Tutor Professional Development Handbook: B.Ed. in Initial Teacher Education - Mathematics Year 3 Semester 1

HANDBOOK FOR **COORDINATORS**





Wisdom, Knowledge and Prudence





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The Government of Ghana







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Foreword

In Ghana we have made great strides in transforming our teacher education system over the past few years. With each passing year the changes brought about through these reforms are maturing, embedding, and sustaining. Once the first B.Ed. graduates from Colleges of Education enter basic school classrooms from 2022 onwards, I am sure that as a nation, we will truly start to see the benefits of these reforms.

The success of national reforms depends on individual tutors and individual teachers working in classrooms across the country every day. The progress that we want to see will only be brought about through the consistent and regular application of the professional knowledge, professional practice and professional values and attitudes set out in the National Teachers' Standards.

This is where the Tutor Professional Development Handbooks have such an important role to play, and it is very pleasing to see the continued development and use of these handbooks as we enter the 3rd Year of the B.Ed. in Initial Teacher Education.

These Handbooks aim to ensure that tutors in Colleges of Education are reflecting critically on their methods of teaching and learning and supporting each other to implement the B.Ed. in line with the National Teacher Education Curriculum Framework and National Teacher Education Assessment Policy. Assessment is one of the areas where we need to pay particular attention as the teacher education reforms matures and is sustained. The National Teacher Education Assessment Policy sets out the range of formative and summative modes and methods of assessment required to ensure that the B.Ed. is both implemented and assessed as planned. Assessment is a key driver of learner behaviour, and we must all ensure that we are familiar with the National Teacher Education Assessment Policy and applying it consistently to ensure that we eliminate the 'chew, pour, pass and forget' syndrome which has infected our education system. These Handbooks pay particular attention to assessment and are an important tool in ensuring that we are all following national policy guidelines correctly and consistently.

This latest set of Professional Development Handbooks, developed by four mentoring universities (University for Development Studies, University of Education, Winneba, University of Ghana and Kwame Nkrumah University of Science and Technology) and tutors from their affiliated Colleges of Education, are the second set of Professional Development Handbooks to be developed since Transforming Teaching, Education & Learning (T-TEL) became a Ghanaian not-for-profit organisation. I would like to take this opportunity to thank both the Ghana Tertiary Education Commission and Mastercard Foundation for making all this possible.

Robin Todd Executive Director, T-TEL September 2021

Year Three Semester One Writing the weekly PD sessions Guidance for the Subject Writing Leads (SWL).

- The PD sessions provide opportunities for tutors to work and plan together to make sure the new B.Ed. courses are taught well
- They are an important way to ensure effective implementation of the B.Ed. and the NTEAP, this may require PD writers to add more detail to what is in the course manuals. Specifically, this means a focus on the integration of:
 - GESI to ensure the needs of females, males and students with special education needs are well catered for (also a stand-alone PD session)
 - ICT and 21c skills to ensure students learn to use technology effectively to support their own and pupils' learning (also a stand-alone PD session)
 - NTEAP and the use of continuous assessment to support learning (also a stand-alone PD session)
- The PD session template provides guidance notes for the Subject Leads (SL)/HoD on how to lead the weekly PD sessions in the CoE
- To ensure appropriate subject and age phase focus for the PD sessions, in line with the B.Ed. requirements
 - where subjects are grouped direct reference needs to be made to the course manuals for each subject
 - Where there are different age phases direct reference needs to be made to the course manuals for each age phase
- SL/HoD need to have details of the resources needed for all the activities including guidance on how to create any TLMs and references to literature, previous PD themes etc.
- The PD writing checklist covers the key issues to be addressed in each session. PD writers should use it to support the writing and review of the PD sessions.

Age Phase(s):

- a. Early Grade
- b. Upper Grade
- c. JHS (Core)
- d. JHS (MathsSp)

Name of Subjec(s):

- a. Mathematics: Teaching and Assessingb. Mathematics: Teaching and Assessing
- c. Teaching and Assessing JHS
- d. Mathematics Calculus

Tutor PD Session for Lesson 1 in the Course Manual

Lesson Tittle:

a. Early Grade - Counting, Patterns and Relationships

a.	Larry Grade Countin	ig, i atterns and helationships		
b.	Upper Grade - Count	ing, Patterns and Relationships		
		ement, Shape and Space		
d.	JHS (SP) - Limits and	Continuity: Learning and applying		
Fo	cus: the bullet	Guidance notes on Leading	Guidance Notes on Tutor	Time in
ро	ints provide the	the session. What the SL/HoDs	Activity during the PD	session
fra	me for what is to	will have to say during each	Session.	
be	done. The	stage of the session	What PD Session participants	
gu	idance notes in		(Tutors) will do during each	
ita	lics identify the		state of the session)	
pro	ompt the SL/HoD			
ne	eds and each one			
mı	ust be addressed			
1.	Introduction /	Introduction	Introduction	
	lesson overview	1.1 Ice breaker activity: Begin	1.1 Continue the patterns	
•	Overview of	with an investigational	with the next term.	
	subject/s age	activity on continuing	i. $\frac{1}{10} \frac{1}{100}$, $\frac{1}{1000}$, $\frac{1}{10000}$	
	phase/s to be	patterns of numbers	ii. $\frac{3}{10'}$, $\frac{5}{10'}$, $\frac{7}{10'}$, $\frac{9}{10'}$,)	
	covered in this PD	(e.g. continue:	$\ldots \frac{1}{10}, \frac{1}{10}, \frac{1}{10}, \frac{1}{10}, \ldots)$	
	session and how it	i. $\frac{1}{10} \frac{1}{100}$, $\frac{1}{1000}$, $\frac{1}{10000}$,		
	will be organised.	ii. $\frac{3}{10}$, $\frac{5}{10}$, $\frac{7}{10}$, $\frac{9}{10}$,)		
	Including guidance	10' 10' 10' 10'		
	on grouping tutors	1.2 Ask tutors to discuss the	1.2 Discuss the overview of	
	according to the	overview of the phases to		
	subject/s, age	be covered in this PD	the phases to be covered in this PD	
	phase/s.	session and how it will be	session and how it will	
•	Reflection on	organized.	be organized.	
	previous PD	i. Early and upper Grade: The	De Organizeu.	
	Session	lesson considers counting		
	(Introduction to	and representing numbers,		
	the course	number patterns and	N/B	
	manual/s)	relationships as well as	If you teach more than one	
•	Introduction and	investigations with	course, join the course group	
	overview of the	numbers. It also considers	which you may need support	
	main purpose of	how the various assessment	in preparation.	
	the lesson in the	strategies can be		
1	course manual/s	incorporated in the lesson		

incorporated in the lesson

- Identification of important or distinctive aspects of the lesson/s
- Reading and discussion of the introductory sections up to learning outcomes
- as well as in the Basic School classroom.
- ii. JHS Core considers exploring shapes and their properties, relationship among faces, edges and vertices, perimeters, areas of 2-D shapes and properties and volumes of 3-D shapes.
- iii. JHS Calculus considers relationship between the everyday use of the term 'limit' and how it relates to the definition of limits. It further considers limits of a function and its properties.

N/B: I) Remember to put members into groups according to the phases to be taught in the semester.
II) Tutors who are teaching more than one course should join any course which they may have much challenge. Ask tutors to tell how useful the previous semester's PD session was and how it influenced their teaching in year 2 semester 2. 1.

Tell how useful the previous semester's PD session was and how it influenced your teaching in year 2 semester 2.

- 1.3 Ask tutors to identify the purpose of the lesson from the course manual and state their expectations of the PD Session.
- 1.4 Ask tutors to read the overview of the various courses (of the various phases named above) and discuss the course learning outcomes (CLOs) in groups as appropriate
- 1.5 Guide tutors to establish the relationship between

- 1.3 Identify the purpose of the lesson from the course manual and state your expectations of the PD Session.
- 1.4 Read the overview of the various courses (of the various phases named above) and discuss the course learning outcomes (CLOs) in groups as appropriate
- 1.5 Guide tutors to establish the relationship between

- CLOs and the learning outcomes of individual lessons in the course
- 1.6 Ask tutors in phase groups discuss the important or distinctive aspects of the first lesson including vocabulary and fundamental concepts related to the components of the front matters.

Distinctive aspects include the interactive nature of the activities, emphasis on connecting concepts: a. Early Grade-eq. relationships between place value, fractions and Patterns. b. Upper Grade – eg. relationships between place value, fractions and Patterns. c. JHS; Assessment – eq. Linking ICT with literacy and numeracy d. JHS; Calculus – eg. application of calculus in real life situations

1.7 Ask tutors to read and discuss the introductory sections of the lesson (up to Learning Outcomes) and suggest the relevant students' previous knowledge that can support the teaching and learning of the lesson.

N/B

Be ready for likely questions from tutors for clarification.

Anticipated questions:

- i. Why teaching counting at this level?
- ii. Do plane shapes have faces?

- CLOs and the learning outcomes of individual lessons in the course
- 1.6 In phase groups, discuss the distinctive aspects of the first lesson including vocabulary and fundamental concepts related to the components of the front matters.

1.7 Read and discuss the introductory sections of the lesson (up to Learning Outcomes) and suggest the relevant students' previous knowledge that can support the teaching and learning of the lesson.

71.	a mildama a sa ta s	iii. What is the relationship between functions and limit?		
	e guidance notes			
Jor	SL/HoD need to			
•	Provide short			
	overview of the lesson			
•	Identify important or distinctive features of the lesson			
•	Identify assessment,			
	aligned to NTEAP			
•	Anticipate			
	questions which			
	might arise from the introduction to			
	the lesson and			
	provide responses			
	for SL/HoD.			
•	Issues that			
	prompted			
	questions or			
	discussion during			
	curriculum and			
	course writing			
	may well also be			
	issues for SL/HoD			
2.	Concept	Concept Development	Concept Development	25 mins
	Development	2.1 Ask tutors to identify	2.1 Identify familiar and	
	(New learning likely to arise in	familiar and unfamiliar	unfamiliar concepts in	
	this lesson):	concepts in their lessons	their lessons and discuss	
	Identification and	and discuss with the larger	with the larger group.	
	discussion of	group.		
	concepts	2.2 Lead tutors to draw	2.2 Draw connections among	
•	Identification of	connections among	concepts in the various	
	possible	concepts in the various	lessons in line with the	
	challenging areas	lessons in line with the	basic school curriculum.	
	in teaching of the	basic school curriculum.		
	concept.			
•	Identification of	2.3 Ask tutors to outline	2.3 Outline possible	
	needed resources	possible challenging areas	challenging areas in	
	for the teaching	in Teaching and Assessing,	Teaching and Assessing,	
			measurement of shape	

and learning of the concept.	Measurement of Shape and Space and in Calculus taking into consideration GESI (eg. Avoid making discriminatory statements such as: "even the girls are doing better")	and space and in calculus taking into consideration GESI. (eg. Avoid making discriminatory statements such as : "even the girls are doing better")	
	2.4 Lead tutors to discuss misconceptions and barriers in teaching and learning of the lesson. Example: a. Early Grade – one(1) is a prime number b. Upper Grade - one(1) is a prime number c. JHS (CORE) – Plane shapes can be touched d. JHS (Calculus) – Calculus is For boys	2.4 Participate in the discussion on misconceptions and barriers in teaching and learning of the lesson.	
	2.5 Support tutors to identify GESI responsive resources such as supporting staff with experts in sign language as well as resources such as teacher and learner resource packs, textbooks, course manual, prisms, pyramids, projectors, flip charts, sticky notes, tactile materials that can be used in the teaching and learning of the concepts mentioned above (NTS 3j)	2.5 Identify as many GESI responsive resources such as supporting staff with experts in sign language as well as resources such as teacher and learner resource packs, textbooks, course manual, prisms, pyramids, etc that can be used in the teaching and learning of the concepts in Teaching and Assessing, measurement of shape and space and in calculus NTS 3j	
Guidance notes for SL/HoD should • Identify any aspect of the lesson that might be challenging for tutors in terms of			

		T	T	
	new learning and			
	which needs to be			
	considered prior			
	to taking tutors			
	through the lesson			
	activities " walk			
	through".			
	<u> </u>			
•	The resources			
	needed must be			
	identified:			
	literature – page			
	referenced etc, on			
	web, Utube,			
	physical resources,			
	power point; how			
	they should be used.			
	Consideration needs			
	to be given to local			
	availability			
•	This section can			
	build on the PD			
	needs identified			
	from the course			
	manuals			
3.	Teaching, learning	Teaching and learning	Teaching and learning	40 mins
			i reaching and realling	
.				40 1111113
	and assessment	activities	activities	40 1111115
	and assessment activities for the	activities	activities	40 1111113
	and assessment activities for the lesson	activities 3.1 Ask tutors to suggest	activities 3.1 Suggest teaching and	40 1111113
•	and assessment activities for the lesson Reading of	activities 3.1 Ask tutors to suggest teaching and learning	activities 3.1 Suggest teaching and learning activities for the	40 1111113
•	and assessment activities for the lesson Reading of teaching and	activities 3.1 Ask tutors to suggest teaching and learning activities for the lesson	activities 3.1 Suggest teaching and learning activities for the lesson taking into account	40 111115
•	and assessment activities for the lesson Reading of teaching and learning activities	activities 3.1 Ask tutors to suggest teaching and learning	activities 3.1 Suggest teaching and learning activities for the	40 111115
•	and assessment activities for the lesson Reading of teaching and learning activities and identification	activities 3.1 Ask tutors to suggest teaching and learning activities for the lesson	activities 3.1 Suggest teaching and learning activities for the lesson taking into account	40 111115
•	and assessment activities for the lesson Reading of teaching and learning activities	activities 3.1 Ask tutors to suggest teaching and learning activities for the lesson taking into account GESI	activities 3.1 Suggest teaching and learning activities for the lesson taking into account	40 111115
•	and assessment activities for the lesson Reading of teaching and learning activities and identification	activities 3.1 Ask tutors to suggest teaching and learning activities for the lesson taking into account GESI	activities 3.1 Suggest teaching and learning activities for the lesson taking into account	40 111115
•	and assessment activities for the lesson Reading of teaching and learning activities and identification of areas that	activities 3.1 Ask tutors to suggest teaching and learning activities for the lesson taking into account GESI issues.	activities 3.1 Suggest teaching and learning activities for the lesson taking into account	40 111115
•	and assessment activities for the lesson Reading of teaching and learning activities and identification of areas that require clarification	activities 3.1 Ask tutors to suggest teaching and learning activities for the lesson taking into account GESI issues.	activities 3.1 Suggest teaching and learning activities for the lesson taking into account	40 111115
•	and assessment activities for the lesson Reading of teaching and learning activities and identification of areas that require clarification Reading of	activities 3.1 Ask tutors to suggest teaching and learning activities for the lesson taking into account GESI issues. eg. i. Provision made for physically challenged	activities 3.1 Suggest teaching and learning activities for the lesson taking into account	40 1111113
•	and assessment activities for the lesson Reading of teaching and learning activities and identification of areas that require clarification Reading of assessment	activities 3.1 Ask tutors to suggest teaching and learning activities for the lesson taking into account GESI issues. eg. i. Provision made for physically challenged ii. Both genders take leading	activities 3.1 Suggest teaching and learning activities for the lesson taking into account	40 1111115
•	and assessment activities for the lesson Reading of teaching and learning activities and identification of areas that require clarification Reading of assessment opportunities and	activities 3.1 Ask tutors to suggest teaching and learning activities for the lesson taking into account GESI issues. eg. i. Provision made for physically challenged ii. Both genders take leading roles in group task	activities 3.1 Suggest teaching and learning activities for the lesson taking into account	40 1111115
•	and assessment activities for the lesson Reading of teaching and learning activities and identification of areas that require clarification Reading of assessment opportunities and ensuring they are	activities 3.1 Ask tutors to suggest teaching and learning activities for the lesson taking into account GESI issues. eg. i. Provision made for physically challenged ii. Both genders take leading roles in group task iii. Even distribution of	activities 3.1 Suggest teaching and learning activities for the lesson taking into account	40 1111115
•	and assessment activities for the lesson Reading of teaching and learning activities and identification of areas that require clarification Reading of assessment opportunities and ensuring they are aligned to the	activities 3.1 Ask tutors to suggest teaching and learning activities for the lesson taking into account GESI issues. eg. i. Provision made for physically challenged ii. Both genders take leading roles in group task iii. Even distribution of questions to different	activities 3.1 Suggest teaching and learning activities for the lesson taking into account	40 1111115
•	and assessment activities for the lesson Reading of teaching and learning activities and identification of areas that require clarification Reading of assessment opportunities and ensuring they are aligned to the NTEAP and	activities 3.1 Ask tutors to suggest teaching and learning activities for the lesson taking into account GESI issues. eg. i. Provision made for physically challenged ii. Both genders take leading roles in group task iii. Even distribution of questions to different categories of learners based on	activities 3.1 Suggest teaching and learning activities for the lesson taking into account	40 1111115
•	and assessment activities for the lesson Reading of teaching and learning activities and identification of areas that require clarification Reading of assessment opportunities and ensuring they are aligned to the NTEAP and required course	activities 3.1 Ask tutors to suggest teaching and learning activities for the lesson taking into account GESI issues. eg. i. Provision made for physically challenged ii. Both genders take leading roles in group task iii. Even distribution of questions to different categories of learners based on gender, ability, previous	activities 3.1 Suggest teaching and learning activities for the lesson taking into account	40 1111113
•	and assessment activities for the lesson Reading of teaching and learning activities and identification of areas that require clarification Reading of assessment opportunities and ensuring they are aligned to the NTEAP and required course assessment:	activities 3.1 Ask tutors to suggest teaching and learning activities for the lesson taking into account GESI issues. eg. i. Provision made for physically challenged ii. Both genders take leading roles in group task iii. Even distribution of questions to different categories of learners based on gender, ability, previous experience, etc	activities 3.1 Suggest teaching and learning activities for the lesson taking into account	40 1111113
•	and assessment activities for the lesson Reading of teaching and learning activities and identification of areas that require clarification Reading of assessment opportunities and ensuring they are aligned to the NTEAP and required course	activities 3.1 Ask tutors to suggest teaching and learning activities for the lesson taking into account GESI issues. eg. i. Provision made for physically challenged ii. Both genders take leading roles in group task iii. Even distribution of questions to different categories of learners based on gender, ability, previous experience, etc Draw tutors attention to'	activities 3.1 Suggest teaching and learning activities for the lesson taking into account	40 1111113
•	and assessment activities for the lesson Reading of teaching and learning activities and identification of areas that require clarification Reading of assessment opportunities and ensuring they are aligned to the NTEAP and required course assessment:	activities 3.1 Ask tutors to suggest teaching and learning activities for the lesson taking into account GESI issues. eg. i. Provision made for physically challenged ii. Both genders take leading roles in group task iii. Even distribution of questions to different categories of learners based on gender, ability, previous experience, etc	activities 3.1 Suggest teaching and learning activities for the lesson taking into account	40 1111113
•	and assessment activities for the lesson Reading of teaching and learning activities and identification of areas that require clarification Reading of assessment opportunities and ensuring they are aligned to the NTEAP and required course assessment: subject project	activities 3.1 Ask tutors to suggest teaching and learning activities for the lesson taking into account GESI issues. eg. i. Provision made for physically challenged ii. Both genders take leading roles in group task iii. Even distribution of questions to different categories of learners based on gender, ability, previous experience, etc Draw tutors attention to'	activities 3.1 Suggest teaching and learning activities for the lesson taking into account	40 mms
•	and assessment activities for the lesson Reading of teaching and learning activities and identification of areas that require clarification Reading of assessment opportunities and ensuring they are aligned to the NTEAP and required course assessment: subject project (30%), subject	activities 3.1 Ask tutors to suggest teaching and learning activities for the lesson taking into account GESI issues. eg. i. Provision made for physically challenged ii. Both genders take leading roles in group task iii. Even distribution of questions to different categories of learners based on gender, ability, previous experience, etc Draw tutors attention to'	activities 3.1 Suggest teaching and learning activities for the lesson taking into account	40 1111115
•	and assessment activities for the lesson Reading of teaching and learning activities and identification of areas that require clarification Reading of assessment opportunities and ensuring they are aligned to the NTEAP and required course assessment: subject project (30%), subject portfolio (30%)	activities 3.1 Ask tutors to suggest teaching and learning activities for the lesson taking into account GESI issues. eg. i. Provision made for physically challenged ii. Both genders take leading roles in group task iii. Even distribution of questions to different categories of learners based on gender, ability, previous experience, etc Draw tutors attention to' NTS 1a, b, c, d, 2b, e, f, 3b, c	activities 3.1 Suggest teaching and learning activities for the lesson taking into account GESI issues.	40 1111115

semester	
examination (40	ጋ%)

 Working through one or two activities, course manuals and identify areas that require clarification.

Strategies to clarify the otherwise dark spots may include investigation, internet search, etc.

3.3Lead tutors to brainstorm to come up with some pedagogical approaches and their related core competencies likely to be inculcated in students and for that matter Basic School learners. eg.

Strategy	Core Competency
Group Work	Collaborative
	learning
Investigation	Critical Thinking
Role Play	Communication

Role Play Communication

3.4 Ask tutors to discuss the assessment strategies to be used during teaching of

the lesson – 'Assessment

as' (Draw tutors attention

to NTS 3k). Take a sample

of responses

Assessment must be aligned to the NTEAP and required course. Continuous assessment activities (assignments, quizzes, group presentations, etc, should be used to create subject projects and build subject portfolios

- 3.5 Lead tutors to discuss the various ways they can support student teachers to build their project and subject portfolio for the semester.
- 3.6 Ask a tutor to model a presentation of an activity

manual and identify areas that require clarification.

3.3 Brainstorm to come up with some pedagogical approaches and their related core competencies likely to be inculcated in students and for that matter Basic School learners.

3.4 Discuss the assessment strategies to be used during teaching of the lesson – 'Assessment as' (take note of NTS 3k).

- 3.5 Discuss the various ways they can support student teachers to build their project and subject portfolios
- 3.6 Model a presentation of an activity using ICT tools

		using ICT tools and taking	and taking into	
		into consideration GESI	consideration GESI issues	
		issues (eg. Both genders	in the lessons; Teaching	
		taking the leading roles in	and Assessing and in	
		their groups and in the	Calculus. NTS 1a, b, 2b, e,	
		demonstration of the use	3b, c, J; BSC pp. iii)	
		of ICT tools) in the lesson		
		Teaching and Assessing		
		and in Calculus. NTS 1a, b,		
		2b, e, 3b, c, J; BSC pp. iii)		
		20, ε, ου, ο, ο, σου ρρ,		
	idance notes for			
SL	/HoD should			
•	Select activities,			
	linked to CLO and			
	indicators, from			
	the lesson that are			
	likely to be most			
	different from			
	tutors' previous			
	experience. These			
	could involve			
	applying new			
	content, e.g. from			
	section 2, or			
	approaches to			
	teaching, learning			
	and assessment,			
	incl. gender			
	responsive and			
	inclusive			
	approaches			
•	Identify how any			
	assessments			
	relate to course			
	assessment			
	components			
•	The selected			
	activities should			
	be done with			
	tutors in real or			
	close to real time			
•	Anticipate any			
	issues for			
	clarification or			
	questions which			
	•			
•	issues for clarification or			

				T
	tutors work			
	through the			
	activities and			
	provide guidance			
	on these			
•	Identify where,			
	and which, core			
	and transferable			
	skills, including			
	21 st skills and the			
	use of information			
	technology, are			
	being developed			
	or applied			
•	Makes links to the			
	existing PD			
	Themes with page			
	reference where			
	they can support			
	teaching, for			
	example: action			
	research,			
	questioning and to			
	other external			
	reference material			
•	Identify where			
	power point			
	presentations or			
	other resources			
	need to be			
	developed to			
	support learning			
	and provide			
	•			
	guidance			
•	Identify resources			
	required for any			
	TLMs and provide			
	guidance on			
	development of			
_	these	Deffective Control	Deffective and the	
4.	Evaluation and	Reflective Activity	Reflective Activity	5 mins
	review of session:	4.1Engage tutors in self-	4.1 Show by fingers/nods of 5	
•	identification of	evaluation as well as	or 3 or 1 as to those who	
	any outstanding	encourage tutors to	"really got it", "got some	
	issues relating to	provide feedback of the PD	of it" or "didn't get it"	
	this lesson for	session taking into	respectively. Explain if	
	clarification	consideration inclusivity –	you really got the lesson.	

- Advance preparation
- In the case of unresolved issues

how to be patient with stutterers, using tactile for visually challenged, paying attention to all courses, etc.

Ask tutors to show by fingers/nods their level odf satisfaction with the session. (NTS 1a, 3i).

4.2 Engage tutors to identify unresolved issues relating to this lesson for clarification

N/B: Take note of all unresolved issues and use any of following strategies

- put on SL/SWL WhatsApp platform for discussion
- tutors to research for the next PD session for discussion

Advance Preparation

Ask tutors to read Lesson 2 of the Course Manual on: Early Grade - Place value: (Teaching and Assessing) Upper Primary - Counting and Number Relationships

JHS; Teaching and Assessment

 Construction, Angles and Polygons: (Teaching and Assessing 2)

JHS Calculus - Limits and Continuity: Learning and applying

N/B

 Remind tutors to identify a critical friend from the same or related discipline to observe during teaching and provide feedback (NTS 1a). 4.2 Reflect on the activities in the session and outline unresolved issues relating to the lesson

Advance Preparation

Read Lesson 2 of the Course Manual on:

Early Grade - Place value: (Teaching and Assessing) Upper Primary - Counting and Number Relationships

JHS; Teaching and
Assessment - Construction,
Angles and Polygons:
(Teaching and Assessing 2)

JHS Calculus - Limits and Continuity: Learning and applying

N/B

Get a critical friend from the same or related discipline to observe your lesson during teaching and provide feedback (NTS 1a).

	II. Read the course manual,
	the PD session guide ahead
	of time to identify any
	outstanding issues relating
	to the lesson for
	clarification.
	III. Collect all inclusive
	resources (such as
	projector, flip chart and
	sticky notes) you need
	ahead of time, prepare
	samples of TLMs you may
	need and rehearse how
	these may be used to
	support the achievement of
	your goals
Course assessment in	The session above is exactly what is required. Of particular value is the
accordance with the	conclusion and evaluation section. Please apply relevant comments here
NTEAP: SWL need to	to the remainder of the lessons.
review assessment in	
the course manual to	
ensure it complies with NTEAP	
implementation and	
the 60% continuous	
assessment and 40 %	
End of semester	
examination. This	
means ensuring:	
subject project,	
subject portfolio	
preparation and	
1	
development are	
development are explicitly addressed	

in the PD sessions.

Age Phase:

- a. Early Grade
- b. Upper Grade
- c. JHS (CORE)
- d. JHS (SP)

Name of Courses:

- a. Teaching and Assessing Numeracy
- b. Teaching and Assessing mathematics for Upper Primary
- c. Teaching and Assessing JHS Mathematics
- d. Euclidean Geometry

Tutor PD Session for Lesson 2 in the Course Manual

Lesson Tittle:			
a. Early Grade - Place va	alue		
b. Upper Grade - Place	value		
c. JHS (CORE) - Construc	ction, Angles and Polygons		
d. JHS (SP) - Limits and	Continuity: Learning and applyin	g	
Focus: the bullet	Guidance notes on Leading	Guidance Notes on Tutor	Time in
points provide the	the session. What the	Activity during the PD Session.	session
frame for what is to	SL/HoDs will have to say	What PD Session participants	
be done. The	during each stage of the	(Tutors) will do during each	
guidance notes in	session	state of the session)	
italics identify the			
prompt the SL/HoD			
needs and each one			
must be addressed			
1. Introduction /	Introduction	Introduction	15 mins
lesson overview	1.1 Ice breaker activity: Begin	1.1 Engage in an investigational	
Reflection on	with an investigational	activity (e.g. In 27,342	
previous PD	activity (e.g. Play "Tell my	which digit is at the	
Session	digit". Mention a number	"thousands" place?)	
(Introduction to	(say 27,342) and let	,	
the course	tutors tell the digit that		
manual)	goes with a particular		
 Introduction and 	place mentioned)		
overview of the	productive states and		
main purpose of	1.2 Ask tutors to tell how	1.2 Explain how useful the	
the lesson in the	useful the week one PD	week one PD session	
course manual.	session (NTS 1b)	influenced your teaching	
 Highlight cross 	influenced their teaching	over the week and how	
cutting themes	over the week and how	students were well placed	
i.e., gender	students were well	to employ the various	
equality and social	placed to employ the	concepts during the Basic	
inclusion (GESI),	various concepts during	School classroom work.	
ICT	the Basic School		
Identification of	classroom work.		
important or	Classicotti work.		
distinctive aspects	1.3 Ask a critical friend to	1.3 As a critical friend, share	
of the lesson	give feedback on	with members feedback on	
Reading and	observation during the	observation during the	
discussion of the	_	teaching of:	
discussion of the	enactment of lesson 1 on:	ccucining on	

introductory sections up to learning outcomes

- a. Early Grade Counting,
 Patterns and Relationships
 b. Upper Grade Counting,
 Patterns and Relationships
 c. JHS (CORE) Measurement, Shape and
 Space
 d. JHS (SP) Limits and
 Continuity: Learning and
 applying
 N/B: Draw tutors' attention
 to all NTS references.
- 1.4 Lead tutors to discuss any challenges that arose during the enactment. Eg In what ways did the students appreciate the need to consider equality and equity during the lesson and during STS activities?
- 1.5 Ask tutors to read the course manual and identify the purpose and learning outcomes of the lesson for the day. Ask members to state their expectations of the PD Session on lesson2. NTS 2b.
- 1.6 Lead tutors to outline the important features of lesson 2 in the course manual taking note of cross cutting themes (including developing awareness of equity and diversity issues and issues on ICT).
- 1.7 Ask tutors to silently read the introductory sections (up to learning outcomes) and discuss the important

a. Early Grade - Place value
b. Upper Grade - Place value
c. JHS (CORE) - Construction,
Angles and Polygons
d. JHS (SP) - Limits and
Continuity: Learning and
applying
N/B: Take note of all NTS

references.

- 1.4 Discuss any challenges that arose during the enactment. Eg In what ways did the students appreciate the need to consider equality and equity during the lesson and during STS activities?
- 1.5 Read the course manual and identify the purpose of the lesson (NTS 2b) and state your expectations of the PD Session.
- 1.6 Identify the important features of lesson 2 in the course manual taking note of cross cutting themes (including developing awareness of equity and diversity issues and issues on ICT).
- 1.7 Read the introductory sections (up to learning outcomes) silently and in pairs/groups discuss the

	or distinctive aspects of	important or distinctive	
	the lesson (i.e. the	aspects of the lesson (i.e.	
	interactive nature of the	the interactive nature of	
	activities, emphasis on	the activities, emphasis on	
	curriculum, how an	curriculum, how an	
	understanding of	understanding of	
	mathematics develops,	mathematics develops,	
	effective use of	effective use of	
	constructing geometrical	constructing geometrical	
	shapes and exploring the	shapes and exploring the	
	meanings of limits and	meanings of limits and	
	continuity as used in	continuity as used in	
	everyday situation and in	everyday situation and in	
	calculus)	calculus)	
	Refer to course manual,	Refer to course manual,	
	lesson 2	Lesson 2	
	1033011 2	LC33011 Z	
The guidance notes			
for SL/HoD need to			
Provide short			
overview of the			
lesson			
Identify important			
or distinctive			
features of the			
lesson			
• Identify			
assessment,			
aligned to NTEAP			
• Anticipate			
questions which			
might arise from			
the introduction to			
the lesson and			
provide responses			
for SL/HoD.			
 Issues that 			
prompted			
questions or			
discussion during			
curriculum and			
course writing			
may well also be			
issues for SL/HoD			

- 2. Concept
 Development
 (New learning
 likely to arise in
 this lesson):
- Identification and discussion of concepts
- Identification of possible challenging areas in teaching of the concept. This may include GESI and ICT related concepts
- Identification of needed GESI responsive and ICT resources for the teaching and learning of the concept.

Concept Development

- 2.1 Lead tutors to identify familiar and unfamiliar concepts in the lesson and discuss with the larger group.
- 2.2 Lead tutors to draw relevant connections among concepts in the lesson with other lessons. Example;
- i. Dealing with operations on numbers up to 10,000,000. (B.ED course manual and BSC content standard **B3.1.1.1.**; **B5.1.1.1**; **B6.1.1.1**)
- ii. place value (BSC content standard **B4.1.4.1**)
- iii. Constructing lines and angles
- iv. Limits and Continuity
- 2.3 Ask tutors to outline possible challenging areas in teaching and learning i Place value, ii Construction, Angles and Polygons, iii Limits and Continuity
 - as pertain to B.ED class and at the Basic School classroom. Take into consideration GESI related issues (eg. Make provision for tutors as well as students with a challenge of using the hand to explain process instead of to constructing).
- 2.4 Lead tutors to discuss misconceptions and barriers in teaching and learning of the lesson. Example:

Concept Development

- 2.1 Identify familiar and unfamiliar concepts in the lesson and discuss with the larger group.
- 2.2 Draw relevant connections among concepts in the lesson with other lessons and the use of relevant resources.

2.3 Outline possible challenging areas in teaching and learning Place value, Construction, Angles and Polygons, Limits and Continuity as pertain to B.ED class and at the Basic School classroom. Take into consideration GESI related issues

2.4 Explore potential misconceptions of teaching and learning "place value", "construction of angles and polygons", and "limits and continuity".

25 mins

a. Early Grade – the place of a digit in a numeral is the same as its value.
b. Upper Grade – the only way to operate on multi digits is to arrange vertically c. JHS (CORE) – an angle is just a figure(shape) d. JHS (Calculus) – the limit is equal to the function value at a point.

N/B: Refer tutors to the lesson 2 of the course manual for other potential misconceptions and barriers. **Barriers:** Non availability of appropriate: inclusive resource, Technology, Pre-requisite knowledge

- 2.5 Ask tutors to suggest creative approaches for addressing the identified challenges.
- Eg. Using group work, problem solving, internet search, the principle of multiple embodiment.
- 2.6 Support tutors to identify **GESI** responsive resources such as supporting staff for sign language, projectors, flip charts, sticky notes, tactile that can be used in the teaching and learning of the concepts mentioned above. Other materials include curriculum materials (teachers and learners resource packs, textbooks, course manual, prism and pyramids, etc.) Draw tutors attention to NTS 3j

2.5 Suggest creative approaches for addressing the identified challenges.

2.6 Identify GESI responsive resources in the environment and at the Basic school that will support achieving the learning outcomes of the lesson.

Guidance notes for SL/HoD should Identify any aspect of the lesson that might be challenging for tutors in terms of new learning and which needs to be considered prior to taking tutors through the lesson activities " walk through". The resources needed must be identified: literature – page		
 Identify any aspect of the lesson that might be challenging for tutors in terms of new learning and which needs to be considered prior to taking tutors through the lesson activities " walk through". The resources needed must be identified: 		
referenced etc, on web, Utube, physical resources, power point; how they should be used. Consideration needs to be given to local availability This section can build on the PD		
needs identified from the course		
manuals		
	Teaching, learning and	40 mins
	assessment activities for the	
activities for the lesson.	lesson	
lesson		
 Reading of teaching and learning activities and identification of areas that require clarification especially GESI related activities. Reading of teaching and learning activities useful for achieving the learning outcomes of the lesson taking into account GESI (eg. Both gender taking the leading roles in group work, even distribution of questions, provision made for seating of physically challenged) 	3.1 Suggest teaching and learning activities useful for achieving the learning outcomes of the lesson taking into account GESI issues. Read the activities in the course manual lesson 2 and identify those that require clarification (Take note of NTS 1a, b, c, d, 2b, e, f, 3b, c; BSC p. iii).	

of GESI and ICT issues that require clarification.

- the activities outlined in the course manual (Refwriting the weekly PD session-pp 3., Draw tutors attention to NTS 1a, b, c, d, 2b, e, f, 3b, c; BSC p. iii)
- 3.2 Ask tutors to read the activities outlined in the course manual and identify areas that require clarification.

N/B: Strategies to clarify the otherwise dark spots may include investigation, internet search, etc.

3.3 Lead tutors to brainstorm

- to come up with some pedagogical approaches and their related core competencies likely to be inculcated in students and for that matter basic school learners. Example: Group Work -Collaborative learning Investigation - Critical Thinking Role Play -Communication Students can ascertain the extent to which
- 3.4 Ask tutors to discuss the assessment strategies to be used during teaching of the lesson 'Assessment as' (Draw tutors' attention to NTS 3k) and group work presentation. Take a

methods are used during STS activities in schools.

3.2 Read the activities outlined in the course manual and identify areas that require clarification.

3.3 Brainstorm to come up with some pedagogical approaches and their likely related core competencies to be inculcated in students and for that matter basic school learners.

3.4 Discuss the assessment strategies to be used during enactment of the lesson referring to the NTEAP at the various levels (KG, UP, JHS) – 'Assessment as' (Take note

sample feedback for each course.

N/B: Assessment must be aligned to the NTEAP and required course. Continuous assessment activities (assignments, quizzes, group presentations, etc, should be used to create subject projects and build subject portfolios

of NTS 3k) and group work presentation.

- 3.5 Ask tutors to read and identify the assessment components of the lesson in the course manual focusing on Assessment of, as and for to reflect the demands of the NTEAP
- 3.5 Read and identify the assessment components of the lesson in the course manual focusing on Assessment of, as and for to reflect the demands of the NTEAP.
- 3.6 Lead tutors to discuss the various ways they can support student teachers to build their portfolios before, during and after lessons.
- 3.6 Discuss the various ways they can support student teachers to build their portfolios before/during/after lessons.
- 3.7 Ask a tutor to model a presentation of an activity using ICT tools and taking into consideration GESI issues (eg. Both genders taking the leading roles in their groups and in the demonstration of the use of ICT tools) in the B. ED and the Basic School Curricula (BSC). NTS 1a, b, c, d, 2b, e, 3b, c, J; BSC pp. iii)
- 3.7 Model a presentation of an activity using ICT tools and taking into consideration GESI issues in the B. ED and the Basic School Curricula (BSC). NTS 1a, b, c, d, 2b, e, 3b, c, J; BSC pp. iii)

NOTE:

 Tutors are likely to ask about the relevance of this activity in teaching

		1		
			mathematics lessons.	
			When this comes up,	
			refer them to the PD	
			Theme 1, that is,	
			Creative Approaches	
		ii.	The core and	
		".	transferable skills being	
			developed or used	
			include social skills,	
			communication skills,	
			critical and creative	
			thinking skills	
		iii.	Creative Activities,	
			Questioning, Talk and	
			Learn and Group Work	
			can be used to support	
			the delivery of this	
			session	
G	idance notes for		35331011	
3L,	/HoD should			
•	Select activities,			
	linked to CLO and			
	indicators, from			
	the lesson that are			
	likely to be most			
	different from			
	tutors' previous			
	experience. These			
	could involve			
	applying new			
	content, e.g. from			
	section 2, or			
	approaches to			
	teaching, learning			
	and assessment,			
	•			
	incl. gender			
	responsive and			
	inclusive			
	approaches			
•	Identify how any			
	assessments			
	relate to course			
	assessment			
	components			
•	The selected			
	activities should			
	be done with			
	DE UUITE WILII			

	tutors in real or	
	close to real time	
•	Anticipate any	
	issues for	
	clarification or	
	questions which	
	might arise as the	
	tutors work	
	through the	
	activities and	
	provide guidance	
	on these	
•	Identify where,	
	and which, core	
	and transferable	
	skills, including	
	21 st skills and the	
	use of information	
	technology, are	
	being developed	
	or applied	
•	Makes links to the	
	existing PD	
	Themes with page	
	reference where	
	they can support	
	teaching, for	
	example: action	
	research,	
	questioning and to	
	other external	
	reference material	
•	Identify where	
	power point	
	presentations or	
	other resources	
	need to be	
	developed to	
	support learning	
	and provide	
	guidance	
•	Identify resources	
	required for any	
	TLMs and provide	
	guidance on	
	development of	
	these	
		1

4. Evaluation and review of session:

- identification of any outstanding issues relating to this lesson for clarification
- Advance preparation In the case of unresolved issues

Evaluation and review of session:

- 4.1 Engage tutors in selfevaluation encouraging them to provide feedback of the PD session taking into consideration being patient with stutterers, using tactile for visually challenged, allowing tutors to show by fingers/nods. (NTS 1a, 3i).
- 4.2 Engage tutors to reflect on activities and identify unresolved issues relating to this lesson for clarification

Take note of all unresolved issues and use any of following strategies

- put on SL/SWL WhatsApp platform for discussion
- tutors to research for the next PD session for discussion

Advance Preparation

4.3 Ask tutors to read Lesson 3 of the Course Manual on:

Early Grade - Fraction concepts: Teaching and Assessing

Upper Primary - Fraction concepts: Teaching and Assessing)

JHS; Teaching and
Assessment - Fraction
concepts: Teaching and
Assessing

JHS Calculus - Derivatives
1: Learning and applying
Calculus

Evaluation and review of session:

- 4.1 Show by fingers/nods of 5 or 3 or 1 as to those who "really got it", "got some of it" or "didn't get it" respectively. Explain if you really understood the lesson.
- 4.2 Reflect on the activities in the session and outline unresolved issues relating to the lesson

Advance Preparation

4.3 Read Lesson 3 of the Course Manual on:
Early Grade - Fraction

concepts: Teaching and

Assessing

Upper Primary - Fraction concepts: Teaching and Assessing)

JHS; Teaching and
Assessment - Fraction
concepts: Teaching and
Assessing

JHS Calculus - Derivatives 1: Learning and applying Calculus 15 mins

	N/B	N/B
	IV. Remind tutors to identify	Get a critical friend from the
	a critical friend from the	same or related discipline to
	same or related discipline	observe your lesson during
	to observe during	teaching and provide feedback
	teaching and provide	(NTS 1a).
	feedback (NTS 1a).	
	v. Read the course manual,	
	the PD session guide	
	ahead of time to identify	
	any outstanding issues	
	relating to the lesson for	
	clarification.	
	vı. Collect all inclusive	
	resources (such as	
	projector, flip chart and	
	sticky notes) you need	
	ahead of time, prepare	
	samples of TLMs you may	
	need and rehearse how	
	these may be used to	
	support the achievement	
	of your goals	
Course assessment in		
accordance with the		
NTEAP: SWL need to		
review assessment in		
the course manual to		
ensure it complies		
with NTEAP		
implementation and		
the 60% continuous		
assessment and 40 %		
End of semester		
examination. This		
means ensuring :		
subject project,		
subject portfolio		
preparation and development are		
explicitly addressed		
in the PD sessions.		
in the PD sessions.		

Age Phase/s:

- a. Early Grade
- b. Upper Grade
- c. JHS (Core)
- d. JHS (Maths Sp)

Name of Subject/s: Mathematics:

- a. Teaching and Assessing
- b. Mathematics: Teaching and Assessing
- c. Teaching and Assessing JHS
- d. Mathematics Calculus

Tutor PD Session for Lesson 3 in the Course Manual

Lesson of Title:				
a. Early Grade: Fraction Concepts				
• •	and the state of t			
•	c. JHS (Core) : Fraction Concepts			
d. JHS (Maths Sp): Learn	d. JHS (Maths Sp): Learning and Applying Derivatives 1			
Focus: the bullet points Guidance notes on Leading Guidance Notes on Tutor			Time in	
provide the frame for	the session. What the	Activity during the PD	session	
what is to be done. The	SL/HoDs will have to say	Session.		
guidance notes in	during each stage of the	What PD Session participants		
italics identify the	session	(Tutors) will do during each		
prompt the SL/HoD		state of the session)		
needs and each one				
must be addressed				
1. Introduction	Introduction	Introduction		
1. Introduction	1.1 Ice breaker activity:	1.1 Participate in the starter		
	Begin with an	(an investigational		
	investigational activity	activity) on continuing		
	on continuing patterns	patterns (e.g. continue		
	of numbers (e.g.	the:		
	continue the:			
		i. $\frac{1}{10} \frac{1}{100}$, $\frac{1}{1000}$, $\frac{1}{10000}$		
	i. $\frac{1}{10} \frac{1}{100}$, $\frac{1}{1000}$, $\frac{1}{10000}$,	ii. $\frac{3}{10}$, $\frac{5}{10}$, $\frac{7}{10}$, $\frac{9}{10}$,)		
	ii. $\frac{3}{10}$, $\frac{5}{10}$, $\frac{7}{10}$, $\frac{9}{10}$,)	10 10 10 10		
	10 10 10 10			
Reflection on	1.2 Ask tutors tell how	1.2 Explain how useful the		
previous PD Session	useful the PD session 2	previous PD session		
(Introduction to the	was and how it	influenced your teaching		
course manual/s)	influenced their teaching	over the week.		
	in semester one. (NTS	N/B: Pay attention to all NTS		
	1b)	references.		
	Note: Draw tutors'	Terer emees.		
	attention to all referenced			
	NTSs			
	1.2 Aple a puitical fairmal to	1.3 As the critical friend,		
	1.3 Ask a critical friend to	share with members		
	give feedback on his/her	feedback on your		
	observation of the last	observation of the last		
	enacted lesson.	enacted lesson.		
		enacieu iesson.		

- Introduction and overview of the main purpose of the lesson in the course manual/s
- Highlight cross cutting themes i.e., gender equality and social inclusion (GESI), ICT
- Identification of important or distinctive aspects of the lesson
- Reading and discussion of the introductory sections up to learning outcomes

- 1.2 Engage tutors through questioning to suggest the purpose of the lesson (NTS 2b) and state their expectations of the PD Session.
- 1.3 Lead tutors to outline the important features in the course manual and also create awareness of cross cutting and GESI issues (NTS 3j, 3k)
- 1.4 Ask tutors in pairs discuss to the important or distinctive aspects of the lesson including vocabulary and fundamental concepts related to the components of the front matters.
- 1.5 Ask tutors to read the introductory sections (up to learning outcomes) silently. Let tutors in pairs discuss the important or distinctive aspects of the lesson (i.e., the interactive nature of the activities, emphasis
- a. Early Grade: Fraction Concepts
- b. Upper Grade: Fraction Concepts
- c. JHS (Core): Fraction Concepts
- d. JHS (Maths Sp): Learning and Applying Derivatives1

- 1.2 Discuss and explain the purpose of the lesson NTS 2b) in the course manual and state your expectations of the PD session.
- 1.3 Outline the important features in the course manual taken into consideration cross cutting and GESI issues.
- 1.4 In pairs discuss the distinctive aspects of the lesson including vocabulary and fundamental concepts related to the components of the front matters.
- 1.5 Read the introductory sections (up to learning outcomes) silently. Let tutors in pairs discuss the important or distinctive aspects of the lesson (i.e., the interactive nature of the activities)

Refer to Course Manual lesson 3

•

2	Concont	NB EXPECTED QUESTION • Why is it important to identify fraction? • Why is $\frac{a}{0}$ not an expression of fraction? Answers?	Concent Dayalanment	25 mins
3.	Concept Dovolonment (Now	Concept Development	Concept Development	25 mins
•	Development (New learning likely to arise in this lesson): Identification and discussion of concepts	2.1 Lead tutors to identify familiar and unfamiliar concepts in the lesson and discuss relevant connections among concepts in the lesson with other lessons and the use of relevant resources.	2.1 Identify familiar and unfamiliar concepts in the lesson and discuss relevant connections among concepts in the lesson with other lessons and the use of relevant resources.	
•	Identification of possible challenging areas in teaching of the concept. This may include GESI and ICT related concepts.	2.2 Engage tutors to identify and discuss various strategies for the development of conceptual understanding of the lesson. Vocabulary and fundamental concepts related to fraction in EGE, fraction in UP, Fraction in JHS course and Derivatives in JHS course. Example: Interactive, Internet search, Model lessons, Exploratory (Let tutors refer to lesson 3 of the course manual for additional strategies.) Refer to Course Manual, lesson 3	2.2 Participate in the identification and discussion and discuss various strategies for the development of conceptual understanding of the lesson. Refer to Course Manual, lesson 3.	
•	Identification of some misconception and barriers in teaching	2.3 Ask tutors to outline possible challenging areas in fraction and derivatives in Calculus taking into consideration GESI.	2.3 Outline possible challenging areas in fraction and derivatives in calculus taking into consideration GESI and	

and learning the
concept.

- Identification of needed GESI responsive and ICT resources for the teaching and learning of the concept.
- Lead tutors how ICT can be applicable in the concept.
- 2.4 Lead tutors to discuss misconceptions and barriers in teaching and learning of the concepts.
- 2.5 Support tutors to identify GESI responsive resources such as supporting staff for sign language, projectors, flip charts, sticky notes, tactile that can be used in the teaching and learning of the concepts mentioned above (e.g. curriculum materials (teachers and leaners resource packs, textbooks, course manual, prism and pyramids, etc.) NTS 3j.
- 2.6 Engage Tutors on how the concepts (e.g. fraction) are used both in school mathematics and life outside the mathematics classroom.
- 2.7 Ask tutors to outline possible challenging areas in the teaching and learning of these concepts fraction and derivatives.

N/B

 For instance, fraction expressed as group whole or as a unit whole.

- ICT application in the concept.
- 2.4 Participate in the discussion on misconceptions and barriers in teaching and learning of the concepts.
- 2.5 Identify as many GESI responsive resources as possible that can be used in the teaching and learning of the concepts in teaching and assessing, measurement of shape and space and in calculus NTS 3j.

- 2.6 Discuss how fraction and derivatives concepts are used both in school mathematics and life outside the mathematics classroom.
- 2.7 Outline possible challenging areas in the teaching and learning of fraction and derivatives

		a Alco undoneteradio a		
		Also understanding		
		limit as a substitution in		
		derivatives		
Gı	iidance notes for			
SL	/HoD should			
•	Identify any aspect			
	of the lesson that			
	might be			
	challenging for			
	tutors in terms of			
	new learning and			
	which needs to be			
	considered prior to			
	taking tutors			
	through the lesson			
	activities "walk			
	through".			
	The resources			
•	needed must be			
	identified: literature			
	– page referenced			
	etc, on web, Utube,			
	physical resources,			
	power point; how			
	they should be used.			
	Consideration needs			
	to be given to local			
	availability			
•	This section can			
	build on the PD			
	needs identified			
	from the course			
	manuals			
3.	Teaching, learning	Teaching and learning	Teaching and learning	40 mins
	and assessment	activities	activities	
	activities for the			
	lesson	3.1 Ask tutors to suggest	3.1 Suggest teaching and	
•	Reading of teaching	teaching and learning	learning activities for the	
	and learning	activities for the lesson	lesson taking into	
	activities and	taking into account GESI	account GESI issues and	
	identification of	issues and demonstrate	demonstrate	
	areas that require	how the LO's of the	achievement of LO's in	
	clarification	curriculum can be	the curriculum	
		achieved.		
		eg.		
		i. Provision made for		
		physically challenged		

ii. Both genders take
leading roles in group task
iii. Even distribution of
questions
Ref: Writing the weekly PD
session-pp, NTS 1a, b, c, d,
2b, e, f, 3b, c

- 3.2 Ask tutors to read the activities outlined in the course manual and identify areas that require clarification.

 Strategies to clarify the otherwise dark spots may include investigation, internet search, etc.
- 3.3 Lead tutors to brainstorm to come up with some pedagogical approaches and their related core competencies likely to be inculcated in students and for that matter basic school learners. eg.

Strategy	Core
	Competency
Group Work	Collaborative
	learning
Investigation	Critical Thinking
Role Play	Communication

 Working through one or two activities,

Reading of assessment

opportunities and ensuring they are aligned to the

NTEAP and required course assessment: subject project (30%), subject

portfolio (30%) and

examination (40%)

end of semester

3.4 Ask tutors to discuss the assessment strategies to be used during teaching of the lesson – 'Assessment as' (NTS 3k). Encourage tutors to discuss the mode of Assessment (working in group or individual by presentation, exercises, etc)

3.2 Read the activities outlined in the course manual and identify areas that require clarification.

3.3 Brainstorm to come up with some pedagogical approaches and their related core competencies likely to be inculcated in students and for that matter basic school learners.

3.4 Ask tutors to discuss the assessment strategies to be used during teaching of the lesson – 'Assessment as' (NTS 3k). Discuss the mode of Assessment (working in group or individual by presentation, exercise, etc)

Assessment must be
aligned to the NTEAP and
required course Assessment

- 3.5 Lead tutors to discuss the various ways they can support student teachers to build their portfolio.
- 3.6 Ask a tutor to model a presentation of an activity using ICT tools and taking into consideration GESI issues (eg. Both genders taking the leading roles in their groups and in the demonstration of the use of ICT tools) in the lesson **Teaching and Assessing of Fraction Concept and Learning** and Applying Derivatives 1. NTS 1a, b, 2b, e, 3b, c, J; BSC pp. iii)
- 3.7 Students can ascertain the extent to which pedagogy is used during STS activities in schools.
- 3.8 Engage tutors in a discussion of inclusive strategies to clarify the otherwise dark spots (e.g. using Selection model for fraction problems and principle of multiple embodiment etc.)
- 3.9 Engage tutors in pairs to discuss strategies to strengthen core competencies (e.g.

- 3.5 Lead tutors to discuss the various ways they can support student teachers to build their portfolio.
- 3.6 Model a presentation of an activity using ICT tools and taking into consideration GESI issues in the lessons; Teaching and Assessing and Learning and Applying Derivatives 1. NTS 1a, b, 2b, e, 3b, c, J; BSC pp. iii)

- 3.7 Students can ascertain the extent to which pedagogy is used during STS activities in schools.
- 3.8 Engage tutors in a discussion of inclusive strategies to clarify the otherwise dark spots (e.g. using Selection model for fraction problems and principle of multiple embodiment etc.)
- 3.9 Engage tutors in pairs to discuss strategies to strengthen core competencies (e.g. mind-

	mind- reading word	reading word puzzle,	
	puzzle, investigation,	investigation, etc.).	
	etc.).		
	NB		
	Tutors are likely to ask		
	about the relevance of this		
	activity in teaching		
	mathematics lessons. When		
	this comes up, refer them to		
	PD Manuals:		
	i. that is, Creative		
	Approaches		
	ii. the core and transferable		
	skills being developed or		
	used include social skills,		
	communication skills,		
	critical and creative		
	thinking skills		
	iii. creative Activities,		
	Questioning, Talk and Learn		
	and Group Work can be		
	I -		
	used to support the delivery		
Cuidanas natas fan	of this session.		
Guidance notes for			
SL/HoD should			
Select activities,			
linked to CLO and			
indicators, from the			
lesson that are likely			
to be most different			
from tutors'			
previous experience.			
These could involve			
applying new			
content, e.g. from			
section 2, or			
approaches to			
teaching, learning			
and assessment,			
incl. gender			
responsive and			
inclusive			
approaches			
 Identify how any 			
assessments relate			
to course			
L	1		

	assessment		
	components		
•	The selected		
	activities should be		
	done with tutors in		
	real or close to real		
	time		
•	Anticipate any		
	issues for		
	clarification or		
	questions which		
	might arise as the		
	tutors work through		
	the activities and		
	provide guidance on		
	these		
•	Identify where, and		
	which, core and		
	transferable skills,		
	including 21st skills		
	and the use of		
	information		
	technology, are		
	being developed or		
	applied		
•	Makes links to the		
	existing PD Themes		
	with page reference		
	where they can		
	support teaching,		
	for example: action		
	research,		
	questioning and to		
	other external		
	reference material		
•	Identify where		
	power point		
	presentations or		
	other resources		
	need to be		
	developed to		
	support learning		
	and provide		
	guidance		
•	Identify resources		
	required for any		
	TLMs and provide		

guidance on			
development of these			
4. Evaluation and Review of session:	Reflective Activity	Reflective Activity	5 mins
• identification of any outstanding issues relating to this lesson for clarification	4.1 Engage tutors in self- evaluation as well as encourage tutors to provide feedback of the PD session taking into consideration inclusivity (NTS 1a, 3i). Engage tutors to identify unresolved issues relating to this lesson for clarification.	4.1 Show by fingers/nods of 5 or 3 or 1 as to those who "really got it", "got some of it" or "didn't get it" respectively. Explain if you really got the lesson.	
	4.2 Ask tutors in pair mention how GESI issues was used in the lesson	4.2 Reflect on the activities in the session and outline unresolved issues relating to the lesson.	
	4.3 Lead tutors to discuss the strategies required to resolve the unresolve issues identified.	4.3 In pair mention how GESI issues was used in the lesson	
• Advance Preparation	NB Take note of all unresolved issues and use any of following strategies put on SL/SWL WhatsApp, Telegram platform for discussion tutors to research for the next PD session for discussion	Discuss the strategies you will use to resolve the unresolved issues	
	Advance Preparation 4.5 Ask tutors to read Lesson 4 of the Course Manual on: Early Grade - Teaching and Assessing operations on Fractions	Advance Preparation 4.4 Read Lesson 4 of the Course Manual on: Early Grade - Teaching and Assessing operations on Fractions	

• In the case of unresolved issues	Upper Primary - Teaching and Assessing operations on Fractions JHS - Teaching and Assessing operations on Fractions JHS Calculus – Learning and Applying Derivatives 2	Upper Primary - Teaching and Assessing operations on Fractions JHS - Teaching and Assessing operations on Fractions JHS Calculus - Learning and Applying Derivatives 2	
	N/B VII. Remind tutors to identify a critical friend from the same or related discipline to observe during teaching and provide feedback (NTS 1a). VIII. Read the course manual, the PD session guide ahead of time to identify any outstanding issues relating to this lesson for clarification. IX. Collect all resources (such as projector, flip chart and sticky notes) you need ahead of time, prepare samples of TLMs you may need and rehearse how these may be used to support the achievement of your goals	N/B Get a critical friend from the same or related discipline to observe your lesson during teaching and provide feedback (NTS 1a).	
Course assessment in accordance with the NTEAP: SWL need to			
review assessment in the course manual to ensure it complies with			
NTEAP implementation and the 60%			
continuous assessment and 40 % End of semester examination.			

This means ensuring:	
subject project, subject	
portfolio preparation	
and development are	
explicitly addressed in	
the PD sessions	

Age Phase/s:

a. Early Grade

b. Upper Grade

c. JHS (Core)

d. JHS (Maths Sp)

Name of Subject/s:

a. Mathematics: Teaching and Assessing

b. Mathematics: Teaching and Assessing

c. Teaching and Assessing JHS

d. Mathematics – Calculus

Tutor PD Session for Lesson 4 in the Course Manual

	Tutor PD Session for Lesson 4 in the Course Manual			
Le	sson Title:			
a.	a. Early Grade: Operations on fractions			
b.	b. Upper Grade: Operations on fractions			
c.	c. JHS (Core): Operations on fractions			
d.	JHS (Maths Sp): Deriv	ratives 2: Learning and applying		
Fo	cus: the bullet	Guidance notes on Leading	Guidance Notes on Tutor	Time in
ро	ints provide the	the session. What the	Activity during the PD	session
fra	me for what is to be	SL/HoDs will have to say	Session.	
do	ne. The guidance	during each stage of the	What PD Session participants	
no	tes in italics identify	session	(Tutors) will do during each	
	e prompt the		state of the session)	
	/HoD needs and		,	
_	ch one must be			
ad	dressed			
1.	Introduction /	Introduction	Introduction	
	lesson overview	1.1 Ice breaker activity: Begin	1.1 Engage tutors in an	
•	Overview of	with an investigational	investigational activity	
	subject/s age	activity according to the	according to the subjects	
	phase/s to be	subjects and age phases	and age phases	
	covered in this PD	(e.g. early grade:	(e.g. early grade:	
	session and how it	arithmetic operation on	arithmetic operation on	
	will be organised.	fractions, $\frac{1}{3} + \frac{2}{3}, \frac{1}{5} + \frac{2}{5}$,	fractions, $\frac{1}{3} + \frac{2}{3}, \frac{1}{5} + \frac{2}{5}$,	
	Including guidance	1 2		
	on grouping tutors	$\frac{1}{7} + \frac{2}{7}$,	$\frac{1}{7} + \frac{2}{7} \dots$	
	according to the	Calculus: the rate of	Calculus: the rate of	
	subject/s, age	change of slope when	change of slope when	
	phase/s.	climbing or descending a	climbing a mountain ,	
•	Reflection on	mountain , rate of change	rate of change of the	
	previous PD Session	of the heartbeat when	heartbeat when	
	(Introduction to the	walking)	Walking)	
	course manual/s)			
•	Introduction and	1.2 Expose tutors to the	1.2 Participate in the	
	overview of the	overview of the subject	discussion on the	
	main purpose of	age phases to be covered	overview of the subject	
	the lesson in the	in this PD session and	age phases to be covered	
	course manual/s	how it will be organised.	in this PD session and	
	Identification of		how it will be organised.	
	important or	i. Early and upper grade and	N/B: Pay attention to all	
	πηροιταπτ οι	JHS (Core) lessons focus on	NTS references.	
		developing an		

- distinctive aspects of the lesson/s
- Reading and discussion of the introductory sections up to learning outcomes

understanding of operations on fractions: (Teaching and Assessment) with respect to operations on fraction within the basic school curriculum.

ii.JHS (Maths Sp) considers

The lesson seeks to develop student teachers' concepts and assessment strategies based on differentiation. The areas to be covered include transcendental function, Implicit functions and special attention will be given to continuity of polynomial and rational functions.

N/B: Draw tutors' attention to all NTS references.

- 1.3 Ask a critical friend to give feedback on observation during the enactment of lesson 3.
- 1.4 Ask tutors to suggest the purpose of the lesson and state their expectations of the PD Session.
- 1.5 Ask tutors to read the overview of the various courses (of the various phases named above) and discuss the course learning outcomes (CLOs) in groups as appropriate
- 1.6 Guide tutors to establish the linkage between CLOs and the LOs of the lesson
- 1.7 Aks tutors in pairs to discuss the important or

- 1.3 As a critical friend, share with members feedback on observation during the teaching of lesson 3.
- 1.4 Engage tutors to suggest the purpose of the lesson and state your expectations of the PD Session.
- 1.5 Read the overview of the various courses (of the various phases named above) and discuss the course learning outcomes (CLOs) in groups as appropriate
- 1.6 Participate in the identification of the CLOs and link them to the LOs of the lesson
- 1.7 In pairs, discuss the distinctive aspects of the

distinctive aspects of the lesson including vocabulary and fundamental concepts related to the components of the front matters.

matters.

Distinctive aspects include the interactive nature of the activities, emphasis on connecting concepts and assessment strategies:

a. Early Grade—eg.
operations on fractions and the efficient use of TLMs with an appropriate form of

assessment.

b. Upper Grade – eg. the use of ICT and TLMs in the operations on fractions.

c. JHS (core) – eg. the use of

ICT and TLMs in the operations on fractions.
d. JHS(Calculus) – eg. application of calculus in real

life situations

1.8 Ask tutors to read and discuss the introductory sections of the lesson (up to Learning Outcomes). and suggest the relevant students' previous knowledge that can support the teaching and learning of the lesson.

N/B

Be ready for likely questions from tutors for clarification.

Anticipated questions:

- iv. How can an assessment strategy be infused into the learning process of operations on fractions?
- v. What is the relationship between limit of a function

lesson including vocabulary and fundamental concepts related to the components of the front matters.

1.8 Read and discuss the introductory sections of the lesson (up to Learning Outcomes). and suggest the relevant students' previous knowledge that can support the teaching and learning of the lesson.

		and the derivative of a		
		function?		
		junction?		
Th	e guidance notes for			
	/HoD need to			
•	Provide short			
	overview of the			
	lesson			
	Identify important			
	or distinctive			
	features of the			
	lesson			
•	Identify			
	assessment, aligned			
	to NTEAP			
•	Anticipate			
	questions which			
	might arise from			
	the introduction to			
	the lesson and			
	provide responses			
	for SL/HoD.			
•	Issues that			
	prompted questions			
	or discussion during			
	curriculum and			
	course writing may			
	well also be issues			
	for SL/HoD			
2.	Concept	Concept Development	Concept Development	25 mins
	Development (New			
	learning likely to	2.1 Lead tutors to identify	2.1 Identify familiar and	
	arise in this lesson):	familiar and unfamiliar	unfamiliar concepts in the	
•	Identification and	concepts in the lesson	lesson and discuss	
	discussion of	and discuss connections	connections among	
	concepts	among concepts in the	concepts in the lesson.	
•	Identification of	lesson.		
	possible			
	challenging areas	2.2 Ask tutors to outline	2.2 Outline possible	
	in teaching of the	possible challenging areas	challenging areas in	
	concept.	in teaching and assessing	teaching and assessing	
_	Identification of	operations on fractions	operations on fractions	
•		and teaching calculus	and in Calculus taking into	
	needed resources	taking into consideration	consideration GESI .	
	for the teaching	GESI	consideration desi .	
	and learning of the			
	concept.	Eg. The use of differentiated		
		instruction to cater for the		

needs of all children in the early and upper grade and JHS classrooms, including those with special educational needs and creating a safe, secure, happy and stimulating learning environment (NTS 3c 3f, pg. 14).

- 2.3 Lead tutors to discuss misconceptions and barriers in teaching and learning of the lesson. Eg. i) Operations on fractions: $\frac{1}{4} + \frac{2}{3} = \frac{1+2}{4+3}$ ii) calculus: derivative of a function has no relationship with the limit of that function.
- 2.4 Support tutors to identify GESI responsive resources such as supporting staff for sign language, projectors, flip charts, sticky notes, tactile that can be used in the teaching and learning of the concepts mentioned above (e.g. curriculum materials, teachers and leaners resource packs, textbooks, course manual, etc.) NTS 3j
- i. Need to identify any aspect of the lesson that might be challenging for tutors in terms of new learning which need to be considered prior to taking tutors through the lessons.
- ii. Need to identify needed resources well suited for each lesson according to

2.3 Participate in the discussion on misconceptions and barriers in teaching and learning of the lesson.

2.4 Identify as many GESI responsive resources as possible that can be used in the teaching and learning of the concepts in teaching and assessment of operations on fractions and exploring concepts of limit and derivatives of a function NTS 3j

		the subject and age phase: where appropriate,		
		indicate the literature page referenced etc., on web,		
		utube, powerpoint,		
		physical reources		
	idance notes for			
SL,	/HoD should			
•	Identify any aspect			
	of the lesson that			
	might be			
	challenging for			
	tutors in terms of			
	new learning and			
	which needs to be			
	considered prior to			
	taking tutors			
	through the lesson			
	activities "walk			
	through".			
•	The resources			
	needed must be			
	identified: literature			
	 page referenced etc, on web, Utube, 			
	physical resources,			
	power point; how			
	they should be used.			
	Consideration needs			
	to be given to local			
	availability			
•	This section can			
	build on the PD			
	needs identified			
	from the course			
_	manuals	Tanahina and lagurina	Tanahina and languina	40
3.	Teaching, learning and assessment	Teaching and learning activities	Teaching and learning activities	40 mins
	activities for the	activities	activities	
	lesson	3.1 Ask tutors to suggest	3.1 Suggest teaching and	
	Reading of teaching	teaching and learning	learning activities for the	
	and learning	activities for the lesson	lesson taking into account	
	activities and	taking into account GESI	GESI issues.	
	identification of	issues.		
	areas that require	eg.		
	clarification	i. Provision made for		
		physically challenged		

- Reading of
 assessment
 opportunities and
 ensuring they are
 aligned to the
 NTEAP and required
 course assessment:
 subject project
 (30%), subject
 portfolio (30%) and
 end of semester
 examination (40%)
- Working through one or two activities,
- ii. Both genders take leading roles in group task iii. Even distribution of questions Ref: Writing the weekly PD session-pp 3., NTS 1a, b, c, d, 2b, e, f, 3b, c
- 3.2 Ask tutors to read the activities outlined in the course manual and identify areas that require clarification.

Strategies to clarify the otherwise dark spots may include investigation, internet search, etc.

3.3 Lead tutors to brainstorm to come up with some pedagogical approaches and their related core competencies likely to be inculcated in students and for that matter basic school learners. eg.

Strategy
Core
Competency
Group Work
Collaborative
learning
Investigation
Critical Thinking
Role Play
Communication

assessment strategies to be used during teaching of the lesson – 'Assessment as' (NTS 3k). Assessment must be aligned to the NTEAP and required course Assessment to include

3.4 Ask tutors to discuss the

portfolio (30%) and end of semester examination (40%) 3.5 Lead tutors to discuss the

various ways they can

support student teachers

subject project (30%), subject

- 3.2 Read the activities outlined in the course manual and identify areas that require clarification.
- 3.3 Brainstorm to come up with some pedagogical approaches and their related core competencies likely to be inculcated in students and for that matter basic school learners.

3.4 Ask tutors to discuss the assessment strategies to be used during teaching of the lesson – 'Assessment as' (NTS 3k).

3.5 Lead tutors to discuss the various ways they can

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		to build their portfolio	support student teachers	
		and subject projects.	to build their portfolio	
		3.6 Let a tutor model a presentation of an activity using ICT tools and taking into consideration GESI issues (eg. Both gender taking the leading roles in their groups and in the demonstration of the use of ICT tools) in the lesson; operations on fractions (Teaching and Assessing) and rate of change and derivatives in Calculus. NTS 1a, b, 2b, e, 3b, c, J; BSC pp. iii)	3.6 Model a presentation of an activity using ICT tools and taking into consideration GESI issues in the lessons; (Teaching and Assessing) and rate of change and derivatives in Calculus. NTS 1a, b, 2b, e, 3b, c, J; BSC pp. iii)	
Gu	idance notes for			-
	/HoD should			
•	Select activities,			
	linked to CLO and			
	indicators, from the			
	lesson that are			
	likely to be most			
	different from			
	tutors' previous			
	experience . These			
	could involve			
	applying new			
	content, e.g. from			
	section 2, or			
	approaches to			
	teaching, learning			
	and assessment,			
	incl. gender			
	responsive and			
	inclusive			
	approaches			
•	Identify how any assessments relate			
	to course			
	assessment			
	components			
	The selected			
	activities should be			
	activities should be			

	done with tutors in	
	real or close to real	
	time	
•	Anticipate any	
	issues for	
	clarification or	
	questions which	
	might arise as the	
	tutors work	
	through the	
	activities and	
	provide guidance	
	on these	
•	Identify where, and	
	which, core and	
	transferable skills,	
	including 21 st skills	
	and the use of	
	information	
	technology, are	
	being developed or	
	applied	
•	Makes links to the	
	existing PD Themes	
	with page reference	
	where they can	
	support teaching,	
	for example: action	
	research,	
	questioning and to	
	other external	
	reference material	
	Identify where	
	power point	
	presentations or	
	other resources	
	need to be	
	developed to	
	support learning	
	and provide	
	guidance	
•	Identify resources	
	required for any	
	TLMs and provide	
	guidance on	
	development of	
	these	

5. Evaluation and review of session:

- identification of any outstanding issues relating to this lesson for clarification
- Advance preparation
- In the case of unresolved issues

Reflective Activity

- 4.1 Engage tutors in selfevaluation as well as encourage tutors to provide feedback of the PD session taking into consideration inclusivity (NTS 1a, 3i).
- 4.2 Engage tutors to identify unresolved issues relating to this lesson for clarification

Take note of all unresolved issues and use any of following strategies

- put on SL/SWL WhatsApp platform for discussion
- tutors to research for the next PD session for discussion

Advance Preparation

4.3 Ask tutors to read Lesson 5 of the Course Manual on:

Early Grade -

Micro Lessons and use of technology across Early Grade numeracy: (Teaching and Assessing)

Upper Primary - Micro Lessons and use of technology across Primary school numeracy: (Teaching and Assessing)

JHS- Micro Lessons and use of technology across JHS numeracy: (Teaching and Assessing)

JHS Calculus -Curve sketching, maxima and minima;

Reflective Activity

- 4.1Show by fingers/nods of 5 or 3 or 1 as to those who "really got it", "got some of it" or "didn't get it" respectively. Explain if you really got the lesson.
- 4.2 Reflect on the activities in the session and outline unresolved issues relating to the lesson

Advance Preparation

4.3 Read Lesson 5 of the
Course Manual on:
Early Grade - Place value:
(Teaching and Assessing)
Upper Primary - Counting
and Number Relationships
JHS; Teaching and
Assessment - Construction,
Angles and Polygons:
(Teaching and Assessing 2)
JHS Calculus - Limits and
Continuity: Learning and
applying

5 mins

	N/B	N/B
	X. Remind tutors to identify	Get a critical friend from the
	a critical friend from the	same or related discipline to
	same or related discipline	observe your lesson during
	to observe during	teaching and provide
	teaching and provide	feedback (NTS 1a).
	feedback (NTS 1a).	
	XI. Read the course manual,	
	the PD session guide	
	ahead of time to identify	
	any outstanding issues	
	relating to this lesson for	
	clarification.	
	XII. Collect all resources (such	
	as projector, flip chart and	
	sticky notes) you need	
	ahead of time, prepare	
	samples of TLMs you may	
	need and rehearse how	
	these may be used to	
	support the achievement	
	of your goals	
Course assessment in		
accordance with the		
NTEAP: SWL need to		
review assessment in		
the course manual to		
ensure it complies		
with NTEAP		
implementation and		
the 60% continuous		
assessment and 40 %		
End of semester		
examination. This		
means ensuring:		
subject project,		
subject portfolio		
preparation and		
development are		
explicitly addressed in		
the PD sessions.		

Age Phase/s:

- a. Early Grade
- b. Upper Grade
- c. JHS (Core)
- d. JHS (Maths Sp)

Name of Subject/s:

- a. Mathematics: Teaching and Assessingb. Mathematics: Teaching and Assessing
- c. Teaching and Assessing JHS
- d. Mathematics Calculus

Tutor PD Session for Lesson 5 in the Course Manual

Lesson	litt	Δ.
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- a. Early Grade Micro Lessons and use of technology across Early Grade numeracy
- b. Upper Grade Micro Lessons and use of technology across Primary school numeracy

	c. JHS (CORE) - Micro Lessons and use of technology across JHS numeracy				
	d. JHS (SP) - Curve sketching, maxima and minima				
	cus: the bullet points	Guidance notes on Leading	Guidance Notes on Tutor	Time in	
-	ovide the frame for	the session. What the	Activity during the PD	session	
	at is to be done.	SL/HoDs will have to say	Session.		
	e guidance notes in	during each stage of the	What PD Session participants		
	lics identify the	session	(Tutors) will do during each		
-	ompt the SL/HoD		state of the session)		
	eds and each one				
	ist be addressed				
1.	Introduction /	Introduction	Introduction		
	lesson overview	1.1 Ice breaker activity:	1.1 Tell an interesting story		
•	Overview of	Begin with an	about a micro lesson you		
	subject/s age	interesting story about a	observed or participated		
	phase/s to be	micro lesson observed	in.		
	covered in this PD	or participated in.			
	session and how it				
	will be organised.	1.2 Ask tutors to tell how	1.2 Tell how useful the		
	Including guidance	useful the previous PD	previous PD session was		
	on grouping tutors	session was and how it	and how it influenced		
	according to the	influenced their	your teaching over the		
	subject/s, age	teaching over the week	week. Explain how		
	phase/s.	and how students were	students were well placed		
•	Reflection on	well placed to employ	to employ the strategies		
	previous PD Session	the various strategies	and skills during Basic		
	(Introduction to the	and skills during the	School classroom work		
	course manual/s)	Basic School classroom	including STS field		
•	Introduction and	work including STS field	experience.		
	overview of the	experience.			
	main purpose of				
	the lesson in the	N/B: Draw tutors' attention	N/B: Pay attention to all NTS		
	course manual/s	to all NTS references.	references.		
•	Identification of				
	important or	1.3 Ask the critical friend to	1.3 As a critical friend, give		
		give feedback on his/her	feedback on your		

- distinctive aspects of the lesson/s
- Reading and discussion of the introductory sections up to learning outcomes
- observation of the last enacted lesson.
- 1.4 Lead tutors to discuss any challenges that arose during the enactment. Eg In what ways did the students appreciate the need to consider equality and equity during the lesson and during STS activities?
- 1.5 Ask tutors to read the course manual and identify the purpose of the lesson Ask members to state their expectations of the PD Session on lesson 5. (NTS 2b).
- 1.6 Lead tutors in pairs to discuss the important or distinctive aspects of lesson 5 such as vocabulary and fundamental concepts related to the lesson including developing awareness of equity and diversity issues and issues on ICT.

Distinctive aspects include the interactive nature of the activities, emphasizing on connecting concepts:

a. Early Grade— eg. Using mathematical learning pedagogy and resources to plan, carry out and critique micro lessons based.

b. Upper Grade— eg. Using mathematical learning pedagogy and resources to

- observation of the previous enacted lesson.
- 1.4 Discuss any challenges that arose during the enactment.

- 1.5 Read the course manual and identify the purpose of the lesson (NTS 2b).
 State your expectations of the PD Session.
- 1.6 In pairs, discuss the important or distinctive aspects of lesson 5 such as vocabulary and fundamental concepts related to the lesson including developing awareness of equity and diversity issues and issues on ICT.

	plan, carry out and critique micro lessons based. c. JHS; Assessment – eg. Using mathematical learning pedagogy and resources to plan, carry out and critique micro lessons based. d. JHS; Calculus – eg. using graph sheets to investigate maxima and minima		
	1.7 Ask tutors to read individually and discuss in pairs the introductory sections of the lesson (up to Learning Outcomes).	1.7 Read individually and discuss the introductory sections of the lesson (up to Learning Outcomes).	
	N/B Be ready for likely questions from tutors for clarification. Anticipated questions: i.How can the micro teaching classroom be made useful? At what point do we have maxima and minima?		
The guidance notes for SL/HoD need to Provide short overview of the lesson Identify important or distinctive features of the lesson Identify assessment, aligned to NTEAP Anticipate questions which might arise from the introduction to the lesson and provide responses for SL/HoD.			

2.	Issues that prompted questions or discussion during curriculum and course writing may well also be issues for SL/HoD Concept Development (New	Concept Development	Concept Development	
•	learning likely to arise in this lesson): Identification and discussion of	2.1 Ask tutors to identify familiar and unfamiliar concepts in their lessons and discuss with the larger group.	2.1 Identify familiar and unfamiliar concepts in their lessons and discuss with the larger group.	
•	concepts Identification of possible challenging areas in teaching of the concept. Identification of	2.2 Lead tutors to draw connections among concepts in the various lessons in line with the basic school curriculum.	2.2 Draw connections among concepts in the various lessons in line with the basic school curriculum.	
	needed resources for the teaching and learning of the concept.	2.3 Using think pair share, ask tutors to outline possible challenging areas in teaching and assessing Micro lessons and using curve sketching to identify maxima and minima. Take into consideration GESI (eg. Use motivating statements such as: "You have done well" irrespective of physical or social condition of learner).	2.3 Through think-pair-share, outline possible challenging areas in teaching and assessing Micro lessons and using curve sketching to identify maxima and minima. Take into consideration GESI.	
		2.4 Ask tutors to suggest creative approaches for addressing the identified challenges. Eg. Using group work, the principle of multiple embodiment, problem solving, internet search.	2.4 Mention creative approaches for addressing the identified challenges.	
		2.5 Lead tutors to discuss misconceptions and	2.5 Discuss misconceptions and barriers in teaching	

	barriers in teaching and learning of the lesson. Example: a. Early/Upper/JHS (Core) Grade – Some people are born teachers and so they do better b. JHS (Calculus) – Calculus is for boys Barrier: inappropriate inclusive resources, technology and prerequisite knowledge 2.6 Focusing on one Phase at a time, ask tutors to identify GESI responsive	and learning of the lesson. 2.6 2.6 Identify GESI responsive resources that can be used to achieve	
	resources that can be used to achieve the LOs. N/B: Such resources include supporting staff for sign language, projectors, flip charts, sticky notes, tactile that can be used in the teaching and learning of the concepts mentioned above. other materials are curriculum materials, graph sheets, etc.) NTS 3j	the LOs.	
Guidance notes for			
SL/HoD should			
 Identify any aspect of the lesson that might be challenging for tutors in terms of new learning and which needs to be considered prior to taking tutors through the lesson activities "walk through". The resources 			
needed must be identified: literature			

•	- page referenced etc, on web, Utube, physical resources, power point; how they should be used. Consideration needs to be given to local availability This section can build on the PD needs identified from the course manuals			
3.	Teaching, learning	Teaching and learning	Teaching and learning	
	and assessment	activities	activities	
	activities for the			
	lesson	3.1 Ask tutors to suggest	3.1 Suggest teaching and	
•	Reading of teaching	teaching and learning	learning activities useful	
	and learning	activities useful for	for achieving the learning	
	activities and	achieving the learning	outcomes of the lesson	
	identification of	outcomes of the lesson taking into account	taking into account GESI.	
	areas that require clarification	GESI.		
•	Reading of	eg.		
•	assessment opportunities and ensuring they are aligned to the NTEAP and required course assessment: subject project (30%), subject portfolio (30%) and end of semester examination (40%) Working through one or two activities,	 i. Consider pairing male to a female where feasible for team teaching ii. Provision made for physically challenged during grouping iii. Both genders take leading roles in group task iv. Even distribution of questions NTS 1a, b, c, d, 2b, e, f, 3b, c, BSC p. iii) 		
	activities,	3.2 Ask tutors to read the activities outlined in the course manual and identify areas that require clarification. N/B: Strategies to clarify the otherwise dark spots may include investigation, internet search, etc.	3.2 Read the activities outlined in the course manual and identify areas that require clarification.	

3.3 Lead tutors through brainstorming to come up with some pedagogical approaches and their related core competencies likely to be inculcated in students and for that matter Basic School learners.

Example:
Group Work - Collaborative
learning
Investigation - Critical
Thinking
Role Play - Communication
Students can ascertain the
extent to which methods
are used during STS

activities in schools.

3.4 Ask tutors to discuss the assessment strategies to be used during teaching of the lesson – 'Assessment as' (NTS 3k) and group work presentation.

N/B: Assessment must be aligned to the NTEAP and required course. Continuous assessment activities (assignments, quizzes, group presentations, etc, should be used to create subject projects and build subject portfolios

3.5 Lead tutors to discuss the various ways they can support student teachers to build their project and portfolio before/during/ after lessons.

3.3 Brainstorm to come up with some pedagogical approaches and their related core competencies likely to be inculcated in students and for that matter Basic School learners.

3.4 Discuss the assessment strategies to be used during teaching of the lesson – 'Assessment as' (NTS 3k) and group work presentation.

3.5 Discuss the various ways they can support student teachers to build their portfolio.

	3.6 Ask a tutor to model a	3.6 Model a presentation of	
	presentation of an	an activity using ICT tools	
	activity using ICT tools	and taking into	
	and taking into	consideration GESI issues	
	consideration GESI	in the lessons; Teaching	
	issues (eg. Both gender	and Assessing and in	
	taking the leading roles	Calculus. NTS 1a, b, 2b, e,	
	in their groups and in	3b, c, J; BSC pp. iii)	
	the demonstration of		
	the use of ICT tools) in		
	the lesson Teaching and		
	Assessing and in		
	Calculus. NTS 1a, b, 2b,		
	e, 3b, c, J; BSC pp. iii)		
	With the help of a Lesson	With the help of a Lesson	
	Observation Guide, lead	Observation Guide, reflect on	
	tutors to reflect on the	the modelled lesson.	
	modelled lesson.		
Guidance notes for			
SL/HoD should			
 Select activities, 			
linked to CLO and			
indicators, from the			
lesson that are			
likely to be most			
different from			
tutors' previous			
experience. These			
could involve			
applying new			
content, e.g. from			
section 2, or			
approaches to			
teaching, learning			
and assessment,			
incl. gender			
responsive and			
inclusive			
approaches			
 Identify how any 			
assessments relate			
to course			
assessment			
components			
The selected			
activities should be			
done with tutors in			

	real or close to real	
	time	
•	Anticipate any	
	issues for	
	clarification or	
	questions which	
	might arise as the	
	tutors work through	
	the activities and	
	provide guidance on	
	these	
•	Identify where, and	
	which, core and	
	transferable skills,	
	including 21 st skills	
	and the use of	
	information	
	technology, are	
	being developed or	
	applied	
•	Makes links to the	
	existing PD Themes	
	with page reference	
	where they can	
	support teaching,	
	for example: action	
	research,	
	questioning and to	
	other external	
	reference material	
	Identify where	
	power point	
	presentations or other resources	
	need to be	
	developed to	
	support learning	
	and provide	
	guidance	
•	Identify resources	
	required for any	
	TLMs and provide	
	guidance on	
	development of	
	these	

4. Evaluation and review of session:

- identification of any outstanding issues relating to this lesson for clarification
- Advance preparation
- In the case of unresolved issues

Evaluation and review of session:

- 4.1 Encourage tutors to provide feedback of the PD session taking into consideration inclusivity how to be patient with stutterers, using tactile for the visually challenged, allowing tutors to show by fingers/nods. (NTS 1a, 3i).
- 4.2 Ask tutors to identify unresolved issues relating to this lesson for clarification

N/B: Take note of all unresolved issues and use any of following strategies

- put on SL/SWL
 WhatsApp platform for discussion
- tutors to research for the next PD session for discussion

Advance Preparation

4.3 Ask tutors to read Lesson 6 of the Course Manual on:

Early Grade - Diagnosis and remediation; assessment resources/records, and monitoring progress: (Teaching and Assessing Upper Primary - Diagnosis and remediation; assessment resources/records, and monitoring progress JHS; - Diagnosis and remediation; assessment resources/records, and remediation; assessment resources/records, and

Evaluation and review of session:

5 mins

- 4.1 Show by fingers/ nods of 5 or 3 or 1 as to those who "really got it", "got some of it" or "didn't get it" respectively. Explain if you really got the lesson.
- 4.2 Reflect on the activities in the session and outline unresolved issues relating to the lesson

Advance Preparation

4.3 Read Lesson 2 of the Course Manual on:

Early Grade - Diagnosis and remediation; assessment resources/records, and monitoring progress: (Teaching and Assessing Upper Primary - Diagnosis and remediation; assessment resources/records, and monitoring progress JHS; - Diagnosis and remediation; assessment resources/records, and monitoring progress (Teaching and Assessing 2)

	monitoring progress (Teaching and Assessing 2)	JHS Calculus - Linear kinematics: Learning and	
	JHS Calculus - Linear	applying	
	kinematics: Learning and		
	applying		
	N/B	N/B	
	XIII. Remind tutors to identify a critical friend from the same or related discipline to observe during teaching and provide feedback (NTS 1a). XIV. Read the course	Get a critical friend from the same or related discipline to observe your lesson during teaching and provide feedback (NTS 1a).	
	manual, the PD session guide ahead of time to identify any outstanding issues relating to the lesson for clarification.		
	xv. Collect all-inclusive resources (such as projector, flip chart and sticky notes) you need ahead of time, prepare samples of TLMs you may need and rehearse how these may be used to support the achievement of your goals		
Course assessment in	gouis		
accordance with the			
NTEAP: SWL need to review assessment in			
the course manual to			
ensure it complies with			
NTEAP implementation			
and the 60%			
continuous assessment			
and 40 % End of semester examination.			
This means ensuring:			
subject project, subject			
portfolio preparation			

and development are		
explicitly addressed in		
the PD sessions.		

Age Phase/s:

- a. Early Grade
- b. Upper Grade
- c. JHS (Core)
- d. JHS (Maths Sp)

Name of Subject/s:

- a. Mathematics: Teaching and Assessing
- b. Mathematics: Teaching and Assessing
- c. Mathematics: Teaching and Assessing JHS
- d. Mathematics Learning and Applying Calculus

Tutor PD Session for Lesson 6 in the Course Manual

Lesson Title:

- **e. Early Grade:** Diagnosis and remediation; assessment resources/records, and monitoring progress
- **f. Upper Grade:** Diagnosis and remediation; assessment resources/records, and monitoring progress
- **g.** JHS (Core): Diagnosis and remediation; assessment resources/records, and monitoring progress
- h. JHS (Maths Sp): Learning and Applying Derivatives 2

Focus: the bullet points provide the frame for what is to be done. The guidance notes in italics identify the prompt the SL/HoD needs and each one must be addressed	Guidance notes on Leading the session. What the SL/HoDs will have to say during each stage of the session	Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each state of the session)	Time in session
Overview of subject/s age phase/s to be covered in this PD session and how it will be organised. Including guidance on grouping tutors according to the subject/s, age phase/s.	Introduction 1.1 Ice breaker activity: Begin with a reinforcement game (Counter game) activity by asking tutors to shake and spill a select group of colour counters on their workspace and compare their counters with a partner. N/B: This game will consolidate writing number sentences, interpreting mathematical word problems, and organizing and interpreting data symbolically. N/B: Draw tutors' attention to all NTS references.	Introduction 1.1 Pick a bag containing colour counters. shake and spill a select group of colour counters on their workspace and compare their counters with a partner. N/B: This game will consolidate writing number sentences, interpreting mathematical word problems, and organizing and interpreting data symbolically. N/B: Pay attention to all NTS references.	
	1.2 Ask tutors to discuss the overview of the phases to	1.2 Discuss the overview of the phases to be	

 Reflection on previous PD Session (Introduction to the course manual/s)

- be covered in this PD session and how it will be organized.
- i. Early, Upper Grade and JHS (doing core): The lesson considers developing an understanding of Diagnosis and remediation; assessment resources/records, and monitoring progress. It also considers how the various assessment strategies can be incorporated in the lesson as well as in the Basic School classroom.

ii. JHS – Calculus considers definitions of derivatives, derivatives of polynomial and rational functions. It seeks to develop learner's knowledge to establish and address learning needs, perceptions and misconceptions of concepts based on differentiation. es.

N/B: Remember to put members into groups according to the phases to be taught in the semester.

- Introduction and overview of the main purpose of the lesson in the course manual/s
- 1.3 Ask tutors to tell how useful the PD session 5 was and how it influenced their teaching over the week and how students were well placed to employ the various strategies and skills during the Basic School classroom work including STS experience. (NTS 1b)
- 1.4 Ask tutors to identify the purpose of the lesson from the course manual and

covered in this PD session and how it will be organized.

- 1.3 Tell how useful the previous PD session was and how it influenced your teaching over the week. Explain how students were well placed to employ the strategies and skills during Basic School classroom work including STS experience.
- 1.4 Identify the purpose of the lesson from the course manual and

	<u>, </u>	,
	state their expectations of	state your expectations
	the PD Session	of the PD Session.
	1.5 Ask the critical friend to give feedback on his/her observation of the last enacted lesson.	1.5 As a critical friend, give feedback on your observation of the previous enacted lesson.
Identification of important or distinctive aspects of the lesson	1.6 Ask tutors to read the overview of the various courses (of the various phases named above) and discuss the course learning outcomes (CLOs) in groups as appropriate.	1.6 Read the overview of the various courses (of the various phases named above) and discuss the course learning outcomes (CLOs) in groups as appropriate.
	1.7 Guide tutors to establish the relationship between CLOs and the learning outcomes of individual lessons in the course	1.7 Guide tutors to establish the relationship between CLOs and the learning outcomes of individual lessons in the course.
 Reading and discussion of the 	1.8 Ask tutors in phase groups to discuss the important or distinctive aspects of the lesson including vocabulary and fundamental concepts related to the components of the front matters. Distinctive aspects include the interactive nature of the activities, emphasis on connecting concepts: a. Early Grade— eg. understand heuristics measures of learners learning needs through: diagnosis and remediation, assessment resources/ records and monitoring progress. b. Upper Grade— eg. understand heuristics measures of learners learning	1.8 In phase groups, discuss the distinctive aspects of the lesson including vocabulary and fundamental concepts related to the components of the front matters.
introductory	needs through: diagnosis and remediation, assessment	

sections up to	resources/ records and	
learning outcomes	monitoring progress.	
	c. JHS (Core)- understand	
	heuristics measures of learners	
	learning needs through: diagnosis and remediation,	
	assessment resources/ records	
	and monitoring progress.	
	d. JHS; Calculus – relationship	
	between displacement,	
	velocity, acceleration and	
	velocity-time graph	
	, , , ,	
	1.9 Ask tutors to read and	1.9 Read and discuss the
	discuss the introductory	introductory sections of
	sections of the lesson (up	the lesson (up to
	to Learning Outcomes) and	Learning Outcomes)
	suggest the relevant	and suggest the
	students' previous	relevant students'
	knowledge that can	previous knowledge
	support the teaching and	that can support the
	learning of the lesson.	teaching and learning of
	N/D	the lesson.
	N/B Be ready for likely questions	
	from tutors for clarification.	
	Anticipated questions:	
	i. What are some of the	
	misconceptions in	
	Mathematics at the basic	
	school?	
	ii. How will you diagnose the	
	misconception that there are	
	no numbers between 2.2 and	
	2.3?	
	iii. What is the difference	
	hat an and the said	

between position and

velocity?

The	e guidance notes for			
SL/	HoD need to			
•	Provide short overview of the lesson Identify important			
	or distinctive features of the lesson			
•	Identify assessment, aligned to NTEAP			
	Anticipate questions which might arise from the introduction to the lesson and provide responses for SL/HoD.			
Issi	งเวทิงป. ues that prompted			
	estions or discussion			
	ring curriculum and			
cou	ırse writing may well			
	o be issues for			
SL/	'HoD			
2.	Concept Development (New learning likely to arise in this lesson): Identification and	Concept Development 2.1 Ask tutors to identify familiar and unfamiliar concepts in their lessons and discuss with the larger group.	Concept Development 2.1 Identify familiar and unfamiliar concepts in their lessons and discuss with the larger group.	25 mins
	discussion of			
	concepts	2.2 Lead tutors to draw connections among concepts in the various lessons in line with the basic school curriculum.	2.2 Draw connections among concepts in the various lessons in line with the basic school curriculum.	
	Identification of	2.3 Ask tutors to outline possible challenging areas in Teaching and Assessing linear kinematics in Calculus	2.3 Outline possible challenging areas in Teaching and Assessing linear kinematics in	
	possible	taking into consideration	calculus taking into	
	challenging areas	GESI (eg. the challenging	consideration GESI.	
	in teaching of the	areas include diagnosis of		
	concept. This may	fractions, application of:		
	include GESI and	displacement, velocity, and	İ	1

ICT related concepts.	acceleration and GESI: TLMs should cater for all students and encourage all students in the teaching and learning of kinematics)	
Identification of some misconception and barriers in teaching and learning the concept.	2.4 Lead tutors to discuss misconceptions and barriers in teaching and learning of the lesson. Example: a. Early Grade – Mathematics is not applicable to real life. b. Upper Grade –those who are good in Mathematics are born with natural ability c. JHS (CORE) – Mathematics is all about memorization. d. JHS (Calculus) – if speed of the object is constant then acceleration is zero.	2.4 Discuss the misconceptions and barriers in teaching and learning of the lesson.
Identification of needed GESI responsive and ICT resources for the teaching and learning of the concept.	2.5 Focusing on one Phase at a time, support tutors to identify GESI responsive resources that can be used to achieve the LOs. N/B: Such resources include supporting staff for sign language, projectors, flip charts, sticky notes, tactile that can be used in the teaching and learning of the concepts mentioned above. other materials are curriculum materials, graph sheets, etc.) NTS 3j	2.5 Identify GESI responsive resources that can be used to achieve the LOs.
Guidance notes for		
SL/HoD should		
 Identify any aspect of the lesson that might be challenging for tutors in terms of new learning and which needs to be considered prior to 		

taking tutors through the lesson activities "walk through". The resources needed must be identified: literature - page referenced etc, on web, Utube, physical resources, power point; how they should be used. Consideration needs to be given to local availability This section can build on the PD needs identified from the course manuals Teaching, learning and assessment activities for the lesson Reading of teaching and learning activities and identification of areas that require clarification	Teaching and learning activities 3.1 Ask tutors to suggest teaching and learning activities for the lesson taking into account GESI issues and demonstrate how the LO's and LI's of the curriculum can be achieved. eg. i. Provision made for physically challenged ii. Both genders take leading roles in group task. iii. Even distribution of questions to different categories of learners based on gender, ability, previous	Teaching and learning activities 3.1 Suggest teaching and learning activities for the lesson taking into account GESI issues and demonstrate achievement of LO's and LI's in the curriculum	40 mins
	categories of learners based on		
	NTS 1a, b, c, d, 2b, e, f, 3b, c		
	3.2 Ask tutors to read the activities outlined in the course manual and identify	3.2 Read the activities outlined in the course manual and identify	

areas that require	9
clarification.	

N/B: Strategies and techniques to clarify the otherwise dark spots may include investigation, internet search,

3.3 Lead tutors to brainstorm to come up with some pedagogical approaches and their related core competencies likely to be inculcated in students and for that matter basic school learners. eg.

Core Competency Strategy Group Work Collaborative learning Investigation **Critical Thinking** Role Play Communication

3.3 Brainstorm to come up with some pedagogical approaches and their related core competencies likely to be inculcated in students and for that matter basic school

learners.

areas that require clarification.

• Working through one or two activities,

Reading of

assessment

opportunities and

ensuring they are

aligned to the NTEAP

and required course

assessment: subject project (30%), subject

portfolio (30%) and

examination (40%)

end of semester

3.4 Ask tutors to discuss the assessment strategies to be used during teaching of the lesson - 'Assessment as' (NTS 3k). Encourage tutors to discuss the mode of Assessment (working in group or individual by presentation, exercises, etc)

Assessment must be aligned to the NTEAP and required course Assessment. Continuous assessment activities (assignments, quizzes, group presentations, etc, should be used to create subject projects and build subject portfolios

3.5 Lead tutors to discuss the various ways they can support student teachers to build their portfolio. NB: Assign student teachers to develop equivalent fractions

3.4 Ask tutors to discuss the assessment strategies to be used during teaching of the lesson -'Assessment as' (NTS 3k). Discuss the mode of Assessment (working in group or individual by presentation, exercise, etc)

3.5 Lead tutors to discuss the various ways they can support student teachers to build their portfolio.

from locally available resources to share among colleagues and also write a report on the teaching of the lesson.

- 3.6 Ask a tutor to model a presentation of an activity using ICT tools and taking into consideration GESI issues (eg. Both gender taking the leading roles in their groups and in the demonstration of the use of ICT tools) in the lesson Teaching and Assessing Diagnosis and remediation; assessment resources/ records, and monitoring progress and teaching and applying kinematics. NTS 1a, b, 2b, e, 3b, c, J; BSC.
- 3.7 Lead tutors to discuss how student teachers can apply the pedagogy developed in the lesson during STS activities in basic schools.

NB

Tutors are likely to ask about the relevance of this activity in teaching mathematics lessons. When this comes up, refer them to PD Manuals:

- i. that is, Creative Approaches
- ii. the core and transferable skills being developed or used include social skills, communication skills, critical and creative thinking skills
- iii. creative Activities, Questioning, Talk and Learn and Group Work can be used to support the delivery of this session.

- 3.6 Model a presentation of an activity using ICT tools and taking into consideration GESI issues in the lessons; Teaching and Assessing diagnosis and remediation; assessment resources/records, and monitoring progress and teaching and applying kinematics. NTS 1a, b, 2b, e, 3b, c, J; BSC.
- 3.7 Discuss how student teachers can apply the pedagogy developed in the lesson during STS activities in basic schools.

Guidance notes for		
SL/HoD should		
• Select activities,		
linked to CLO and		
indicators, from the		
lesson that are likely		
to be most different from tutors'		
previous experience. These could involve		
applying new		
content, e.g. from		
section 2, or		
approaches to		
teaching, learning		
and assessment,		
incl. gender		
responsive and		
inclusive approaches		
Identify how any		
assessments relate		
to course		
assessment		
components		
The selected		
activities should be		
done with tutors in		
real or close to real		
time		
Anticipate any		
issues for		
clarification or		
questions which		
might arise as the		
tutors work through		
the activities and		
provide guidance on		
these		
Identify where, and		
which, core and		
transferable skills,		
including 21 st skills		
and the use of		
information		
technology, are		
being developed or		
applied		

 Makes links to the existing PD Themes with page reference where they can support teaching, for example: action research, questioning and to other external reference material Identify where power point presentations or other resources need to be developed to support learning and provide guidance Identify resources required for any TLMs and provide guidance on development of these 			
4. Evaluation and	Reflective Activity	Reflective Activity	5 mins
Review of session:	Nonective Activity	Reflective Activity	2 111113
identification of any outstanding issues relating to this lesson for clarification	4.1 Encourage tutors to provide feedback of the PD session taking into consideration GESI (how to be patient with stutterers, using tactile for visually challenged, paying attention to all courses, etc. Ask tutors to show by fingers/nods their level of satisfaction with the session). NTS 1a, 3i.	4.1 Show by fingers/nods of 5 or 3 or 1 as to those who "really got it", "got some of it" or "didn't get it" respectively. Explain if you really got the lesson.	
	4.2 Ask tutors in pairs to mention how GESI issues were used in the lesson.	4.2 Mention how GESI issues were used in the lesson	
	4.3 Engage tutors to identify unresolved issues relating	4.3 Reflect on the activities in the session and outline unresolved	

	to this lesson for	issues relating to the
	clarification.	lesson.
In the case of		
unresolved issues	4.4 Lead tutors to discuss the	4.4 Discuss the strategies
	strategies required to	you will use to resolve
	resolve the unresolve	the unresolved issues
	issues identified.	the amesoived issues
	issues identified.	
	N.D.	
	NB	
	i. Take note of all unresolved	
	issues and use any of	
	following strategies	
	ii. put on SL/SWL WhatsApp,	
	Telegram platform for	
	discussion.	
Advance Preparation	iii. tutors to research for the	
/ tavance i reparation	next PD session for	
	discussion	
	uiscussioii	
	Advance Dreneration	Advance Drenovation
	Advance Preparation	Advance Preparation
	4.5 Ask tutors to read Lesson 7	4.5 Read Lesson 5 of the
	of the Course Manual on:	Course Manual on:
	Early Grade - Teaching and	Early Grade - Teaching and
	Assessing Shape, Space and	Assessing Shape, Space and
	Measurement	Measurement
	Upper Primary - Teaching and	Upper Primary - Teaching
	Assessing Shape, Space and	and Assessing Shape, Space
	Measurement	and Measurement
	JHS - Teaching and Assessing	JHS - Teaching and
	Shape, Space and	Assessing Shape, Space and
	Measurement	Measurement
	JHS Calculus – Learning and	JHS Calculus - Learning and
	Applying Integration 1	Applying Integration 1
	N / D	1 21/2
	N/B	N/B
	i. Remind tutors to identify a	Get a critical friend from
	critical friend from the same	the same or related
	or related discipline to	discipline to observe your
	observe during teaching and	lesson during teaching and
	provide feedback (NTS 1a).	provide feedback (NTS 1a).
	ii. Read the course manual,	, , ,
	the PD session guide ahead	
	of time to identify any	
	outstanding issues relating	
	to this lesson for	
	clarification.	

	iii. Collect all resources (such as projector, flip chart and sticky notes) you need ahead of time, prepare samples of TLMs you may need and rehearse how these may be used to support the achievement of your goals
Course assessment in accordance with the NTEAP: SWL need to review assessment in the course manual to ensure it complies with NTEAP implementation and the 60% continuous assessment and 40 % End of semester examination. This means ensuring: subject project, subject portfolio preparation and development are explicitly addressed in the PD sessions.	

Age Phase/s:

- a. Early Grade
- b. Upper Grade
- c. JHS (Core)
- d. JHS (Maths Sp)

Name of Subject/s:

- a. Mathematics: Teaching and Assessing
- b. Mathematics: Teaching and Assessing
- c. Teaching and Assessing JHS
- d. Mathematics Calculus

Tutor PD Session for Lesson 7 in the Course Manual

Lesson Title:					
a. Early Grade: Shape, Space and Measurement: (Teaching and Assessment)					
b. Upper Grade: Shape, Space and Measurement: (Teaching and Assessment)					
	e, Space and Measurement: (Tea	iching and Assessment)			
d. JHS (Maths Sp): Integ	ration 1: Learning and applying				
Focus: the bullet points	Guidance notes on Leading	Guidance Notes on Tutor	Time in		
provide the frame for	the session. What the	Activity during the PD	session		
what is to be done.	SL/HoDs will have to say	Session.	50001011		
The guidance notes in	during each stage of the	What PD Session participants			
italics identify the	session	(Tutors) will do during each			
prompt the SL/HoD		state of the session)			
needs and each one		,			
must be addressed					
1. Introduction /	Introduction	Introduction			
lesson overview	1.1 Ice breaker activity: Begin	1.1 Ice breaker activity: Begin			
Overview of	with an investigational	with an investigational			
subject/s age	activity according to the	activity according to the			
phase/s to be	subjects and age phases	subjects and age phases.			
covered in this PD	(e.g. select an object and	(e.g. select an object and			
session and how it	identify the number of	identify the number of			
will be organised.	edges and faces in 7	edges and faces in 7			
Including guidance	seconds)	seconds)			
on grouping tutors					
according to the	1.2 Expose tutors to the	1.2 Participate in the			
subject/s, age	overview of the subject	discussion on the overview			
phase/s.	age phases to be covered	of the subject age phases to			
Reflection on	in this PD session and	be covered in this PD			
previous PD Session	how it will be organised.	session and how it will be			
(Introduction to the	, , ,	organised.			
course manual/s)	iii. Early and upper grade				
Introduction and	and JHS (Core) lessons	NI/D. Downstrontion to all NITC			
overview of the	focus on developing an	N/B: Pay attention to all NTS			
main purpose of	understanding of	references.			
the lesson in the	Teaching and assessing				
course manual/s	early and upper grade and				
	JHS (core) Mathematics				

- Identification of important or distinctive aspects of the lesson/s
- Reading and discussion of the introductory sections up to learning outcomes
- especially, Shape, Space and Measurement within the basic school curriculum.
- iv. JHS (Maths Sp) lesson seeks to develop student teachers' concepts of integration as an inverse of differentiation to establish the rule of integration of polynomials and the use of integration to find areas and volumes.

N/B: Draw tutors' attention to all NTS references.

- 1.3 Ask a critical friend to give feedback on observation during the enactment of lesson 6.
- 1.4 Ask tutors to tell how useful the previous PD session was and how it influenced their teaching over the week.
- 1.5 Ask tutors to suggest the purpose of the lesson and state their expectations of the PD Session.
- 1.6 Ask tutors to read the overview of the various courses (of the various phases named above) and discuss the course learning outcomes (CLOs) in groups as appropriate
- 1.7 Guide tutors to establish the linkage between CLOs and the LOs of the lesson

- 1.3 As a critical friend, share with members feedback on observation during the teaching of lesson 6.
- 1.4 Explain how useful the previous PD session influenced their teaching over the week.
- 1.5 Engage tutors to suggest the purpose of the lesson and state your expectations of the PD Session.
- 1.6 Read the overview of the various courses (of the various phases named above) and discuss the course learning outcomes (CLOs) in groups as appropriate
- 1.7 Participate in the identification of the CLOs and link them to the LOs of the lesson

- 1.8 Ask tutors in pairs discuss the important or distinctive aspects of the lesson including vocabulary and fundamental concepts related to the components of the front matters.
- Distinctive aspects include the interactive nature of the activities with emphasis on connecting concepts (creating addition facts, Effective assessment skills, key features of the basic school curriculum, applying a topic to real life with other lessons and the use of relevant resources.
- a. Early Grade- eg. the use of TLMs to develop understanding of such attributes as length, angle, area, volume and capacity, time, and money. b. Upper Grade – eq. Activation of group project work, ICT and TLM to help student teachers develop understanding of such attributes as length, angle, area, volume and capacity, time, and money c. JHS(core) – eg. Activation of group project work, ICT and TLM to help student teachers develop understanding of such attributes as length, angle, area, volume and capacity, time, and money d. JHS (Math sp) - eq.application of integration to finding areas and volumes in real life situations

1.8 In pairs discuss the distinctive aspects of the lesson including vocabulary and fundamental concepts related to the components of the front matters.

- 2. Concept
 Development (New learning likely to arise in this lesson):
- Identification and discussion of concepts
- Identification of possible challenging areas in teaching of the concept.
- Identification of needed resources for the teaching and learning of the concept.

Concept Development

- 2.1 Lead tutors to identify familiar and unfamiliar concepts in the lesson and discuss connections among concepts in the lesson.
- 2.2 Ask tutors to outline possible challenging areas in the teaching and assessment of lesson 'Shape, Space and Measurements' and the teaching of integration taking into consideration GESI
- Eg. The use of differentiated instruction to cater for the needs of all children in the early and upper grade and JHS classrooms, including those with special educational needs and creating a safe, secure, happy and stimulating learning environment (NTS 3c 3f, pg. 14).
- 2.3 Lead tutors to discuss misconceptions and barriers in teaching and learning of the lesson.

Eg.

- i) volume is the same as capacity
- ii) calculus: integration is a routine calculation of a number based on some formulas.
- 2.4 Support tutors to identify GESI responsive resources such as supporting staff for sign language, projectors, flip charts, sticky notes,

Concept Development

- 2.1 Identify familiar and unfamiliar concepts in the lesson and discuss connections among concepts in the lesson.
- 2.2 Outline possible challenging areas in the teaching and assessing 'Shape, Space and Measurements' and in Calculus taking into consideration **GESI**.

2.3 Participate in the discussion on misconceptions and barriers in teaching and learning of the lesson.

2.4 Identify as many GESI responsive resources as possible that can be used in the teaching and learning of the concepts in teaching and

25 mins

	_		
	tactile that can be used in the teaching and learning of the concepts mentioned above (e.g. curriculum materials, teachers and leaners resource packs, textbooks, course manual, etc.) NTS 3j i. Need to identify any aspect of the lesson that might be challenging for tutors in terms of new learning which need to be considered prior to taking tutors through the lessons. ii. Need to identify needed resources well suited for each lesson according to the subject and age phase: where appropriate, indicate the literature page referenced etc., on web, utube, powerpoint,	assessment of operations on fractions and exploring concepts of limit and derivatives of a function NTS 3j	
Guidance notes for	physical resources		
Guidance notes for SL/HoD should			
• Identify any aspect of the lesson that might be challenging for tutors in terms of new learning and which needs to be considered prior to taking tutors through the lesson activities "walk through". • The resources needed must be identified: literature – page referenced etc, on web, Utube, physical resources,			

		<u> </u>		1
	power point; how			
	they should be used.			
	Consideration needs			
	to be given to local			
	availability			
•	This section can			
	build on the PD			
	needs identified			
	from the course			
	manuals			
3.	Teaching, learning	Teaching and learning	Teaching and learning	40 mins
	and assessment	activities	activities	
	activities for the	3.1 Ask tutors to suggest	3.1 Suggest teaching and	
	lesson	teaching and learning	learning activities for the	
	Reading of teaching	activities for the lesson	lesson taking into account	
	-	taking into account GESI	GESI issues.	
	and learning		GLSI ISSUES.	
	activities and	issues.		
	identification of	eg.		
	areas that require	i. Provision made for		
	clarification	physically challenged		
•	Reading of	ii. Both genders take leading		
	assessment	roles in group task		
	opportunities and	iii. Even distribution of		
	ensuring they are	questions		
	• .	Ref: Writing the weekly PD		
	aligned to the			
	NTEAP and required	session-pp 3., NTS 1a, b, c, d,		
	course assessment:	2b, e, f, 3b, c		
	subject project			
	(30%), subject	3.2 Let tutors read the	3.2 Read the activities	
	portfolio (30%) and	activities outlined in the	outlined in the course	
	end of semester	course manual and	manual and identify areas	
	examination (40%)	identify areas that	that require clarification.	
	, ,	require clarification.	that require clarification.	
•	Working through	I -		
	one or two	Strategies to clarify the		
	activities,	otherwise dark spots may		
		include investigation, internet		
		search, etc.		
		3.3 Lead tutors to brainstorm	3.3 Brainstorm to come up	
		to come up with some	with some pedagogical	
		pedagogical approaches	approaches and their	
		and their related core	related core	
		competencies likely to be	competencies likely to be	
		inculcated in students	inculcated in students	
		and for that matter basic	and for that matter basic	
		school learners. eg.	school learners.	
		<u>I</u>		l .

Strategy	Core
	Competency
Group Work	Collaborative
	learning
Investigation	Critical Thinking
Role Play	Communication

- 3.4 Ask tutors to discuss the assessment strategies to be used during teaching of the lesson. (NTS 3k).

 Assessment must be aligned to the NTEAP and required course Assessment to include subject project (30%), subject portfolio (30%) and end of semester examination (40%)
- 3.5 Lead tutors to discuss the various ways they can support student teachers

to build their portfolio

and subject projects.

- 3.6 Ask tutors to model a presentation of an activity using ICT tools and taking into consideration GESI issues (eg. Both gender taking the leading roles in their groups and in the demonstration of the use of ICT tools) in the lesson; shapes, space and measurement (Teaching and Assessing) and integration. NTS 1a, b, 2b, e, 3b, c, J; BSC pp. iii)
- Note
- i. Select activities, linked to CLO and indicators, from the lesson that are likely to be most different from tutors
- ii. The selected activities should be done with

3.4 Ask tutors to discuss the assessment strategies to be used during teaching of the lesson (NTS 3k).

- 3.5 Discuss the various ways they can support student teachers to build their portfolio
- 3.6 Model a presentation of an activity using ICT tools and taking into consideration GESI issues in the lessons; shapes, space and measurement (Teaching and Assessing) and integration. NTS 1a, b, 2b, e, 3b, c, J; BSC pp. iii)

			tutors in real or close to	
			real time	
		iii.	Identify where, and which,	
			core and transferable	
			skills, including 21st skills	
			and the use of	
			information skills	
GL	idance notes for		y	
	/HoD should			
•	Select activities,			
	linked to CLO and			
	indicators, from the			
	lesson that are			
	likely to be most			
	different from			
	tutors' previous			
	experience. These			
	could involve			
	applying new			
	content, e.g. from			
	section 2, or			
	approaches to			
	teaching, learning			
	and assessment,			
	incl. gender			
	responsive and			
	inclusive			
	approaches			
•	Identify how any			
	assessments relate			
	to course			
	assessment			
	components			
•	The selected			
	activities should be			
	done with tutors in			
	real or close to real			
	time			
•	Anticipate any			
	issues for			
	clarification or			
	questions which			
	might arise as the			
	tutors work through			
	the activities and			
	provide guidance on			
	these			
	UICSC			

	Ideal's 1			
•	Identify where, and			
	which, core and			
	transferable skills,			
	including 21 st skills			
	and the use of			
	information			
	technology, are			
	being developed or			
	applied			
•	Makes links to the			
	existing PD Themes			
	with page reference			
	where they can			
	support teaching,			
	for example: action			
	research,			
	questioning and to			
	other external			
	reference material			
•	Identify where			
	power point			
	presentations or			
	other resources			
	need to be			
	developed to			
	support learning			
	and provide			
	guidance			
	Identify resources			
	required for any			
	TLMs and provide			
	•			
	guidance on			
	development of			
	these	Defication Activity	Defication Activity	F*
4.	Evaluation and	Reflective Activity	Reflective Activity	5 mins
	review of session:	4.1 Engage tutors in self-	4.1 Show by fingers/nods of 5	
•	identification of any	evaluation as well as	or 3 or 1 as to those who	
	outstanding issues	encourage tutors to	"really got it", "got some	
	relating to this	provide feedback of the	of it" or "didn't get it"	
	lesson for	PD session taking into	respectively. Explain if	
	clarification	consideration inclusivity	you really got the lesson.	
•	Advance	(NTS 1a, 3i).		
	preparation			
•	In the case of	4.2 Engage tutors to identify	4.2 Reflect on the activities in	
	unresolved issues	unresolved issues relating	the session and outline	
		to this lesson for	unresolved issues relating	
		clarification	to the lesson	
<u> </u>		1	1	i

- Take note of all unresolved issues and use any of following strategies
- put on SL/SWL WhatsApp platform for discussion
- tutors to research for the next PD session for discussion

Advance Preparation

4.3 Ask tutors to read Lesson 8 of the Course Manual on:

Early Grade -

Handling Data and Chance: (Teaching and Assessing
Upper Primary - Handling
Data and Chance: (Teaching
and Assessing)
JHS- Handling Data and
Chance: (Teaching and

JHS Calculus -Integration 2: Learning and applying

N/B

Assessing)

- XVI. Remind tutors to identify a critical friend from the same or related discipline to observe during teaching and provide feedback (NTS 1a).
- XVII. Read the course manual, the PD session guide ahead of time to identify any outstanding issues relating to this lesson for clarification.

Advance Preparation

4.3 Read Lesson 8 of the Course Manual on:

Early Grade -

Handling Data and Chance: (Teaching and Assessing
Upper Primary - Handling
Data and Chance: (Teaching
and Assessing)
JHS- Handling Data and
Chance: (Teaching and
Assessing)
JHS Calculus -Integration 2:

Learning and applying

N/B

Get a critical friend from the same or related discipline to observe your lesson during teaching and provide feedback (NTS 1a).

	be used to support the achievement of your goals	
Course assessment in		
accordance with the		
NTEAP: SWL need to		
review assessment in		
the course manual to		
ensure it complies with		
NTEAP implementation		
and the 60%		
continuous assessment		
and 40 % End of		
semester examination.		
This means ensuring:		
subject project, subject		
portfolio preparation		
and development are		
explicitly addressed in		
the PD sessions.		

Age Phase/s:

- a. Early Grade
- b. Upper Grade
- c. JHS (Core)
- d. JHS (Maths Sp)

Name of Subject/s:

- a. Mathematics: Teaching and Assessingb. Mathematics: Teaching and Assessing
- c. Teaching and Assessing JHS
- d. Mathematics Calculus

Tutor PD Session for Lesson 8 in the Course Manual

Lesson	I ITTI	Δ.

- a. Early Grade Handling Data and Chance
- b. Upper Grade Handling Data and Chance
- c. JHS (CORE) Handling Data and Chance

	c. JHS (CORE) - Handling Data and Chance			
	d. JHS (SP) - Integration 2			ı
	cus: the bullet points	Guidance notes on Leading	Guidance Notes on Tutor	Time in
provide the frame for		the session. What the SL/HoDs	Activity during the PD	session
	nat is to be done.	will have to say during each	Session.	
	e guidance notes in	stage of the session	What PD Session	
	lics identify the		participants (Tutors) will do	
_	ompt the SL/HoD		during each state of the	
	eds and each one		session)	
	ust be addressed			
1.	Introduction /	Introduction	Introduction	
	lesson overview	1.1 Ice breaker activity: Begin	1.1 In turns, quickly say as	
•	Overview of	by asking members to take	many things as possible	
	subject/s age	turns to say as many things	about the Mathematics	
	phase/s to be	as possible about the	Department of the	
	covered in this PD	Mathematics Department	College.	
	session and how it	of the College. Skip a		
	will be organised.	member who delays		
	Including guidance	his/her turn.		
	on grouping tutors			
	according to the	1.2 Ask tutors to tell how	1.2 Tell how useful the	
	subject/s, age	useful the previous PD	previous PD session was	
	phase/s.	session was and how it	and how it influenced	
•	Reflection on	influenced their teaching	your teaching over the	
	previous PD Session	over the week and how	week and how students	
	(Introduction to the	students were well placed	were well placed to	
	course manual/s)	to employ the various	employ the various	
•	Introduction and	concepts and skills during	concepts and skills	
	overview of the	STS field experience.	during STS field	
	main purpose of		experience.	
	the lesson in the			
	course manual/s	1.3 Ask a critical friend to give	1.3 As a critical friend, give	
•	Identification of	feedback on his/her	feedback on your	
	important or	observation of the last	observation of the	
	distinctive aspects	enacted lesson for the	previous enacted	
	of the lesson/s	whole group to deliberate.	lesson.	

- Reading and discussion of the introductory sections up to learning outcomes
- N/B: Draw tutors' attention to all NTS references.
- 1.4 Lead tutors to discuss any challenges that arose during the enactment of the previous lesson and how they were resolve. Eg. In what ways did the students appreciate the need to consider equality and equity during the lesson and during STS activities?

1.5 Ask tutors to read the

NTS 2b

- course manual and identify the purpose and learning outcomes of the lesson for the day. Ask members to state their expectations of the PD Session on lesson 8.
- 1.6 Lead tutors in pairs to discuss the important or distinctive aspects of lesson 8 such as vocabulary and fundamental concepts related to the lesson including GESI and ICT issues.

Distinctive aspects include the interactive nature of the activities, emphasizing on connecting concepts: a. Early Grade-eq. Collect, interpret and present data and chance.

- b. Upper Grade eg. Measures of central tendencies, Graphical representation and chance.
- c. JHS; Assessment eq. Measures of central tendencies, Graphical representation and chance.

- N/B: Pay attention to all NTS references.
- 1.4 Discuss any challenges that arose during the enactment of the previous lesson and how they were resolve.

- 1.5 Read the course manual to identify the purpose of the lesson (NTS 2b) and state your expectations of the PD Session
- 1.6 In pairs, discuss the important or distinctive aspects of lesson 8 such as vocabulary and fundamental concepts related to the lesson including GESI and ICT issues.

	d. JHS; Calculus – eg.		
	Numerical Integration and its		
	Applications		
	1.7 Ask tutors to read	1.7 Read individually and	
	individually and discuss in	discuss the introductory	
	pairs the introductory	sections of the lesson	
	sections of the lesson (up	(up to Learning	
	to Learning Outcomes).	Outcomes).	
	N/B	o decomesy.	
	Be ready for likely questions		
	from tutors for clarification.		
	Anticipated questions:		
	ii. Which graphical		
	representations should be		
	treated in this semester?		
	iii. What should be done to		
	complete the lesson since		
	the scope is wide?		
The guidance notes for	the scope is wide:		
The guidance notes for SL/HoD need to			
• Provide short			
overview of the lesson			
 Identify important or distinctive 			
features of the			
lesson			
Identify assessment, aligned to NTEAR.			
aligned to NTEAP			
 Anticipate questions which might arise 			
from the			
introduction to the			
lesson and provide			
responses for SL/HoD.			
• Issues that			
prompted questions			
or discussion during			
curriculum and			
course writing may			
well also be issues			
for SL/HoD			
שטו אבן ווטט			

- 2. Concept
 Development
 (New learning
 likely to arise in
 this lesson):
- Identification and discussion of concepts
- Identification of possible challenging areas in teaching of the concept.
- Identification of needed resources for the teaching and learning of the concept.

Concept Development

- 2.1 Ask tutors to identify familiar and unfamiliar concepts in their lessons and discuss with the larger group.
- 2.2 Lead tutors to draw connections among concepts in the various lessons in line with the basic school curriculum. Refer to BSC B1.4.1.1, B1.4.1.2, B2.4.1.1, B2.4.1.2 B3.4.1.1, B3.4.1.2 B4.4.1.1, B4.4.1.2, B6.4.1.1-2, B6.4.2.2
- 2.3 Using think-pair-share, ask tutors to outline possible challenging areas in teaching and assessing Handling Data and Chance (in EGE, UPE, JHS Core) and Integration 2 in JHS (SP). Take into consideration GESI (eg. Use motivating statements for all manner of students)
- 2.4 Ask tutors to suggest creative approaches for addressing the identified challenges.
- Eg. Using group work, the principle of multiple embodiments, problem solving, internet search.
- 2.5 Lead tutors to discuss misconceptions and barriers in teaching and learning of the lesson. Example:
- a. Early/Upper/JHS (Core)Grade "Age is a discrete variable"

Concept Development

- 2.1 Identify familiar and unfamiliar concepts in their lessons and discuss with the larger group.
- 2.2 Draw connections among concepts in the various lessons in line with the basic school curriculum. Refer to BSC B1.4.1.1, B1.4.1.2, B2.4.1.1, B2.4.1.2 B3.4.1.1, B3.4.1.2 B4.4.1.1, B4.4.1.2, B6.4.1.1-2, B6.4.2.2
- 2.3 Draw Kk Through thinkpair-share, outline possible challenging areas in teaching and assessing Handling Data and Chance (in EGE, UPE, JHS Core) and Integration 2 in JHS (SP). Take into consideration GESI.
- 2.4 Discuss misconceptions and barriers in teaching and learning of the lesson.
- 2.5 Identify GESI responsive resources that can be used to achieve the LOs.

25 mins

	b. JHS (Calculus) – "Integration	
	cannot be applied in everyday	
	life activity".	
	Barrier: Appropriate inclusive	
	resources Technology	
	Pre-requisite knowledge	
	Fre-requisite knowledge	
	2.6 Focusing on one Phase at a 2.6 Identify GESI responsive	
	time, ask tutors to identify resources that can be	
	GESI responsive resources used to achieve the LOs.	
	that can be used to achieve	
	the LOs.	
	N/B: Such resources include	
	supporting staff for sign	
	language, projectors, flip	
	charts, sticky notes, tactile that	
	can be used in the teaching	
	and learning of the concepts	
	mentioned above. other	
	materials are ludu dice, graph	
	sheets, news prints, exams	
	score sheets and curriculum	
	materials) NTS 3j	
Guidance notes	for	
SL/HoD should		
• Identify any o	aspect	
of the lesson	that	
might be		
challenging f	for	
tutors in tern	ns of	
new learning	g and	
which needs	to be	
considered pi	rior to	
taking tutors	5	
through the I	lesson	
activities "wo	alk	
through".		
The resources	es	
needed must	t be	
identified: lite	erature	
– page referen		
etc, on web, U		
physical resou	irces,	
power point; h	how	
they should be		
Consideration		
to be given to	local	
availability		

		T	I	T
•	This section can build on the PD needs identified from the course manuals			
3.	Teaching, learning and assessment activities for the lesson Reading of teaching and learning activities and identification of areas that require clarification Reading of assessment opportunities and ensuring they are aligned to the NTEAP and required course assessment: subject project (30%), subject portfolio (30%) and end of semester examination (40%) Working through one or two activities,	Teaching and learning activities 3.1 Ask tutors to suggest teaching and learning activities useful for achieving the learning outcomes of the lesson taking into account GESI. eg. i. Provision made for physically challenged during grouping ii. Both genders take leading roles in group task iii. Even distribution of questions NTS 1a, b, c, d, 2b, e, f, 3b, c, BSC p. iii) 3.2 Ask tutors to read the activities outlined in the course manual and identify areas that require clarification. N/B: Strategies to clarify the otherwise dark spots may include investigation, internet search, etc. 3.3 Lead tutors through brainstorming to come up with some pedagogical approaches and their related core competencies likely to be inculcated in students and for that matter Basic School learners.	Teaching and learning activities 3.1 Suggest teaching and learning activities useful for achieving the learning outcomes of the lesson taking into account GESI. 3.2 Read the activities outlined in the course manual and identify areas that require clarification. 3.3 Brainstorm to come up with some pedagogical approaches and their related core competencies likely to be inculcated in students and for that matter Basic School learners.	40 mins

Example:
Group Work - Collaborative
learning
Investigation - Critical Thinking
Role Play - Communication
Students can ascertain the
extent to which methods are
used during STS activities in
schools.

3.4 Ask tutors to discuss the assessment strategies to be used during teaching of the lesson – 'Assessment as' (NTS 3k) and group work presentation.

N/B: Assessment must be aligned to the NTEAP and required course. Continuous assessment activities (assignments, quizzes, group presentations, etc, should be used to create subject projects and build subject portfolios

- 3.5 Lead tutors to discuss the various ways they can support student teachers to build their project and portfolio before/during/ after lessons.
- 3.6 Ask a tutor to model a presentation of an activity using ICT tools and taking into consideration GESI issues (eg. Allowing students to demonstrate the use of ICT tools and ensuring both gender take the leading roles in their groups. NTS 1a, b, 2b, e, 3b, c, J; BSC pp. iii)
- 3.7 With the help of a Lesson Observation Guide, lead

3.4 Discuss the assessment strategies to be used during teaching of the lesson – 'Assessment as' (NTS 3k) and group work presentation.

- 3.5 Discuss the various ways they can support student teachers to build their portfolio
- 3.6 Model a presentation of an activity using ICT tools and taking into consideration GESI issues. NTS 1a, b, 2b, e, 3b, c, J; BSC pp. iii)

3.7 With the help of Lesson Observation Guide,

	tutors to reflect on the	reflect on the modelled	
	modelled lesson	lesson	
Guidance notes for			
SL/HoD should			
 Select activities, 			
linked to CLO and			
indicators, from the			
lesson that are			
likely to be most			
different from			
tutors' previous			
experience. These			
could involve			
applying new			
content, e.g. from			
section 2, or			
approaches to			
teaching, learning			
and assessment,			
incl. gender			
responsive and			
inclusive			
approaches			
Identify how any			
assessments relate			
to course			
assessment			
components			
• The selected			
activities should be			
done with tutors in			
real or close to real			
time			
Anticipate any			
issues for			
clarification or			
questions which			
might arise as the			
tutors work through			
the activities and			
provide guidance on			
these			
• Identify where, and			
which, core and			
transferable skills,			
including 21 st skills			
and the use of			

information technology, are being developed or applied Makes links to the existing PD Themes with page reference where they can support teaching, for example: action research, questioning and to other external reference material Identify where power point presentations or other resources need to be developed to support learning and provide guidance Identify resources required for any TLMs and provide guidance on development of these			
 4. Evaluation and review of session: identification of any outstanding issues relating to this lesson for clarification Advance preparation In the case of unresolved issues 	Evaluation and review of session: 4.1 Encourage tutors to provide feedback of the PD session taking into consideration inclusivity – how to be patient with stutterers, using tactile for the visually challenged, allowing tutors to show by fingers/nods. (NTS 1a, 3i).	Evaluation and review of session: 4.1 Show by fingers/nods of 5 or 3 or 1 as to those who "really got it", "got some of it" or "didn't get it" respectively. Explain if you really got the lesson.	5 mins
	4.2 Ask tutors to read Lesson 9 of the Course Manual before the next PD session. Early Grade - Rational and Irrational Number 1 (Teaching and Assessing)	4.2 Read the next lesson (Lesson 9) of the Course Manual on: Early Grade - Rational and Irrational Number 1 (Teaching and Assessing)	

Upper Primary - Rational and Irrational Number 1 (Teaching and Assessing) JHS(Core) -Rational and Irrational numbers 1 (Teaching and Assessing 2) JHS Calculus - Integration 2: Learning and applying

4.3 Ask tutors to come out with unresolved issues relating to this lesson for clarification.

N/B:

Take note of all unresolved issues and use any of following strategies

- put on SL WhatsApp platform for discussion
- tutors to research for the next PD session for discussion

N/B

- XIX. Remind tutors to identify a critical friend from the same or related discipline to observe during teaching and provide feedback (NTS 1a).
- XX. Read the course manual, the PD session guide ahead of time to identify any outstanding issues relating to the lesson for clarification.

Collect all inclusive resources (such as projector, flip chart and sticky notes) you need ahead of time, prepare samples of TLMs you may need and rehearse how these may be used to support the achievement of your goals

Upper Primary - Rational and Irrational Number 1 (Teaching and Assessing) JHS(Core) - Rational and Irrational numbers 1: Teaching and Assessing JHS Calculus - Integration 2: Learning and applying

4.3 Reflect on the activities in the session and outline unresolved issues relating to the lesson

N/B

Get a critical friend from the same or related discipline to observe your lesson during teaching and provide feedback (NTS 1a).

Course assessment in
accordance with the
NTEAP: SWL need to
review assessment in
the course manual to
ensure it complies with
NTEAP implementation
and the 60%
continuous assessment
and 40 % End of
semester examination.
This means ensuring:
subject project, subject
portfolio preparation
and development are
explicitly addressed in
the PD sessions.

Age Phase/s:

- a. Early Grade
- b. Upper Grade
- c. JHS (Core)
- d. JHS (Maths Sp)

Name of Subject/s:

- a. Mathematics: Teaching and Assessing
- b. Mathematics: Teaching and Assessing
- c. Mathematics: Teaching and Assessing JHS
- d. Mathematics Learning and Applying in Calculus

Tutor PD Session for Lesson 9 in the Course Manual

Lesson Title:

- a. Early Grade: Rational and Irrational Number 1
- b. Upper Grade: Rational and Irrational Number 1
- c. JHS (Core): Rational and Irrational Number 1
- d. JHS (Maths Sp): Learning and Applying Integration 2

Focus: the bullet points provide the frame for what is to be done. The guidance notes in italics identify the prompt the SL/HoD needs and each one must be addressed	Guidance notes on Leading the session. What the SL/HoDs will have to say during each stage of the session	Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each state of the session)	Time in session
 Introduction Overview of subject/s age phase/s to be covered in this PD session and how it will be organised. Including guidance on grouping tutors according to the subject/s, age phase/s. 	Introduction 1.1 Ice breaker activity: Provide each tutor with a pack of task cards for them to pick and act on the questions Examples: What is the title of a favourite book? Spell Calculus with your head? Mention in sequence four real number systems. 1.2 Ask tutors to tell how useful the PD session 8 was and how it influenced their teaching in semester one. (NTS 1b)	1.1 Pick and act on the questions 1.2 How useful was the previous PD session and how did it influence your teaching over the week?	

 Reflection on previous PD Session (Introduction to the course manual/s) N/B: Draw tutors' attention to all NTS references.

- 1.3 Ask tutors to identify the purpose of the lesson from the course manual and state their expectations of the PD Session
- 1.4 Ask tutors to read the overview of the courses (of the various phases named above) and discuss the course learning outcomes (CLOs) in phase groups where applicable.
- 1.5 Guide tutors to establish the relationship between CLOs and the learning outcomes of individual lessons in the course.
- 1.6 Ask tutors in phase groups to discuss the important or distinctive aspects of the first lesson including vocabulary and fundamental concepts related to the components of the front matters.

Distinctive aspects include the interactive nature of the activities, emphasis on connecting concepts:
a. Early Grade: eg. relationships among the various aspects of real number system
b. Upper Grade: eg. application of real number system to real life

N/B: Pay attention to all NTS references.

- 1.3 Identify the purpose of the lesson from the course manual and state your expectations of the PD Session.
- 1.4 Read the overview of the lesson and discuss the course learning outcomes (CLOs) in groups as appropriate.
- 1.5 Guide tutors to establish the relationship between CLOs and the learning outcomes of individual lessons in the course.
- 1.6 In phase groups, discuss the distinctive aspects of the first lesson including vocabulary and fundamental concepts related to the components of the front matters.

 Introduction and overview of the main purpose of the lesson in the course manual/s

 Identification of important or distinctive aspects of the lesson Reading and discussion of the introductory sections up to learning outcomes 	c. JHS (Core): eg. application of real number system to real life d. JHS; Calculus: apply fundamental ideas of integration with emphasis on numerical Integration and application of Integration. 1.7 Ask tutors to read and discuss the introductory sections of the lesson (up to Learning Outcomes) and suggest the relevant students' previous knowledge that can support the teaching and learning of the lesson. N/B Be ready for likely questions from tutors for clarification. Anticipated questions: i. How do we perform trigonometric rules for integration process? ii. What are the examples of irrational numbers?	1.7 Read and discuss the introductory sections of the lesson (up to Learning Outcomes) and suggest the relevant students' previous knowledge that can support the teaching and learning of the lesson.	
The second of the second of t			
The guidance notes for			
SL/HoD need toProvide short			
Provide short overview of the			
lesson			
• Identify important			
or distinctive			
features of the			
lesson			
• Identify assessment,			
aligned to NTEAP			
Anticipate questions			
which might arise			
from the introduction to the			
lesson and provide			
responses for			
SL/HoD.			

qu du co als	sues that prompted lestions or discussion aring curriculum and lurse writing may well so be issues for hoD			
•	Concept Development (New learning likely to arise in this lesson): Identification and discussion of concepts	Concept Development 2.1 Ask tutors to identify familiar and unfamiliar concepts in their lessons and discuss with the larger group. 2.2 Lead tutors to draw	Concept Development 2.1 Identify familiar and unfamiliar concepts in your lesson and discuss with the larger group. 2.2 Draw connections among	25 mins
		connections among concepts in the various lessons in line with the basic school curriculum.	concepts in the lesson in line with the basic school curriculum.	
•	Identification of possible challenging areas in teaching of the concept. This may include GESI and ICT related concepts.	2.3 Ask tutors to outline possible challenging areas in Teaching and Assessing rational and irrational numbers 1 and Integration 2 in Calculus taking into consideration GESI such as giving equal opportunity for all to solve task irrespective gender, physical or social challenge. N/B: The challenging areas include application of numerical integration	2.3 Outline possible challenging areas in Teaching and Assessing rational and irrational numbers 1, Learning and Applying Integration 2 taking into consideration GESI.	
•	Identification of some misconception and barriers in teaching and learning the concept.	2.4 Lead tutors to discuss misconceptions and barriers in teaching and learning of the lesson. Example: a. Early/ Upper/ JHS (CORE) Grade – that ∏ is a rational number. d. JHS (Calculus) – integrating by partial fractions	2.4 Discuss the misconceptions and barriers in teaching and learning of the lesson.	

	Ask tutors to suggest GESI	Identify as many GESI	
	responsive resources such as	responsive resources such as	
	supporting staff with experts	supporting staff with experts	
	in sign language as well as	in sign language as well as	
	resources such as teacher	resources such as resource	
	and learner resource packs,	persons and material resources that can be used	
	textbooks, course manual, graph sheet, mathematical	in the teaching and learning	
	set, projectors, flip charts,	of the concepts in the lesson	
Identification of	sticky notes, tactile, posters;	(NTS 3j).	
needed GESI	video clips; downloads;	(1413 3j).	
responsive and ICT	models etc. materials that		
resources for the	can be used in the teaching		
teaching and	and learning of the concepts		
learning of the	mentioned above (NTS 3j).		
concept.	, , ,		
Guidance notes for			
SL/HoD should			
Identify any aspect			
of the lesson that			
might be			
challenging for tutors in terms of			
new learning and			
which needs to be			
considered prior to			
taking tutors			
through the lesson			
activities "walk			
through".			
The resources			
needed must be			
identified: literature			
– page referenced			
etc, on web, Utube,			
physical resources,			
power point; how			
they should be used.			
Consideration needs			
to be given to local availability			
This section can build			
on the PD needs			
identified from the			
course manuals			

3. Teaching, learning and assessment activities for the lesson

 Reading of teaching and learning activities and identification of areas that require clarification

Teaching and learning activities

3.1 Ask tutors to suggest teaching and learning activities for the lesson taking into account GESI issues and demonstrate how the LO's and LI's of the curriculum can be achieved.

eg.

- i. Provision made for physically challenged
- *ii.* Both genders take leading roles in group task.
- iii. Even distribution of questions to different categories of learners based on gender, ability, previous experience, etc NTS 1a, b, c, d, 2b, e, f, 3b, c
- 3.2 Ask tutors to read the activities outlined in the course manual and identify areas that require clarification.

 Strategies and techniques to clarify the otherwise dark spots may include investigation, internet search, etc.
- 3.3 Lead tutors to brainstorm to come up with some pedagogical approaches and their related core competencies likely to be inculcated in students and for that matter basic school learners. eg.

Strategy	Core
	Competency
Group Work	Collaborative
	learning
Investigation	Critical Thinking
Role Play	Communication

Teaching and learning activities

3.1 Suggest teaching and learning activities for the lesson taking into account GESI issues and demonstrate achievement of LO's and LI's in the curriculum

3.2 Read the activities outlined in the course manual and identify areas that require clarification.

3.3 Brainstorm to come up with some pedagogical approaches and their related core competencies likely to be inculcated in students and for that matter basic school learners.

40 mins

 Reading of assessment opportunities and ensuring they are aligned to the NTEAP and required course assessment: subject project (30%), subject portfolio (30%) and end of semester examination (40%)

Working through one or two activities,

- 3.4 Ask tutors to discuss the assessment strategies to be used during teaching of the lesson 'Assessment as' (NTS 3k), Encourage tutors to discuss the mode of Assessment (working in group or individual by presentation, exercises, project etc)
- Assessment must be aligned to the NTEAP and required course Assessment
- 3.5 Lead tutors to discuss the various ways they can support student teachers to build their portfolio.
- 3.6 Ask a tutor to model a presentation of an activity using ICT tools and taking into consideration GESI issues (eg. Both gender taking the leading roles in their groups and in the demonstration of the use of ICT tools). NTS 1a, b, 2b, e, 3b, c, J; BSC.
- 3.7 Lead tutors to discuss how student teachers can apply the pedagogy developed in the lesson during STS activities in basic schools.

NB

Tutors are likely to ask about the relevance of this activity in teaching mathematics lessons. When this comes up, refer them to PD Manuals: i. that is, Creative Approaches 3.4 Discuss the assessment strategies to be used during teaching of the lesson – 'Assessment as' (NTS 3k). Discuss the mode of Assessment.

- 3.5 Discuss the various ways they can support student teachers to build their portfolio.
- 3.6 Model a presentation of an activity using ICT tools and taking into consideration GESI issues in the lessons. NTS 1a, b, 2b, e, 3b, c, J; BSC.

3.7 Discuss how student teachers can apply the pedagogy developed in the lesson during STS activities in basic schools.

		ii. the core and transferable	
		skills being developed or	
		used include social skills,	
		communication skills,	
		critical and creative	
		thinking skills	
		iii. creative Activities,	
		<u> </u>	
		Questioning, Talk and Learn	
		and Group Work can be	
		used to support the delivery	
		of this session.	
	uidance notes for		
SL	/HoD should		
•	Select activities,		
	linked to CLO and		
	indicators, from the		
	lesson that are likely		
	to be most different		
	from tutors'		
	previous experience.		
	These could involve		
	applying new		
	=		
	content, e.g. from		
	section 2, or		
	approaches to		
	teaching, learning		
	and assessment,		
	incl. gender		
	responsive and		
	inclusive approaches		
•	Identify how any		
	assessments relate		
	to course		
	assessment		
	components		
•	The selected		
	activities should be		
	done with tutors in		
	real or close to real		
	time		
•	Anticipate any		
	issues for		
	clarification or		
	questions which		
	might arise as the		
	tutors work through		
	the activities and		

	provide guidance on			
	these			
•	Identify where, and			
	which, core and			
	transferable skills,			
	including 21 st skills			
	and the use of			
	information			
	technology, are			
	being developed or			
	applied			
•	Makes links to the			
	existing PD Themes			
	with page reference			
	where they can			
	support teaching,			
	for example: action			
	research,			
	questioning and to			
	other external			
	reference material			
•	Identify where			
	power point			
	presentations or			
	other resources			
	need to be			
	developed to			
	support learning			
	and provide			
	guidance			
•	Identify resources			
	required for any			
	TLMs and provide			
	guidance on			
	development of			
	these			
4.	Evaluation and	Reflective Activity	Reflective Activity	5 mins
	Review of session:	4.1 Encourage tutors to	4.1 Share your experience in	
•	identification of any	provide feedback of the	the PD session. Show by	
	outstanding issues	PD session taking into	fingers/nods of 5 or 3 or	
	relating to this	consideration inclusivity –	1 as to those who "really	
	lesson for	how to be patient with	got it", "got some of it"	
	clarification	stutterers, using tactile	or "didn't get it"	
		for the visually	respectively. Explain if	
		challenged, allowing	you really got the lesson.	
		tutors to show by		
		fingers/nods. (NTS 1a, 3i).		

	etc. Ask tutors to show by fingers/nods their level of satisfaction with the session). NTS 1a, 3i.	
	4.2 Engage tutors to identify unresolved issues relating to this lesson for clarification.	4.2 Reflect on the activities in the session and outline unresolved issues relating to the lesson.
In the case of	4.3 Ask tutors in pairs to mention how GESI issues were used in the lesson.	4.3 Mention how GESI issues was used in the lesson
unresolved issues	4.4 Lead tutors to discuss the strategies required to resolve the unresolve issues identified.	4.4 Discuss the strategies you will use to resolve the unresolved issues
Advance Preparation	NB Take note of all unresolved issues and use any of following strategies i. put on SL/SWL WhatsApp, Telegram platform for discussion. ii. tutors to research for the next PD session for discussion	
	Advance Preparation 4.5 Ask tutors to read Lesson 10 of the Course Manual on: a. Early Grade: Fractions 1 b. Upper Grade: Handling Data 1 (Teaching and Assessing) c. JHS (Core): Fractions 1 (Teaching and Assessing) d. JHS (Maths Sp): Numerical Integration: Learning and applying	Advance Preparation 4.5 Read Lesson 10 of the Course Manual on: a. Early Grade: Fractions 1 b. Upper Grade: Handling Data 1 (Teaching and Assessing) c. JHS (Core): Fractions 1 (Teaching and Assessing) d. JHS (Maths Sp): Numerical Integration: Learning and applying
	N/B i. Remind tutors to identify a critical friend from the	N/B Get a critical friend from the same or related discipline to

	same or related discipline to observe during teaching and provide feedback (NTS 1a). ii. Read the course manual, the PD session guide ahead of time to identify any outstanding issues relating to this lesson for clarification. iii. Collect all resources (such as projector, flip chart and sticky notes) you need ahead of time, prepare samples of TLMs you may need and rehearse how these may be used to support the achievement of your goals	observe your lesson during teaching and provide feedback (NTS 1a).	
Course assessment in accordance with the NTEAP: SWL need to review assessment in the course manual to ensure it complies with NTEAP implementation and the 60% continuous assessment and 40 % End of semester examination. This means ensuring: subject project, subject portfolio preparation and development are explicitly addressed in the PD sessions.			

Age Phase/s:

- a. Early Grade
- b. Upper Grade
- c. JHS (Core)
- d. JHS (Maths Sp)

Name of Subject/s:

- a. Mathematics: Teaching and Assessingb. Mathematics: Teaching and Assessing
- c. Teaching and Assessing JHS
- d. Mathematics Calculus

Tutor PD Session for Lesson 10 in the Course Manual

Lesson Title:

- a. Early Grade: Fractions 1
- b. Upper Grade: Handling Data 1 (Teaching and Assessing)
- c. JHS (Core): Fractions 1 (Teaching and Assessing)
- d. JHS (Maths Sp): Numerical Integration: Learning and applying

Focus: the bullet
points provide the
frame for what is to
be done. The
guidance notes in
italics identify the
prompt the SL/HoD
needs and each one
must be addressed

Guidance notes on Leading the session. What the SL/HoDs will have to say during each stage of the session

Guidance Notes on Tutor Activity during the PD Session.

What PD Session participants (Tutors) will do during each state of the session)

Time in session

1. Introduction / lesson overview

- Overview of subject/s age phase/s to be covered in this PD session and how it will be organised. Including guidance on grouping tutors according to the subject/s, age phase/s.
- Reflection on previous PD Session (Introduction to the course manual/s)
- Introduction and overview of the main purpose of the lesson in the course manual/s

Introduction

1.1 Ice breaker activity: Begin with an investigational activity according to the subjects and age phases (e.g. JHS (core): select some fraction (say $\frac{1}{2}$, $\frac{2}{5}$ and $\frac{7}{3}$) to let tutors name them. Pay attention to the exposition for the correct naming of fractions such as one-half for $\frac{1}{2}$, two-fifths for $\frac{2}{5}$ and seventhird $\frac{7}{3}$.

Calculus: using a card board cut out a trapezium with some specified size and find its area and try to approximate to definite integrals.)

Introduction

1.1 Ice breaker activity: Begin with an investigational activity (e.g. JHS (core): select some fraction (say $\frac{1}{2}$, $\frac{2}{5}$ and $\frac{7}{3}$) to let tutors name them. Pay attention to the exposition for the correct naming of fractions such as one-half for $\frac{1}{2}$, twofifths for $\frac{2}{5}$ and seventhird $\frac{7}{2}$. Calculus: using a card board cut out a trapezium with some specified size and find its area and try to approximate to definite integrals.)

- Identification of important or distinctive aspects of the lesson/s
- Reading and discussion of the introductory sections up to learning outcomes
- 1.2 Expose tutors to the overview of the subject age phases to be covered in this PD session and how it will be organised.
- v. Early and JHS (Core)
 lessons focus on developing
 an understanding of
 Teaching and assessing
 early and JHS (core)
 Mathematics especially,
 fractions and its application
 within the basic school
 curriculum.
- vi. Upper primary focuses on developing an understanding of Teaching and Assessing Primary School Mathematics about handling data. The topics to be considered include Collecting, interpreting and presenting data
- vii. JHS (Maths Sp) lesson seeks to develop student teachers' content knowledge and experiences to establish and address their learning needs, perceptions and misconceptions of concepts based on differentiation. The areas to be covered include the definition of derivatives (algebraic properties of derivativessum, difference, product, quotient), as well as, derivatives of polynomial and rational. Special attention will be given to continuity of polynomial and rational functions.
- 1.3 Ask a critical friend to give feedback on observation

1.2 Participate in the discussion on the overview of the subject age phases to be covered in this PD session and how it will be organised.

during the enactment of lesson 9.

N/B: Draw tutors' attention to all NTS references.

- 1.4 Ask tutors to tell how useful the previous PD session was and how it influenced their teaching over the week.
- 1.5 Ask tutors to suggest the purpose of the lesson and state their expectations of the PD Session.
- 1.6 Ask tutors to read the overview of the various courses (of the various phases named above) and discuss the course learning outcomes (CLOs) in groups as appropriate
- 1.7 Guide tutors to establish the linkage between CLOs and the LOs of the lesson
- 1.8 Ask tutors in pairs discuss the important or distinctive aspects of the lesson including vocabulary and fundamental concepts related to the components of the front matters.

Distinctive aspects include the interactive nature of the activities with emphasis on connecting concepts (creating addition facts, Effective assessment skills, key features of the basic school curriculum, applying a topic to real life with other lessons and the use of relevant resources.

- 1.3 As a critical friend, share with members feedback on observation during the teaching of lesson 9.
- 1.4 Explain how useful the previous PD session influenced their teaching over the week.
- 1.5 Engage tutors to suggest the purpose of the lesson and state your expectations of the PD Session.
- 1.6 Read the overview of the various courses (of the various phases) and discuss the course learning outcomes (CLOs) in groups as appropriate
- 1.7 Participate in the identification of the CLOs and link them to the LOs of the lesson
- 1.8 In pairs discuss the distinctive aspects of the lesson including vocabulary and fundamental concepts related to the components of the front matters.

a. Early Grade—eg. The use of TLM to assist student teachers to prepare and identify innovative ways of teaching mathematics, especially, fractions to Early Grade learners.

b. Upper Grade – eq. the use of TLMs and ICT to aid student teachers to prepare and model interactive, and innovative ways of teaching mathematics, especially, collecting and handling data c. JHS (core) – eg. The use of manipulatives, ICT tools, and other TLMs to establish mathematical principles based on addition and subtraction of fractions d. JHS (Math sp) – eg. application of integration to finding areas and volumes in real life situations

1.9 Ask tutors to read and discuss the introductory sections of the lesson (up to Learning Outcomes) and suggest the relevant students' previous knowledge that can support the teaching and learning of the lesson.

N/B

Be ready for likely questions from tutors for clarification. **Anticipated questions:**

- viii. How can an assessment strategy be infused into the learning process of operations on fractions?
- ix. How can the Trapezium and Simpson's rules be

1.9 Read and discuss the introductory sections of the lesson (up to Learning Outcomes) and suggest the relevant students' previous knowledge that can support the teaching and learning of the lesson.

		linked to definite		
		integrals?		
		integrais:		
Th	e guidance notes			
for	SL/HoD need to			
•	Provide short			
	overview of the			
	lesson			
•	Identify important			
	or distinctive			
	features of the			
	lesson			
	Identify			
	assessment,			
	aligned to NTEAP			
•	Anticipate Anticipate			
	questions which			
	might arise from			
	the introduction to			
	the lesson and			
	provide responses			
	for SL/HoD.			
	Issues that			
	prompted			
	questions or			
	discussion during			
	curriculum and			
	course writing			
	may well also be			
	issues for SL/HoD			
2	Concept	Concept Development	Concept Development	25 mins
	Development	2.1 Lead tutors to identify	2.1 Identify familiar and	25 111113
	(New learning	familiar and unfamiliar	unfamiliar concepts in the	
	likely to arise in	concepts in the lesson and	lesson and discuss	
	this lesson):	discuss connections among	connections among	
	tilis lessoilj.	concepts in the lesson.	concepts in the lesson.	
	Identification and	concepts in the lesson.	concepts in the lesson.	
	discussion of	2.2 Engage tutors to identify	2.2 Identify and discuss	
		and discuss various	various strategies for the	
	concepts	strategies for the	development of	
•	Identification of	development of	conceptual understanding	
	possible	conceptual understanding	of	
	challenging areas	of the lesson.		
	in teaching of the	טו נוופ ופאטוו.	a. Early Grade – operations on fractions	
	concept.		b. Upper Grade – Handling of	
•	Identification of		data	
	needed resources		uata	
	for the teaching			

and learning	of
the concept.	

Level	Concept	Strategy
Early	Fractions	Interactive
Child	1	
Upp	Handling	Model
Grade	data	lessons/
		Internet
		search
JHS(Cor	Fractions	Interactive
e)	1(Teachin	and Model
	g and	lessons
	assessing	
)	
JHS(sp)	Trapeziu	Model
	m and	lesson
	Simpsons	
	rules and	
	Definite	
	integrals	

c. JHS (core)- rational numbers and fractions d. JHS (sp)-link between trapezium and Simpson's roles and definite integrals.

2.3 Ask tutors to outline possible challenging areas in the teaching and assessing fractions and handling data and the link between the area of regular shapes and definite integrals taking into consideration GESI

Eg. The use of differentiated instruction to cater for the needs of all children in the early and upper grade and JHS classrooms, including those with special educational needs and creating a safe, secure, happy and stimulating learning environment (NTS 3f, pg. 14).

challenging areas in the teaching and assessing fractions and handling data and the link between the area of regular shapes and definite integrals taking into consideration GESI **GESI**.

2.3 Outline possible

- 2.4 Lead tutors to discuss misconceptions and barriers in teaching and learning of the lesson. Eg a. Early Grade all fractions are always part of 1 and never greater than 1,
 - b. Upper Grade -
 - c. JHS (CORE) Fractions are rational numbers.
 - d. JHS (Math sp) Calculus is for gifted children
- 2.4 Participate in the discussion on misconceptions and barriers in teaching and learning of the lesson.

	2.5 Support tutors to identify	2.5 Identify as many GESI	
	GESI responsive resources such as supporting staff for	responsive resources as possible that can be used	
	sign language, projectors,	in the teaching and	
	flip charts, sticky notes, tactile that can be used in	learning of the concepts in teaching and	
	the teaching and learning	assessment of operations	
	of the concepts mentioned above (e.g. curriculum	on fractions and exploring concepts of limit and	
	materials, teachers and	derivatives of a function	
	leaners resource packs, textbooks, course manual,	NTS 3j	
	etc.) NTS 3j		
	i. Need to identify any aspect		
	of the lesson that might be challenging for tutors in		
	terms of new learning which need to be		
	considered prior to taking		
	tutors through the lessons.		
	ii. Need to identify needed		
	resources well suited for each lesson according to the		
	subject and age phase:		
	where appropriate, indicate the literature page		
	referenced etc., on web,		
	Youtube, powerpoint, physical resources		
Guidance notes for			
SL/HoD should ■ Identify any			
aspect of the			
lesson that might			
be challenging for			
tutors in terms of			
new learning and			
which needs to be			
considered prior to taking tutors			
through the lesson			
activities " walk			
through".			
• The resources			
needed must be			

	T		r
identified:			
literature – page			
referenced etc, on			
web, Utube,			
physical resources,			
power point; how			
they should be used.			
Consideration needs			
to be given to local			
availability			
This section can build			
on the PD needs			
identified from the			
course manuals			
3. Teaching, learning	Teaching and learning	Teaching and learning	40 mins
and assessment	activities	activities	
activities for the	3.1 Ask tutors to suggest	3.1 Suggest teaching and	
lesson	teaching and learning	learning activities for the	
 Reading of 	activities for the lesson	lesson taking into account	
teaching and	taking into account GESI	GESI issues.	
learning activities	issues.		
and identification	eg.		
of areas that	i. Provision made for physically		
	challenged		
require			
clarification	ii. Both genders take leading		
 Reading of 	roles in group task		
assessment	iii. Even distribution of		
opportunities and	questions		
ensuring they are	Ref: Writing the weekly PD		
aligned to the	session-pp 3., NTS 1a, b, c, d,		
NTEAP and	2b, e, f, 3b, c		
required course			
assessment:	3.2 Let tutors read the	3.2 Read the activities	
subject project	activities outlined in the	outlined in the course	
(30%), subject	course manual and identify	manual and identify areas	
portfolio (30%)	areas that require	that require clarification.	
and end of	clarification.		
semester	Strategies to clarify the		
examination (40%)	otherwise dark spots may		
Working through	include investigation, internet		
	search, etc.		
one or two	Jearen, etc.		
activities,	3.3 Lead tutors to brainstorm	2 2 Prainstorm to come un	
		3.3 Brainstorm to come up	
	to come up with some	with some pedagogical	
	pedagogical approaches	approaches and their	
	and their related core	related core	
	competencies likely to be	competencies likely to be	
	inculcated in students and	inculcated in students	

for that matter basic school learners. eg.

Strategy	Core Competency
Group Work	Collaborative learning
Investigation	Critical Thinking
Role Play	Communication

3.4 Ask tutors to discuss the assessment strategies to be used during teaching of the lesson. (NTS 3k).

Assessment must be aligned to the NTEAP and required course Assessment to include subject project (30%), subject portfolio (30%) and end of semester examination (40%)

- 3.5 Lead tutors to discuss the various ways they can support student teachers to build their portfolio and subject projects.
- 3.6 Ask tutors to model a presentation of an activity using ICT tools and taking into consideration GESI issues (eg. Both gender taking the leading roles in their groups and in the demonstration of the use of ICT tools) in the lesson; shapes, space and measurement (Teaching and Assessing) and integration. NTS 1a, b, 2b, e, 3b, c, J; BSC pp. iii)

Note

 Select activities, linked to CLO and indicators, from the lesson that are likely to

- and for that matter basic school learners.
- 3.4 Engage tutors to discuss the assessment strategies to be used during teaching of the lesson (NTS 3k).

- 3.5 Engage tutors to discuss the various ways they can support student teachers to build their portfolio
- 3.6 Engage tutors to model a presentation of an activity using ICT tools and taking into consideration GESI issues in the lessons; shapes, space and measurement (Teaching and Assessing) and integration. NTS 1a, b, 2b, e, 3b, c, J; BSC pp. iii)

			be most different from	
			tutors	
		ii.	The selected activities	
			should be done with tutors	
			in real or close to real time	
		iii.	Identify where, and which,	
			core and transferable skills,	
			including 21st skills and the	
			use of information skills	
Gu	idance notes for		, , , , , , , , , , , , , , , , , , , ,	
	/HoD should			
•	Select activities,			
	linked to CLO and			
	indicators, from			
	the lesson that are			
	likely to be most			
	different from			
	tutors' previous			
	experience. These			
	could involve			
	applying new			
	content, e.g. from			
	section 2, or			
	approaches to			
	teaching, learning			
	and assessment,			
	incl. gender			
	responsive and			
	inclusive			
	approaches			
•	Identify how any			
	assessments			
	relate to course			
	assessment			
•	components The selected			
	activities should			
	be done with			
	tutors in real or			
1_	close to real time			
•	Anticipate any			
	issues for			
	clarification or			
	questions which			
	might arise as the			
	tutors work			
	through the			

		T		T .
activitie				
provide	guidance			
on thes	e			
 Identify 	where,			
and wh	ich, core			
and tra	nsferable			
skills, ir	cluding			
21 st skil	Is and the			
use of i	nformation			
technol	ogy, are			
being d	eveloped			
or appli	ied			
	links to the			
existing	ı PD			
_	with page			
	ce where			
_	n support			
teachin				
	e: action			
researc				
	ning and to			
other ex	_			
	ce material			
 Identify 				
power				
1	ations or			
<u>-</u>	esources			
need to				
develop				
	t learning			
and pro	_			
guidan				
_				
	resources			
-	d for any nd provide			
quidan	•			
1				
these	ment of			
4. Evaluati	an and	Doffostivo Astivity	Deflective Activity	r mine
	on and of session:	Reflective Activity	Reflective Activity	5 mins
		4.1 Ask tutors to identify the	4.1 Engage the tutors to	
	cation of	assessment components of the lesson in the new	identify the assessment	
=	standing		components of the lesson	
	elating to	course manual focusing on	in the new course manual	
this less		Assessment of, as and for	focusing on assessment	
clarifica		to reflect the demands of	of, as and for to reflect	
Advanc		the NTEAP in	the demands of the	
prepara	ation	a. Early Grade – Lesson 10.	NTEAP in	

- In the case of unresolved issues
- b. Upper Grade Lesson 10c. JHS; Assessment Lesson 10d. JHS; Euclidean Lesson 10
- b. Upper Grade Lesson 10
 c. JHS; Assessment Lesson 10
 d. JHS; Euclidean Lesson 10

a. Early Grade – Lesson 10.

- 4.2 Ask tutors to show by fingers/nods their level of satisfaction with the session. (NTS 1a, 3i).
- 4.2 Show by fingers/nods of 5 or 3 or 1 as to those who "really got it", "got some of it" or "didn't get it" respectively. Explain if you really got the lesson.
- 4.3 Engage tutors to identify unresolved issues relating to this lesson for clarification
- 4.3 Reflect on the activities in the session and outline unresolved issues relating to the lesson

Take note of all unresolved issues and use any of following strategies

- put on SL/SWL WhatsApp platform for discussion
- tutors to research for the next PD session for discussion
- 4.4 Lead tutors to discuss the various ways they can support student teachers to build their portfolio
- 4.4 Discuss the various ways they can support student teachers to build their portfolio

Advance Preparation

4.5 Ask tutors to read Lesson 11 of the Course Manual on:

Early Grade -

Fraction 2

Upper Primary - Handling Data 2

JHS (core)- Fraction 2 JHS (sp) — Application of Integration: Learning and applying

Advance Preparation

4.5 Read Lesson 11 of the Course Manual on:

Early Grade Fraction 2
Upper Primary - Handling
Data 2
JHS (core)- Fraction 2
JHS (sp) — Application of
Integration: Learning and
applying

	n/B a. Remind tutors to identify a critical friend from the same or related discipline to observe during teaching and provide feedback (NTS 1a). b. Read the course manual, the PD session guide ahead of time to identify any outstanding issues relating to this lesson for clarification. c. Collect all resources (such as projector, flip chart and sticky notes) you need ahead of time, prepare samples of TLMs you may need and rehearse how these may be used to support the achievement of your goals	N/B Get a critical friend from the same or related discipline to observe your lesson during teaching and provide feedback (NTS 1a).
Course assessment in accordance with the NTEAP: SWL need to review assessment in the course manual to ensure it complies with NTEAP implementation and the 60% continuous assessment and 40 % End of semester examination. This means ensuring: subject project, subject portfolio preparation and development are explicitly addressed in the PD sessions.		

Age Phase/s:

- a. Early Grade
- b. Upper Grade
- c. JHS (Core)
- d. JHS (Maths Sp)

Name of Subject/s:

- a. Mathematics: Teaching and Assessing b. Mathematics: Teaching and Assessing
- c. Teaching and Assessing JHS
- d. Mathematics Calculus

Tutor PD Session for Lesson 11 in the Course Manual

Lesson Tittle:

- a. Early Grade Fractions 2
 b. Upper Grade Fractions 2

course manual/s

b. Upper Grade - Fractions 2					
c. JHS (CORE) - Fractions 2 d. JHS (SP) - Applications of integration: Learning and applying					
d. JHS (SP) - Applica	ations of integration, tearning at	ια αρριγιτικ			
Focus: the bullet	Guidance notes on Leading	Guidance Notes on Tutor	Time in		
points provide the	the session. What the	Activity during the PD Session.	session		
frame for what is to	SL/HoDs will have to say	What PD Session participants			
be done. The	during each stage of the	(Tutors) will do during each			
guidance notes in	session	state of the session)			
italics identify the					
prompt the SL/HoD					
needs and each one					
must be addressed					
1. Introduction /	Introduction	Introduction			
lesson overview	1.1 Ice breaker activity: Begin	1.1 I am a number; my			
 Overview of 	with an investigational	numerator is the square of			
subject/s age	activity such as a riddle.	the even-prime number			
phase/s to be	eg. I am a number; my	and my denominator is half			
covered in this PD	numerator is the square	the 2nd power of ten. Who			
session and how it	of the even-prime number	am I?			
will be organised.	and my denominator is				
Including guidance	half the 2nd power of ten.				
on grouping tutors	Who am I?				
according to the					
subject/s, age	1.2 Ask tutors to tell how	1.2 Tell how useful the			
phase/s.	useful the previous PD	previous PD session was			
 Reflection on 	session was and how it	and how it influenced your			
previous PD	influenced their teaching	teaching over the week and			
Session	over the week and how	how students were well			
(Introduction to	students were well placed	placed to employ the			
the course	to employ the various	various concepts and skills			
manual/s)	concepts and skills during	during STS field experience.			
Introduction and	STS field experience.				
overview of the					
main purpose of	1.3 Ask a critical friend to	1.3 As a critical friend, give			
the lesson in the	give feedback on his/her	feedback on your			

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observation of the last

- Identification of important or distinctive aspects of the lesson/s
- Reading and discussion of the introductory sections up to learning outcomes
- enacted lesson for the whole group to deliberate.

N/B: Draw tutors' attention to all NTS references.

- challenges that arose during the enactment of the previous lesson and how they were resolved. Eg. In what ways did the students appreciate the need to consider equality and equity during the lesson and during STS activities?
- 1.5 Ask tutors to read the course manual and identify the purpose and learning outcomes of the lesson for the day. Ask members to state their expectations of the PD Session on lesson 11. NTS 2b.
- 1.6 Lead tutors in pairs to discuss the important or distinctive aspects of lesson 11 such as vocabulary and fundamental concepts related to the lesson including GESI and ICT issues.

Distinctive aspects include the interactive nature of the activities, emphasizing on connecting concepts: a. Early Grade— eg. Multiplication and division of fractions and connecting common and decimal fractions and percent. observation of the previous enacted lesson.

N/B: Pay attention to all NTS references.

1.4 Discuss any challenges that arose during the enactment of the previous lesson and how they were resolved.

- 1.5 Read the course manual and identify the purpose of the lesson (NTS 2b) and state your expectations of the PD Session.
- 1.6 In pairs, discuss the important or distinctive aspects of lesson 11 such as vocabulary and fundamental concepts related to the lesson including GESI and ICT issues.

b. Upper Grade—eg. Multiplication and division of fractions and connecting common and decimal fractions and percent. c. J.HS (Core) – eg. Multiplication and division of fractions and connecting common and decimal fractions and connecting common and decimal fractions and percent. d. J.HS; Calculus – eg. Areas under curves and volumes of solids of revolution 1.7 Ask tutors to read individually and discuss in the whole group introductory sections of the lesson (up to Learning Outcomes). N/B Be ready for likely questions from tutors for clarification. Anticipated questions: iv. In what everyday life situation can the connections between common fractions, decimals and percentages be seen? v. What formular will be used for the area under the curve? The guidance notes for SI/HOD need to Provide short overview of the lesson Identify important or distinctive features of the lesson Identify assessment, aligned to NTEAP Anticipate questions which				
Anticipate	for SL/HoD need to Provide short overview of the lesson Identify important or distinctive features of the lesson Identify assessment,	Multiplication and division of fractions and connecting common and decimal fractions and percent. c. JHS (Core) – eg. Multiplication and division of fractions and connecting common and decimal fractions and percent. d. JHS; Calculus – eg. Areas under curves and volumes of solids of revolution 1.7 Ask tutors to read individually and discuss in the whole group introductory sections of the lesson (up to Learning Outcomes). N/B Be ready for likely questions from tutors for clarification. Anticipated questions: iv. In what everyday life situation can the connections between common fractions, decimals and percentages be seen? v. What formular will be used for the area under	discuss the introductory sections of the lesson in the whole group (up to	
	aligned to NTEAP			
	 Anticipate questions which 			

•	might arise from the introduction to the lesson and provide responses for SL/HoD. Issues that prompted questions or discussion during curriculum and course writing may well also be issues for SL/HoD			
2.	Concept	Concept Development	Concept Development	25 mins
	Development	2.1 Ask tutors to identify	2.1 Identify familiar and	
•	(New learning likely to arise in this lesson):	familiar and unfamiliar concepts in their lessons and discuss with the larger group.	unfamiliar concepts in their lessons and discuss with the larger group.	
•	discussion of concepts Identification of possible challenging areas in teaching of the concept. Identification of needed resources for the teaching and learning of	2.2 Lead tutors to draw connections among concepts in the various lessons in line with the basic school curriculum. Refer to B.ED course manual and BSC B1.1.3.1, B2.1.3.1, B3.1.3.1, B4.1.3.1, B5.1.3.1, B6.1.3.1	2.2 Draw connections among concepts in the various lessons in B.ED course manual in line with the basic school curriculum. Refer to BSC B1.1.3.1, B2.1.3.1, B3.1.3.1, B4.1.3.1, B5.1.3.1, B6.1.3.1	
	the concept.	2.3 Using think-pair-share, ask tutors to outline possible challenging areas in teaching and assessing fractions (in EGE, UPE, JHS Core) and Applications of integration in JHS (SP). Take into consideration GESI (eg. Use motivating statements for all manner of students)	2.3 Through think-pair-share, outline possible challenging areas in teaching and assessing Fractions (in EGE, UPE, JHS Core) and Applications of integration in JHS (SP). Take into consideration GESI.	
		2.4 Ask tutors to suggest creative approaches for	2.4 Mention creative approaches for addressing the identified challenges.	

addressing the identified challenges. Eg. Using group work, the principle of multiple embodiment, problem solving, internet search. 2.5 Lead tutors to discuss 2.5 Discuss barriers and barriers and misconceptions in teaching misconceptions in and learning of the lesson. teaching and learning of the lesson. Example: a. Early/Upper/JHS (Core) Grade – "To multiply a whole number by a fraction, we multiply the whole number by both the numerator and the denominator" b. JHS (Calculus) -"Integration cannot be applied in everyday life activity". **Barrier:** Appropriate inclusive resources Technology Pre-requisite knowledge 2.6 Identify GESI responsive 2.6 Focusing on one Phase at resources that can be used a time, ask tutors to identify GESI responsive to achieve the LOs. resources that can be used to achieve the LOs. N/B: Such resources include supporting staff for sign language, projectors, flip charts, sticky notes, tactile that can be used in the teaching and learning of the concepts mentioned above. other materials are ludu dice, graph sheets, news prints, exams score sheets and

curriculum materials) NTS 3j

Gu	idance notes for			
	/HoD should			
SL				
•	Identify any			
	aspect of the			
	lesson that might			
	be challenging for			
	tutors in terms of			
	new learning and			
	which needs to be			
	considered prior			
	to taking tutors			
	through the lesson			
	activities " walk			
	through".			
	The resources			
	needed must be			
	identified:			
	literature – page			
	referenced etc, on web, Utube,			
	physical resources,			
	power point; how			
	they should be used.			
	Consideration needs			
	to be given to local			
	availability			
Th	is section can build			
on	the PD needs			
	entified from the			
	urse manuals			
	Teaching, learning	Teaching and learning	Teaching and learning	40 mins
"	and assessment	activities	activities	
	activities for the	3.1 Ask tutors to suggest	3.1 Suggest teaching and	
	lesson	teaching and learning	learning activities useful for	
		activities useful for	achieving the learning	
•	Reading of		outcomes of the lesson	
	teaching and	achieving the learning		
	learning activities	outcomes of the lesson	taking into account GESI.	
	and identification	taking into account GESI.		
	of areas that	eg.		
	require	i. Provision made for		
	clarification	physically challenged		
•	Reading of	during grouping		
	assessment	ii. Both genders take leading		
	opportunities and	roles in group task		
	ensuring they are	iii. Even distribution of		
	aligned to the	questions		
	NTEAP and	NTS 1a, b, c, d, 2b, e, f, 3b, c,		
	required course	BSC p. iii)		
	242 20. 200.00	. ,	<u>l</u>	ı

- assessment: subject project (30%), subject portfolio (30%) and end of semester examination (40%)
- Working through one or two activities,
- 3.2 Ask tutors to read the activities outlined in the course manual and identify areas that require clarification.
- **N/B:** Strategies to clarify the otherwise dark spots may include investigation, internet search, etc.
- 3.3 Lead tutors through brainstorming to come up with some pedagogical approaches and their related core competencies likely to be inculcated in students and for that matter Basic School learners.

Example:
Group Work - Collaborative
learning
Investigation - Critical
Thinking
Role Play - Communication
Students can ascertain the
extent to which methods are
used during STS activities in

schools.

3.4 Ask tutors to discuss the assessment strategies to be used during teaching of the lesson – 'Assessment as' (NTS 3k) and group work presentation.

N/B: Assessment must be aligned to the NTEAP and required course. Continuous assessment activities (assignments, quizzes, group presentations, etc, should be used to create subject projects and build subject portfolios

3.2 Read the activities outlined in the course manual and identify areas that require clarification.

3.3 Brainstorm to come up with some pedagogical approaches and their related core competencies likely to be inculcated in students and for that matter Basic School learners.

3.4 Discuss the assessment strategies to be used during teaching of the lesson – 'Assessment as' (NTS 3k) and group work presentation.

		3.5 Lead tutors to discuss the	3.5 Discuss the various ways	
		various ways they can	they can support student	
		support student teachers	teachers to build their	
		to build their project and	portfolio	
		portfolio before, during		
		and after lessons.		
		3.6 Ask a tutor to model a	3.6 Model a presentation of an	
		presentation of an activity	activity using ICT tools and	
		using ICT tools and taking	taking into consideration	
		into consideration GESI	GESI issues. NTS 1a, b, 2b,	
		issues (eg. Allowing	e, 3b, c, J; BSC pp. iii	
		students to demonstrate		
		the use of ICT tools and		
		ensuring both gender take		
		the leading roles in their		
		groups) NTS 1a, b, 2b, e,		
		3b, c, J; BSC pp. iii		
		2.7 With the help of a Losson	2.7 With the help of Lesson	
		3.7 With the help of a Lesson	3.7 With the help of Lesson	
		Observation Guide, lead tutors to reflect on the	Observation Guide, reflect on the modelled lesson	
			on the modelled lesson	
<u> </u>	idanaa nataa far	modelled lesson		
	iidance notes for /HoD should			
J.				
•	Select activities,			
	linked to CLO and			
	indicators, from			
	the lesson that are			
	likely to be most			
	different from			
	tutors' previous			
	experience. These			
	could involve			
	applying new			
	content, e.g. from			
	section 2, or			
	approaches to			
	teaching, learning			
	and assessment,			
	incl. gender			
	responsive and			
	inclusive			
	approaches			
•	Identify how any			
	assessments			
	relate to course			
	. CIGIC TO COULSE	i e	ı	

assessment	
components	
The selected	
activities should	
be done with	
tutors in real or	
close to real time	
Anticipate any	
issues for	
clarification or	
questions which	
might arise as the	
tutors work	
through the	
activities and	
provide guidance	
on these	
• Identify where,	
and which, core	
and transferable	
skills, including	
21 st skills and the	
use of information	
technology, are	
being developed	
or applied	
existing PD	
Themes with page	
reference where	
they can support	
teaching, for	
example: action	
research,	
questioning and to	
other external	
reference material	
Identify where	
power point	
presentations or	
other resources	
need to be	
developed to	
support learning	
and provide	
guidance	

		I	T	T
•	Identify resources required for any			
	TLMs and provide			
	guidance on			
	development of			
	these			
4.	Evaluation and	Evaluation and review of	Evaluation and review of	5 mins
	review of session:	session:	session:	
•	identification of	4.1 Encourage tutors to	4.1 Show by fingers/ nods of 5	
	any outstanding	provide feedback of the	or 3 or 1 as to those who	
	issues relating to	PD session taking into	"really got it", "got some of	
	this lesson for	consideration inclusivity –	it" or "didn't get it"	
	clarification	how to be patient with	respectively. Explain if you	
•	Advance	stutterers, using tactile	really got the lesson.	
	preparation	for the visually		
•	In the case of	challenged, allowing		
	unresolved issues	tutors to show by		
		fingers/nods. (NTS 1a, 3i).		
		4.2 Ask tutors to come out	4.2 Reflect on the activities in	
		with unresolved issues	the session and outline	
		relating to this lesson for	unresolved issues relating	
		clarification.	to the lesson	
		N/B:		
		Take note of all unresolved		
		issues and use any of		
		following strategies		
		put on SL WhatsApp		
		platform for discussion		
		 tutors to research for the 		
		next PD session for		
		discussion		
		4.3 Ask tutors to read Lesson	4.3 Read the next lesson	
		12 of the Course Manual	(Lesson 12) of the Course	
		before the next PD	Manual on:	
		session.	Early Grade - End of Semester	
		Early Grade - End of	Review (Lessons 1-11)	
		Semester Review (Lessons 1-	Upper Primary - End of Semester Review (Lessons 1-	
		11)	11)	
		Upper Primary - End of Semester Review (Lessons 1-	JHS(Core) - End of Semester	
		11)	Review (Lessons 1-11)	
		JHS(Core) - End of Semester	JHS Calculus - Applications of	
		Review (Lessons 1-11)	integration 2: Learning and	
		11CVICVV (LC330113 I II)	applying	
			, 5	

	JHS Calculus - Applications of	
	integration 2: Learning and	
	applying	
	N/B	N/B
	XXI. Remind tutors to identify	Get a critical friend from the
	a critical friend from the	same or related discipline to
	same or related	observe your lesson during
	discipline to observe	teaching and provide feedback
	during teaching and	(NTS 1a).
	provide feedback (NTS	
	1a).	
	XXII. Read the course manual,	
	the PD session guide ahead of time to identify	
	any outstanding issues	
	relating to the lesson for	
	clarification.	
	xxIII. Collect all inclusive	
	resources (such as	
	projector, flip chart and	
	sticky notes) you need	
	ahead of time, prepare	
	samples of TLMs you	
	may need and rehearse	
	how these may be used	
	to support the achievement of your	
	goals	
Course assessment in	900.0	
accordance with the		
NTEAP: SWL need to		
review assessment in		
the course manual to		
ensure it complies		
with NTEAP		
implementation and the 60% continuous		
assessment and 40 %		
End of semester		
examination. This		
means ensuring:		
subject project,		
subject portfolio		
preparation and		
development are		

explicitly addressed	
in the PD sessions.	

Age Phase/s:

- a. Early Grade
- b. Upper Grade
- c. JHS (Core)
- d. JHS (Maths Sp)

Name of Subject/s:

a. Mathematics: Teaching and Assessingb. Mathematics: Teaching and Assessing

c. Teaching and Assessing JHS

d. Mathematics – Calculus

Tutor PD Session for Lesson 12 in the Course Manual

points provide the frame for what is to be done. The guidance notes in italics identify the prompt the SL/HoD needs and each one must be addressed 1. Introduction / lesson overview • Overview of subject/s age phase/s to be covered in this PD session and how it will be organised. Including guidance on grouping tutors according to the subject/s, age phase/s. • Reflection on previous PD Session the session. What PD Session participants (Tutors) will do during each state of the session) Introduction 1.1 Ice breaker activity: Begin with an investigational activity according to the subjects and age phases (e.g. numbers and their application in figures) 1.2 Expose tutors to the overview of the subject age phases to be covered in this PD session and how it will be organised. Introduction 1.1 Ice breaker activity: Begin with an investigational activity according to the subjects and age phases e.g. numbers and their application in figures) 1.2 Expose tutors to the overview of the subject age phases to be covered in this PD session and how it will be organised. Introduction 1.1 Ice breaker activity: Begin with an investigational activity according to the subjects and age phases e.g. numbers and their application in figures) 1.2 Participate in the discussion on the overview of the subject age phases to be covered in this PD session and how it will be organised. Introduction 1.1 Ice breaker activity: Begin with an investigational activity according to the subjects and age phases e.g. numbers and their application in figures)	b. Upper Grade: c. JHS (Core):	a. Early Grade: Revision of Mathematics: Teaching and Assessingb. Upper Grade: Revision of Mathematics: Teaching and Assessing				
italics identify the prompt the SL/HoD needs and each one must be addressedIntroductionIntroduction1. Introduction / 	points provide the frame for what is be done. The	the session. What the SL/HoDs will have to say during each	Activity during the PD Session. What PD Session participants	Time in session		
 lesson overview Overview of subject/s age phase/s to be covered in this PD session and how it will be organised. Including guidance on grouping tutors according to the subject/s, age phase/s. Reflection on previous PD Session Ice breaker activity: Begin with an investigational activity according to the subjects and age phases (e.g. numbers and their application in figures) 1.1 Ice breaker activity: Begin with an investigational activity according to the subjects and age phases e.g. numbers and their application in figures) 1.2 Expose tutors to the overview of the subject age phases to be covered in this PD session and how it will be organised. Reflection on previous PD Session In this PD session and how it will be organised. Viii. Early and upper grade and JHS (Core) lessons focus on 	italics identify the prompt the SL/Ho needs and each o	e				
the course manual/s) Introduction and overview of the main purpose of challenges in teaching and assessing at the phases in the semester within the basic school curriculum. ix. JHS (Maths Sp) lesson	 lesson overview of subject/s age phase/s to be covered in this session and howill be organis Including guid on grouping to according to the subject/s, age phase/s. Reflection on previous PD Session (Introduction the course manual/s) Introduction a overview of the 	1.1 Ice breaker activity: Begin with an investigational activity according to the subjects and age phases (e.g. numbers and their application in figures) 1.2 Expose tutors to the overview of the subject age phases to be covered in this PD session and how it will be organised. 1.2 Expose tutors to the overview of the subject age phases to be covered in this PD session and how it will be organised. 1.3 Early and upper grade and JHS (Core) lessons focus on topics student teachers had challenges in teaching and assessing at the phases in the semester within the basic school curriculum.	 1.1 Ice breaker activity: Begin with an investigational activity according to the subjects and age phases e.g. numbers and their application in figures) 1.2 Participate in the discussion on the overview of the subject age phases to be covered in this PD session and how it will be organised. 			

- Identification of important or distinctive aspects of the lesson/s
- Reading and discussion of the introductory sections up to learning outcomes
- integration: teaching applying.
- 1.3 Ask a critical friend to give feedback on observation during the semester. N/B: Draw tutors' attention to all NTS references.
- 1.4 Ask tutors to tell how useful the PD sessions for the semester were and how they influenced their teaching in the semester.
- 1.5 Ask tutors to suggest the purpose of the lesson and state their expectations of the PD Session.
- 1.6 Ask tutors to read the overview of the various courses (of the various phases named above) and discuss the course learning outcomes (CLOs) in groups as appropriate
- 1.7 Guide tutors to establish the linkage between CLOs and the LOs of the lessons to be revised
- 1.8 Ask tutors in pairs to discuss the important or distinctive aspects of the lesson including vocabulary and fundamental concepts related to the components of the front matters.

Distinctive aspects include the interactive nature of the activities with emphasis on connecting concepts on lessons to be revised (creating addition

- 1.3 As a critical friend, share with members feedback on observation during the teaching in the semester.
 N/B: Pay attention to all NTS references.
- 1.4 Explain how useful the PD sessions of the semester were and how they influenced their teaching in the semester.
- 1.5 Suggest the purpose of the lesson and state your expectations of the PD Session.
- 1.6 Read the overview of the various courses (of the various phases named above) and discuss the course learning outcomes (CLOs) in groups as appropriate
- 1.7 Participate in the identification of the CLOs and link them to the LOs of the lessons to be revised
- 1.8 In pairs, discuss the distinctive aspects of the lesson including vocabulary and fundamental concepts related to the components of the front matters.

facts, Effective assessment skills, key features of the basic school curriculum, applying a topic to real life with other lessons and the use of relevant resources.

- a. Early Grade— eg. the use of TLMs to develop understanding of identified lessons to be revised. b. Upper Grade eg. Activation of group project work, ICT and TLM to help student teachers develop understanding of identified lessons to be revised
- c. JHS (core) eg. Activation of group project work, ICT and TLM to help student teachers develop understanding of identified lessons to be revised d. JHS (Math sp) eg. More examples of application of integration to finding areas and volumes in real life situations
- 1.9 Ask tutors to read and discuss the introductory sections of the lesson (up to Learning Outcomes) and suggest the relevant students' previous knowledge that can support the teaching and learning of the lessons to be revised.

N/B

Be ready for likely questions from tutors for clarification.

Anticipated questions:

x. What if a students is not following ALL topics thought? 1.9 Read and discuss the introductory sections of the lesson (up to Learning Outcomes) and suggest the relevant students' previous knowledge that can support the teaching and learning of the lessons to be revised.

Th	e guidance notes			
fo	r SL/HoD need to			
•	Provide short			
	overview of the			
	lesson			
•	Identify important			
	or distinctive			
	features of the			
	lesson			
•	Identify			
•	assessment,			
	aligned to NTEAP			
	_			
•	Anticipate			
	questions which			
	might arise from			
	the introduction to			
	the lesson and			
	provide responses			
	for SL/HoD.			
•	Issues that			
	prompted			
	questions or			
	discussion during			
	curriculum and			
	course writing			
	may well also be			
	issues for SL/HoD			
2.	Concept	Concept Development	Concept Development	25 mins
	Development	2.1 Lead tutors to identify	2.1 Identify familiar and	
	(New learning	familiar and unfamiliar	unfamiliar concepts in the	
	likely to arise in	concepts in the lessons and	lessons and discuss	
	this lesson):	discuss connections among	connections among	
		concepts in the lessons to	concepts in the lesson to	
•	Identification and	be revised.	be revised.	
	discussion of			
	concepts	2.2 Ask tutors to outline	2.2 Outline possible	
•	Identification of	possible challenging areas	challenging areas in the	
	possible	in the lessons to be revised	lessons to be revised	
	challenging areas	taking into consideration	taking into consideration	
	in teaching of the	GESI	GESI.	
	concept.	Eg. The use of differentiated		
•	Identification of	instruction to cater for the		
	needed resources	needs of all children in the		
	for the teaching	early and upper grade and		
	and learning of the	JHS classrooms, including		
	concept.	those with special educational		
		needs and creating a safe,		

	,	_	
	secure, happy, and stimulating learning environment (NTS 3c 3f, pg. 14).		
	2.3 Lead tutors to discuss misconceptions and barriers in teaching and learning of the lessons identified for each of the phases.	2.3 Participate in the discussion on misconceptions and barriers in teaching and learning of the lesson.	
	2.4 Support tutors to identify GESI responsive resources such as supporting staff for sign language, projectors, flip charts, sticky notes, tactile that can be used in the teaching and learning of the concepts mentioned above (e.g. curriculum materials, teachers and leaners resource packs, textbooks, course manual, etc.) NTS 3j	2.4 Identify as many GESI responsive resources as possible that can be used in the lessons to be revised NTS 3j	
	 i. Need to identify any aspect of the lessons to be revised that might be challenging for tutors in terms of new learning which need to be considered prior to taking tutors through the lessons. This could have been noted during the semester ii. Need to identify needed 		
	resources well suited for each lesson to be revised.		
Guidance notes for SL/HoD should Identify any aspect of the lesson that might be challenging for tutors in terms of new learning and which needs to be	cuentesson to be revised.		

	considered prior			
	to taking tutors			
	through the lesson			
	activities " walk			
	through".			
•	The resources			
	needed must be			
	identified:			
	•			
	literature – page referenced etc, on			
	web, Utube,			
	physical resources,			
	power point; how			
	they should be used.			
	Consideration needs			
	to be given to local			
	availability			
Th	is section can build			
	the PD needs			
	entified from the			
	urse manuals			
	Teaching, learning	Teaching and learning	Teaching and learning	40 mins
J .	and assessment	activities	activities	40 1111113
	activities for the	3.1 Ask tutors to suggest	3.1 Suggest teaching and	
	lesson	teaching and learning	learning activities for the	
1_		activities for the lessons to	_	
•	Reading of		lesson to be revised taking	
	teaching and	be revised taking into	into account GESI issues.	
	learning activities	account GESI issues.		
	and identification	eg.		
	of areas that	i. Provision made for		
	require	physically challenged		
	clarification	ii. Both genders take leading		
•	Reading of	roles in group task		
	assessment	iii. Even distribution of		
	opportunities and	questions		
	ensuring they are	Ref: Writing the weekly PD		
	aligned to the	session-pp 3., NTS 1a, b, c, d,		
	NTEAP and	2b, e, f, 3b, c		
	required course			
	assessment:	3.2 Ask tutors read the	3.2 Read the activities	
	subject project	activities outlined in the	outlined in the course	
	(30%), subject	course manual and identify	manual and identify areas	
	portfolio (30%)	areas that require	that require clarification.	
	and end of	clarification.	and require ciarmenton.	
	semester	Strategies to clarify the		
	examination (40%)	otherwise dark spots may		
		include investigation, internet search, etc.		

	T		
Working through one or two activities,	3.3 Ask tutors to discuss the assessment strategies to be used during teaching of the lessons to be revised (NTS 3k). Assessment must be aligned to the NTEAP and required course Assessment to include subject project (30%), subject portfolio (30%) and end of semester examination (40%)	3.3 Discuss the assessment strategies to be used during teaching of the lessons to be revised (NTS 3k).	
	3.4 Lead tutors to discuss the various ways they can support student teachers to build their portfolio and subject projects.	3.4 Engage tutors to discuss the various ways they can support student teachers to build their portfolio	
	3.5 Ask tutors to model a presentation of an activity using ICT tools and taking into consideration GESI issues (eg. Both gender taking the leading roles in their groups and in the demonstration of the use of ICT tools) in the lessons to be revised. NTS 1a, b, 2b, e, 3b, c, J; BSC pp. iii)	3.5 Engage tutors to model a presentation of an activity using ICT tools and taking into consideration GESI issues in the lessons to be revised. NTS 1a, b, 2b, e, 3b, c, J; BSC pp. iii)	
	i. Select activities, linked to CLO and indicators, from the lessons to be revised that are likely to be most different from tutors ii. The selected activities should be done with tutors in real or close to real time iii. Identify where, and which, core and transferable skills, including 21st skills and the use of information skills		
Guidance notes for SL/HoD should • Select activities, linked to CLO and			

		1
	indicators, from	
	the lesson that are	
	likely to be most	
	different from	
	tutors' previous	
	experience. These	
	could involve	
	applying new	
	content, e.g. from	
	section 2, or	
	approaches to	
	teaching, learning	
	and assessment,	
	incl. gender	
	responsive and	
	inclusive	
	approaches	
•	Identify how any	
	assessments	
	relate to course	
	assessment	
	components	
•	The selected	
	activities should	
	be done with	
	tutors in real or	
	close to real time	
•	Anticipate any	
	issues for	
	clarification or	
	questions which	
	might arise as the	
	tutors work	
	through the	
	activities and	
	provide guidance	
	on these	
•	Identify where,	
•	and which, core	
	and transferable	
	skills, including 21 st skills and the	
	use of information	
	technology, are	
	being developed	
	or applied	

•	Makes links to the			
	existing PD			
	Themes with page			
	reference where			
	they can support teaching, for			
	example: action			
	research,			
	questioning and to			
	other external			
	reference material			
•	Identify where			
	power point			
	presentations or			
	other resources			
	need to be			
	developed to support learning			
	and provide			
	guidance			
•	Identify resources			
	required for any			
	TLMs and provide			
	guidance on			
	development of			
_	these	Deflective Activity	Deflective Activity	Funina
4.	Evaluation and review of session:	Reflective Activity 4.1 Lead tutors in self-	Reflective Activity 4.1 Engage tutors in self-	5 mins
•	identification of	evaluation as well as	evaluation as well as	
	any outstanding	encourage tutors to	encourage tutors to	
	issues relating to	provide feedback of the PD	provide feedback of the	
	this lesson for	session taking into	PD session taking into	
	clarification	consideration inclusivity	consideration inclusivity	
•	Advance	(NTS 1a, 3i).	(NTS 1a, 3i).	
	preparation	425	4.2 Deflect and 1	
•	In the case of	4.2 Engage tutors to identify	4.2 Reflect on the activities in the session and outline	
	unresolved issues	unresolved issues relating to this lesson for	unresolved issues relating	
		clarification	to the lesson	
		Take note of all unresolved		
		issues and use any of following		
		strategies		
		put on SL/SWL WhatsApp		
		platform for discussion		
		 tutors to research for the 		
		next PD session for		
		discussion		

Advance Preparation

4.3 Ask tutors to prepare sample mock examination questions for moderation

Advance Preparation

4.3 Ask tutors to prepare sample mock examination questions for moderation

N/B

XXIV.Remind tutors to identify a critical friend from the same or related discipline to observe during teaching and provide feedback (NTS 1a).

XXV.Read the course manual, the PD session guide ahead of time to identify any outstanding issues relating to this lesson for clarification.

XXVI.Collect all resources (such as projector, flip chart and sticky notes) you need ahead of time, prepare samples of TLMs you may need and rehearse how these may be used to support the achievement of your goals

N/B

Get a critical friend from the same or related discipline to observe your lesson during teaching and provide feedback (NTS 1a).

Course assessment in accordance with the NTEAP: SWL need to review assessment in the course manual to ensure it complies with NTEAP implementation and the 60% continuous assessment and 40 % **End of semester** examination. This means ensuring subject project, subject portfolio preparation and development are explicitly addressed in the PD sessions.

The PD session check list: supporting B.Ed. implementation. In some cases, to support implementation the PD sessions may need to add more detail to what is in the course manuals

What to Include in PD sessions: Check list	Checked and In Place.	
Course introductions and conclusions		
The first PD session of each semester introduces the course manual/s and course expectations to student teachers.		
The final PD session provides the opportunity to review student teachers learning from the course		
Prior knowledge: Points for tutors on assessing or activating student teachers' prior knowledge.		
Basic School Curriculum: when topics for student teachers are from the Basic School		
Curriculum the PD session makes explicit links.		
CLO: relevant to the session to be introduced		
Lesson Learning outcomes and indicators. PD sessions provide opportunities for		
tutors to model interactive approaches to teaching and learning they will use to		
support student teachers		
Integration of subject specific content and subject specific pedagogy. This is		
modelled in PD sessions through activities for tutors. Any potentially new or		
challenging concepts are explored with tutors		
Subject Specific Training. Where subjects have been grouped together for the PD		
sessions, tutors are guided to activities in the subject course manuals to ensure the		
PD is not generic. Where appropriate there is direct page or point references to		
activities in each of the relevant subject course manuals.		
Integrating GESI: each PD session explicitly highlights at least two (2) teaching and learning activities from the course manual/s which should be used to promote student teachers' understanding of GESI responsiveness and support the inclusion of all pupils.		
Assessment. Integrating and embedding NTEAP practices		
PD sessions include at least two continuous assessment opportunities which will		
support tutors in developing student teacher's understanding of and ability to apply		
assessment for or as learning.		
Phase Specific Training. Tutors are guided to specific activities in the relevant phase		
course manuals for EG, UP and JHS. Tutors are advised to group student teachers		
according to the phase they are training for specific activities.		
Building in STS. STS tasks are integrated into the PD sessions. Preparing for work in school		
and opportunities for tutors to draw on what student teachers are learning in school by, for		
example, targeting observations linked directly to the themes in the course manuals.		
Building in activities which support the development of 21c skills in particular the		
use of ICT. The development of these is integrated into the PD sessions including the		

use of ICT to support learning. Each PD session should include at least two (2) examples of students being required to use ICT to extend their learning.		
Resources /TLM. Where specific resources are required, it is clear where tutors can		
access them e.g., videos, online resources, or readings.		

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