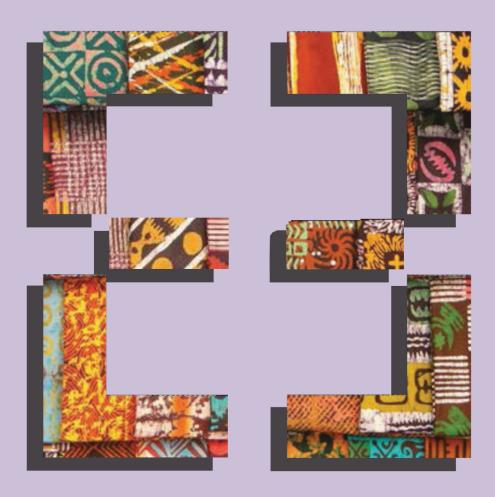
YEAR 2
SEMESTER 1

# Four-Year B.Ed. Course Manual

# **MATHS: THEORIES IN LEARNING**









# The Government of Ghana









## **FOREWORD**

These initial teacher education course manuals were developed by a team consisting of members from colleges of education, and four universities namely, university of Ghana, Kwame Nkrumah university of science and technology, university of education, Winneba, and university of development studies. this team was constituted to support the delivery of the new B.Ed. curriculum as part of Ghana's teacher education reforms supported by T-Tel with assistance from UK aid and overseen by the National Council for Tertiary Education (NCTE).

The course manuals have been produced for use as general guides for the delivery of the new four-year B.Ed. curriculum in colleges of education in collaboration with their affiliated universities. They are designed to support student teachers, tutors and lecturers in delivering a complete B.Ed. course for training student teachers which meets the requirements of the national Teachers' standards (NTS), thus enabling them to teach effectively in basic schools.

The structure and sequence of the manuals follows a process developed through a collaboration by key stakeholders. The first section is focused on the course information and vision for the new four-Year B.Ed. curriculum. The second section presents the course details, Goal for the subject or learning area, course description, Key contextual factors as well as core and transferable skills and cross-cutting issues, including equity and inclusion which will be addressed through the course. the third section is a list of course learning outcomes and their related learning Indicators. the fourth section presents the course content which is broken down into units for each week, the topic and sub-strands and their related teaching and learning activities to achieve the learning outcomes and the teaching and learning strategies. this is followed by course assessment components in section five. The relevant aspects of the national Teachers' standards to be assessed through each assessment are identified. each course is accompanied by the required reading and reference lists as well as teaching and learning resources. The final section presents course related professional development for tutors and lecturers to be able to use each section of the manual.

In all, there are 12 lessons for each course manual. The set of first year manuals present the general courses for the beginning teacher. The second, third and final year manuals deal with specialisms and specialist programmes for student teachers. The different manuals for each successive year cover beginning teaching, developing teaching, embedding teaching, and extending teaching.

field instructions to guide supported teaching in school are integrated into the course manuals to provide the student teacher with the nucleus of practicing and developing teaching throughout the entire period of study to be able to meet the requirements of the NTS and the National Teacher education curriculum framework (NTECF). To ensure maximum benefit the course manuals should be used in addition to other resources such as the NTS, NTCEF, assessment Policy and inclusion Policy. This will help to ensure that learning by student teachers' is integrated within the wider teacher education policy framework.

**Professor Mohammed Salifu Executive Secretary** 

**National Council for Tertiary Education** 

## **ACKNOWLEDGEMENTS**

The course Manuals were developed over several months through the collaborative efforts of a team of individuals from colleges of education, university of Ghana, Kwame Nkrumah university of science and technology, university of education, Winneba, and university of development studies. they were produced in association with the national council for tertiary education of the Ministry of education, Ghana.

A participatory team approach was used to produce this set of resources for tutors/lecturers, mentors, and student teachers. We are grateful to the specialists who contributed their knowledge and expertise.

Special thanks to Professor Jophus Anamuah-Mensah - T-Tel Key Advisor, Dr. Eric Daniel Ananga - T-Tel Key Advisor for Curriculum reform and Beatrice Noble-Rogers who provided key editorial, review and content input and facilitated the process of drafting and finalising the course Manual.

Patricia Appiah-Boateng and Gameli Samuel Hahomene, served as typesetting and formatting coordinators and designed and produced the illustrations, tables, and other graphics which appear in the pages. they spent time and effort designing and redesigning the graphic layout and producing the camera-ready copy resulting in a set of materials that are easy to use, read, and reference.

Thanks also goes to all T-Tel staff members who worked to support production of these course manuals, particularly Beryl Opong-Agyei and Gideon Okai. Their frankness and co-operative attitude complimented the team approach used to produce this manual.

We are indebted to the Ministry of education and the national council for Tertiary education, (NCTE) for the general support and specific helpful advice provided during production of the course Manuals. recognition and thanks must go to chief technical advisor for T-TEL and Policy advisor to the national education reform secretariat, Prof. Mohammed Salifu the executive secretary of NCTE and Mr. Jerry Sarfo the coordinator for the colleges of education, who in diverse ways supported during the course Manual writing workshops.

In addition to all the staff who participated visibly in the development of these materials we would like to acknowledge all those people from the many colleges of education and universities in which we have worked who have, directly or indirectly, shared their views on the curriculum with us.

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# INTRODUCTION TO COURSE MANUALS

Welcome to this B.Ed. Course manual.

Following the accreditation of the B.Ed. by the national accreditation Board with its recognition as a world class teacher education curriculum, the decision was taken to support effective implementation through the development of course manuals. the course manuals provide tutors and lecturers with the materials necessary to support teaching each of the B.Ed. courses. The manuals adhere directly to, and emphasise, the principles and standards set out in the NTS, NTECF and in the B.Ed. and will help ensure operationalising the Government's teacher education reform Policy.

#### The manuals serve the following purposes:

- they are the key educational agreements between the training institution and the student teachers. In this way student teachers know what the expectations are for them and for the training they will receive.
- they lay out the course outcomes, content, strategies, and assessment, thereby providing direction to and consistency in training and B.Ed. implementation among tutors across the country.
- they are explicit documents that provide other institutions with information on which to base transfer/ articulation decisions.

### Specifically, they also:

- support coherent lesson planning and teaching which will enable student teachers to achieve the NTS and become good teachers who ensure all pupils' learning whilst offering tutors the flexibility for adaptation for local needs and contexts.
- Provide a lesson by lesson overview of the course, building on and developing the material in the course specifications.
- Inform tutors, student teachers and others working with student teachers about:
  - 1. What is to be taught and why.
  - 2. how it can be taught.
  - 3. how it should be assessed.
- Provide opportunities for student teachers to develop and apply knowledge during supported teaching in school, creating a strong bond between learning in school and in the training institution.
- Reflect the stage of student teacher development, set out in the model for progress across the four years of the B.Ed.
- Can be used as self-study tools by student teachers.
- Ensure that all information necessary to inform teacher training is in one place (serves as reference document).
- The manuals are the basis of the codes and university professional development sessions to ensure Principals, tutors, lecturers and heads of department are fully familiar with the details of: courses, outcomes, content, approaches, assessments and lessons.

## Who are course manuals for:

- College of Education Tutors
- Teacher Education University Lecturers
- Student Teachers
- Mentors and Lead Mentors
- All Those with An Interested In Teacher Education.

# **USING THIS MANUAL**

Writers of the manuals engaged widely with colleagues in each subject area at each stage of development. Besides, writers envisaged themselves in varied contexts as they wrote, to suggest methodologies and strategies for teaching the strands which would ensure student teachers are enabled to achieve the learning outcomes. In view of our commitment to creativity, problem solving, collaboration and to lifelong learning, we expect that individual tutors will "own" their manuals and become user-developers. lessons in the manuals will be strands for weekly Pd meetings where tutors/lecturers will situate the lessons in the contexts of their colleges and their student teachers, to maximize the benefits.

It is also expected that tutors will model the best pedagogic practices for student teachers. Key among such practices is the communication of the importance of having a personal teaching philosophy. We expect that tutors and lecturers will explicitly communicate their personal teaching philosophies to their student teachers during the first meeting of every course. in preparation for this, we suggest you set out your personal teaching philosophy and how it will be demonstrated in your teaching using, or adapting, the sample sentence introductions below.

My teaching philosophy is	
In view of this philosophy, I	will facilitate this course by/through

# **Mathematics Course Manual**

### **Resources for Course Manual Writing**

- Soft copies of the CWG, New Four-Year B.Ed. Curriculum introduction
- Soft and hard copies of the course specifications for the subject for year one and two
- Soft and hard Course Manual Writing Guide (CMWG)
- Relevant subject texts

### **Target Audience**

• College of Education Tutors

**Teacher Education University Lecturers** 

- Student Teachers
- Mentors

#### The purpose of course manuals

- To provide a lesson by lesson overview of the course, building on, adapting and developing the material in the course specifications
- To provide a resource to support professional development sessions for tutors/lecturers on how to plan for and teach courses from the New Four-Year B.Ed. Curriculum
- To inform tutors /lecturers, student teachers and others working with student teachers about:
  - ✓ what is to be taught and why
  - √ how it can be taught
  - ✓ how it should be assessed
- To support consistency in the implementation of the New Four-Year B.Ed. across institutions who train teachers
- To ensure that all **training** information on skills, processes, and other information necessary to perform the teaching taskare together in one place.
- To operationalize the Teacher Education Reform Policy; the requirements of the NTS & NTECF and the Four-Year B.Ed.

### **Guiding principles of course manual writing**

- They are written with the learner, the student teacher, in mind: what they will *be able* to cope with and only include what student teachers need to know, understand, be able to do and be as a basic school teacher
- They take in to consideration the learner's, the student teacher's, context and possible barriers to, and enablers for, learning
- They are written with the tutors /lecturers who are going to teach the course in mind. Tutors must be able to adapt and develop the plans in course manuals to fit the context they are teaching in and to support their teaching
- They are aligned to the key principles and practices of the Teacher Education Reform Policy: the NTS, the NTECF and the New Four-Year B.Ed.
- They are written to provide opportunities for student teachers to develop and apply knowledge during supported teaching in school
- They are written to reflect the stage of student teacher development, set out in the model for progress in the New Four-Year B.Ed.
- They are written to support progress in student teacher learning, including building on prior learning from the previous programme or course/s and supporting progress to the next course.
- They are to be used as self-study tools.
- They are written to have the following characteristics: easy to read; uses active voice and avoids jargon; uses bullet points to offset text; uses images

### What a teacher educator needs to know, understand and use to inform what they do

- The aims and structure of the education system and Education strategic Plan
- The Basic School Curriculum
- The Inclusion Policy
- The teacher education system: The National Teacher's Standards, the vision for teacher education and the core principles of the New Four-Year B.Ed.
- Andragogy, effective methods and practices for teaching adult learners

• Assessment Literacy. Assessment for, of and as learning -Educative Assessment

### Guidance for completing the course manual writing format: two sections

#### A. Course Information

### Title Page

- Course name: as in course specification unless important reason why not
- The vision for the New Four-Year B.Ed. Curriculum

"To transform initial teacher education and train highly qualified, motivated new teachers who are effective, engaging and fully prepared to teach the basic school curriculum and so improve the learning outcomes and life chances of all learners they teach as set out in the National Teachers' Standards. In doing this to instil in new teachers the Nation's core values of honesty, integrity, creativity and responsible citizenship and to achieve inclusive, equitable, high quality education for all learners. "

<b>Course Deta</b>	Course Details: as in course specification unless important reason why not							
Pre-	The programme / previous semester	The programme / previous semester courses studied.						
requisite/s								
Co-	Links to other courses being taught, support coherence in student experience and avoid							
Requisites	duplication							
Course	Course Co	de	Credit Value	3				
Level								

#### Table of contents

#### Each manual will include:

- The goal for the subject or learning area
- Course description
- Key contextual factors
- Core and cross cutting issues, including equity and inclusion
- Course Learning outcomes
- Course content
- Teaching and learning strategies
- Course Assessment components
- Reading and reference list
- Handouts, power points and other resources for lessons
- Plans for each lesson in the semester

#### A. Course information

## Goal for the Subject or Learning Area

This can be found in subject goal document. It should be a short statement which captures what new teachers will know, understand and be able to do in this subject at the end of their training. This statement should be linked to achieving the vision for the curriculum.

### Key contextual factors

This can be found in the course specification. It should address what needs are to be considered to reflect the Ghanaian context at local and national levels.it includes potential knowledge and skills gaps and any specific: gender, cultural, linguistic, conceptual, infrastructural issues, for example, that might be barriers to learning for student teachers and eventually basic school children? E.g. issues of subject related bias that need addressing. Potential barriers to learning must be explicitly addressed to enable student teachers to achieve the learning outcomes.

#### **Course Description**

This can be found in the course specification. This brief statement should provide a clear understanding of what studying this course involves, what student teachers will get out of studying this course.

## Core and transferable skills and cross cutting issues, including equity and inclusion

This can be found in the course specification. Which core and transferable skills or cross cutting issues will be applied or developed through this course? This needs to be made explicit to student teachers. Are there specific issues to do with equity and inclusion which must be addressed so that all student teachers can fully take part? For example, issues related to gender and mathematics or science.

Course Learning Outcomes	Learning indicators	
These are in the course specification. The course learning	Measurable/assessable/observable performances	

outcomes should specify the expectations of what the student teachers will know, understand and be able to do at the end of the course *not* what student teachers will do **on** the course. They must be appropriate and realistic to the learner's abilities, experience, the identified level of the course and *content*. They must be measurable – allowing assessment of student teacher achievement

- that provide evidence of learning or other changes taking place in student teachers' behaviour which demonstrate that they have met the learning outcome/s.
- What the student teacher will need to do to show they have achieved the learning outcome. (in an inclusive lesson, this should vary and be responsive to student teacher's individual characteristic)

#### Course content

In the course specification. This should provide an outline of the academic and / or practical content of the course. It should be clear how this content relates to the achievement of the intended learning outcomes. The name of each unit in the course should be *briefly* set out – the name should make it clear what the unit is about.

Unit	Topic	Sub-topic (If any)	Teaching and learning activities to
			achieve the learning outcome

#### **Course Assessment Components**

In the course specification. The NTS and the NTECF require a move away from largely examination-based assessment to strategies to enable assessment of student teachers' skills, knowledge and understanding against the learning outcomes and through these the against the NTS

- There should be a maximum of 3 assessment components per 3 credit-course; to avoid over loading student and tutors/ lecturers
- The learning outcomes to be assessed by each assessment component should be identified.
- Each assessment component should explicitly reference the NTS or aspects of the NTS it will assess.
- Each assessment component should include:
  - ✓ The category or type, for example: written, coursework or practical, teaching, examination, collaborative project or presentation, poster, TLM
  - ✓ The type of assessment: of, for and /or as.
  - ✓ An indication of the size of each assessment component (e.g. duration of exams, word limit of written submissions, length of presentations; whether presentations have an individual or group etc.).
  - ✓ The weighting of each assessment component should be expressed as a % of total course mark (overall in each course: 60% continuous assessment of course work, 40% examination of course work).
- Each assessment should be manageable and relevant to supporting the student teachers' development. The guidance on assessing student teachers from the NTS, the NTECF the CWG and the New Four Year B.Ed. should be used.

#### Teaching and learning strategies

Detail in this section should show how the total learning hours will be used to achieve the intended learning outcomes, to provide a guide to the teaching and learning strategies to be used. Each teaching strategy should be selected as most appropriate to achieving the learning outcomes. This may include team teaching or additional tutors. As stated in the B.Ed. experiential learning and interactive teaching approaches are encouraged

### Required Reading and reference list

One or two compulsory texts which must be made available to the student teachers and a SHORT list of 5 relevant references. These lists should be annotated with the key value of each text. Use APA style of writing.

### **Teaching and Learning Resources**

Instructional resources required to support learning during the course e.g.: TLMs, lab and workshop equipment, videos, projectors

#### Course related professional development for tutors/lecturers

This is not included the course manual but professional development needs must be identified to ensure all tutors / lecturers are prepared to teach the course identify any specific topics or issues which may be challenging for tutors / lecturers.

Title of Lesson

Year of B.Ed. 2 Semester 1 Place of lesson in semester 1 2 3 4 5 6 7 8 9 10 11 12

3 Hours

**Lesson Duration** 

Why do we teach mathematics in school?

	, as no								
Lesson description	This lesson fo	ocuses on deve	loping an ui	nderstanding of v	vhat we kn	low about how peop	le think ab	out	
•	mathematics and how an understanding of mathematics develops. It provides an overview of								
		philosophies of mathematics and mathematics education and explores student teachers' beliefs about							
		mathematics and philosophies of mathematics implicit in the official mathematics curriculum and							
		current classroom practice. It also covers children's developmental stages, how children learn							
		nathematics and associated theories, and other psychological factors influencing learning. Another							
					_	rsity. Student-teache	_		
				•	•	r with concepts base			
				which will be em			.a on cima		
	_	-				outcomes in the thr	ee assessn	ment	
		of the course.	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			,			
Previous student	· · · · · · · · · · · · · · · · · · ·		n taught psy	chological basis	of teachin	g and learning and a	are familia	r with	
teacher knowledge,				pment, and mat		8 4.14 164111118 4114 6			
prior learning		ea on eima gro	viii, acveic	princine, and mae	aration,				
(assumed)									
Possible barriers to	Different en	try hehaviours	Socio-cul	tural issues diff	erent lear	ning needs, miscor	centions	ahout	
learning in the lesson		numeration sys	-	a. 133ac3, all1	C. C.IIC ICAI	110000	.5000115	about	
Lesson Delivery –	Face-to-		Vork-	Seminars	Independ	l e-learning	Practicu	m	
chosen to support	face		Based	Semmars	ent Study	_	Tractical		
students in achieving		_ ′ .	eaning	$\boxtimes$					
the outcomes									
Lesson Delivery – main	Face-to-face	Face-to-face: opportunity for an extended and coherent line of argument. It includes discussion,							
mode of delivery	brainstorming, question and answer, etc. This can be tutor and / or student teacher led. It should not								
chosen to support		usually be the main mode.							
student teachers in	· ·		experiment	ation and the ana	alvsis and o	discussion of issues, o	documents	s and	
achieving the learning		well as physica			, 0.0 0 0			,	
outcomes.				idual creativity. d	liscussion a	and reflection: stude	nt and / or	r I	
	<b>Seminars:</b> to generate group and individual creativity, discussion and reflection: student and / or tutor led								
	Independent study: to enable students to engage with relevant and appropriate materials to								
	promote individual and collaborative enquiry, more in-depth analysis and development. This can be								
		f the above mo		. ,,	. ,	•			
	E-learning op	<b>E-learning</b> <i>opportunities</i> – involving the use of interactive packages and virtual learning environments.							
	This can be p	art of any of th	e above mo	des of delivery. I	t is unlikel	y to be a delivery mo	de in its o	wn	
	This can be part of any of the above modes of delivery. It is unlikely to be a delivery mode in its own right.								
Purpose for the	The purpose	of the lesson is	to;						
lesson, what you				course manual to	enable th	em develop awaren	ess of wha	t they	
want the students	are expe	cted of in this I	esson.						
to achieve, serves	• develop	student teach	ers' underst	anding of the na	ature and	importance of math	ematics, a	s well	
as basis for the	as, how	to teach mathe	matics to Ju	ınior High School	l learners.				
learning									
outcomes. An									
expanded version									
of the description.									
Learning Outcome	Learning Out	comes	Learnin	g Indicators		ntify Which cross-	_		
for the lesson,						e and transferable s			
picked and	equity and addressing diversity. How								
developed from						these be addressed	_		
the course	Demonstrate			n and Equity		nclusion and Equity:		ting	
specification		bservation and		duce well-prepar		student teachers to r	_		
• Learning		class teaching		uction schedule a		nstitutional and pers		ces of	
indicators for each		hool activities	•	cedures and		parriers to leaning ar	_	ļ	
learning outcome	(in School 1)		-	vide records of		conscious efforts to a	address the	em.	
	(College & Sc	hool induction	gro	up work activitie	s			ļ	
	_ ,			<u>'</u>					

e (I D p a t	emonstrate skills in reparing a personal writing a personal eaching hilosophy statement of the statement of	comes	til oo c P t t t a v le t t M p k d d o o t	the key features of the official basic school urriculum crovide a write-up of the beginning eacher's self-wareness, beliefs, and values of teaching and earning (personal eaching philosophy) Make oral presentations of nowledge gained during induction and observation by student eachers in their roups.  Teaching and learn outcomes depending	gon	potential barriers to inclusion (including personal bias, stereotypes and institutional discrimination)  Communicative skills of student teachers: can be enhanced through the examination, interrogation and presentation.  Digital literacy: can afford student teachers the opportunity to develop records for reflective journals using digital tools.  to activities to achieve learning delivery mode selected. Teacherwork or independent.
D a u fe c	emonstrate knowledged and mentors of the keatures of the basic sourriculum (BSC); and pecifically focusing on abjects and their asso	ge ey :hool : core ciated	• S fine eight	nd/or cooperative earning for student eachers during observations how records of pecific observations rom wider school environment and induction and Report on small group liscussions with mentors and peers on	•	Characteristics and uniqueness of upper primary learners: By encouraging student teachers to develop awareness of how Knowledge and understanding of child growth, development and maturation support young children's learning Support student teachers the opportunities to explore diversity within the class/subject and potential barriers to inclusion

Topic	Sub-topic(s)	Stage/ Time	Teaching and learning to activities to achieve learning outcomes depending on delivery mode selected. Teacher-lead collaborative group work or independent.		
			Teacher Activity	Student Activity	
WEEK 1  Why do we teach mathematics in school?		40 mins	Introduces student teachers to the Course Manual and discuss the various components including assessment procedures (See Course Assessment Components),	Participate in the discussion of various components of the course manual, take opportunity to ask questions about the Course Manual including assessment procedures.	
mathematics in school?	Definition and importance of Mathematics to the Junior High School teacher	20 mins	Introduce the lesson by giving a historical account of how mathematics was used by various generations and how it has been used to solve problems in different parts of the world, generations; (PD Themes 1 &3)	Outline their expectations and views about the mathematics course.  Listen attentively to the tutor or lecturer's verbal exposition and ask questions for clarification or provide comment(s) to ensure participation and understanding;	
		20 mins	Engage student teachers in a discussion based on how mathematics is used currently and its future prospects (PD Themes 1& 3)	Engage in a think-pair-share session to outline the importance of Mathematics to people in various trades and professions in our Ghanaian	

	How does Mathematics relate to society?  What does it mean to learn and teach Mathematics?	20 mins 20 mins 20 mins	definition(s) of Mathematics through internet search and to discuss their findings; (PD Themes 3 & 4)  Monitor student teachers as they search the internet for definitions of Mathematics and to refine any potential distortions or misconceptions in their narrations; (PD Theme 1)  Poses the question "How does Mathematics relate to society?" (PD Theme 2)  Use Power point presentation interspersed with questioning to discuss opposing views of how young children learn or develop certain	meaning of Mathematics on the internet and to discuss their findings to their findings in groups of five or six.  Alert peers of distortions of facts and principles as they present their findings;  Use appropriate ICT tools to record teacher-pupils' classroom interactions and wider school activities in SR Js  Engage in a group discussion to explore the application of Mathematics in the Ghanaian society.  This discussion should also consider how our cultural practices and artefacts can be used in teaching of school mathematics in the Junior High
		20 mins	Mathematical concepts; (PD Themes 1 & 3)  Assign student teachers to write a reflective paper on "What does it mean to learn and teach Mathematics?, as a consolidation exercise to be presented in the next lesson. (PD Theme 1)	School;  Pay attention to and also participate in the discussion of their own perception of how Mathematical concepts are learned  Use appropriate ICT tools to record teacher-pupils' classroom interactions and wider school activities in SRJs  Read further about what it means to reflect on the historical development of the numeration system and the contributions of different civilizations and cultures have made until the emergence of
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	presented 2. Student te the influer learn math improve te portfolios NTS 3j - Produces	at end of the fachers are assince of a teacher nematics (Assertation and lead (PTP) and uses a var Sets meaningfing	r's values and philosophy of massment as learning) NTS 1a- Critarning. This will be included in the riety of teaching and learning resultasks that encourages learn	the Hindu-Arabic base ten system  ching portfolios (PTP) to be  paper, maximum one page, on athematics on how adolescents tically and collectively reflects to he professional teaching

Required Text (core)	Sriraman, B., & English, L. (2005). Theories of mathematics education: A global survey of theoretical frameworks/trends in mathematics education research. ZentralblattfürDidaktik der						
	lathematik (International Reviews on Mathematical Education), 37(6), 450–456.						
Additional Reading List	Lakoff, G. &Núñez, R. E. (2000). Where Mathematics comes from. New York: Basic Books.						
	Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Tutor notes. Accra: Unimax						
	Publishers.						
	Martin, J. et. al. (1994). <i>Mathematics for teacher training in Ghana: Students activities</i> . Accra:						
	Unimax Publishers.						
CPD Needs	How to design and/or use some innovative materials and ideas for teaching selected concepts based on theories of learning in Junior High School mathematics.						
	How to manage transition of home to school.						
	Understand the various characteristics and uniqueness of Junior High School learners.						
	How to design tasks for assessment procedures for assessment of, as and for learning.						
	Instructional strategies needed to consciously engage student teachers on how to design						
	and produce portfolios, journals and STS reports.						

Title of Lesson	Teacher teaching		t math	ematic	s and their rel	ation to I	esson Du	ration	3 Hours	
Lesson description			n dev	eloning	an understar	ding of what v	ve know a	about how	neonle think	
Lesson description										
		about mathematics and how an understanding of mathematics develops. It provides an overview of philosophies of mathematics and mathematics education and explores trainee								
		teachers' beliefs about mathematics and philosophies of mathematics implicit in the official								
					-	practice. It also		-		
						ociated theorie			-	
						ed to share th				
		n the teaching				ea to share th	icii views	or equity	and anversity	
Previous student teacher						al basis of teac	hing and I	earning ar	nd are familiar	
knowledge, prior				_		ent, and matu	_	carriing ar	id are farminar	
learning (assumed)		-		_	-	ature and imp		: mathema	itics	
Possible barriers to						ues, different				
learning in the lesson		umber and nu				acs, anterent	icarriiig	necus, m	iscorrecptions	
Lesson Delivery – chosen	Face-	Practical	Work		Seminars	Independent	e-learn	ing	Practicum	
to support students in	to-	Activity	Base		Schillars	Study	opport	_	Tracticani	
achieving the outcomes	face		Learr							
demesting the outcomes				В						
Lesson Delivery – main		-face: onnor	tunitv	for an	extended and	coherent line	of argume	nt. It inclu	des	
mode of delivery chosen			-			etc. This can b	_			
to support student		nould not usu	_	-		, 0001 11110 0011 1	, c tato. a.	, 0. 500.		
teachers in achieving the			-			the analysis a	nd discuss	sion of issu	ies.	
learning outcomes.					as physical act					
leaning careenies.						ativity, discuss	on and re	flection: st	tudent and /	
	or tutor		6.0	а <b>р</b> аа		a, a				
			to ena	ble stu	dents to enga	ge with releva	nt and app	propriate n	naterials to	
	1 -	promote individual and collaborative enquiry, more in-depth analysis and development. This can be part of any of the above modes								
						nteractive pacl	ages and	virtual lea	rning	
						ove modes of c				
		mode in its o			•		•	•		
Purpose for the	The pur	pose of the le	esson	is to;						
lesson, what you	• aud	lit content kr	nowled	dge and	dexperiences	of student to	eachers to	establish	and address	
want the students to	the	ir learning ne	eds, p	ercept	ions and miso	conceptions ab	out the le	earning an	d teaching of	
achieve, serves as	nur	neracy in Juni	ior Hig	h Scho	ol					
basis for the learning	• dev	elop student	t teac	hers'a	wareness of	howteachers'	beliefs a	bout mat	hematics can	
outcomes. An	infl	uence their te	eachin	g						
expanded version of										
the description.										
Learning Outcome	Learning	g Outcomes		Learnin	g Indicators			-	cross-cutting	
for the lesson,									d transferable	
picked and									y, equity and	
developed from the									versity. How	
course specification									addressed or	
<ul> <li>Learning indicators</li> </ul>								oped?		
for each learning		nonstrate	•		line and analy				d Equity: by	
outcome		wledge and		-	spectives on r			ipporting s		
		erstanding of				differences an		achers to	_	
		erent			ilarities;				and personal	
	1	pectives	. •		cribe concept			ources of b		
	l (hali	iefs and value	s)	mat	thematics imp	licit in their	l le	aning and	making	
1	-		′		•			_	_	
	-	nathematics			n beliefs; and	personal belief	s co	nscious ef	forts to	
	-			abo	n beliefs; and		s co	_	forts to	

	Demonstrate an understanding of relevant professional values and attitudes in teaching Junior High School mathematics	learni skills contii profe Outlir Value respe can p	ct critically on their own ing experiences and use the gained to plan for nuous personal and ssional development ne relevant professional is, as well as, show how ct for equity and inclusivity romote effective learning in unior High School ematics classroom	<ul> <li>Characteristics and uniqueness of JHS learners: By encouraging student teachers to develop awareness of how Knowledge and understanding of child growth, development and maturation support young children's learning</li> <li>Inclusion and Equity: by recognizing institutional and personal sources of barriers to leaning and making conscious efforts to address them.</li> <li>Professional development:         <ul> <li>Developing understanding of NTS through conscious effort and support from mentors, peers, and tutors.</li> </ul> </li> <li>Support student teachers the opportunities to explore diversity within the class/subject and potential barriers to inclusion (including personal bias, stereotypes and institutional discrimination)</li> </ul>
Topic	Sub-topic(s)	Stage/ Time	_	activities to achieve learning n delivery mode selected.
			Teacher-lead collaborative Teacher Activity	groupwork or independent.  Student Activity
	Definitions and		Review the previous lesson	by Participate in the
	interpretations of the concepts: beliefs attitudes and values	10 mins	asking student teachers to present their reflective pap on the importance of mathematics to society; (PD Theme 1)	discussion to review the previous lesson;
Teacher beliefs about mathematics and how this influences learning and teaching of mathematics in Junior	Implications of teacher	20 mins	Give an exposition based or the concepts, attitudes, beliefs, and values (PD Theme 3)	tutor or lecturer's verbal exposition on the concepts; attitudes, beliefs, and values and
High School.	attitude on pupils' learning ofmathematicsin the Junior High School	60 mins	Engage student teachers in discussion on how teachers attitudes influence Junior High School learner's learni of mathematical concepts; (PD Theme 1& 3)	comment(s) to ensure participation and

	Making connections between teacher beliefs and practice and developing mathematical task	40 mins 30 mins	Assign student teachers to use a table to illustrate the differences and similarities among the concepts:values, attitudes, and beliefs; (PD Theme 1)  Use Power point presentation, interspersed with questioning, to discuss how learners' attitude and beliefs influence their own learning of Mathematical concepts; (PD Themes 1 & 3)  Assign student teachers to write a reflective paper on "What does it mean to learn and teach Mathematics?" as a consolidation exercise to be presented in the next lesson. (PD Theme 1)	Engage in a think-pair-share session to outline and discuss the effect of teachers' attitudes on the learning and teaching of mathematics at the Junior High School;  Create a table that illustrates the similarities and differences among values, attitudes, and beliefs and how these impact learning in Junior High School;  Discuss the importance of Mathematics to people in various trades and professions in our Ghanaian cultural settings;  Pay attention to and also participate in the discussion of how young children's attitude, beliefs, and values affect their learning of Mathematical concepts.  Read further about what it means to Reflect on how learners' attitude and beliefs influence their own learning of
Lesson assessments –	Student teachers are to b	egin record	l ling important ideas and experier	Mathematical concepts
evaluation of learning:		_	es of mathematics and compare t	
of, for and as learning			um (Assessment as learning) NTS	•
within the lesson			ning and learning. This is to be inc	cluded in their professional
	teaching portfolios (PTP).  NTS 3i - Produces and use		of teaching and learning resource	es including ICT to be
			Employs a variety of instructiona	
	encourages student parti	cipation an	d critical thinking.	
Instructional Resources		_	natics in the jobs; video clips dow	
	_	n beliefs,	attitudes, and values within the	e context of mathematics
Required Text (core)	teaching and learning	achers' hol	iefs about mathematics, its teach	ing and learning and the
nequired Text (core)			rudents: A case study in Botswana	
	dissertation. University of			
Additional Reading List			Education: A Brief Inquiry into th	neir Conceptual Differences
		1athematics	s for teacher training in Ghana: T	utor notes. Accra: Unimax
	Publishers.	4 + l- · · ·	- ft	todanta nati ili
	Unimax Publishers.		s for teacher training in Ghana: S	
CPD Needs			e innovative materials and ideas	
		oping and i	using the "Read my mind" word g	games to reinforce concept
	developed)			
	1			

- Instructional strategies needed to consciously engage student teachers to participate effectively and to be ready to share their past experiences without fear of ridicule;
- Understand the various characteristics and uniqueness of Junior High School learners as suggested by various perspectives
- How to design tasks for assessment procedures for assessment of, as and for learning to satisfy Junior High School learning experiences
- Instructional strategies needed to consciously engage student teachers on how to design and produce portfolios, journals and STS reports.

Title of Lesson				High School offic	ial	Lesson Duration	3				
		and inclusive	-				Hours				
Lesson description		This lesson focuses on beliefs underlying the current Junior High School official curriculum and									
		inclusive classroom practice. Areas of concentration include the Nature of Junior High School									
		mathematics curriculum and Implications of this for classroom practice with emphasis on inclusion and equity from a reflective perspective. Student teachers will be required to participate in									
						•					
			_	•	-	an understanding					
		-			-	les an overview of	•				
					-	e beliefs implicit i					
				·		sson has the tende	ncy to develop				
			•	y and diversity is							
Previous student			_			ning and learning a	nd are familiar				
teacher knowledge,		-	_	, development, a							
prior learning	Student te	achers have be	een introduc	ed to the nature	and import	ance of mathematic	CS				
(assumed)											
Possible barriers to		=	aviours, Soc	cio-cultural issue	s, differen	t learning needs, r	nisconceptions				
learning in the lesson		curriculum									
Lesson Delivery –	Face-to-	Practical	Work-	Seminars	Independ		Practicum				
chosen to support	face	Activity	Based		ent Study						
students in achieving			Leaning		$\boxtimes$						
the outcomes											
Lesson Delivery – main						argument. It include					
mode of delivery				etc. This can be	tutor and /	or student teacher	ed. It should				
chosen to support		be the main r									
student teachers in					analysis and	discussion of issue:	s, documents				
achieving the learning		als, as well as									
outcomes.	Seminars: to generate group and individual creativity, discussion and reflection: student and / or										
		tutor led									
	-	=				and appropriate ma					
	_ ·			enquiry, more in	n-depth ana	lysis and developme	ent. This can				
	-	any of the abo									
	_		_			ges and virtual learn	_				
			e part of an	y of the above m	odes of deli	ivery. It is unlikely to	be a delivery				
	mode in its										
Purpose for the						hilosophies of ma					
lesson, what you			-	the beliefs impli	cit in the o	fficial mathematics	curriculum and				
want the students	current cia	ssroom praction	ce								
to achieve, serves											
as basis for the											
learning outcomes.											
An expanded											
version of the											
description.	1 0		1	- I II A	1.1.						
Learning Outcome	Learning O	utcomes	Learning	g Indicators		entify Which cross-	_				
for the lesson,					CO		•				
picked and						clusivity, equity a	_				
developed from						versity. How wi					
the course	Danasanatus			1. 1 .1		dressed or develop					
specification	Demonstra			line, describe and	•	Communicative sk					
Learning indicators	understand	_		lyse different			be enhanced				
for each learning	different b			osophies implicit		through the	examination,				
outcome		the current		r personal beliefs		interrogation and p					
	_	School officia		icide or otherwis		the philosophies	of the JHS				
		and inclusive		n those embedde		mathematics.					
	classroom	practice	the	current Junior Hi	gh						

	Demonstrate an understanding of relevant professio values and attitud in teaching Junior High School mathematics	nal es		School curriculum. Explain the influence of a teacher's values and philosophies of mathematics in students' learning  Write a short personal philosophy of teaching and learning of mathematics in Junior High School  Reflect critically on their own learning experiences and use the skills gained to plan for continuous personal and professional development  Describe differing conceptions about mathematics based on student teachers' own beliefs, values, and attitudes.	•	Characteristics and uniqueness of JHS learners: By encouraging student teachers to develop awareness of how Knowledge and understanding of child growth, development and maturation support young children's learning  Inclusion and Equity: by supporting student teachers to recognize institutional and personal sources of barriers to leaning and making conscious efforts to address them.  Personal development: Developing understanding of NTS through conscious effort and support from mentors, peers, and tutors.  Support student teachers the opportunities to explore diversity within the class/subject and potential barriers to inclusion (including personal bias, stereotypes and institutional discrimination)
Topic Title	Sub-topic(s)	Stage, Time	/	_	deli	•
				Teacher Activity		Student Activity
	Nature of Junior High School mathematics curriculum	10 mi	ins	Project the learning outcomes and indicators for student teachers to know what is expected of them.		Read the learning outcomes and indicators to help monitor what they are going through.
Beliefs underlying the current Junior High School official curriculum and inclusive classroom		20 mi	ins	Review the previous lesson by asking student teachers to present their reflective papers on the importance of mathematics to society; (PD Theme 1)		Participate in the discussion to review the previous lesson;
practice	Implications for classroom practice relating to the concepts of inclusion and equity from a reflective perspective	60 mi	ins	Give an exposition based on inclusion and equity (PD Theme 3)		Listen attentively to the tutor or lecturer's verbal exposition on the concepts attitudes, beliefs, and values and ask questions for clarification or provide comment(s) to ensure participation and understanding;

	Making connections between teacher beliefs and practice and developing mathematical task	50 mins	Engage student teachers in a discussion on how teachers' knowledge and understanding of inclusivity and equity can influence their interpretation of the beliefs underlying Junior High School mathematics curriculum (PD Theme 1& 3)  Assign student teachers to write a reflective paper on "What does it mean to learn and teach Mathematics as a consolidation exercise to be presented in the next	Engage in a think-pair-share session to outline and discuss the effect of teachers' attitudes on the learning and teaching of mathematics at the Junior High School;  Read further about what it means to reflect on the historical development of the numeration system and the contributions of different civilizations and cultures have made until the emergence of the Hindu-Arabic base ten system	
			lesson. (PD Theme 1)		
Lesson assessments – evaluation of learning:of, for and as learning within the lesson	continuous p (Assessment and learning. 2. Write a one be included i	ersonal and for learning paragraph n their SRJ	d professional development arg) NTS 1a- Critically and collect personal philosophy of teach (Assessment for learning) NT	d use the skills gained to plan for and to record this in their SRJ tively reflects to improve teaching ing with respect to mathematics, to as 3a - Plans and delivers varied and aded outcomes of their teaching.	
Instructional Resources	Posters illustrating per internet;	ople using r	mathematics in the jobs; video	clips downloaded from the	
Required Text (core)	Garegae, K. G. (2001). communication of the dissertation. Universit	ese beliefs to y of Manito	o students: A case study in Bo oba, Canada.	teaching and learning and the tswana. Unpublished Doctoral	
Additional Reading List	Radford, L. Theories in Mathematics Education: A Brief Inquiry into their Conceptual Differences Martin, J. et. al. (1994). <i>Mathematics for teacher training in Ghana: Tutor notes</i> . Accra: Unimax Publishers.  Martin, J. et. al. (1994). <i>Mathematics for teacher training in Ghana: Students activities</i> . Accra: Unimax Publishers.				
CPD Needs	concepts base  Understand to how to use the How to design	ed on theologiche various nis in plannin tasks for	ries of learning in Junior High s characteristics and uniquenes ing to teach. assessment procedures for as	and ideas for teaching selected School mathematics. s of Junior High School learners and sessment of, as and for learning. tfolios, journals and STS reports.	

Title of Lesson	Beliefs underlying		_		Lesson Di	uration	3 Hours		
Lesson description  Previous student	Curriculum and inclusive classroom practice 2  This lesson focuses on developing an understanding of what we know about how people think about mathematics and how an understanding of mathematics develops. It provides an overview of philosophies of mathematics and mathematics education and explores trainee teachers' beliefs about mathematics and philosophies of mathematics implicit in the official mathematics curriculum and current classroom practice. It also covers children's developmental levels, how children learn mathematics and associated theories, and other psychological factors influencing learning. The lesson has the tendency to develop student teachers' awareness of equity and diversity issues.  Student-teachers have been taught psychological basis of teaching and learning and are familiar								
teacher knowledge, prior learning (assumed) Possible barriers to	with concepts bas Student teachers Different ent	have bee	en introduced	to the nature a	nd important				
learning in the lesson		-	meration syst				•		
Lesson Delivery – chosen to support students in achieving the outcomes		ractical ctivity	Work- Based Leaning	Seminars	Independ ent Study	e-learning opportunities	Practicum		
Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes.      Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.	Face-to-face: op brainstorming, que not usually be the Practical Activity: and materials, as Seminars: to gentutor led Independent study promote individuate part of any of telearning opportenvironments. The mode in its own ridevelop student to understanding	estion and main main main main main main main main	nd answer, etcode. g experimenta hysical activit oup and indivi- hable students llaborative en e modes involving the part of any or is to; understandir arning mathe difficulties in	tion and the arges. dual creativity, to engage with quiry, more in- use of interact f the above more g of underlying matics and thei mathematics e	ator and / or so nalysis and dis- discussion and relevant and depth analysi ive packages des of deliver beliefs, attitur r implications g. dyscalculia	student teacher lescussion of issues de reflection: student appropriate mands and development and virtual learning. It is unlikely to udes, and values a for classroom processions.	ed. It should , documents lent and / or terials to ent. This can ng be a delivery within the ractice relative		
<ul> <li>Learning Outcome for the lesson, picked and developed from the</li> </ul>	Learning Outcomes	Lea	rning Indicato		and transfer	ich cross-cutting rable skills, incluing diversity. He dor developed?	usivity, equity		
course specification  • Learning indicators for each learning outcome	Demonstrate secure knowledge and understandin of relevant professional value and attitudes	es •	own learning experiences and teaching and use them to plan for continuous personal development throughmodelling of subject-teach and establishment of personal stigma.						

relevant equity and inclusi the mathematics and attitudes in teaching Junior High School mathematics  relevant equity and inclusi the mathematics classroom  • Analyse different perspectives on the for developing		quity and inclusivity in he mathematics lassroom  Analyse different erspectives on the need or developing rofessional values and ttitudes	institutional and personal sources of barriers to leaning and making conscious efforts to address them.  Support student teachers the opportunities to explore diversity within the class/subject and potential barriers to inclusion (including personal bias, stereotypes and institutional discrimination)	
Topic Title	Sub-topic(s)	Stage/ Time		ctivities to achieve learning outcomes e selected. Teacher-lead collaborative
		"""	groupwork or independent.	
			Teacher Activity	Student Activity
	Underlying assumptions of beliefs, attitudes, and values within		Project the learning outcomes and indicators for student teachers to know what is expected of them.	indicators to help monitor what they are going through.
	the context of teaching and learning mathematics	10 mins	Review the previous lesson by asking student teachers to present their reflective paper on the importance of mathematics to society; (PD Theme 1)	Participate in the discussion to review the previous lesson;
	Implications for classroom practice relative to understanding learning difficulties in mathematics e.g.	20 mins	Give an exposition based on the concepts, attitudes, beliefs, and values with respect to how they influence	
Poliofe underlying	dyscalculia	60 mins	the implementation of any curriculum (PD Theme 3)	Reflect on the implications of the discussions held above on their classroom observation
Beliefs underlying the current Junior High School official curriculum and inclusive classroom practice 2		40 mins	Engage student teachers in a discussion on how teachers' attitudes influence Junior High School learner's learning of mathematical concepts; (PD Theme 1& 3)	Engage in a think-pair-share session to outline and discuss the effect of teachers' attitudes on the learning and teaching of mathematics at the Junior High School;
		30 mins	Assign student teachers to use a table to illustrate the differences and similarities among the concepts, values, attitudes, and beliefs; (PD Theme 1)	Create a table that illustrates the similarities and differences among values, attitudes, and beliefs and how these impact learning in Junior High School;
	Making connections between teacher beliefs and practice and developing mathematical task	20 min <b>s</b>	Use Power point presentation interspersed with questioning to discuss how learners' attitude and beliefs influence their own learning of Mathematical concepts; (PD Themes 1 & 3)	·

	contributions of different civilizations and cultures have made until the
	emergence of the Hindu-Arabic base ten system
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	<ol> <li>Student teachers to reflective and discuss underlying assumptions of beliefs, attitudes (such as commitment, flexibility in ideas, tolerance, respect for evidence, reflection, etc), and values (such as respect, diversity, equity, team work, truth and integrity) within the context of teaching and learning of the basic school mathematics curriculum.</li> <li>Project work for the semester         Assign student teachers, in their small groups to:         Design and produce developmentally and age-appropriate TLMs from locally available materials that can be used to teach common fractions, decimal number and percent and to establish connections among them(NTS 3j, pg. 14)         Write an accompanying guide for each of the TLM explaining how to use them and which aspects of teaching JHS mathematics they are designed to address.     </li> </ol>
	<ul> <li>Identify the learning outcomes that likely to be achieved</li> <li>N/B: consider early grade learners' cultural, linguistic, socio-economic and educational backgrounds in designing the TLMs as well as theoretical perspectives that influence the choice of material and they were produced.</li> <li>Deadline for submission: 11<sup>th</sup> week of the semester</li> </ul>
Instructional	Posters illustrating people using mathematics in the jobs; video clips downloaded from the internet;
Resources	
Required Text	Garegae, K. G. (2001). Teachers' beliefs about mathematics, its teaching and learning and the
(core)	communication of these beliefs to students: A case study in Botswana. Unpublished Doctoral dissertation. University of Manitoba, Canada
Additional Reading List	Ministry of Education. (2010). <i>Teaching syllabus for core mathematics</i> (Senior High School). Accra: Ministry of Education, Science and Sports.  Martin, J. et. al. (1994). <i>Mathematics for teacher training in Ghana: Tutor notes</i> . Accra: Unimax Publishers.  Martin, J. et. al. (1994). <i>Mathematics for teacher training in Ghana: Students activities</i> . Accra: Unimax
	Publishers.
CPD Needs	<ul> <li>How to design and/or use some innovative materials and ideas for teaching selected concepts         (e.g. developing and using the "Read my mind" number and word games to reinforce concept         developed)</li> <li>Instructional strategies needed to consciously connect mathematical ideas, as well as, connect</li> </ul>
	mathematics to other curriculum areas and to the world outside

Title of Lesson			ning in Junion		L	esson Duration	3 Hours			
Lesson description					ding of mair	or theories of ho	w lunior High			
Lesson description										
		Schoolchildren develop and learn mathematics. It provides an overview of theories of learning mathematics in Junior High School. Emphasises will be placed on major theories of learning and								
		teaching of Junior High School mathematics in inclusive classrooms. Specifically, socio-cultural,								
	_	_				issed to enable stu				
						g children in Junio				
	classroon		in ownedge a	na competencie.	o ioi manami	.S crimarer in Jani	or riight series.			
Previous student teacher			e been taugh	t psychological b	asis of teach	ing and learning a	nd are familiar			
knowledge, prior			_	development, an						
learning (assumed)						rtance of mathema	atics			
Possible barriers to						learning needs, n				
learning in the lesson		-	d numeration		ŕ		•			
Lesson Delivery – chosen	Face-	Practical	Work-	Seminars	Independ	e-learning	Practicum			
to support students in	to-face	Activity	Based		ent Study	opportunities				
achieving the outcomes			Leaning							
Lesson Delivery - main	Face-to-f	ace: opport	unity for an e	extended and col	nerent line of	f argument. It inclu	ıdes			
mode of delivery chosen	discussio	n, brainstorn	ning, questior	n and answer, etc	c. This can be	e tutor and / or stu	dent teacher			
to support student	led. It sho	ould not usua	ally be the ma	in mode.						
teachers in achieving the	Practical	Activity: ena	ıbling experin	nentation and th	e analysis an	d discussion of iss	ues,			
learning outcomes.	documen	its and mate	rials, as well a	is physical activit	ies.					
		_	e group and i	ndividual creativ	ity, discussio	n and reflection: s	tudent and /			
	or tutor l									
	Independent study: to enable students to engage with relevant and appropriate materials to									
	promote individual and collaborative enquiry, more in-depth analysis and development. This									
	can be part of any of the above modes									
		E-learning opportunities – involving the use of interactive packages and virtual learning								
			· ·	any of the above	modes of de	livery. It is unlikely	to be a			
		node in its o								
Purpose for the		ose of the le								
lesson, what you						ctivity theory and	situated			
want the students to	cognit	ion perspect	ives and their	r implications for	practice					
achieve, serves as basis for the learning										
outcomes. An										
expanded version of										
the description.										
Learning Outcome	Learning	Outcomes	Learnin	g Indicators	I	dentify Which	cross-cutting			
for the lesson, picked			200			ssues- core and	~			
and developed from						kills, inclusivity,				
the course						ddressing diversi				
specification						_	dressed or			
Learning indicators					d	eveloped?				
for each learning	Dem	onstrate		Inclusion and Ed		Inclusion and	Equity: by			
outcome	know	ledge and	• Ge	nerate examples		supporting st				
		rstanding of		Idren's individua		teachers to r				
		heoretical ba		erences based o	n their		and personal			
	of lea	arning	me	mbership in vari	ous	sources of ba	rriers to			
	math	ematics in	suk	cultures;		leaning and r	making			
	Junio	r High Schoo	ol			conscious eff	orts to			
						address then	า.			
Ĩ	1									

	Demonstrate knowledge and understanding and appreciation the contribution made by some theorists whose works are relevated Junior High School profession.	of on for ons	•	Suggest age-appropriate strategies for learning and teaching mathematics to Junior High School childred Outline similarities and differences among sociocultural, activity, and situated cognition theorie and to indicate their relevance in learning and teaching mathematics in Junior High School classrooms  Write short notes on contributions made by learning theorists such as the Johann Heinrich Pestalozzi, Friedrich Froebel, Maria Montesso Jean Piaget, and Jerome Bruner, etc.  Compare conceptions about the learning of mathematics implicit in the works of the theorists mentioned above and indicate how knowledge and understanding of the theories can support the teaching of mathematics the Junior High School Reflect critically on their own learning experiences are influenced by the theorists listed above.	en	<ul> <li>Communicative skills of student teachers: can be enhanced through the examination, interrogation and presentation.</li> <li>Socio-cultural activity: Consciously support student teachers to outline socio-cultural, activity in teaching JHS mathematics.</li> <li>Characteristics and uniqueness of JHS learners: By encouraging student teachers to develop awareness of the different learning theories of child growth, development and maturation support young children's learning</li> <li>Professional development: Developing understanding of NTS through conscious effort and support from mentors, peers, and tutors.</li> </ul>
Topic Title	Sub-topic(s)	Stage/			7 to	activities to achieve learning
Topic Tide	Jub-topic(s)	Time		_	_	very mode selected. Teacher-lead
		Time		collaborative groupwork		-
					1	udent Activity
				Teacher Activity	311	duent Activity
Major theories of	<ul> <li>Socio-cultural perspectives</li> <li>Activity theory perspectives</li> <li>A situated cognition perspective</li> </ul>	10 mir		Review the previous lesson through questioning technique and to connect key issues that are emerging to the new lesson (PD Theme 1)	revi mat	ticipate in the discussion to ew the previously learned cerial lesson
learning and teaching of Junior High School mathematics in inclusive classrooms		20 mir 50 mir		Project the learning outcomes and indicators for student teachers to know what is expected of them. (PD Theme 1)	indic are	d the learning outcomes and cators to help monitor what they going through.  en attentively to the tutor or
				Give a short exposition based on socio-cultural, activity theory	lecti diffe	urer's verbal exposition on the erent theoretical perspectives ler review.

and a situated

	Making connections between the theoretical perspectives and learning of mathematics in Junior High School	40 mins 30 mins 20 mins	cognition perspectives (PD Theme 3)  Engage student teachers in a discussion on the similarities and differences of the theoretical perspectives mentioned above. (PD Theme 3)  Write a two-page report to identify the major ideas of Jean Piaget, Richard Skemp, Zoltan Dienes, Jerome Bruner and Vygotsky and their implications for teaching and learning of mathematical teaching practices at the Junior High School children level	Engage in a think-pair-share session to outline and hold a discussion on how similar or different the three theoretical perspectives mentioned are;  Participate in the guided practice session to search for information about Johann Heinrich Pestalozzi, Friedrich Froebel, Maria Montessori, Jean Piaget, and Jerome Bruner using cooperative learning technique and demand corrective feedback.  Take note of the assignment given; Read further about other relevant theoretical perspectives	
Lesson assessments – evaluation of learning:			School children level (PD Theme 1& 3)  Relate the various theories to how they explain the way  Assign student teachers to read further on the topic treated to prepare for the next lesson (PD Themes 1 & 3)  w would you use the ideas	Read further about other relevant theoretical perspectives  of any of the following theorists:	
of, for and as learning within the lesson	Friedrich Froebel, Maria Montessori, Jean Piaget, and Jerome Bruner in teaching a named concept in the JHS mathematics classroom?  2. Outline five (5) cultural practices and artefacts from your locality and explain how any one of them can be used in the teaching a named concept in the Early Grade mathematics syllabus. For example, using draught board for teaching fractions. NTS 2f - Takes accounts of and respects learners' cultural, linguistic, socio-economic and educational backgrounds in planning and teaching.  Outline three (3) age-appropriate strategies for learning and teaching mathematics to early grade children and present. NTS 3g - Employs instructional strategies appropriate for mixed ability, multilingual and multi-age classes.				
Instructional Resources	Posters illustrating pointernet;	eople using	g mathematics in the jo	bs; video clips downloaded from the	
Required Text (core)	Primary school teache	rs DOI: 10.	1109/WEEF.2017.8467070		
Additional Reading List	Wilson, S. M., & Peter for Educators? Washir	son, P. L. (2 ngton, DC 2	0036-3290	ly Bruner to Later Bruner. g and Teaching: What Do They Mean n Ghana: Tutor notes. Accra: Unimax	

	Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Students activities. Accra: Unimax Publishers.						
CPD Needs	<ul> <li>How to design and/or use some innovative materials and ideas for teaching selected concepts (e.g. developing and using the "Read my mind" number and word games to reinforce concept developed)</li> <li>Instructional strategies needed to consciously connect mathematical ideas, as well as, connect mathematics to other curriculum areas and to the world outside</li> </ul>						

Title of Lesson	Major t	heories of lear	ning a	and teach	ning of	Lesso	n Durati	on	3 Hou	ırs
110001 200011	Major theories of learning and teaching of Junior High School mathematics in inclusive								3 Hours	
	classrooms 2									
Lesson description	This lesson focuses on developing an understanding of what we know about how people think									
	about mathematics and how an understanding of mathematics develops. It provides an									
	overview of philosophies of mathematics and mathematics education and explores trainee									
	teachers' beliefs about mathematics and philosophies of mathematics implicit the official									
		mathematics curriculum and current classroom practice. It also covers children's								
		developmental levels, how children learn mathematics and associated theories, and other								
Previous student teacher		psychological factors influencing learning.								
knowledge, prior learning	Student-teachers have been taught psychological basis of teaching and learning and are familiar with concepts based child growth, development, and maturation;									
(assumed)		t teachers have		_		-			themat	ics
Possible barriers to		nt entry beha								
learning in the lesson		umber and nu				,		J	,	·
Lesson Delivery – chosen to	Face-	Practical	W	/ork-	Seminars	Indep	endent	e-learni	ng	Practicum
support students in	to-	Activity	В	ased		St	udy	opportun	ities	
achieving the outcomes	face		Le	<u>ani</u> ng			$\boxtimes$			
Lesson Delivery – main		-face: opport	-					_		
mode of delivery chosen to		on, brainstorm	_	-		etc. Th	is can be	tutor and /	or stud	ent teacher
support student teachers in achieving the learning		led. It should not usually be the main mode.								
outcomes.	<b>Practical Activity:</b> enabling experimentation and the analysis and discussion of issues, documents and materials, as well as physical activities.									
outcomes.	Seminars: to generate group and individual creativity, discussion and reflection: student and /									
	or tutor led									
	Independent study: to enable students to engage with relevant and appropriate materials to									
	promote individual and collaborative enquiry, more in-depth analysis and development. This									
	can be part of any of the above modes									
		E-learning opportunities – involving the use of interactive packages and virtual learning								
	environments. This can be part of any of the above modes of delivery. It is unlikely to be a									
	delivery mode in its own right.									
Purpose for the lesson,  what was want the	The purpose of the lesson is to;									
what you want the students to achieve,	develop student teachers' understanding of theories of learning e.g., cognitive,     constructivist and behaviourist perspectives and their implications for practice.									
serves as basis for the	constructivist and behaviourist perspectives and their implications for practice									
learning outcomes. An										
expanded version of										
the description.										
Learning Outcome for	Learnin	g Outcomes	Lea	arning In	dicators		Identify	Which cre	oss-cut	ting issues-
the lesson, picked and							core		nsferal	•
developed from the							inclusiv			addressing
course specification							diversit	="	will	these be
Learning indicators for	- Dan			Outline o	the differen	_		ed or devel	_	
each learning outcome	_	nonstrate wledge and	•		of Constructiv			ent teachers	•	y supporting
		erstanding of		Behavio		v13111,		tutional and		_
		structivism			vism and disc	cuss		arriers to lea	-	
		aviourism,		_	ews on learn			cious effort	_	_
		nitivism								
	thed	oretical	•	Compa	re and contra	ast	<ul> <li>Supp</li> </ul>	ort student	teache	ers the
		spectives of		the con	structivism,		opportunities to explore diversity			
	learning Behaviourism, within the class/subject and									
				_	vism as learn	ing	•	ntial barrier		
	theories (including personal bias,									

Topic Title Su	Demonstrat knowledge a understandi the implicat Constructivi Behaviourisi Cognitivism theoretical perspectives learning Jun High School mathematic  b-topic(s)	and ng of ion of sm m and s of		stereotypes and institutional discrimination)  Characteristics and uniqueness of upper primary learners: By encouraging student teachers to develop awareness of how Knowledge and understanding of child growth, development and maturation support young children's learning.
			groupwork or independent.	
			Teacher Activity	Student Activity
•	A cognitive perspective Constructivism Behaviourism Implications for	10 mins	Review the previous lesson through questioning technique (PD Theme 1)  Project learning outcomes and indicators on a screen for student teachers to read	Participate in the discussion to review the previous lesson;  Read the learning outcomes and indicators to develop awareness of the expectations in the lessons
	practice		and be aware of what is ahead.  Give an exposition based on	Pay attention to the verbal
Major theories of learning and teaching of Junior		60 mins	cognitive, behaviourism constructivism and their implications on the learning of mathematics in Junior High School (PD Theme 3)	exposition on the on cognitive, constructivism and their implications on the learning of mathematics in Junior High School;  Engage in a think-pair-share session to outline and discuss the effect of
High School mathematics in inclusive classrooms 2		60 mins	Engage student teachers in a discussion cognitivist, constructivist, behaviourism and other theoretical perspectives and how they explain the way Junior High School children learn	cognitivist, constructivist and other theoretical perspectives on the learning and teaching of mathematics in the Junior High School;
		30 mins	mathematical concepts; (PD Theme 1 & 3)  Assign student teachers to read on the theorists such as Lev Vygotsky, Skemp etc. and their contributions to	Search on the internet for information about Lev Vygotsky, Skemp and other relevant theorists whose works explain how Junior High School children develop and learn mathematical concepts
			the learning of mathematics in the Junior High School (PD Theme 1)	Read further about the importance of learning theories in the learning and teaching of mathematics in the Junior High School. (to be presented in the next class)
Lesson assessments  – evaluation of learning: of, for and as learning within the lesson	Cognitivism per teaching portfo	spectives of lios (PTP) (A	groups to compile a report on c f learning to be presented in cla Assessment for learning) NTS 3a ng a clear grasp of the intended	ss, to be added to their professional - Plans and delivers varied and
	sters illustrating pe	ople using r	mathematics in the jobs; video c	lips downloaded from the internet;

Resources						
Required Text (core)	Sriraman, B., & English, L. (2005). Theories of mathematics education: A global survey of theoretical frameworks/trends in mathematics education research. ZentralblattfürDidaktik der Mathematik (International Reviews on Mathematical Education), 37(6), 450–456.					
Additional Reading	Radford, L. Theories in Mathematics Education: A Brief Inquiry into their Conceptual Differences					
List	Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Tutor notes. Accra: Unimax Publishers.  Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Students activities. Accra: Unimax Publishers.					
CPD Needs	<ul> <li>How to design worksheets as tools for assessment.</li> <li>How to design and/or use some innovative materials and ideas for teaching selected concepts (e.g. developing and using the "Read my mind" number and word games to reinforce concept developed)</li> <li>Instructional strategies needed to consciously connect mathematical ideas, as well as, connect mathematics to other curriculum areas and to the world outside</li> </ul>					

Title of Lesson	Children and Mathema	Lesson Duration	3 Hours				
Previous student teacher knowledge, prior learning (assumed)  Possible barriers to learning in the lesson Lesson Delivery – chosen	This lesson focuses on developing knowledge and understanding of what we know about how children in Junior High School think about mathematics and how their understanding of mathematics develops. It provides an overview of psychological principles that explain what mathematics children are capable of learning and how they think as they go through given activities. It also highlights children's developmental levels, how children learn mathematics and associated theories, and other psychological factors influencing learning. The lesson has the tendency to deepen student teachers' awareness of equity and diversity issues.  Student-teachers have been taught psychological basis of teaching and learning and are familiar with concepts based on child growth, development, and maturation; Student teachers have been introduced to some major theories in the learning of mathematics in the Junior High School  Different entry behaviours, Socio-cultural issues, different learning needs, misconceptions about number and numeration system.  Face- Practical Work- Seminars Independ e-learning Practicum						
to support students in achieving the outcomes	to-face Activity	Based ent Stu Leaning	opportunities				
Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes.  Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of	Face-to-face: opportunity for an extended and coherent line of argument. It includes discussion, brainstorming, question and answer, etc. This can be tutor and / or student teacher led. It should not usually be the main mode.  Practical Activity: enabling experimentation and the analysis and discussion of issues, documents and materials, as well as physical activities.  Seminars: to generate group and individual creativity, discussion and reflection: student and / or tutor led  Independent study: to enable students to engage with relevant and appropriate materials to promote individual and collaborative enquiry, more in-depth analysis and development. This can be part of any of the above modes  E-learning opportunities – involving the use of interactive packages and virtual learning environments. This can be part of any of the above modes of delivery. It is unlikely to be a delivery mode in its own right.  The purpose of the lesson is to;  • develop student teachers' understanding of how children learn mathematics at the Junior High School level						
the description.     Learning Outcome for the lesson, picked and developed from the course specification     Learning indicators for each learning outcome	Demonstrate     knowledge and     understanding of     different ways     Junior High School     children learn     mathematical     concepts as     proposed by     theorists and their	Describe how respect for gender, equity and inclusivity in the mathematics classroom promote learning for all     Identify theories and theoretical principles that are relevant to the learning and teaching of mathematics in the Junior	issues- core and tra skills, inclusivity, equaddressing diversity. these be addressed or de Inclusion and Equity: supporting student te recognize institutional personal sources of be leaning and making co- efforts to address the	by eachers to I and arriers to onscious m. iniqueness arners: By teachers			

		Demonstrate a understanding relevant theori and principles elearning and the implications fo teaching Junior High School mathematics	of es of eir r	Junio math to ide theor form curric Obser repor High: (each obser childr math and trimplic effect instrumath childr Reflect own I and u analy theor learninglic implicit.	ct critically on their earning experiences ise this as a basis for sing relevant ies and principles of ing and their cations for teaching	a ccl So o d ccl b p ir	f child growth, development nd maturation support young hildren's learning upport student teachers the pportunities to explore iversity within the lass/subject and potential arriers to inclusion (including ersonal bias, stereotypes and astitutional discrimination)  ritical thinking:bydeveloping tudent teachers' ability to nink critically when analysing oncepts.
					r High School ematics		
Topic Title	Sub-topi	ic(s)	Stag Tim		outcomes dependi	ing o	activities to achieve learning n delivery mode selected. e groupwork or independent.  Student Activity
Children's Number readiness experiences  Concepts for Number Readiness  • Understanding size, shape and patterns  • Ability to count verbally (first forward, then backward)  • Recognizing numerals  • Identifying more and less of a quantity  • Understanding one-to-one correspondence (for example, matching sets or knowing which group)		1	.0 mins	Review the previous lesson on major the of learning mathema in Junior High Schoo (PD Theme 1) Engage student teact to outline theorists whose work are releto the development	ories atics I hers	Participate in the discussion to review the previously learned material;  List from memory theoretical perspectives and principles of learning that are relevant to Junior High School children	
		30 mins		young children and how they learn mathematics  Give an exposition on theories that explain how children develop number readiness such Understanding size, shape and patterns;		Listen attentively to the tutor or lecturer's verbal exposition on the concepts attitudes, beliefs, and values	
	knowing which group has four and which has five) Logical and psychological approaches to learning mathematics		6	0 mins	Ability to count verb Recognizing numera Understanding one-tone correspondence (PD Theme 3)	ally; ls; to-	Engage in a think-pair-share session to outline and discuss on logical and psychological approaches to learning mathematics.

	40 mins	Engage student teachers	Discuss theoretical					
		in a discussion based on	principles that explain how					
		logical and psychological	children learn given					
		approaches to learning mathematics.	mathematics concepts in Junior High School					
		(PD Theme 1& 3)	Julio High School					
	40 mins	(i z ineme za s)	Read further about how					
			early children learn					
		Assign student teachers	mathematics					
		to discuss different						
		theoretical principles						
		that explain Junior High School children's learning						
		of mathematics.						
		(PD Theme 1)						
		Analyse portions of the						
		Junior High School official						
		mathematics curriculum to identify which						
		theoretical perspectives						
		form the bases of the						
		curriculum.						
		(PD Theme 1)						
Lesson	4 6 1 1 1 1 1 1 1 1 1 1							
assessments – evaluation of	1. Student teachers are to write a reflective paper on logical and psychological approaches to							
learning: of, for	learning mathematics at the Junior High School level (Assessment for learning) NTS 2e - Understands how children develop and learn in diverse contexts and applies this in his or her							
and as learning	teaching.							
within the lesson	Reflect critically on their own learning experiences and use this as a basis for analysing							
	relevant theories and principles of learning and their implications for teaching Junior High							
	School mathematics. (Assessment for learning) NTS 3e - Employs a variety of instructional							
	strategies that encourages student participation and critical thinking. To be included in their PTP							
Instructional	Posters illustrating people using mathematic	s in the jobs: video clins dowr	nloaded from the internet:					
Resources		I I jozo, I.aco enpo dowi						
Required Text	Kashefi, H. (2017). Teaching and learning the		classroom among Primary					
(core)	school teachers DOI: 10.1109/WEEF.2017.8467070							
Additional	Anghileri, J. (2006). Scaffolding practices that enhance mathematics learning. Journal of Mathematics Teacher Education, 9,33–52. doi:10.1007/s10857-006-9005-9							
Reading List	Mathematics reacher Education, 9,33–52. do 	JI.10.1007/S10857-006-9005-	·9					
	·   Martin, J. et. al. (1994). Mathematics for tea	cher training in Ghana: Tutor	notes. Accra: Unimax					
	Publishers.	<u>j</u>						
	Martin, J. et. al. (1994). Mathematics for tea	cher training in Ghana: Stude	nts activities. Accra: Unimax					
	Publishers.							
CPD Needs	How to design and/or use some inn /a a developing and using the "Page"  /a a developing and using the "							
	(e.g. developing and using the "Read my mind" number and word games to reinforce concept							
	<ul> <li>developed)</li> <li>Instructional strategies needed to consciously connect mathematical ideas, as well as, connect</li> </ul>							
	mathematics to other curriculum areas and to the world outside							

Year of B.Ed.	2	Semester	1	Place of lesson in semester	1234567 <b>8</b> 910 11 12
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Title	of Lesson	Characte	ristics of chil	dren's	deve	lopmental sta	ages	Lesso	on Duration	3 Hc	ours	
	n description  ous student teacher	developr Emphasis and othe student t	This lesson focuses on developing an understanding of characteristics of children's developmental stages. It provides an overview of some theories on how children develop. Emphasis will be placed on children's developmental levels, how children learn mathematics, and other psychological factors influencing learning. The lesson has the tendency to deepen student teachers' awareness of equity and diversity issues.  Student-teachers have been taught psychological basis of teaching and learning and are familiar									
know	ledge, prior learning				_	n, developme			_	Ü		
(assu			=	_		-			ortance of mat	hema	tics	
	ble barriers to								t learning nee			ons
learn	ing in the lesson		ut number ar						_		•	
Lesso	n Delivery – chosen	Face-	Practical	Wo	rk-	Seminars	Indeper	ndent	e-learning	3	Practicun	m
achie	pport students in ving the outcomes n Delivery – main	to-face	Activity	Bas Lean	ing ]		Stuc		opportuniti			
Plantage     Plantage	e of delivery chosen support student ters in achieving the ing outcomes.  Purpose for the esson, what you want the students to achieve, serves as easis for the learning outcomes. An	led. It she Practical documer Seminars or tutor I Independ promote can be pa E-learnin environm delivery if The purp	Activity: enants and mate set to general led dent study: individual arart of any of ag opportuniments. This camode in its opose of the leelop student	ally be abling earlis, as te ground to enable the about	the nexpers well pand of the state of the st	nain mode. imentation and as physical and individual crudents to enguiry, nodes ing the use of any of the and immediately.	nd the anactivities. The activity, controlling age with more in-controlling and the activity activity and the activity activity and the activity activity activity activity activity and the activity act	alysis a discussi relevar lepth a ve pack les of d	nd discussion on and reflect nt and appropi nalysis and de cages and virtu elivery. It is ur tics of childre hool level	of issuion: st riate m velopr al lear llikely	es, udent and naterials to nent. This rning to be a	/
	expanded version of the description.											
• e t a t	earning Outcome for he lesson, picked and developed from he course pecification		Outcomes			ing Indicators		core inclus divers addre	sivity, equity sity. How essed or devel	nsfera and will oped?	ble skil addressi these	lls, ing be
f	earning indicators or each learning outcome	characte children' developr • Demo knowl under childre langua social,	anding of ristics of	•	th ak de ar fo ar M Ai pe ch	escribe differ neoretical view pout children' evelopmental and their implier classroom the learning of lathematics; nalyse theore erspectives welevant to how aildren develoarn mathematics;	ws 's I stages cations eaching tical hich are w op and	e P c c	Characteristics apper primary encouraging state levelop aware (nowledge and hild growth, donaturation superiolem-solving consciously engeachers in team of mathematics and contrast the proposition of the level in t	learne udent ness o l unde evelop port y ing g tech gaging ching a	rs: By teachers to f how rstanding o ment and roung niques by student and learnir Compare	o of ng

	intellectual development			Junio	or High School		haviourism, Cognitivism as arning theories.
	acreiopinent	their expe sugg persplain deve		their expe sugg pers plain deve	ect critically on own learning criences and est theoretical pectives that ex these modes of clopment.	<ul> <li>Sup opp wit pot (inc ste disc</li> <li>Cor tea</li> </ul>	poort student teachers the cortunities to explore diversity hin the class/subject and ential barriers to inclusion cluding personal bias, reotypes and institutional crimination) mmunicative skillsof student chers:can be enhanced through
				langı	ain physical, uage, speech, al, emotional, and		examination, interrogation I presentation.
				cogn intel	itive and lectual lopment	upr end	per primary learners: By couraging student teachers to relop awareness of how
			Discuss how Junior     High School children     physical, language,     speech, social,     emotional, and     cognitive and     intellectual     development affect     their learning of     mathematics		Kno chil ma	owledge and understanding of d growth, development and turation support young dren's learning	
Topic Title	Sub-topic(s)		age/		Teaching and lea	_	activities to achieve learning
		Tin	ne		=	_	elivery mode selected. Teacher- ork or independent.
					Teacher Activity	<u> </u>	Student Activity
	Meaning and types of development e.g. Physical, language and speech, social and	20	mins		Review the previo through questioning on how early child learn mathematics (PD d on Theme 1)	ng based ren s	- I
Characteristics of children's developmental stages	emotional, and cognitive development within the context of Junior High School teaching and learning of numeracy  ics of			Give a verbal exported the meaning and to development with emphasis on physical language and specific social and emotion cognitive development within the context Junior High School (PD Theme 3)	exposition on theories of learning mathematics in Junior High School and ask questions for clarification ensure effective understanding; tof Discuss how		
		60	mins		Assign student tea small groups) to se information on the internet about the contributions of a of the following:	earch for e	
		40	mins	;	<ul> <li>Johann Heinin Pestalozzi,</li> <li>Friedrich From Maria Monte</li> </ul>	ebel,	group will look for information on one theorist); Present information obtained briefly in class and

Maria Montessori,

Jean Piaget, and

obtained briefly in class and

to intensify the search

	Jerome Bruner's     in to understanding     learning of mathematics in     Junior High School     (PD Theme 3)      outside class hours to write a paper on children's number readiness  readiness					
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	<ol> <li>Outline theories that explain physical, language, speech, social, emotional, and cognitive and intellectual development. (Assessment as learning) NTS 2f - Takes accounts of and respects learners' cultural, linguistic, socio-economic and educational backgrounds in planning and teaching.</li> <li>Discuss how Junior High School children physical, language, speech, social, emotional, and cognitive and intellectual development affect their learning of mathematics. (Assessment of learning) NTS 3g - Employs instructional strategies appropriate for mixed ability, multilingual and multi-age classes. Class discussions</li> </ol>					
Instructional Resources	Posters illustrating people using mathematics in the jobs; video clips downloaded from the internet;					
Required Text (core)	Walshaw, M. (2017). Understanding mathematical development through Vygotsky, Research in Mathematics Education, 19:3, 293-309, DOI:10.1080/14794802.2017.1379728					
Additional Reading List	Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Tutor notes. Accra: Unimax Publishers.  Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Students activities. Accra: Unimax Publishers.					
CPD Needs	How to design and/or use some innovative materials and ideas for teaching selected concepts (e.g. developing and using the "Read my mind" number and word games to reinforce concept developed)      Instructional strategies needed to consciously connect mathematical ideas, as well as, connect mathematics to other curriculum areas and to the world outside					

Year of B.Ed. 2 Semester 1 Place of lesson in semester 1 2 3 4 5 6 7 8 9 10 11 12

Title of Le	sson	Multiple in	telligences	n Duration	3 Hours						
Lesson des	scription	This lesson focuses on developing an understanding of the foundations of multiple intelligence theory and the influence of this on personal development. The lesson will focus on the foundations of multiple intelligence theory, multiple intelligences theory and implications for teaching numeracy in the Junior High School. It provides an overview of principles of multiple intelligences, description of the dimensions of Howard Gardner's multiple intelligences and how it relates to learning styles									
Previous	student			been taught	psychologic	al basis of	f teach	ing and learning	and are familiar		
teacher	knowledge,	with conce	pts-based ch	ild growth, d	evelopment,	and matu	ration;				
prior	learning	Student tea	achers have b	een introdu	ced to the ch	aracteristi	ics of cl	nildren's develop	mental stages		
(assumed)	)										
Possible b						issues, di	fferent	learning needs,	misconceptions		
_	n the lesson	about	number and	numeration	system.						
Lesson De	-	Face-to-	Practical	Work-	Seminars	Indepen	dent	e-learning	Practicum		
chosen to		face	Activity	Based		Study		opportunities			
	n achieving	$  \boxtimes  $		Leaning							
the outcor											
	Delivery –							rgument. It includ			
	mode of				, etc. This cai	n be tutor	and / c	r student teacher	led. It should		
_	chosen to	-	be the main			41					
support	student					tne analys	sis and	discussion of issu	es, documents		
	in achieving		als, as well as			مائم المائمة			.dombood/or		
the	learning	tutor led	to generate į	group and in	dividual crea	tivity, disc	ussion	and reflection: st	dent and / or		
outcomes	•		nt ctudy: to	anabla stude	ents to onga	o with role	ovant a	nd appropriate m	atorials to		
		-	-					ysis and developn			
			any of the ab		enquiry, me	ne in-dep	tii aiiai	ysis and developin	ient. This can		
		-	-		the use of in	teractive r	nackage	es and virtual lear	ning		
								ery. It is unlikely			
		mode in its		oc part or ar	iy or the abo	· c modes	or acm	ery. ie is armicery	io de a denvery		
Purpo	se for the		se of the less	on is to:							
_	n, what you				es of studer	nt teachers	s to est	tablish and addre	ss their learning		
want	<del>-</del>		perceptions								
	nts to		-		-	-	_	be competent a	nd confidence in		
achiev	ve, serves as	_	ng diverse lea	_	, , ,			•			
basis	for the		J								
learni	ing										
outco	mes. An										
expan	nded version										
of the											
	iption.										
• Learn	_	Learning O	utcomes	Learning In	dicators			fy Which cross	_		
	ome for the							and transferable s	-		
	n, picked							y and addressing nese be addresse			
	eveloped the course	Domonstra	×+ 0	- 0					-		
	tne course fication	Demonstra understand			and analyse			haracteristics and	-		
_		meaning a	_		es of multipl ences, dimen			pper primary lear ncouraging stude	-		
	ing ators for	principles of			ences, dimen d Gardner's n			ncouraging stude evelop awarenes:			
	learning	intelligence	-		ences, learnir	-		nowledge and un			
outco	_	michigence	-3	_	critically on t			hild growth, deve	_		
Juico	e				rning experi			naturation suppor	-		
					w these relat			hildren's learning	c young		
					e intelligence		C	aren a rearriirig			
		1		::.cpi		-					

	Demonstrate knowledge and understanding of implications of multiple intelligences in classroom practice	of Ho multip be use	• how the dimensions ward Gardner's ple intelligences can ed in teaching Junior School children	Critical thinking: by developing critical thinking among student teachers when dealing with JHS learners.  Support student teachers to discuss the major theories of learning and teaching of Upper primary mathematics in inclusive classrooms.	
Topic Title	Sub-topic(s)	Stage/ Time	_	to activities to achieve learning lelivery mode selected. Teacher-lead or independent.	
			Teacher Activity	Student Activity	
			Review the previously learned material; (PD Theme 1)	Participate in the discussion to review the previous lesson;  React to the statement of the	
	The foundations of		State the learning outcomes for the lesson (PD Theme 1)	learning outcomes through giving comments or questioning.	
	multiple intelligence theory	10 mins	Use a short exposition to present a highlight of Gardner's principles of multiple intelligences (PD Theme 3)  Assign student teachers	Listen attentively to the tutor or lecturer's verbal exposition on the foundations of multiple intelligences and ask questions for clarification or provide comment(s) to ensure participation and understanding;	
		50 mins	to do internet search on the theme "foundations of multiple intelligences" and to write short notes for group discussion (PD Theme 1 & 3)	Search on the theme "foundations of multiple intelligences and prepare short notes and to present the findings in groups	
Multiple intelligences		50 mins	Engages student teachers in a discussion based on multiple intelligences theory and personal development (PD Theme 1)	Participate actively in the discussion of multiple intelligences theory and to identify the need to understand its implications in the	
	Multiple intelligences theory and personal development		Use Power point presentation, interspersed with questioning, to discuss the implications of the multiple intelligence in	Junior High School mathematics classroom  Engage in a think-pair-share	
	Implications for teaching numeracy in the Junior High School	30mins	the teaching and learning (PD Themes 1 & 3)	session to outline and discuss the implications of the multiple intelligence in the teaching and learning	

Lesson assessments –	Outline and analyse principles of multiple intelligences and its effects on classroom
evaluation of	learning. (Assessment as learning) NTS 3e - Employs a variety of instructional strategies
learning: of, for and	that encourages student participation and critical thinking.
as learning within the	2. Compare multiple intelligences with learning styles and use this knowledge to plan a
lesson	lesson in Junior High School mathematics class. (Assessment for learning) NTS 3e -
	Employs a variety of instructional strategies that encourages student participation and critical thinking.
	3. Outline how the dimensions of Howard Gardner's multiple intelligences can be used in
	teaching named topics in the Junior High School mathematics curriculum and to be
	presented the following week. (Assessment of learning) NTS 3e - Employs a variety of
	instructional strategies that encourages student participation and critical thinking.
Instructional	Posters illustrating people using mathematics in the jobs; video clips downloaded from the
Resources	internet;
Required Text (core)	https://www.pdfdrive.com/multiple-intelligences-in-the-classroom-e888894.html
Additional Reading	Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Tutor notes. Accra: Unimax
List	Publishers.
	Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Students activities. Accra:
	Unimax Publishers.
	https://www.pdfdrive.com/multiple-intelligences-mi-the-theory-its-implications-d4106293.html
	https://www.pdfdrive.com/intelligence-reframed-multiple-intelligences-for-the-21st-century-
	d158133116.html
CPD Needs	How to design and/or use some innovative materials and ideas for teaching selected
	concepts (e.g. developing and using the "Read my mind" number and word games to
	reinforce concept developed)
	Instructional strategies needed to consciously connect mathematical ideas, as well as,
	connect mathematics to other curriculum areas and to the world outside

Year of B.Ed. 2 Semester 1 Place of lesson in semester 1 2 3 4 5 6 7 8 9 10 11 12

Title of Lesson		Factors that affect teaching and learning of numeracy in Junior High School  3 Hours									
Lesson description	This less	This lesson focuses on developing an understanding of factors that affect children's learning									
	of mathe	of mathematics. It provides an overview of principles of teaching and learning Junior High									
	School N	school Numeracy as found in the current. This lesson will expose student teachers to									
	knowled	knowledge and understanding of what young children's developmentally appropriate									
		strategies for learning mathematics. Knowledge of the developmental levels, how children									
	_	earn mathematics and associated theories, and other psychological factors influencing									
		learning, form part of this lesson. Student teachers will also develop awareness of equity and									
		diversity issues.									
Previous student teacher			been tau	ght psycholog	gical basis of	f teaching and lea	rning and are				
knowledge, prior learning		with concepts-					0				
(assumed)		-		_	-	nultiple intelligence	es				
(account)				р							
Possible barriers to	Different	t entry hehavi	ours Socio	o-cultural issue	es different	learning needs, n	nisconcentions				
learning in the lesson		ımber and nun			oo, ao.						
Lesson Delivery – chosen to	Face-	Practical	Work-	Seminars	Independ	e-learning	Practicum				
support students in	to-face	Activity 🗌	Based		ent Study	opportunities					
achieving the outcomes		,	Leaning								
3											
Lesson Delivery – main	Face-to-	face: opportu	nity for an	extended and	coherent lin	e of argument. It in	cludes				
mode of delivery chosen to			-			n be tutor and / or					
support student teachers in		led. It should n				•					
achieving the learning			•			and discussion of	issues,				
outcomes.		nts and materi			-		•				
						ssion and reflection	n: student and				
	/ or tuto				-						
	Indepen	dent study: to	enable stu	idents to enga	ge with relev	ant and appropria	te materials to				
	promote	individual and	l collaborat	ive enquiry, m	nore in-depth	analysis and deve	opment. This				
	can be p	art of any of th	ne above m	odes							
	E-learnir	ng <i>opportunitie</i>	es – involvi	ng the use of i	nteractive pa	ckages and virtual	learning				
	environr	nents. This can	be part of	any of the abo	ove modes o	f delivery. It is unlik	ely to be a				
	delivery	mode in its ow	n right.								
<ul> <li>Purpose for the lesson,</li> </ul>	The purp	oose of the les	son is to;								
what you want the	• Crea	ate awareness	of the vario	ous factors tha	at affect Juni	or High School child	dren's learning				
students to achieve,	of m	nathematics an	d how thes	se can inform t	their teachin	g practices					
serves as basis for the											
learning outcomes. An											
expanded version of											
the description.											
<ul> <li>Learning Outcome for</li> </ul>	Learning	Outcomes	Learning	Indicators	l l	dentify Which	cross-cutting				
the lesson, picked and						ssues- core and					
developed from the						skills, inclusivity,					
course specification						_	ty. How will				
		addressing diversity. How will									
<ul> <li>Learning indicators for</li> </ul>						hese be ad developed?	dressed or				

each learning outcome	Demonstrate understanding of factors that affect Junior High School children' learning and teaching of Junior High School numeracy      Demonstrate	differe of fact home-natura factor High S learning Junior  Descriteach pre-reand le School about teach Junion Nume teach	ent broad composition cors; (teacher-based, chased, school-based, al and student baseds) that affect Junior chool children' and and teaching of High School numeracy ibe conceptions about er-student ratio as equisites of teaching earning of Junior High of Numeracy set the principles of ing and learning in a High School eracy based on er-student factors	student teachers: can be enhanced through the examination, interrogation and presentation.  Problem-solving techniques by consciously engaging student teachers in teaching and learning of mathematics that Compare and contrast the constructivism, Behaviourism, Cognitivism as learning theories.
	Demonstrate knowledge and understanding of the Principles of teaching and learning in Junior High School Numeracy based on teacher-student factors	teach math Junio math and a	ne (some) principles of ing and learning ematics in the current r High School ematics curriculum nalyse their civeness	Characteristics and uniqueness of upper primary learners: By encouraging student teachers to develop awareness of how Knowledge and understanding of child growth, development and maturation support young children's learning
Topic Title	Sub-topic(s)	Stage/ Time	outcomes depending	to activities to achieve learning on delivery mode selected. ive groupwork or independent.  Student Activity
Factors that affect teaching and learning of numeracy in	Principles of teaching and learning in Junior High School Numeracy	10 mins	Review the previous lesson by asking student teachers to present their work on the implications of multiple intelligences on teaching and students' learning. (PD Theme 1)  Give an exposition on the factors that affect	Participate in the discussion to review the previous lesson;  Pay attention to the tutor or lecturer's verbal exposition on
Junior High School		50 mins	teaching and learning of numeracy in Junior High School to highlight some principles of teaching and learning of Junior High School numeracy (PD Theme 3)	the principles of teaching and learning and ask questions for clarification to ensure understanding;

	Teachers' knowledge of the major factors (that affect Junior High School children's learning of mathematics)	50 mins	Engage student teachers in a discussion on how teachers' knowledge of major factors affecting children's learning can influence their classroom practice (PD Theme 1 & 3)	Participate in a think-pair- share session to outline and discuss the factors that affect children's learning of mathematics and implications of this on teachers' classroom practice		
	Teachers' knowledge of learner-teacher ratio factor	30 mins	Provide student teachers with selected pages of the Junior High School mathematics curriculum to outline some specific learner- teacher ratio factors learning and teaching of numeracy in Junior High School (PD Theme 1)	Outline the principles of learning and teaching mathematics in Junior High School and to describe how they will use such knowledge and understanding to support their activities in their school visits.		
		Use Power point presentation, interspersed with questioning, to discuss how knowledge of factors can influence the choices teachers make in their instructional practices.  (PD Themes 1 & 3)  Participate in the discussion how knowing the factors tha affect children's learning of Mathematical concepts can influence teachers' teaching mathematics.				
		10 mins	Assign student teachers to read further on why student teachers have to develop understanding of factors affecting Junior High School children teaching and learning and write a reflective paper to be presented in the next class meeting.  (PD Theme 1)	Write a brief report based on the interview conducted for presentation in class.		
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	<ol> <li>Analyse the differences among the broad composition of factors; teacher-based, home-based, school-based,natural and student based that affect Junior High School children's learning and teaching of mathematics. (Assessment for learning) NTS 3h - Sets meaningful tasks that encourages learner collaboration and leads to purposeful learning.</li> <li>Outline (some) principles of teaching and learning mathematics in the current Junior High School mathematics curriculum and analyse their effectiveness. (Assessment of learning) NTS 3k - Integrates a variety of assessment modes into teaching to support learning for peer review</li> </ol>					
Instructional Resources	Posters illustrating peo internet;	ple using m	athematics in the jobs; vid	eo clips downloaded from the		
Required Text (core)		iew of The	ories of Learning in Mather	natics Education Research.		
Additional Reading List			ories to practice in the teac tics for teacher training in G			

	Unimax Publishers. Martin, J. et. al. (1994). <i>Mathematics for teacher training in Ghana: Students activities</i> . Accra: Unimax Publishers.
CPD Needs	<ul> <li>How to design and/or use some innovative materials and ideas for teaching selected concepts (e.g. developing and using the "Read my mind" number and word games to reinforce concept developed)</li> <li>Instructional strategies needed to consciously connect mathematical ideas, as well as, connect mathematics to other curriculum areas and to the world outside</li> </ul>

Year of B.Ed. 2 Semester 1 Place of lesson in semester 1 2 3 4 5 6 7 8 9 10 11 12

Title of Lesson		<i>hat</i> affect te gh School	eaching and le	arning numer	racy in L	esson Duration	3 Hours	
Previous student teacher knowledge, prior learning (assumed)  Possible barriers to learning in	This lesson focuses on developing knowledge and understanding of factors that affect children's learning of mathematics. Specific areas of interest include Socio-cultural factors, attitude, and anxiety and the Implications of these for classroom practice. Student teachers will be engaged using a variety of strategies to ensure effective participation of all. Special attention will be given developmentally appropriate strategies are relevant for Junior High School children's developmental levels. Discussions and use of instructional resources, as well as, assigned tasks will focus on how Junior High Schoolchildren learn mathematics and associated theories, and other psychological factors influencing learning. The lesson will also look at the need for developing awareness of equity and diversity issues as potential factors that can influence children's learning of mathematics.  Student-teachers have been taught psychological basis of teaching and learning and are familiar with concepts-based child growth, development, and maturation; Student teachers have been introduced to an aspect of factors that affect children's learning of mathematics;							
the lesson				r and numera			earning needs,	
Lesson Delivery – chosen to support students in achieving the outcomes	Face- to-face	Practical Activity	Work- Based Leaning	Seminars	Independ nt Study	de e-learning		
Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes.      Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.	Face-to-face: opportunity for an extended and coherent line of argument. It includes discussion, brainstorming, question and answer, etc. This can be tutor and / or student teacher led. It should not usually be the main mode.  Practical Activity: enabling experimentation and the analysis and discussion of issues, documents and materials, as well as physical activities.  Seminars: to generate group and individual creativity, discussion and reflection: student and / or tutor led Independent study: to enable students to engage with relevant and appropriate materials to promote individual and collaborative enquiry, more in-depth analysis and development. This can be part of any of the above modes  E-learning opportunities – involving the use of interactive packages and virtual learning environments. This can be part of any of the above modes of delivery. It is unlikely to be a delivery mode in its own right.  The purpose of the lesson is to;  develop in student teachers an awareness and understanding of how socio-cultural factors, attitudes, beliefs, and anxiety can influence their learning and teaching of mathematics;							
<ul> <li>Learning Outcome for the lesson, picked and developed from the course specification</li> <li>Learning indicators for each learning outcome</li> </ul>	Learning Outcomes  Learning Indicators  Identify Which cross-cutting issues- co and transferable skills, inclusivity, equi and addressing diversity. How will the be addressed or developed?  Outline and analyse different factors that influence Junior factors that affect Junior High School children's learning of  Learning Indicators  Identify Which cross-cutting issues- co and transferable skills, inclusivity, equi and addressing diversity. How will thes be addressed or developed?  Characteristics and uniqueness of upper primary learners: By encouraging student teachers to develop awareness of how Knowledge and understanding of child growth, development and maturation support young children's learning Support student teachers th opportunities to explore diversi							

Topic Title	this for classroom practice  Demonstrate knowledge and understanding socio-cultural factors; attitude; anxiety that influence learning and teaching of Junior High School mathematics  stopic(s)  Stage Time		that affect children's learning of mathematics in Junior High School.  Outline and analyse how socio-cultural factors; attitude and anxiety that influence learning and teaching of Junior High School mathematics; Reflect critically on the impact of socio-cultural factors; attitude; anxiety on classroom practices  Teaching and lear		<ul> <li>Inclusion and Equity: by supporting student teachers to recognize institutional and personal sources of barriers to leaning and making conscious efforts to address them.</li> <li>Digital literacy:can afford student teachers the opportunity todevelop records for reflective journals using digital tools.</li> </ul>	
				collaborative group Teacher Activity	work o	or independent. Student Activity
	Socio-cultural factors; attitude; anxiety;			Review the previous by asking student te		•

		Time	collaborative groupwork or independent.			
			Teacher Activity	Student Activity		
	Socio-cultural factors; attitude; anxiety;	10 mins	Review the previous lesson by asking student teachers to present an outcome of the short interview with about two children on school visit (PD Theme 1)	Present short reports and participate in the discussion to review the previous lesson;		
Factors that affect teaching and learning numeracy in Junior High School	Implications for classroom practice	50 mins	Give an exposition based on socio-cultural factors, attitudes, beliefs, values and anxiety.  (PD Theme 3)	Listen attentively to the tutor or lecturer's verbal exposition on the concept's attitudes, beliefs, values and anxiety. and ask questions for clarification or provide comment(s) to ensure participation and understanding;		
		60 mins	Engage student teachers in a discussion on how teacher content knowledge, pedagogical knowledge, and pedagogical content knowledge that affect children's learning of mathematics in Junior High School (PD Theme 1& 3)	Engage in a think-pair-share session to outline and discuss the effect of teachers' teacher content knowledge, pedagogical knowledge, and pedagogical content knowledge that affect children's learning of mathematics in Junior High School		

	40 mins	Use Power point presentation, interspersed with questioning, to discuss how teachers' professional values and attitudes remain important factors in their teaching of Junior High School mathematics (PD Themes 1 & 3)	Create a table that illustrates the similarities and differences among values, attitudes, and beliefs and how these impact learning in Junior High School;			
	20 mins	Assign student teachers to write a reflective paper on the topic "The role of the teacher in promoting effective learning of mathematics in Junior High School" to be submitted the following week (PD Theme 1)	Pay attention to and also participate in the discussion of how teachers' professional values and attitudes remain important factors in their teaching of Junior High School mathematics Do internet search and further reading to write reflective papers individually on the topic "The role of the teacher in promoting effective learning of mathematics in Junior High School"			
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	1. 1. a final portfolio in mathematics, with emphasis on Early Grade Curriculum and relative to theories of learning, (Course work)(Assessment as learning) NTS 3k - Integrates a variety of assessment modes into teaching to support learning.  1. Project work report on designing TLMs for teaching numeracy in early grade. (Project) (Assessment as learning) NTS 3h - Sets meaningful tasks that encourages learner					
Instructional Resources	collaboration and leads to purposeful learning.  Posters illustrating people using mathematics in the jobs; video clips downloaded from the					
Required Text (core)	internet; Tsafe, A. K. (2012). Effective Learning of Mathematics: From Theory to Practice. Volume 13 (2)					
Additional Reading List	Joan, M. E. & Katharine R. S. (). Integrating Social, Moral, and Cognitive Developmental Theory: Implications of James Fowler's Epistemological Paradigm for Basic Writers Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Tutor notes. Accra: Unimax Publishers.  Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Students activities. Accra: Unimax Publishers.					
CPD Needs	<ul> <li>How to design and/or use some innovative materials and ideas for teaching selected concepts (e.g. developing and using the "Read my mind" number and word games to reinforce concept developed)</li> <li>Instructional strategies needed to consciously connect mathematical ideas, as well as, connect mathematics to other curriculum areas and to the world outside</li> </ul>					

Year of B.Ed. 2 Semester 1 Place of lesson in semester 12345678910 11 12

Title of Lesson	Factors that affect lea Junior High School	rning and teach	ning of numera	cy in Lesson		rs	
Previous student teacher knowledge, prior learning (assumed) Possible barriers to learning in the lesson Lesson Delivery – chosen to support students in achieving the outcomes	This lesson focuses on developing knowledge and understanding of factors that affect children's learning of mathematics. Specific areas of interest include Social and emotional intelligence and how these influence Junior High School children's learning of mathematics and its Implications for classroom practice. Student teachers will be engaged using a variety of strategies to ensure effective participation of all. The lesson will also look at the need for developing awareness of equity and diversity issues as potential factors that can influence children's learning of mathematics.  Student-teachers have been taught psychological basis of teaching and learning and are familiar						
Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes.  Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of	Face-to-face: opportunity for an extended and coherent line of argument. It includes discussion, brainstorming, question and answer, etc. This can be tutor and / or student teacher led. It should not usually be the main mode.  Practical Activity: enabling experimentation and the analysis and discussion of issues, documents and materials, as well as physical activities.  Seminars: to generate group and individual creativity, discussion and reflection: student and / or tutor led  Independent study: to enable students to engage with relevant and appropriate materials to promote individual and collaborative enquiry, more in-depth analysis and development. This can be part of any of the above modes  E-learning opportunities — involving the use of interactive packages and virtual learning environments. This can be part of any of the above modes of delivery. It is unlikely to be a delivery mode in its own right.  The purpose of the lesson is to;  develop in student teachers an awareness and understanding of how social and emotional intelligence, among other factors, like attitudes, beliefs, and anxiety can influence their learning and teaching of mathematics;						
the description.  Learning Outcome for the lesson, picked and developed from the course specification  Learning indicators for each learning outcome	Demonstrate understanding of social and emotional intelligence and how this influences Junior High School children's learning of mathematics	different teachers developin emotiona • Describe concerns	nd analyse roles that play in ng children's al intelligence teachers' for teaching al intelligence; ne basic	and transfers and addressed be addressed Character upper prin encourage develop a and unde developm young chi student t institution	ch cross-cutting in the control of the characteristics and uniquer mary learners: By ing student teached wareness of how restanding of child lent and maturation lidren's eachers to recognize and personal so leaning and make	vity, equity v will these  ess of ers to Knowledge growth, on support ize ources of	

Demonstrate knowledge and understanding of how to validate the feelings of others in a busy classroom.  Topic Title Sub-topic(s) Stage/Time		ge and anding of alidate ngs of a busy m.			understanding of NTS through conscious effort and support from mentors, peers, and tutors.  Inclusion and Equity: by recognizing institutional and personal sources of barriers to leaning and making conscious efforts to address them.  Professional development: Developing understanding of NTS through conscious effort and support from mentors, peers, and tutors.		
	Time		depending on delivery collaborative groupwork or in				
				Teacher Activity		Student Activity	
	Social and emotional intelligence and	20 mins 30 mins		Review the previous lesson through questioning; (PD Theme 1)		Participate in the discussion to review the previous lesson;	
	children's learning of mathematics			Project learning outcomes and indicators for student teachers to read		Read learning outcomes and indicators to become aware of what is expected of them.	
				Provide verbal expos social and emotional intelligence	ition on	Pay attention to the verbal exposition based on social and emotional intelligence and children's learning of	
Factors that affect			Hold a discussion on the role of acceptance, tolerance,		nce,	mathematics	
learning and teaching of numeracy in Junior High School			cooperation, striving for the common, and other values in promoting classroom learning and successful life for all.		alues in learning	Participate in the discussion on the role of acceptance, tolerance, cooperation, striving for the common, and other	
			Leads a discussion on how teachers' knowledge of learners' social and emotional		values in promoting classroom learning and successful life for all.		
			iins	intelligence influence formation and effecti activities  Monitors student teathey search the intersocial qualities that coneed to be effective in the learning of	e group ive group ichers as net for hildren	Participate in the discussion on how teachers' knowledge of learners' social and emotional intelligence influence group formation and effective group activities	

	School classroom?		mathematics. (PD Theme 1& 3)	Search the internet for social qualities that children need to be effective partners in the learning of mathematics		
		20 mins	Assign student teachers to write a reflective paper on "The need for developing appropriate social qualities in Junior High School learners" for effective learning and a healthy life.  (PD Theme 1)	Discuss their findings briefly in small groups on the implications of these for teachers' classroom instructional practices.  Read further about what it means to develop social qualities and to reflect through writing on the implications of		
				this on their preparation to become effective teachers.  Outline some social qualities they consider very important for children's emotional and social development and how this can influence children's learning of mathematics (through independent study and to present later for grading).		
				Write a reflective paper on how teachers' knowledge of children's social and emotional intelligence can affect their classroom practices (to be submitted for grading)		
Lesson assessments  – evaluation of learning: of, for and as learning within the lesson	<ul> <li>Student teachers to submit the following; involve in review of the course;</li> <li>a final portfolio in mathematics, with emphasis on Junior High School Curriculum and relative to theories of learning.</li> <li>journal entries based on their experiences in how children learn mathematics in Junior High School. (Assignment)</li> <li>report of STS observation and small group teaching in Junior High School mathematics classroom. (collaborative project or presentation)</li> <li>provide information on end of semester examination based on learningtheories inJunior High School mathematics.</li> </ul>					
Instructional Resources	Posters illustrating people using mathematics in the jobs; video clips downloaded from the internet;					
Required Text (core)	Tsafe, A. K. (2012). Effective Learning of Mathematics: From Theory to Practice. Volume 13 (2)					
Additional Reading List	Joan, M. E. & Katharine R. S. Integrating Social, Moral, and Cognitive Developmental Theory: Implications of James Fowler's Epistemological Paradigm for Basic Writers Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Tutor notes. Accra: Unimax Publishers. Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Students activities. Accra: Unimax Publishers					
CPD Needs	Publishers.  Review of previous lessons and preparation for end of the semester examination based on learning theories in early grade mathematics.					
¹Component 1: Subject  • Selected items	: Portfolio Assessm s of students work(2					

<sup>1</sup> See rubrics on Subject Portfolio Assessment in Annex 6 of NTEAP

- Midterm assessment -20%
- Reflective journal 40%
- Organization of the subject portfolio-10% (how it is presented /organized

## <sup>2</sup>Component 2: Subject Project Assessment (30% overall score)

- Introduction; a clear statement of aim and purpose of the project-10%
- Methodology; what the student teacher has done and how achieve the purpose of the project-20%
- Substantive or main section-40%
- Conclusion 30%

Component 3: End of Semester Examination- (40% overall)

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<sup>&</sup>lt;sup>2</sup> See rubrics on Subject Project Assessment in Annex 6 of NTEAP

