesson to help take		
care of different		
ability aroups		
(Differentiation)		
e) Teacher used		
nrojector to project		
the nicture of a doa		
for learners to		
identify the features		
of the dog (ICT) etc		
3 2 Ask teachers to	3 2 Recommend other	
recommend other	appropriate strategies that	
appropriate strategies that	could aid in the	
could aid in the	development of language	
development of language	using numeracy skills of	
using numeracy skills of	learners who struggled with	
learners who struggled with	identifying adjectives (NTS	
identifying adjectives (NTS	$2d_{3}a_{and} 3g$	
$2d_{3}a_{2}a_{3}a_{3}a_{3}a_{3}a_{3}a_{3}a_{3}a_{3$	20, 50 and 58).	
E a	Fa	
L.y.	L.y.	
a) Asking rearriers to	Asking learners to	
their pats according	their pats according	
to colour size and	then pets according	
co colour, size una	co colour, size una	
shupe	snupe, etc.	
b) Asking learners in		
groups to mention		
their javourite pets,		
record the number of		
Javourite pets and		
represent the		
information in a bar		
chart, etc.		
3.3 Ask teachers to explain	3.3 Explain how IC1 can be	
now ICI can be used in	used in assessing numeracy	

	assessing numeracy skills of	skills of learners in a	
	learners in a language lesson	language lesson (NTS 3i).	
	(NTS 3i)		
	F a	Fa	
	a) Tasking learners to	L.y. Tasking learners to	
	compile words that	compile words that	
	comple words that	comple words that	
	Jrom a wora bank	Jrom a wora bank	
	and use Excel	and use Excel	
	spreadsheet to find	spreadsheet to find	
	their percentage	their percentage, etc.	
	b) Giving learners		
	assignments to		
	represent pictorially,		
	the types of		
	adjectives and		
	present in		
	PowerPoint, etc.		
	3.4 Ask a teacher to model a	3.4 Model a teaching activity	
	teaching activity based on	based on the sample lesson	
	the sample lesson plan that	plan that can support	
	can support learners who	learners who may struggle	
	may struggle with	with identifying adjectives,	
	identifying adjectives, taking	taking into consideration	
	into consideration GESI. SEL.	GESI. SEL. ICT. 21 st century	
	ICT. 21 st century skills and	skills and differentiation	
	differentiation (NTS $3e - 3i$)	(NTS 3e – 3i)	
	3.5 Ask teachers to provide	3.5 Provide feedback on the	
	feedback on the modelled	modelled activity (NTS 1a,	
	activity (NTS 1a, 3l).	31).	
4. Evaluation and	4.1 Ask teachers in groups to	4.1 In your group, reflect,	10
review of	reflect, write and share	write and share what you	mins
session:	what they have learned with	have learned with the larger	
	the larger group with regard	group with regard to the	
i. Noting that	to the concept and benefits	concept and benefits of	
teachers	of numeracy at the right	numeracy at the right level in	
need to	level in languages (NTS 1a	languages (NTS 1a. 1b).	
identify	1b).	00(
critical	-,		
friends to	4.2 Remind teachers to,	4.2 Where possible, identify	
observe	where possible, identify a	a critical friend to observe	
lessons and	critical friend to observe	your lesson in relation to PLC	
report at next	their lesson in relation to	Session 8 and provide	
session	PLC Session 8 and provide	feedback to you (NTS 1a. 3l	
		and 3n).	

feedback to them (NTS 1a, 3l and 3n).		
4.3 Remind teachers to read PLC Session 9 in preparation	4.3 Read PLC Session 9 in preparation for the next	
for the next session.	session.	

Appendix 8	A sample lesson plan for	A sample lesson plan for
	teaching English Language	teaching English Language
	and show how it can be	and show how it can be
	taught with the support of	taught with the support of
	numeracy for learners who	numeracy for learners who
	struggle with identifying	struggle with identifying
	attributive adjectives	attributive adjectives
	a) Aspect:	a) Aspect:
	Grammar	Grammar
	h) Tonic:	h) Tonic:
	Adjectives	Adjectives
	c) Sub-tonic:	c) Sub-tonic:
	Attributive and	Attributive and
	nradicativa adjactivas	nredicative adjectives
	d) Objectives	d) Objectives
	u) Objectives.	a) Objectives.
	By the end of the lesson,	By the end of the
	the learner will be able	lesson, the learner will
		be able to:
	i. Explain what an	i. Explain what an
	adjective is.	adjective is.
	ii. Define:	ii. Define:
	> Attributive	Attributive
	adjective	adjective
	Predicative	Predicative
	adjective	adjective
	iii. Use the adjectives	iii. Use the adjectives
	appropriately in	appropriately in
	sentences.	sentences.
	iv. Group adjectives	v. Group adjectives
	identified in given	identified in given
	sentences into	sentences into
	attributive and	attributive and
	predicative and	predicative and
	draw a bar chart	draw a bar chart
	from data	from data
	obtained.	obtained.
	e) Relevant Previous	e) Relevant Previous
	Knowledge (RPK):	Knowledge (RPK):
	Learners can identify	Learners can identify
	and describe pets.	and describe pets.
	f) Teachina Learnina	f) Teachina Learnina
	Resources (TLRs)	Resources (TLRs):
	Picture of a doa, pre-	Picture of a doa, pre-
	recorded audio on	recorded audio on
	adjectives aranh	adjectives aranh
	sheets computer and	sheets computer and
	nrojector	nrojector
	ρισμετισί	μισμετισι

q) Reference:	g) Reference:	
GES/MoE teaching	GES/MoE teaching	
syllabus for SHS	syllabus for SHS	
1(2012). AKI-OLA series	1(2012). AKI-OLA series	
h) Introduction:	h) Introduction:	
, Put learners into	, Put learners into	
mixed-aender/mixed-	mixed-gender/mixed-	
ability arouns to	ability arouns to	
discuss the external	discuss the external	
features of a doa from	features of a doa	
the picture projected.	from the nicture	
Task each aroun to	projected. Task each	
choose one person to	aroun to choose one	
tally the features	nerson to tally the	
identified and share	features identified	
with the whole class	and share with the	
with the whole class.	whole class	
i) Discussion:	i) Discussion:	
i Form mixed-	i Ask learners in their	
ahility/mixed-gender	arouns to identify	
arouns (where	and write at least 2	
nossible) Ask learners	words that are used	
in their groups to	in the description	
identify and write at	which say something	
least two words that	about features of a	
are used in the	net	
description which say	pet.	
something about		
features of a net	ii learners count and	
ii Learners count and	document the	
document the number	number of identified	
of identified features	features of the dog	
of the dog in the	in the nicture and	
nicture and represent	represent them on a	
them on a har chart	har chart using	
using granh sheets	aranh shoots	
iii Identify and support	iii Identify and support	
lagraers who have	lagrners who have	
difficulty in	difficulty in	
reconnising features	recognising features	
of a dog to enable	of a dog to onable	
them identify and	them identify and	
write at least one	write at least one	
footure of the dee	forture of the dee	
jeuture oj the dog.	jeature oj trie dog.	
video / audio on the	iv. riuy u pre-recorded	
viueo/uuaio on trie		
types of aajectives	types of adjectives	

and a	isk learners to		and ask learners to	
listen	attentively and		listen attentively and	
write	at least two		write at least 2 types	
types	of adjectives		of adjectives they	
they	can remember		can remember for	
for fu	rther discussion.		further discussion.	
v. Based	d on the audio,	<i>v</i> .	Based on the audio,	
ask le	earners in their		ask learners in their	
vario	us groups to		various groups to	
write	at least three		write at least three	
key te	erms in the		key terms in the	
lesso	n and give their		lesson and give their	
defin	itions (an		definitions (an	
adjec	tive, attributive		adjective, attributive	
adjec	tive and		adjective and	
predi	cative adjective).		predicative	
	-		adjective).	
j) Present	ation:	j) Pre	sentation:	
Teache	r gives further	Тес	cher gives further	
explan	ations to all that	exp	lanations to all that	
the lea	rners have	the	learners have	
discuss	ed.	dise	cussed.	
k) Core po	ints:	k) Co	re points:	
i. Ar	n adjective is a	i.	An adjective is a	
wa	ord or a		word or a	
gr	ammatical item		grammatical item	
th	at modifies,		that modifies,	
de	scribes or gives		describes or gives	
fu	rther information		further information	
ab	out a noun or a		about a noun or a	
pr	onoun.		pronoun.	
Some	types of		Some types of	
Ac	ljectives		Adjectives	
\checkmark	Attributive		✓ Attributive	
	adjective		adjective	
✓	Predicative		✓ Predicative	
	adjective		adjective	
ii. At	tributive	ii.	Attributive adjective is	
ac	ljective is an		an adjective that	
ac	ljective that		appears before the	
ar	pears before the		noun or the pronoun it	
nc	oun or the		, describes. For	
pr	onoun it		instance: The airl has	
de	escribes. For		red lips, etc.	
in	stance: The girl		, ,	
hc	ns <u>red</u> lips, etc.			

iii. Predicative	iii. Predicative adjective	
adjective is an	is an adjective that	
adjective that	occurs after the noun	
occurs after the	or the pronoun it	
noun or the	describes. For	
pronoun it	instance: The boy is	
describes. For	tall, etc.	
instance: The boy		
is tall, etc.		
I) Core Competencies:	I) Core Competencies:	
i. collaboration	i. collaboration skill	
skills	ii. leadership skill	
ii. leadership skills	iii. critical thinking	
iii. critical thinking	skill	
skills	iv. digital literacy	
iv. digital literacy	skills	
skills	<i>v</i> .	
m) Conclusion:	m) Conclusion:	
Conclude the lesson	Conclude the lesson	
by asking the	by asking the learners	
learners to reflect	to reflect and	
and mention at least	mention at least two	
two things they have	things they have	
learned in the lesson.	learned in the lesson.	
n) Evaluation:	n) Evaluation:	
i. What is an adjective?	i. What is an adjective?	
(Level 1)	(Level 1)	
ii. Which of the	ii. Which of the	
following pair of	following pair of	
adjectives were	adjectives were	
discussed in the	discussed in the	
lesson?	lesson?	
a. comparative and	a. comparative and	
superlative	superlative	
adjectives	adjectives	
b. attributive and	b. attributive and	
predicative	predicative	
adjectives	adjectives	
c. demonstrative	c. demonstrative	
and possessive	and possessive	
adjectives (Level	adjectives (Level	
1)	1)	
III. Form two sentences	III. Form two sentences	
eacn using "proud"	each using "proud"	
and "beautiful"	and "beautiful"	

attributively and	attributively and	l
predicatively. Present	predicatively. Present	l
the sentences in a	the sentences in a	l
table form. (Level 2)	table form. (Level 2)	l
iv. Identify adjectives in	iv. Identify adjectives in	l
the passage below.	the passage below.	l
Calculate the	Calculate the	l
percentage of the	percentage of the	l
words that are	words that are	l
attributive adjectives	attributive adjectives	l
and the percentage	and the percentage	l
that are predicative	that are predicative	l
adjectives. (Level 3)	adjectives. (Level 3)	l
Passage	Passage	l
The chalkboard is by	The chalkboard is by	l
far the commonest teaching	far the commonest teaching	l
aid used at virtually all the	aid used at virtually all the	l
levels of education- from the	levels of education- from the	l
nursery to the university.	nursery to the university. The	l
The chalkboard used to be	chalkboard used to be black,	l
black, which was why the	which was why the name	l
name "blackboard" stuck for	"blackboard" stuck for ages;	l
ages; but today, there are	but today, there are boards	l
boards of various colours:	of various colours: blue,	l
blue, green, even white. It is	green, even white. It is not	l
not easy to draw complex	easy to draw complex	l
, diaarams showina minute	diaarams showina minute	l
details, such as parts of the	details, such as parts of the	l
body. unless one is a good	body, unless one is a good	l
artist. Where one has	artist. Where one has	l
succeeded with laborious	succeeded with laborious	l
illustrations, using different	illustrations, using different	l
colours, it could be painful	colours, it could be painful	l
when the board has to be	when the board has to be	l
cleaned by the next teacher.	cleaned by the next teacher.	l
However, there are	However, there are	l
nowadays various	nowadays various	l
innovations. includina	innovations. includina	l
foldable boards made of	foldable boards made of	l
plywood which allow	plywood which allow	1
teachers more room to leave	teachers more room to leave	1
their materials for longer	their materials for longer	1
periods.	periods.	1
· - ·		1
o) Remarks:	o) Remarks:	1
,	,	

PLC Session 9: Supporting the teaching and learning of			
numeracy at	the right level in scie	ence subjects	
Focus: the bullet points provide the frame for what is to be done in the session. The writer should use the bullets to guide what they write for the PLC Coordinators and teachers to do and say during each session. Each bullet needs to be addressed	Guidance notes on Leading the session. What the PLC Coordinator will have to say during each stage of the session	Guidance Notes on Teacher Activity during the PLC Session. What teachers will do during each stage of the session	Time in session
1. Introduction	1.1 Start the PLC session by asking teachers to share what they did differently in the classroom or elsewhere based on PLC Session 8, on supporting the teaching and learning of numeracy at the right level in languages, which they think impacted learning positively.	1.1 Share what you did differently in the classroom or elsewhere based on PLC Session 8, on <i>supporting the</i> <i>teaching and learning of</i> <i>numeracy at the right level</i> <i>in languages</i> , which you think impacted learning positively.	20 mins
	1.2 Ask teachers to discuss and summarise in a single sentence why they think what a colleague did by way of application of what they learned in Session 8, on supporting the teaching and learning of numeracy at the right level in languages, supported learning.	1.2 Discuss and summarise in a single sentence why you think what your colleague did by way of application of what they learned in Session 8, on supporting the teaching and learning of numeracy at the right level in languages, supported learning.	
2. Planning for teaching, learning and assessment activities, making	2.1 Ask a teacher to read the Purpose, Learning Outcomes (LOs) and Learning Indicators (LIs) for the session.	2.1 Read the Purpose, Learning Outcomes (LOs) and Learning Indicators (LIs) for the session.	30 mins

links with the	Purpose:	Purpose:	
Pre-Tertiary	The purpose of this session	The purpose of this session	
(standards-	is to discuss concepts that	is to discuss concepts that	
based)	support the teaching and	support the teaching and	
Curriculum and	learning of numeracy at the	learning of numeracy at the	
using GESI, SEL,	right level in science	right level in science	
ICT and 21 st	subjects, and vice versa.	subjects, and vice versa.	
century skills	LO 1: Demonstrate	LO 1: Demonstrate	
	knowledge,	knowledge,	
	understanding and	understanding and	
	application of relevant	application of relevant	
	concepts in science at	concepts in science at	
	the right level to	the right level to	
	support the	support the acquisition	
	acquisition of	of numeracy skills (NTS	
	numeracy skills (NTS	2a – 2c, 2e and 2t).	
	2a - 2c, $2e$ and $2f$).		
	LI 1.1 Identify concepts in	LI 1.1 Identify concepts in	
	the acquisition of numerous	the acquisition of numerous	
	chills at the right level	chills at the right lovel	
	IIII 2 Analyse at least a	LI 1 2 Applyso at loast a	
	concept in science that can	concept in science that can	
	be used to support the	be used to support the	
	acquisition of numeracy	acquisition of numeracy	
	skills at the right level	skills at the right level	
	skins at the right level.	skills at the right level.	
	LO 2: Demonstrate	LO 2: Demonstrate	
	knowledge,	knowledge,	
	understanding and	understanding and	
	application of	application of	
	numeracy in planning,	numeracy in	
	teaching and assessing	planning, teaching	
	science lessons (NTS	and assessing science	
	2a – 2c, 2e and 2f).	lessons (NTS 2a – 2c,	
		2e and 2f).	
	LI 2.1 Outline at least one	LI 2.1 Outline at least one	
	strategy and benefit of using	strategy and benefit of using	
	numeracy in the planning	numeracy in the planning	
	and teaching of science	and teaching of science	
	lessons.	lessons.	
	LI 2.2 Discuss at least one	LI 2.2 Discuss at least one	
	assessment tool that can be	assessment tool that can be	
	used to assess science	used to assess science	
	concepts using numeracy.	concepts using numeracy.	

2.2 Ask teachers in subject	2.2 In your subject groups,
groups to identify concepts	identify concepts in any
in any domain in science that	domain in science that can
can promote the acquisition	promote the acquisition of
of numeracy skills (NTS 3i).	numeracy skills (NTS 3i).
E.g.	E.g.
a) Concepts in biology:	a) Concepts in biology:
i. Ecology (sampling)	Ecology (sampling), etc.
ii. Respiration	37 1 37
(equation)	
iii. Photosynthesis	
(equation), etc.	
b) Concepts in chemistry:	b) Concepts in chemistry:
i. Balancina of	Balancina of chemical
chemical equations	Equations (equation),
(equations)	etc.
ii. Titration	
(measurement and	
calculations)	
iii. Mole concept	
(calculations), etc.	
c) Concepts in physics:	c) Concepts in physics:
i. Temperature	Temperature (measurement
(measurement and	and calculations), etc.
calculations)	
<i>ii. Force (calculations)</i>	
iii. Measurement of	
physical quantities	
(measurement and	
calculations), etc.	
2.3 Ask teachers in their	2.3 In your science domain
science domain groups to	groups, analyse at least one
analyse at least one concept	concept in science that can
in science that can be used	be used to support the
to support the acquisition of	acquisition of numeracy
numeracy skills at the right	skills at the right level (NTS
level (NTS 2b, 2c).	2b, 2c).
E.g.	E.g.
In physics, work is said	In physics, work is said
to be done when a	to be done when a
force moves from its	force moves its point of
point of application	application through a
through a distance in	distance in the
the direction of the	direction of the force.
force.	

For instance during	For instance during	
For instance, during	For instance, during	
braking, a jorce of 200	Druking, a jorce of 200	
newton (N) is applied to	newton (N) is applied	
the brake of a car, the	to the brake of a car,	
car takes 20 metres (m)	the car takes 20 metres	
to come to a stop.	(m) to come to a stop.	
Calculate the work	Calculate the work	
done.	done.	
Solution: Force (F) =	Solution:	
200N	<i>Force (F) = 200N</i>	
Distance (d) =	Distance (d) = 20m	
20m	Work done (Wd) =	
Work done (Wd) = Force	Force (F)	
(F)	x Distance (d)	
×Distance (d)	$Wd = F \times d$	
$Wd = F \times d$	Wd = 200N×20m	
Wd = 200N×20m	=	
=	4000J/4000N	
4000J/4000N	m. etc.	
m. etc.	,	
2.4 Ask teachers to discuss	2 4 Discuss at least three	
at least three benefits of	benefits of numeracy skills in	
numeracy skills in the	the teaching and learning of	
teaching and learning of	scientific concents (NTS 2h -	
scientific concents (NTS 2h -	$2f_{3a}$ and $3f_{-}3i$	
$2f_{22}$ and $2f_{21}$	21, 5a ana 51 - 5jj.	
21, 5a anu 51 - 5jj.	Fa	
L.y.	L.y. The skill of	
u) The skill Oj	rife skill Oj	
In numeracy can help	in numeracy can neip	
learners to have a	learners to have a	
better understanding	better understanding of	
of science concepts	science concepts that	
that involve	involve calculations.	
calculations. For	For instance, the	
instance, the	concepts of 'force' and	
concepts of 'force',	'temperature', etc.	
'temperature', etc.		
b) Logical reasoning		
skills acquired in		
numeracy can help		
learners to think		
analytically in solving		
science related		
problems		

c) Sorting skills	
acquired in numeracy	
can help learners to	
categorise the	
number of hydrogen	
and oxygen atoms in	
a balanced chemical	
equation	
d) Numeracy skills	
acquired in basic	
statistics can help	
learners to analyse	
and interpret data in	
scientific concepts,	
etc.	
2.5 Ask teachers to discuss	2.5 Discuss one
one assessment tool that	assessment tool that can be
can be used to assess	used to assess scientific
scientific concepts (NTS 3k -	concepts (NTS 3k - 3p).
3p).	
E.g.	E.g.
a) Test:	Test:
Test is a set of items,	Test is a set of items,
questions, prompts or	questions, prompts or
tasks that measure	tasks that measure
learners' thinking	learners' thinking
abilities and exam	abilities and exam
preparations. There can	preparations. There can
be different types and	be different types and
categories depending on	categories depending on
the subject, level and	the subject, level and
purpose of the	purpose of the
assessment. An example	assessment. An example
of a test item is a	of a test item is a
multiple-choice test.	multiple-choice test.
Multiple choice tests are	Multiple choice tests are
tests in which each item	tests in which each item
has a stem followed by	has a stem followed by
options (alternatives)	options (alternatives)
from which the	Jrom which the
respondent selects what	respondent selects what
ne/sne considers as the	ne/sne considers as the
option that best	option that best
completes or answers the	completes or answers the
stem. Such questions are	stern. Such questions are

normally composed of	normally composed of
four parts:	four parts:
i. Stem-auestion or	i. Stem-auestion or
incomplete	incomplete
statement	statement
ii Ontions- suggester	ii Ontions- suggested
answers or	answers or
completions	completions
iii Distracters/Foils-	iii Distracters/Foils-
incorrect response	incorrect responses
iv Kay correct	iv Key correct
There are rubrics that	There are rubrics that
There are rubics that	There are rubics that
govern the construction	govern the construction
of multiple-choice	of multiple-choice
questions. For instance,	questions. For instance,
the distractors should d	ill the distractors should all
be plausible to the	be plausible to the
uninformed.	uninformed.
Poor test item:	Poor test item:
In an experiment to tes	t In an experiment to test
for starch in a leaf, whi	ch for starch in a leaf, which
one of the following	one of the following
reasons best explains	reasons best explains
why the leaf is boiled?	why the leaf is boiled?
a. For the leaf to	a. For the leaf to
become wrinkled	become wrinkled
b. To kill the cells of th	e b. To kill the cells of the
leaf	leaf
c. For the leaf to chan	ge c. For the leaf to change
its colour	its colour
d. To enable the leaf to	o d. To enable the leaf to
be carried easily	be carried easily
	,
Good test item:	Good test item:
In an experiment to test for	r In an experiment to test for
starch in a leaf, which one	of starch in a leaf, which one of
the following reasons best	the following reasons best
explains why the leaf is	explains why the leaf is
boiled? To	boiled? To
a. kill the cells of the lea	af a. kill the cells of the leaf
and stop all chemica	l and stop all chemical
reactions.	reactions.
b. soften the cells of the	e b. soften the cells of the
leaf and makes its	leaf and makes it
watery.	watery.

 c. soften the cells of the leaf and make it wrinkled. d. stop all chemical reactions taking place in the leaf. 	 c. soften the cells of the leaf and make it wrinkled. d. stop all chemical reactions taking place in the leaf. 	
b) Checklist: Checklist is a tool that states specific criteria and allow learners to gather information and to make judgements about what learners know and can do in relation to learning outcomes. They offer systematic ways of collecting data about specific behaviours, knowledge and skills		
c) Subject Portfolio: Subject portfolio is the deliberate collection of learners' work that has been selected and organised for a particular subject to show learner's learning and progress to achieving the learning outcomes through examples of his or her best work, etc.		
2.6 Ask teachers to discuss a sample lesson plan in integrated science and show how it can be taught to promote numeracy skills at the right level to learners who may struggle with the concept of photosynthesis (NTS 2b, 2e, 2f and 3c - 3p).	2.6 Discuss a sample lesson plan in integrated science and show how it can be taught to promote numeracy skills at the right level to learners who may struggle with the concept of photosynthesis (NTS 2b, 2e, 2f and 3c - 3p).	
sample lesson plan in	kejer to Appendix 9 for a sample lesson plan in	

	integrat	ed science for SHS 1	integrated science for SHS 1	
	(Basic 1	0)	(Basic 10)	
	2.7 Ask t	teachers to indicate	2.7 Indicate how the lesson	
	how the	lesson will be	will be assessed using other	
		dusing other	annronriate assessment	
	annronr	iate assessment	methods (NTS $3k = 3n$)	
	mothod	c (NTS 2k - 2n)		
	E a	s (115 SK – SP).	Fa	
	E.y.	Class oversise	L.y.	
		Liuss exercise	Cluss exercise, etc.	
	<i>D)</i> S	Subject portjollo		
	C) E	nquiry		
	a) I	est/quiz		
	e) E	zxams, etc.		
3. Modelling a	3.1 Ask t	teachers to identify in	3.1 Identify in the sample	30
teaching activity,	the sam	ple lesson plan,	lesson plan activities that	mins
making links with	activities	s that could promote	could promote GESI, SEL,	
the Pre-Tertiary	GESI, SE	L, ICT, 21 st century	ICT, 21 st century skills and	
(standards-	skills and	d differentiation (NTS	differentiation (NTS 3f).	
based)	3f).			
Curriculum and	E.g.		E.g.	
using GESI, SEL,	a) I	Learners worked in	Learners worked in	
ICT and 21 st		pairs, mixed-gender	pairs, mixed-gender	
century skills		and mixed-ability	and mixed-ability	
		groups to perform an	groups to perform	
		experiment on how to	an experiment on	
	1	test for starch in a	how to test for	
		leaf after watching a	starch in a leaf after	
		video on it (GESI/ICT)	watching a video on	
	b)	Learners worked in	it, etc.	
	,	pairs and in mixed-	,	
		aender aroups which		
		encouraaed		
		collaboration		
		hetween males and		
		females includina SEN		
	J	learners		
		ICUITIETS		
		(SLL/GLSI/ZI		
		Teacher provided		
	ι)	individualized even ent		
		iu leurners wild		
		struggiea with the		
		steps involved in how		
	1	to test for starch in a		
		leaf		
		(SEL/Differentiation)		

d) Differentiated		
activities for level 1, 2		
and 3 learners on how		
to test for starch in a		
leaf were provided	3.2 Show how ICT can be	
(Differentiation)	used in assessing concepts	
()) ,	in integrated science to	
3.2 Ask teachers to show how	promote numeracy skills at	
ICT can be used in assessing	the right level (NTS 3i).	
concepts in integrated	E.a.	
science to promote numeracy	Watchina	
skills at the right level (NTS	YouTube/Pre-	
3i).	recorded videos and	
F.a.	podcast on how	
a) Watchina	photosynthesis	
YouTube/Pre-	occurs and write a	
recorded videos and	balanced chemical	
podcast on how	equation for it, etc.	
photosynthesis		
occurs and write a		
balanced chemical		
equation for it		
b) Giving learners		
assignments on the		
steps involved in		
how to test for		
starch in a leaf to		
be presented in		
PowerPoint		
c) Giving learners		
projects to search		
online for		
information on how		
photosynthesis		
takes place and its		
chemical equation		
d) Using rating scale		
to determine the	3.3 Model a teaching	
atom that occurs	activity based on the	
most in the	sample lesson plan that can	
balanced chemical	support learners who may	
equation of	struggle with concepts in	
photosynthesis, etc.	photosynthesis for	
	feedback from your	
3.3 Ask a teacher to model a	colleagues taking into	
teaching activity based on the	consideration GESI, SEL, ICT,	
sample lesson plan that can	21 st century skills and	

	support learners who may struggle with concepts in	differentiation (NTS 1a, 2c and 3e).	
	photosynthesis for feedback		
	from their colleagues taking		
	into consideration GESI, SEL,		
	ICT, 21 st century skills and		
	differentiation (NTS 1a, 2c		
	and 3e).		
4. Evaluation and	4.1 Ask teachers in groups to	4.1 In your group, reflect,	10
review of	reflect, write and share what	write and share what you	mins
session:	they have learned with the	have learned with the	
	larger group with regard to	larger group with regard to	
i. Noting that	the concept of supporting the	the concept of supporting	
teachers	teaching and learning of	the teaching and learning of	
need to	numeracy at the right level in	numeracy at the right level	
identify	science subjects (NTS 1a, 1b).	in science subjects (NTS 1a,	
Critical friende te		10).	
iriends to	4.2 Domind toochors to	1.2 Identify a critical friend	
lossons and	4.2 Remind teachers to	4.2 identity a critical menu	
report at	(where possible) to observe	vour lesson in relation to	
next session	their lesson in relation to PLC	PLC Session 9 and provide	
	Session 9 and provide	feedback to you (NTS 2e 3a	
	feedback to them (NTS 2e. 3a	and 3h).	
	and 3h).		
	4.3 Remind teachers to read	4.3 Read and bring along	
	and bring along any relevant	any relevant materials for	
	materials for PLC Session 10	PLC Session 10 in	
	in preparation for the next	preparation for the next	
	session.	session.	
Appendix 9	A sample lesson plan that	A sample lesson plan that	
	supports the teaching and	supports the teaching and	
	learning of numeracy at the	learning of numeracy at the	
	right level in science subjects:	right level in science	
		subjects:	
	a) Topic:	a) Topic:	
	Enerav	Energy	
	b) Sub-topic:	b) Sub-topic:	
	Photosvnthesis	Photosvnthesis	
	c) Objectives:	c) Objectives:	
	By the end of the lesson.	By the end of the	
	the learner will be able	lesson, the learner will	
	to:	be able to:	

i Explo	in the term	i Ev	nlain the term
1. Explu	synthesis	1. LAJ	otosynthosis
photo	synthesis	pn	olosynthesis
corre			nectly
II. Demo	onstrate how to	II. De	monstrate how
test f	or starch in a	to	test for starch in
leaf		a l	eaf
iii. Write	a balanced	iii. Wi	rite a balanced
chem	ical equation	ch	emical equation
that	ummarises the	the	at summarises
proce	ss of	the	e process of
photo	synthesis and	ph	otosynthesis and
, ident	, ifv the number	, ide	entify the number
of hy	droaen, carbon	of	hydrogen.
and c	xvaen atoms at	ca.	rhon and oxygen
the re	pactant and	ati	oms at the
produ	ict sides of the	ro	actant and
prod	tion	100	aduct sides of the
equu		pro	untion
d) Torobin	and Loarning -	eq	ing and Lograins
a) reaching	ana Learning a)	i) Teachi	
Resource	s (TLRS):	Resour	rces (TLRs):
YouTube	videos on how	YouTu	be videos on how
photosyn	thesis occurs,	photos	synthesis occurs,
projector	,	projec	tor,
laptop/co	omputer, water-	laptop	/computer,
bath, bec	ker, dropping	water-	-bath, beaker,
pipette, µ	etri-dish,	droppi	ing pipette, petri-
ethanol,	water, bunsen	dish, e	thanol, water,
burner, li	ghter, leaf of	bunser	n burner, lighter,
talinum t	riangulare	leaf of	f talinum
(water le	af)/periwinkle,	triang	ulare (water
iodine so	ution and test	leaf)/p	periwinkle, iodine
tubes.		solutio	on and test tubes.
e) Relevant	Previous e)) Releva	ant Previous
, Knowledd	ne (RPK):	Knowl	edae (RPK):
Learners	eat every day	Learne	ers eat every day
and nren	are food	and nr	repare food
Learners	also see leaves	learne	ers also see
of plants	in their	Ιρηγρο	of plants in their
oppiants	ont	onviro	nment
f) Introduct	ion:	Introd	uction:
j) Introducti Device le		Device	
Revise le	IIIIEIS KPK	KEVISE	reutilets KPK
through	juestions and	throug	in questions and
answers.	For Instance,	answe	rs. For instance,
what pro	cess makes it	what p	process makes it
possible j	or plants to	possib	le for plants to
manufac	ture their own	manuf	facture their own
food?(Ex	pected Answers-	food?('Expected

	Photosynthesis, rainfall	Answers-	
	and sunlight)	Photosynthesis, rainfall	
	Note:	and sunlight)	
	Share specific objectives with	Note:	
	learners	Share specific objectives	
	g) Tasks/Activities:	with learners	
	Activity 1:	g) Tasks/Activities:	
	Learners, after watching	Activity 1:	
	a video on	Learners, after watching	
	photosynthesis, think-	a video on	
	pair-share its meaning.	photosynthesis, think-	
	Guide learners to explain	pair-share its meaning.	
	the meaning of the term	Guide learners to	
	photosynthesis.	explain the meaning of	
		the term	
		photosynthesis.	
	Activity 2:	Activity 2:	
	Learners work	Learners work	
	individually and in mixed-	individually and in	
	ability groups to perform	mixed-ability groups to	
	the activity of testing for	perform the activity of	
	starch in a leaf.	testing for starch in a	
		leaf.	
	Step 1:	Step 1:	
	Place a potted plant of	Place a potted plant of	
	Talinum trangulare	Talinum trangulare	
	(waterleaf) under the sun	(waterleaf) under the	
	for about three (3) hours	sun for about three (3)	
		hours	
	Step 2:	Step 2:	
	Pluck one leaf and place	Pluck one leaf and place	
	it in a water bath to boil	it in a water bath to boil	
	for about five (5) minutes	for about five (5)	
	(this is meant to kill the	minutes (this is meant to	
	cells of the leaf. soften it	kill the cells of the leaf.	
	and stop all chemical	soften it and stop all	
	reactions taking place)	chemical reactions	
		takina place)	
	Step 3:	Step 3:	
	Remove the leaf from the	Remove the leaf from	
	water-bath and place it	the water-bath and	
	in a test tube containing	place it in a test tube	
	70% ethanol and place	containina 70% ethanol	
	the test tube in a water	and place the test tube	
	hath for the ethanol to	in a water bath for the	
	simmer for about three	ethanol to simmer for	
		about three (3) minutes	
1	1		

(3) minutes (this is to	(this is to decolourise
decolourise the leaf)	the leaf)
Step 4:	Step 4:
Remove the leaf from the	Remove the leaf from
test tube and wash it	the test tube and wash
gently in a hot water to	it gently in a hot water
soften it and finally place	to soften it and finally
it on a petri-dish.	place it on a petri-dish.
Step 5:	Step 5:
With the help of a	With the help of a
dropping pipette, place	dropping pipette, place
few drops of the iodine	few drops of the iodine
solution on the leaf and	solution on the leaf and
observe.	observe.
Observation:	Observation:
Learners will observe that	Learners will observe
the leaf turns blue-black.	that the leaf turns blue-
	black.
Conclusion:	Conclusion:
The blue-black	The blue-black
colouration indicates the	colouration indicates the
presence of starch in the	presence of starch in the
leaf.	leaf.
Note:	Note:
Questions that can promote	Questions that can promote
the acquisition of numeracy	the acquisition of numeracy
skills	skills
i. How many test tubes	i. How many test tubes
were used in the	were used in the
experiment?	experiment?
ii. If one leaf took five	ii. If one leaf took five
minutes to boil, how	minutes to boil, how
many minutes will take	many minutes will take
three leaves to boil?	three leaves to boil?
Activity 3:	Activity 3:
Learners write a balanced	Learners write a
chemical equation that	balanced chemical
summarises the process of	equation that
photosynthesis from its	summarises the process
definition.	of photosynthesis from
	its definition.
h) Core Points:	h) Core Points:
i. Keywords:	i. Keywords:
✓ Photosynthesis	✓ Photosynthesis
✓ Iodine solution	✓ Iodine solution
✓ Chlorophyll	✓ Chlorophyll
✓ Starch	✓ Starch

	✓ Dropping pipette	✓ Dropping pipette	
ii.	Explanation of the	ii. Explanation of the	
	term photosynthesis:	term	
	Photosynthesis is the	photosynthesis:	
	process whereby	Photosynthesis is	
	simple inorganic	the process	
	substances such as	whereby simple	
	carbon di-oxide and	inorganic	
	water are combined in	substances such as	
	the presence of	carbon di-oxide and	
	sunlight and	water are combined	
	chlorophyll to form an	in the presence of	
	organic food complex	sunlight and	
	(glucose) and oxygen	chlorophyll to form	
	is given out as a by-	an organic food	
	product.	complex (glucose)	
		and oxygen is given	
		out as a by-product.	
iii.	The chemical equation	iii. The chemical	
	that summarise the	equation that	
	process of	summarise the	
	photosynthesis:	process of	
		photosynthesis:	
Sunli	ght	Sunlight	
6C02-	+6H2O ====================================	6C0 ₂ +6H ₂ O ====================================	
6O ₂		6O ₂	
Chlor	ophyll	Chlorophyll	
<i>I)</i> (Core Competencies:	i) Core Competencies:	
	Problem-solving skills	I. Problem-solving skills	
	i. Critical thinking	II. Critical thinking	
	. Compunication skills	III. Conaborative	
	v. Communication skills	in Communication skills	
	. Leuversnip skins	IV. Communication skills	
		v. Leudersnip skins	
i) (Conclusion:	i) Conclusion:	
j, i.	Draw learners'	i. Draw learners'	
	attention to the end	attention to the end	
	of the lesson.	of the lesson.	
ii.	Summarize the	ii. Summarize the	
	lesson by asking	lesson by askina	
	learners in their	learners in their	
	groups to tell what	groups to tell what	
	they have loarnt	they have loarnt	
	lifey have rearrie	they have learni	
	Give exercise, mark	iii. Give exercise, mark	

	feedback to the		feedback to the	
	learners individually		learners individually	
iv.	Assian an activity for	iv.	Assian an activity	
	the next lesson		for the next lesson	
			,	
Tasks	for the various levels	Tasks	for the various levels	
i uono	Learners identify and	i	Learners identify	
	sort out at least five		and sort out at	
	resources that can		least five resources	
	he used when testing		that can be used	
	be used when lesting		unul cun de useu	
	jor starch in a leaj		when testing jor	
	(Level 1)		starch in a leaf	
11.	Learners jurtner		(Level 1)	
	demonstrate how to	11.	Learners further	
	test for starch in a		demonstrate how	
	leaf and explain the		to test for starch in	
	processes at each		a leaf and explain	
	stage of the		the processes at	
	experiment		each stage of the	
	(Level 2)		experiment	
iii.	Additionally,		(Level 2)	
	learners write and	iii.	Additionally,	
	balance a chemical		learners write and	
	equation that		balance a chemical	
	summarises the		equation that	
	process of		summarises the	
	photosynthesis		process of	
	(Level 3)		photosynthesis	
			(Level 3)	
k) Ev	aluation:	k) Eva	aluation:	
, i.	Explain the term	<i>i</i> .	Explain the term	
	photosynthesis.		, photosynthesis.	
ii.	, Outline at least three	ij.	, Outline at least three	
	(3) steps involved in		(3) steps involved in	
	testing for starch in a		testing for starch in a	
	leaf and aive		leaf and aive	
	reason(s):		reason(s):	
	\blacktriangleright Why the leaf was		Why the leaf was	
	hoiled for five (5)	,	hoiled for five (5)	
	minutes?		minutes?	
	 Why the leaf was 	Δ	Why the leaf was	
	allowed to simmer		allowed to simmer	
	in the otheral for		in the ethanol for	
	three (2) minutes?		three (2) minutes?	
	United (3) Minutes?		unree (3) minutes?	
<i>III.</i>	chomical aquation that	<i>III.</i>	chomical aquation	
	chemical equation that		ther average straight	
			that summarises the	

iv. v. vi.	summarises the process of photosynthesis. What is the total number of oxygen atoms in the balanced chemical equation? How many principal and by-products were formed in the balanced chemical equation? Represent the information from iv and v on a bar graph.	iv. v. vi.	process of photosynthesis. What is the total number of oxygen atoms in the balanced chemical equation? How many principal and by-products were formed in the balanced chemical equation? Represent the information from iv and v on a bar graph.	
1)	Remarks:	l)	Remarks:	

PLC Session 10: Supporting the teaching and learning of				
numeracy at the right level in the social sciences				
Focus: the bullet points provide the frame for what is to be done in the session. The writer should use the bullets to guide what they write for the PLC Coordinators and teachers to do and say during each session. Each bullet needs	Guidance notes on Leading the session. What the PLC Coordinator will have to say during each stage of the session	Guidance Notes on Teacher Activity during the PLC Session. What teachers will do during each stage of the session	Time in session	
to be addressed				
1. Introduction	1.1 Start the PLC session by asking teachers to share what they did differently in the classroom or elsewhere based on PLC Session 9, on supporting the teaching and learning of numeracy at the right level in science subjects, which they think impacted learning positively.	1.1 Share what you did differently in the classroom or elsewhere based on PLC Session 9, on supporting the teaching and learning of numeracy at the right level in science subjects, which you think impacted learning positively.	20 mins	
	1.2 Ask teachers to discuss and summarise in a single sentence why they think what a colleague did by way of application of what they learned in Session 9, on supporting the teaching and learning of numeracy at the right level in science subjects, supported learning.	1.2 Discuss and summarise in a single sentence why you think what your colleague did by way of application of what they learned in Session 9, on supporting the teaching and learning of numeracy at the right level in science subjects, supported learning.		
2. Planning for teaching, learning and assessment activities, making links with the Pre-Tertiary	2.1 Ask a teacher to read the Purpose, Learning Outcomes (LOs) and Learning Indicators (LIs) for the session.	2.1 Read the Purpose, Learning Outcomes (LOs) and Learning Indicators (LIs) for the session.	30 mins	

(standards-	Purpose:	Purpose:	
based)	The purpose of the session is	The purpose of the session is	
Curriculum and	to discuss how to support	to discuss how to support	
using GESI, SEL,	the teaching and learning of	the teaching and learning of	
ICT and 21 st	numeracy at the right level	numeracy at the right level	
century skills	in the social sciences, and	in the social sciences, and	
	vice versa.	vice versa.	
	LO 1: Demonstrate	LO 1: Demonstrate	
	knowledge,	knowledge,	
	understanding and	understanding and	
	application of the social	application of the social	
	sciences in the	sciences in the	
	development of	development of	
	numeracy skills (NTS 2c	numeracy skills (NTS 2c	
	– 2f, 3e and 3j).	– 2f, 3e and 3j).	
	LI 1.1 Give at least two	LI 1.1 Give at least two	
	examples of how the social	examples of how the social	
	sciences can be used to	sciences can be used to	
	support the teaching and	support the teaching and	
	learning of numeracy skills.	learning of numeracy skills.	
	LI 1.2 Analyse ways of	LI 1.2 Analyse ways of	
	applying the social sciences	applying the social sciences	
	to support the development	to support the development	
	of numeracy skills.	of numeracy skills.	
	LO 2: Demonstrate	LO 2: Demonstrate	
	knowledge,	knowledge,	
	understanding and	understanding and	
	application of numeracy	application of numeracy	
	skills in supporting the	skills in supporting the	
	teaching and learning of	teaching and learning of	
	the social sciences (NTS	the social sciences (NTS	
	2c – 2f, 3e and 3j).	2c – 2f, 3e and 3j).	
	LI 2.1 Identify at least three	LI 2.1 Identify at least three	
	numeracy skills that can be	numeracy skills that can be	
	used to support the teaching	used to support the teaching	
	and learning of the social	and learning of the social	
	sciences.	sciences.	
	LI 2.2 Explain at least three	LI 2.2 Explain at least three	
	ways numeracy skills can	ways numeracy skills can	
	support the teaching and	support the teaching and	
	learning of the social	learning of the social	
	sciences.	sciences.	
	2.2 Ack topohore to stud at	2.2 Cive at least time	
	2.2 Ask teachers to give at	2.2 GIVE at least two	
	least two examples of how	examples of now the social	

t	he social sciences can be	sciences can be used to	
u	used to support the teaching	support the teaching and	
a	and learning of numeracy	learning of numeracy skills	
s	kills (NTS 2c, 2d, 3e and 3k).	(NTS 2c, 2d, 3e and 3k).	
E	ī.a.	E.a.	
	a) Concepts in the social	Concepts in the	
	sciences such as man	social sciences such	
	work inflation	as man work provide	
	nonulation demand	onnortunities for the	
	and supply etc	development and	
	nrovide opportunities	application of	
	for the development	numeracy skills etc	
	and application of	numeracy skins, etc.	
	h) Data from the social		
	b) Data from the social		
	sciences such as		
	voting records,		
	opinion polis, maps		
	ana economic		
	indicators could be		
	used to support the		
	development and		
	application of		
	numeracy skills		
	c) Social science enquiry		
	tools such as		
	interviews,		
	experiments,		
	opinionnaires, field		
	observations and		
	surveys can support		
	the development of		
	numeracy skills, etc.		
2	2.3 Ask teachers to analyse	2.3 Analyse ways of applying	
v	vays of applying the social	the social sciences to	
S	ciences to support the	support the development of	
d	levelopment of numeracy	numeracy skills (NTS 1a, 2b,	
s	kills (NTS 1a, 2b, 2d, 2e and	2d, 2e and 3i).	
3	Bi).		
E	E.g.	E.g.	
	a) Some social science	Some social science	
	concepts such as	concepts such as	
	inflation, map work.	inflation naturally	
	demand and supply	have numeracy	
	naturally have	embedded in them.	
	numeracy embedded	therefore direct	

	in them, therefore	teaching of such	
	direct teaching of	concepts develops	
	such concepts	numeracy skills, etc.	
	, develops numeracy		
	skills		
b)	Data from the social		
	sciences such as		
	votina records.		
	oninion nolls mans		
	economic indicators		
	could be given to		
	learners to		
	manipulate through		
	counting adding		
	counting, adding,		
	subtracting, aiviaing		
	and representing to		
	develop their		
	numeracy skills		
<i>C)</i>	Social science enquiry		
	tools such as		
	interviews,		
	experiments,		
	opinionnaires and		
	field observations		
	used to collect data		
	can facilitate the		
	development of		
	counting, measuring,		
	sorting, adding and		
	other numeracy skills,		
	etc.		
2.4 As	sk teachers to identify	2.4 Identify at least three	
at lea	st three numeracy skills	numeracy skills that can be	
that c	an be used to support	used to support the teaching	
the te	eaching and learning of	and learning of the social	
the so	ocial sciences (NTS 1a,	sciences (NTS 1a, 2b, 2d, 2e	
2b, 2c	d, 2e and 3i).	and 3i).	
E.g.		E.g.	
a)	Arithmetic operations	Arithmetic operations,	
b)	Counting	etc.	
c)	Seriation		
d)	Measuring		
e)	Representation, etc.		
-,			
2.5 As	sk teachers to explain	2.5 Explain at least three	
at lea	st three ways	ways numeracy skills can	

numeracy skills can support the teaching and learning of the social sciences (NTS 1a, 2b, 2d, 2e and 3i). <i>E.g.</i> <i>a) Using representation</i> <i>(graphs, maps,</i>	support the teaching and learning of the social sciences (NTS 1a, 2b, 2d, 2e and 3i). <i>E.g.</i> <i>Using representation</i> <i>(graphs, maps, etc.)</i>
patterns, etc.) for illustrations b) Using arithmetic operations (addition, subtraction, division, multiplication, etc.) to compute distances, values and	for illustrations, etc.
other data c) Applying measuring skills to take coordinates, read maps, measure quantities, etc. d) Applying geometrical knowledge in	
illustrations such as demand/supply curves, maps, charts, etc. 2 6 Ask teachers to discuss	2.6 Discuss the sample
the sample lesson plan in Geography and show how it can be taught to develop numeracy skills in learners (NTS 3e - 3l).	lesson plan in Geography and show how it can be taught to develop numeracy skills in learners (NTS 3e - 3l).

	Refer to Appendix 10 for a	Refer to Appendix 10 for a	
	sample lesson plan in the	sample lesson plan in the	
	social sciences	social sciences (Geography)	
	(Geography)		
	2.7 Ask teachers to indicate	2.7 Indicate how the lesson	
	how the lesson will be	will be assessed using other	
	assessed using other	appropriate methods (NTS	
	appropriate methods (NTS	1a, 3k - 3n).	
	1a, 3k - 3n).		
	E.g.	E.g.	
	a) Project works	Project works, etc.	
	b) Peer assessment		
	c) Class assignments		
	d) Quizzes		
	e) Case studies, etc.		
3. Modelling a	3.1 Ask teachers to identify	3.1 Identify strategies in the	30
teaching activity,	strategies in the sample	sample lesson plan that	mins
making links with	lesson plan that could	could promote GESI, SEL,	
the Pre-Tertiary	promote GESI, SEL, ICT, 21 st	ICT, 21 st century skills and	
(standards-	century skills and	differentiation (NTS 3f).	
based)	differentiation (NTS 3f).		
Curriculum and	E.g.	E.g.	
using GESI, SEL,	a) Learners were	Learners were	
ICT and 21 st	encouraged to move	encouraged to move	
century skills	around the class to	around the class to	
-	give 'high five' to	give 'high five' to	
	their colleagues	their colleagues, etc.	
	(GESI/SEL)		
	b) Learners were		
	encouraged to reach		
	out to their		
	colleagues especially		
	SEN learners to avoid		
	them feeling left out		
	of the activity		
	(GESI/SEL)		
	c) Topographical maps		
	that are very clear to		
	enhance learners'		
	viewing were		
	provided and		
	projected (ICT/GESI)		
	d) Mixed-ability groups		
	were used in the		
	lesson (GESI/SEL/21 st		
	century skills)		

 e) Enough time was provided for learners to work at appropriate pace (GESI/SEL) f) Differentiated assessment was provided to cater for all levels of learners (Differentiation), etc. 		
 3.2 Ask teachers to recommend other appropriate assessment strategies that could aid in the development of numeracy skills in learners (NTS 1a, 2e, 3f and 3m). E.g. a) Peer assessment b) Playing number games (cards, ludo, dominoes, etc.) c) Number riddles d) Maths quiz, etc. 	3.2 Recommend other appropriate assessment strategies that could aid in the development of numeracy skills in learners (NTS 1a, 2e, 3f and 3m). <i>E.g.</i> <i>Peer assessment, etc.</i>	
 3.3 Ask teachers to indicate ways ICT can be used in assessing numeracy skills in learners (NTS 3j, 3k). E.g. a) Using ICT application tools such as google forms, socrative, kahoot and mentimeter to build numeracy related tasks to assess learners b) Giving learners data that require the use of ICT tools such as spreadsheets and calculators to compute 	3.3 Indicate ways ICT can be used in assessing numeracy skills in learners (NTS 3j, 3k). <i>E.g.</i> <i>Using ICT application</i> <i>tools such as google</i> <i>forms and socrative</i> <i>to build numeracy</i> <i>related tasks to</i> <i>assess learners, etc.</i>	

	c) Engaging learners in playing mathematical game applications such as Solitaire, Sudoku and 2048 to assess numeracy skills, etc.		
	3.4 Ask a teacher to model a teaching activity based on the sample lesson plan that can support learners who may struggle with practical skills in reading maps at the appropriate level, taking into consideration GESI, SEL, ICT, 21 st century skills and differentiation (NTS 1a, 2c, 2e, 2f and 3e - 3j).	3.4 Model a teaching activity based on the sample lesson plan that can support learners who may struggle with practical skills in reading maps at the appropriate level, taking into consideration GESI, SEL, ICT, 21 st century skills and differentiation (NTS 1a, 2c, 2e, 2f and 3e - 3j).	
	3.5 Ask teachers to provide feedback on the lesson observed (NTS 3n, 3o).	3.5 Provide feedback on the lesson observed (NTS 3n, 3o).	
5. Evaluation and	4.1 Ask teachers in groups to	4.1 In your group, reflect,	10
review of	reflect, write and share what	write and share what you	mins
session:	they have learned with the	have learned with the larger	
	, larger group with regard to	group with regard to	
Noting that	supporting the teaching and	supporting the teaching and	
teachers	learning of numeracy at the	learning of numeracy at the	
need to	right level in the social	right level in the social	
identify	sciences (NTS 1a 1b)	sciences (NTS 1a 1b)	
critical			
friends to	4.2 Remind teachers to.	4.2 Where possible, identify	
observe	where possible, identify a	a critical friend to observe	
lessons and	critical friend to observe	vour lesson in relation to PLC	
report at next	their lesson in relation to	Session 10 and provide	
session	PLC Session 10 and provide	feedback to you (NTS 1a.	
	feedback to them (NTS 1a, 1b).	1b).	
	4.3 Remind teachers to read PLC Session 11 in preparation for the next session.	4.3 Read PLC Session 11 in preparation for the next session.	

Appendix 10	A sample lesson plan for the	A sample lesson plan for the
	development of learner's	development of learner's
	numeracy skills in the	numeracy skills in the
	teaching and learning of	teaching and learning of
	Geoaraphy:	Geography:
	a) Topic:	a) Topic:
	Principles of Man	Principles of Map
	Readina	Readina
	h) Sub-Tonic:	h) Sub-Tonic:
	Practical skills to	Practical skills to
	demonstrate man	demonstrate man
	reading	reading
	c) Objectives:	c) Objectives:
	C) Objectives.	By the and of the losson
	by the end of the lesson,	By the end of the lesson,
	the learner will be able	
	io: i Deduce a	i Dodwoo z
	I. Reduce a	1. Reduce a
	topographical map	topograpnical map
	by a given scale	by a given scale
	factor.	factor.
	ii. Enlarge a	ii. Enlarge a
	topographical map	topographical map
	by a given scale	by a given scale
	factor.	factor.
	iii. Draw a cross-	iii. Draw a cross-section
	section of a	of a topographical
	topographical	map.
	тар.	
	d) Teaching and Learning	d) Teaching and Learning
	Resources (TLRs):	Resources (TLRs):
	Computer, projector,	Computer, projector,
	topographical maps,	topographical maps,
	metre rule, graph	metre rule, graph sheets,
	sheets, etc.	etc.
	e) Relevant Previous	e) Relevant Previous
	Knowledge (RPK):	Knowledge (RPK):
	Learners can identify	Learners can identify
	features on a	features on a
	topographical map.	topographical map.
	f) Introduction:	f) Introduction:
	<i>i.</i> Start the lesson by	i. Start lesson by
	askina learners to	asking learners to
	move round the	move round the
	class to give a 'high	class to give a
	five' to at least 5	'high five' to at
	collegaues they	least 5 colleagues
	have not interacted	they have not

with in the day.	interacted with in			
Encourage learners	the day.			
to reach out to	Encourage			
especially SEN	learners to reach			
learners in the class	out to especially			
to avoid them	SEN learners in			
feeling left out of	the class to avoid			
the activity.	them feeling left			
	out of the activity.			
ii. In an all-inclusive	ii. In an all-inclusive			
class discussion,	class discussion,			
learners mention	learners mention			
some basic features	some basic			
of a topographical	features of a			
map.	topographical			
	map.			
g) Tasks/Activities:	g) Tasks/Activities:			
i. Present	i. Present			
topographical map	topographical map			
sheets to learners	sheets to learners			
and project a soft	and project a soft			
copy on a	copy on a			
screen/board.	screen/board.			
Guide learners	Guide learners			
using structuring-	using structuring-			
talk- for learning	talk- for learning			
strategy to discuss	strategy to discuss			
the steps involved	the steps involved			
in reducing a map	in reducing a map			
by a given scale	by a given scale			
factor.	factor.			
Note:	Note:			
Ensure the features on the	Ensure the features on the			
topographical sheets are	topographical sheets are			
very clear to enhance	very clear to enhance			
learner's viewing.	learner's viewing.			
Armadilla Ridga	Armadillo Ridgo			
Armadillo Ridge	Armadillo Ridge			
ii.	In mixed-ability	ii.	In mixed-ability	
------	---------------------	------	---------------------	--
	and mixed-gender		and mixed-gender	
	groups, task		groups, task	
	learners to apply		learners to apply	
	knowledge in		knowledge in	
	reducing a		reducing a	
	topographical map		topographical map	
	to enlarge a part		to enlarge a part	
	of the map by a		of the map by a	
	given scale factor.		given scale factor.	
	Move round to		Move round to	
	provide support for		provide support for	
	learners in need.		learners in need.	
iii.	Guide leaners as	iii.	Guide learners as	
	they work in pairs,		they work in	
	to use the		pairs, to use the	
	appropriate tools		appropriate tools	
	such as rulers,		such as rulers,	
	pencils, and pens		pencils, and pens	
	to mark the key		to mark the key	
	features between		features between	
	two points of a		two points of a	
	topographical map		topographical map	
	for cross sectional		for cross sectional	
	drawing. Provide		drawing. Provide	
	enough time for		enough time for	
	learners to work at		learners to work at	
	appropriate pace		appropriate pace	
	and		and	
	scaffold/support		scaffold/support	
	when necessary.		when necessary.	
	Level 1:		Level 1:	
	Construct a cross		Construct a cross	
	section with the		section with the	
	elevations		elevations	
	recorded.		recorded.	
	Level 2:		Level 2:	
	Construct a cross		Construct a cross	
	section with		section with	
	elevations		elevations	
	recoraea ana		recoraea ana	
	appropriate		appropriate	
	annotations		unnotations	
	proviaea.		proviaea.	
	Level 3:		Level 3:	
	Construct a cross		Construct a cross	
	section with		section with	

elevations	elevations	
recorded,	recorded,	
appropriate	appropriate	
annotations	annotations	
provided and areas	provided and areas	
of inter-visibility	of inter-visibility	
indicated.	indicated.	
h) Core Points:	h) Core Points:	
i. Steps in reducing a	i. Steps in reducing a	
topographical map:	topographical map:	
> Measure the	Measure the	
length and width	length and width	
of the map using	of the map using	
a ruler.	a ruler.	
Divide the length	Divide the length	
and width by a	and width by the	
scale factor. For	scale factor. For	
instance, if the	instance, if the	
length of the	length of the	
map is 20cm and	map is 20cm and	
the width is	the width is	
15cm and it is	15cm and it is	
supposed to be	supposed to be	
reduced by a	reduced by a	
scale factor of ½,	scale factor of ½,	
divide the	divide the	
dimensions each	dimensions each	
by 2 (new Length	by 2 (new Length	
= 10cm, new	<i>= 10cm, new</i>	
Width=7.5cm).	Width=7.5cm).	
> Use the	> Use the	
dimensions to	dimensions to	
draw the outline	draw the outline	
of the map.	of the map.	
Divide distances	Divide distances	
between	between	
features by 2	features by 2	
and then insert	and then insert	
them on the	them on the	
map.	map.	
ii. Steps in enlarging a	ii. Steps in enlarging a	
topographical map:	topographical map:	
Measure the	Measure the	
length and width	length and width	
of the map using	of the map using	
a ruler.	a ruler.	

7	Multiply the		\triangleright	Multiply the	
	length and width			length and width	
	by a scale factor.			by a scale factor.	
	For instance, if			For instance, if	
	the length of the			the length of the	
	map is 20cm and			map is 20cm and	
	the width is			the width is	
	15cm and it is			15cm and it is	
	supposed to be			supposed to be	
	enlaraed by a			enlaraed by a	
	scale factor of 2.			scale factor of 2.	
	multiply each of			multiply each of	
	the dimensions			the dimensions	
	hv 2 (new Length			hv 2 (new Length	
	=40cm_new			= 40cm new	
	Width=30cm)			Width=30cm)	
5	 Use the 			lise the	
,	dimensions to		,	dimensions to	
	draw the outline			draw the outline	
	of the man			of the man	
7	> Multinku			0j the map. Multinly	
,	distances		-	distances	
	hatwaan			hatwaan	
	footures by 2			footures by 2	
	jeulures by 2			jeulures by 2	
	tham on the			them on the	
	them on the			them on the	
	map.		Dura	map.	
III. D	rawing a cross-	<i>III.</i>	Dra	wing a cross-	
Se			sect		
	pograpnical map:		τορο	ograpnical map:	
	Use a strip of			Use a strip of	
	paper and place it		I	paper and place it	
	along the cross-		(along the cross-	
	section line. Make			section line. Make	
	a mark and		(a mark and	
	record the		I	record the	
	elevations.			elevations.	
	Take the strip of			Take the strip of	
	paper and put it		I	paper and put it	
	on a fresh piece of		(on a fresh piece of	
	paper (graph		I	paper (graph	
	sheet).			sheet).	
	Make dots			Make dots	
	corresponding to		(corresponding to	
	the elevations		1	the elevations	
	along the strip of		(along the strip of	
	paper			paper	

representing the	representing the
cross-section line.	cross-section line.
Draw vertical	Draw vertical
lines representing	lines representing
the boundaries of	the boundaries of
the cross section.	the cross section.
\succ Join the points	Join the points
together with a	together with a
line	line
 Input appropriate 	 Innut appropriate
annotations	annotations
i) Core Competencies:	i) Core Competencies:
i Digital literacy	i Digital literacy
i. Digital interacy	i. Digital interacy
II. Problem solving	n. Problem solving
SKIIIS	SKIIIS III Collaboration
	III. Collaboration
IV. Critical thinking	SKIIIS
skills	iv. Critical thinking
	skills
j) Conclusion:	j) Conclusion:
Review lesson with	Review lesson with
learners by asking	learners by asking
them in their various	them in their various
groups to summarise	groups to summarise
what they have	what they have
learned in the lesson.	learnt in the lesson.
k) Evaluation:	k) Evaluation:
Use the	Use the
topographical map	topographical map
displayed to answer	displayed to answer
the questions that	the questions that
follow:	follow:
5	,
Image: Distribution of the second	DANNO DISTRICT
i. Reduce the map by a	i. Reduce the map by a
scale factor of ½	scale factor of ½
(Level 1).	(Level 1).

ii. iii.	On the new map, insert town Dambo (Level 2). Draw a cross section of the point A and B (Level 3).	іі. ііі.	On the new map, insert town Dambo (Level 2). Draw a cross section of the point A and B (Level 3).	
I)	Remarks:	Ŋ	Remarks:	

PLC Session 11: Supporting numeracy across the				
curriculum t	hrough lesson obser	vation		
Focus: the bullet points provide the frame for what is to be done in the session. The writer should use the bullets to guide what they write for the PLC Coordinators and teachers to do and say during each session. Each bullet needs to be addressed	Guidance notes on Leading the session. What the PLC Coordinator will have to say during each stage of the session	Guidance Notes on Teacher Activity during the PLC Session. What teachers will do during each stage of the session	Time in session	
1. Introduction	1.1 Start the PLC session by asking teachers to share what they did differently in the classroom or elsewhere based on PLC Session 10, on supporting the teaching and learning of numeracy at the right level in the social sciences, which they think impacted learning positively (NTS 1a).	1.1 Share what you did differently in the classroom or elsewhere based on PLC Session 10, on <i>supporting</i> <i>the teaching and learning of</i> <i>numeracy at the right level</i> <i>in the social sciences</i> , which you think impacted learning positively (NTS 1a).	20 mins	
	1.2 Ask teachers to discuss and summarise in a single sentence why they think what a colleague did by way of application of what they learned in Session 10, on supporting the teaching and learning of numeracy at the right level in the social sciences, supported learning (NTS 1a).	1.2 Discuss and summarise in a single sentence why you think what your colleague did by way of application of what they learned in Session 10, on <i>supporting the</i> <i>teaching and learning of</i> <i>numeracy at the right level</i> <i>in the social sciences,</i> supported learning (NTS 1a).		
2. Planning for teaching, learning and assessment	2.1 Ask a teacher to read the Purpose, Learning Outcomes (LOs) and	2.1 Read the Purpose, Learning Outcomes (LOs) and Learning Indicators (LIs) for the session.	30 mins	

activities,	Learning Indicators (LIs) for		
making links	the session.		
with the Pre-			
Tertiary	Purpose:	Purpose:	
(standards-	The session seeks to assist	The session seeks to assist	
based)	teachers to strengthen their	teachers to strengthen their	
Curriculum and	ability to support the	ability to support the	
using GESI, SEL,	teaching and learning of	teaching of numeracy across	
ICT and 21 st	numeracy across the	the curriculum through	
century skills	curriculum through lesson	lesson observation. This	
	observation. This approach	approach will promote	
	will promote reflective	reflective practice among	
	practice among teachers to	teachers to help improve	
	help improve the	the integration of numeracy	
	integration of numeracy in	in the various subjects.	
	the various subjects.		
	LO 1: Demonstrate	LO 1: Demonstrate	
	knowledge and	knowledge and	
	understanding of	understanding of	
	how to support	how to support	
	numeracy across the	numeracy across the	
	curriculum through	curriculum through	
	lesson observation	lesson observation	
	(NTS 1a, 2b - 2f, 3a	(NTS 1a, 2b - 2f, 3a	
	and 3e - 3k).	and 3e - 3k).	
	LI 1.1 List the criteria in the	LI 1.1 List the criteria in the	
	observation guidelines for	observation guidelines for	
	supporting the teaching and	supporting the teaching and	
	learning of numeracy across	learning of numeracy across	
	the TVET /SHS curriculum.	the TVET /SHS curriculum.	
	LI 1.2 Analyse at least two	LI 1.2 Analyse at least two	
	ways in which the lesson	ways in which the lesson	
	observation guidelines can	observation guidelines can	
	support the teaching and	support the teaching and	
	learning of numeracy across	learning of numeracy across	
	the IVEL/SHS curriculum.		
	LO 2: Demonstrate	LO 2: Demonstrate	
	application of the use	application of the use	
	of the observation	of the observation	
	guidelines to support	guidelines to support	
	the teaching and	the teaching and	
	learning of numeracy	learning of numeracy	
	across the TVET /SHS	across the TVET /SHS	
	curriculum (NTS 1a,	curriculum (NTS 1a,	
	2b - 2f, 3a and 3e -	2b - 2f, 3a and 3e -	
	3k).	3k).	

LI 2.1 Observe a lesson that	LI 2.1 Observe a lesson that	_
incorporates numeracy	incorporates numeracy	
across the TVET /SHS	across the TVET /SHS	
curriculum using the	curriculum using the	
observation guidelines.	observation guidelines.	
LI 2.2 Provide feedback on	LI 2.2 Provide feedback on	
how the lesson observed	how the lesson observed	
supports numeracy across	supports numeracy across	
the TVFT/SHS curriculum.	the TVFT/SHS curriculum.	
2.2 Ask teachers in their	2.2 In your subject domain	
subject domain groups to	groups, list the criteria in the	
list the criteria in the	observation guidelines for	
observation guidelines for	supporting the teaching and	
supporting the teaching and	learning of numeracy across	
learning of numeracy across	the TVFT /SHS curriculum	
the TVFT /SHS curriculum	(NTS 1a, 2c and 2d).	
(NTS 1a 2c and 2d)	(110 10) 20 010 20).	
(1110 10, 20 0110 20).		
Refer to Appendix 11 for the	Refer to Appendix 11 for the	
lesson observation	lesson observation	
auidelines	auidelines	
F. a.	F.a.	
a) Demoaraphic	Pedagogical and	
information	assessment activities	
b) Pedagogical and	that incorporative	
assessment	numeracy concepts.	
activities that	etc.	
incorporates		
numeracy concepts		
c) Cross cutting issues		
such as the		
incorporation of		
GESL SEL ICT and		
21 st Century skills		
that support		
numeracy skills		
d) Differentiated		
activities to support		
all learners develop		
numeracy skills, etc.		
2.3 Ask teachers in pairs to	2.3 In pairs, analyse at least	
analyse at least two ways in	two ways in which the	
which the lesson	lesson observation	
observation guidelines can	guidelines can support the	
support the teaching and	teaching and learning of	

learning of numeracy across	numeracy across the TVET	
the TVET /SHS curriculum	/SHS curriculum (NTS 1a).	
(NTS 1a).	,	
F.a.	F.a.	
a) Applving the criteria	Applving the criterig	
in the observation	in the observation	
auidelines to	auidelines to	
objectively assess	objectively assess	
lessons that focus	lessons that focus on	
on the incorporation	the incorporation of	
of numeracy at the	numeracy at the	
right level across	right level across the	
the curriculum	curriculum, etc.	
b) Providina	,	
constructive		
feedback that		
outline the		
strengths,		
challenges and		
possible areas of		
incorporating		
numeracy in lessons		
using positive		
language		
c) Accepting and		
reflecting positively		
on feedback to		
review lessons		
appropriately to		
incorporate		
numeracy at the		
right level, etc.		
2.4 Ask a teacher to teach a	2.4 Teach a planned lesson	
planned lesson in any	in your subject area that	
subject area that	incorporates numeracy	
incorporates numeracy	across the TVET /SHS	
across the TVET /SHS	curriculum for a colleague to	
curriculum for a colleague	observe using the	
to observe using the	observation guidelines (NTS	
observation guidelines (NTS	1a, 1c, 1e, 2c and 3h).	
1a, 1c, 1e, 2c and 3h).		
Refer to Annendix 11 for the	Refer to Annendix 11 for the	
lesson observation	lesson observation	
auidelines	auidelines	
	y	

	2.5 Ask the teacher who	2.5 Listen and write the	
	observed the lesson to	feedback on how the lesson	
	provide feedback on how	observed supported	
	the lesson observed	numeracy across the TVET	
	supported numeracy across	/SHS curriculum (NTS 1a, 1c,	
	the TVET /SHS curriculum	1e, 2c and 3h).	
	(NTS 1a, 1c, 1e, 2c and 3h).		
	 2.6 Ask teachers to discuss at least one alternative numeracy strategy that could be used in the lesson to develop numeracy concepts at the right level (NTS 1b, 2c - 2e, 3f and 3g). <i>E.g.</i> a) Combining words and numbers to provide a complete 	2.6 Discuss at least one alternative numeracy strategy that could be used in the lesson to develop numeracy concepts at the right level (NTS 1b, 2c - 2e, 3f and 3g). <i>E.g.</i> <i>Combining words and</i> <i>numbers to provide a</i> <i>complete understanding</i>	
	understanding of	of concepts, etc.	
	concepts		
	b) Using concepts in		
	maths such as:		
	Addition can be		
	described as 'put		
	together' or 'sum'		
	c) Using visual images		
	and shapes to reflect		
	the meaning of		
	mathematical		
	concepts		
	d) Using mathematical		
	games to help		
	learners develop		
	mathematical		
3 Modelling a	3 1 Ask teachers in groups	3.1 In your groups discuss	30 mins
teaching activity	to discuss how the activities	how the activities observed	50 111115
making links	observed in the model	in the model lesson promote	
with the Pre-	lesson promote GESI, SEL	GFSI, SFL, ICT, 21 st century	
Tertiary	ICT. 21 st century skills and	skills and differentiation	
(standards-	differentiation (NTS 3f).	(NTS 3f).	
based)	E.g.	E.g.	
Curriculum and	a) Learners were	Learners were	
using GESI, SEL,	actively engaged in	actively engaged in	
ICT and 21 st	mixed-ability/	mixed-	
century skills	mixed-	ability/mixed-	

gender/mixed-	gender/mixed-	
culture groups	culture groups which	
which encouraged	encouraged	
participation of all	participation of all	
learners	learners	
(males/females and	(males/females and	
SEN learners)	SEN learners), etc.	
b) Learners were aiven		
the opportunity to		
share their ideas to		
the whole class		
using different		
prosentation modes		
presentation modes		
c) Learners were given		
activities according		
to their ability levels		
and learning needs		
which built their		
capacities, etc.		
3.2 Ask teachers to	3.2 Recommend other	
recommend other	annropriate	
appropriate	appropriate	
appropriate	could be used to support	
could be used to support	the development of	
the development of	numoracy skills in the	
numoracy skills in the	absorved model lesson (NTS	
absorved model lesson (NTS	12 22 2f and 2m)	
observed model lesson (NTS	1d, 2e, 3i anu 3mj.	
1a, 2e, 3i anu 3m).		
E.g.	E.g.	
a) Group presentation	Portfolio building,	
b) Portfolio building	etc.	
c) Project work		
d) Exhibition		
e) Jury		
f) Game/puzzles		
g) Graph presentations,		
etc.		
2.2 Ack topchors to suggest	2.2 Suggest alternative wave	
J.J. ASK LEGUIEIS LU SUBBESL	of using ICT in the observed	
in the observed lessen to	losson to support the	
in the observed lesson to	tesson to support the	
support the teaching and	Leaching and learning of	
learning of numeracy across	numeracy across the	
the IVEI/SHS curriculum	IVEI/SHS curriculum (NTS	
(NTS 3J).	-3J).	<u> </u>

		E.g.	E.g.	
		a) Showing of	Showing of YouTube/Pre-	15 mins
		YouTube/Pre-recorded	recorded videos and	
		videos and podcast on	podcast on mathematical	
		, mathematical related	' related concepts in the	
		concepts in the subject	subiect area, etc.	
		area		
		h) Using interactive		
		whiteboard to present		
		varied numeracy related		
		concents across the		
		TVFT/SHS curriculum		
		c) Giving learners projects		
		to search online and		
		present information		
		using charts and figures		
		nresented in		
		presented in DowarDoint atc		
Λ	Evaluation	A 1 Ack toachars in pairs to	1.1 In pairs discuss and	10 mins
4.	evaluation	4.1 Ask teachers in pairs to	4.1 III pairs, discuss and	10 111115
	and review	larger group what they have	what you have learnt about	
	or session:	larger group what they have	what you have learnt about	
-	N		using lesson observation to	
•	Noting that	observation to support	support numeracy across	
	teachers	numeracy across the	(NTC 1 = 1 = a = 1 f)	
	need to	IVET/SHS curriculum (NTS	(NTS 1a, 1b and 1f).	
	Identify	1a, 1b and 1f).		
	critical			
	friends to	4.2 Remind teachers, where	4.2 Remember to identify a	
	observe	possible, to identify a	critical friend to use the	
	lessons and	critical friend to use the	lesson observation	
	report at	lesson observation	guidelines in Appendix 11 to	
	next session	guidelines in Appendix 11 to	observe your lessons and	
		observe their lessons and	provide feedback to you	
		provide feedback to them	(NTS 1a, 1e and 3l).	
		(NTS 1a, 1e and 3l).		
		4.3 Remind teachers to	4.3 Remember to conduct	
		conduct peer lesson	peer lesson observations	
		observations using the	using the observation	
		observation guidelines in	guidelines in Appendix 11 to	
		Appendix 11 to support	support numeracy across	
		numeracy across the	the TVET/SHS Curriculum	
		TVET/SHS Curriculum (NTS	(NTS 1a, 3b).	
		1a, 3b).		

Appendix 11: Teacher Lesson Observation Sheet for							
District:							
Circuit:							
School:							
Name of Teacher:							
Class:							
Subject:							
Topic:							
Time:							
Question		Y *	N**	IP***	Comment		
1.	Is/Are the purpose(s) of the lesson clearly stated in the lesson plan and focused on learners developing						
	numeracy skills (i.e., number, algebra,						
	space & shapes and handling data) and						
	achieving the lesson learning outcomes						
	Irrespective of the subject taught?						
2.	provide opportunities for them to use						
	their numeracy skills to complete the						
	tasks?						
2	Is teaching differentiated to cater for the						
3.	across the ability range?						
	Does the teacher use real life examples						
4	which are familiar to learners and						
	enable learners to apply numeracy						
	SKIIIS?						
5.	interactive and creative appropriate						
	group work, role play, storytelling to						
	support learners in developing						
	numeracy skills irrespective of the subiect taught?						

6.	Does the teacher demonstrate knowledge and understanding of how numeracy can support the teaching of		
	their subject?		
7.	Is Gender Equality and Social Inclusion responsive language used in the lesson to address numeracy-related challenges learners face?		
8.	Are cross-cutting issues integrated in the lesson to support numeracy development? e.g., problem-solving, logical thinking, use of ICT as a tool for highlighting numeracy -related activity?		
9.	Are teaching/learning materials and other resources being used to support learning support numeracy development?		
10.	Does the teacher maintain a non- threatening learning environment throughout the lesson by using numeracy examples accessible to the learners?		
11.	Does the teacher encourage learners to ask numeracy-related questions during the lesson?		
12.	Does assessment include assessment as, for and of learning?		

* Yes ** No ***In part

www.t-tel.org