

Four-Year B.Ed. Course Manual

Theories in the Learning of Numeracy

















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

FOREWORD

These Initial Teacher Education course manuals were developed by a team consisting of members from Colleges of Education and four universities namely the University of Ghana, Kwame Nkrumah University of Science and Technology, University of Education, Winneba, and University for Development Studies. This team was originally constituted by the National Council for Tertiary Education (now the Ghana Tertiary Education Commission) in 2019 to support the delivery of the new B.Ed. curriculum with assistance from T-TEL and UK Aid. The revision, finalization and printing of these manuals took place in 2021 with support from T-TEL and Mastercard Foundation.

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, enabling them to teach effectively in basic schools.

The first section of the manuals is focused on the course information and vision for the 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. 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. Each manual contains a list of required reading and references 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.

Field instructions to guide Supported Teaching in School are integrated into the course manuals to provide the student teacher with guidance in developing teaching throughout the entire period of study to be able to meet the requirements of the National Teachers' Standards (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, National Teacher Education & Assessment Policy and the National Teacher Education Gender Equality and Social Inclusion (GESI) Strategy and Action Plan.. This will help to ensure that student teachers' learning is integrated within the wider teacher education policy framework.

Professor Mohammed Salifu Director General, Ghana Tertiary Education Commission

ACKNOWLEDGEMENTS

The course manuals were developed 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 for Development Studies. They were produced in association with the Ghana Tertiary Education Commission 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 Ghana Tertiary Education Commission (GTEC) 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, Akwasi Addae-Boahene, Prof. Mohammed Salifu, the Director General of GTEC 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.

CORE WRITING TEAM

Names of writers	Subject		Names of writers	Subject
Dr. Isaac Eshun			Cletus Ngaaso	Social Studies
Dr. Anthony Baabereyir			Mohammed Adam	
Ms. Shirley Dankwa	African Studies		Dr. Emmanuel Adjei-Boateng	
Prof. S.Y. Annor	Agriculture		Dr. Yaw Nyadu Offei	Special Education
Dr. Salome praise Otami			Prof. Samuel Hayford	
Dr. Samuel Frimpong			Dr. Awuni	
Robert Quansah	Early Grade		Rev.(Dr) Nyueko Avotri	Technical Vocational
Dr. Abraham Kwadwo Okrah			Elizabeth Lani Ashong	Education and
Dr. Sarah Emma Eshun	English Language		Michael Tsorgali	Training
Vivian Acquaye			Wilender FootSun	
Felix A. Odonkor			Frnacis Donkor	
Dr. Cecilia Esinam Agbeh	-		Dr. Maxwell Nyatsikor	
Ibrahim Osmanu	French		Prof. Salomey Essuman	
Dr. Kofi Adu-Boahen			Dr. Paul Kwadwo Addo	
Dr. M. Kusimi	-		Dr. Winston Kwame Abroampa	
Dr. Aboagye Dacosta			Mr. Kwaku Esia-Donkoh	
Mr. Alexander Otoo	Geography		Mohammed Z. Abdulmumin	Pedagogy
Dr. Yvonne A.A. Ollennu	Ghanaian		Dr. Mohammed Hafiz	Arabic
Kwasi Adomako	Language		Iddris Mohammed	
Dr. Akwasi Kwarteng Amoako-Gyampah			Mohammed Almu Mahaman	
Anitha Oforiwah Adu- Boahen			Murtada M. Muaz	
Gertrude Nkrumah	History		Dr M. Q. Adjahoe	Music
Prof Charles Owu-Ewie	Literacy	1	Prof Cosmas Mereku	
Dr. Ahmed Amihere			Prof. Reginald Ocansey	Physical Education
Zakaria Sadiq	Mathematics		Dr. Emmanuel Osei Sarpong	
Dr. R. Addai-Mununkum	RME		E. Kwaku Kwaa-Aidoo	ICT
				l

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

Course Manual W	/riting Guide					
A. Course li	nformation					
Title Page						
The vision for the	New Four-Year B.E	d. Curriculu	m			
To transform initi	al teacher education	i and train h	ighly qualified, motivated ne	ew teachers who ar	e effective, enga	ging and
fully prepared to	teach the basic scho	ol curriculur	n and so improve the learni	ng outcomes and lif	e chances of all I	earners
they teach as set	out in the National T	eachers' Sta	andards. In doing this to inst	il in new teachers t	he Nation's core	values of
honesty, integrity	, creativity and respo	onsible citiz	enship and to achieve inclus	ive, equitable, high	quality educatio	n for all
learners						
Course Details						
Course name	Theories in the Lea	arning of Nu	meracy in Early Grade			
Pre-requisite	Senior High School	l Mathemat	ics			
Course Level	200	Course		Credit Value	3 Hours	
		Code				
Table of contents						
Goal for the Subj	ect or Learning Area	l				
This aspect of t	he mathematics pro	gramme wil	I prepare tutors and studen	t teachers to be co	mpetent and kno	owledgeable
enough to facili	tate teaching and le	arning of m	athematics and demonstrat	te commitment to e	equity and inclus	ivity in their
work, in order t	o maintain acceptab	le values an	d attitudes, knowledge and	skills for application	n in real life.	
Course Description	n					
This course focu	ses on developing a	n understan	ding of what student teach	ers should know ab	out how people	think about
mathematics an	d how children's un	nderstanding	g of mathematics develops.	It will provide an	overview of phil	losophies of
mathematics an	d how to teach ma	thematics i	n the early grades. It see	ks to prepare stud	ent teachers to	explore the
underlying conce	eption about mather	matics in the	e official mathematics curric	culum and current v	iews that suppo	rt children's
active participat	ion of classroom ins	truction and	assessment practices. It al	so covers discussio	n of theoretical p	perspectives
of how children	learn mathematics a	nd factors t	hat influence learning (NTEC	CF, p. 21).		
There is therefo	ore the need for tu	tors to des	ign strategies for auditing	of related pedago	gical content kn	nowledge to
establish and ad	dress student teach	ers' learning	g needs, perceptions and m	isconceptions in the	e Theories in the	Learning of
Mathematics.						
Additionally, stu	dent teachers will a	develop awa	areness of equity, inclusivit	ty and diversity iss	ues, especially ir	n respect of
being able to ide	entify the main deve	lopmental r	nilestone of children in the	grade, as they inte	ract with pupils	during small
group and obser	vation in supported	teaching in	schools (NTECF, p.45).			
This course is ex	pected to support st	tudent teacl	ners learn how to teach mat	thematics in the off	icial curriculum a	and begin to
develop their pr	ofessional identities	s by reflecti	ng and making connections	between theory a	nd practice. The	e course will
prepare student	teachers to demons	strate a grov	ving understanding of the re	equirement of the I	NTS, in terms of	professional
practice, knowle	dge, values and attit	udes.				
The learning out	comes would be as	ssessed thro	ough a combination of for	mative and summ	ative assessmen	ts including
coursework,	individual and group	assignment	s/, presentations and mathe	ematics histories.		
Key contextual fa	ctors					
A numbe	er of on-going interve	entions have	e been initiated by governme	ent and other stake	holders which su	pport the
Early Chi	Id Education (ECE) se	ector, such a	is mainstreaming KG into co	mpulsory basic edu	cation for all sch	ool-age
children,	school feeding prog	ramme, pro	vision of free school uniforr	ns, National Literac	y Acceleration Pr	ogramme
(NALAP)	and USAID support	programme	s (learning materials).			
 However 	, current research	shows that	early childhood education	is still facing a nun	nber of challeng	es. Some of
			the relevance of early ch	-	-	
			ints and inadequate infrastr			
			inguistic barriers; mode of		pils and a lack o	of conducive
			aching and learning of math			
			alified early childhood teacl		e-based learning	in Ghanaian
			thematical concepts.	, 9	0	
	-		d teachers does not prepa	are them sufficient	tly to identify, r	nanage and
		•	en in mathematics; including		•	-
		-	by society as women's field			
	a low competency lo	wel of early	childhood teachers in integr	rating ICT into their	teaching and loa	rning
		ver of early	cimunoou teachers in integr	ating ici into thelf	cacinity allu ied	i i i i i i g
Play-base			2012 Programme to Scale U	Ip Quality Kindergar	ten Education Na	ationwide,
	all teachers to adopt					
Core and transfer	able skills and cross	cutting issu	ies, including equity and inc	clusion		

- Core and transferable skills include: critical thinking, problem solving, social skills, creative thinking and communication skills, use of ICT.
- Cross cutting issues include: assessment literacy and assessing students' progress and professional values and attitudes, reflection and classroom enquiry
- **Background of student teachers:** An effort was made in year one to transition student teachers from diverse backgrounds to teacher education programme. They have also been introduced to psychological basis of learning as a course in pedagogy. Student teachers are aware of their own learning styles, interest and individual characteristics as means of learning. However, these experiences were not specifically related to teaching and learning of mathematics, especially how children develop and learn mathematics. Tutors need to engage student teachers to how mathematics should be taught to children in the early grade. Another major challenge is the lack of qualified early childhood teachers, leading to rote-based learning in Ghanaian early years` settings. *(CLO 4)*.
- **Needs of the student teachers:** Student teachers may have different needs (such as hunger, stress, sickness, financial, etc.) that are likely to affect their participation and learning in the mathematics classroom. Conscious efforts should be made to develop skills and competencies to identify and address the various needs of children as they observe, interact and teach small groups of children during (STS)
- **Inclusivity:** Student teachers can identify their own beliefs/bias about diversity, inclusion and equity, classroom instructional and assessment practices should consciously be designed to cater for learner diversity to promote learning opportunity for all. This will position them to begin to reflect on how to provide support for all learners in the mathematics classroom, irrespective of their challenges. Also, it will help them to understand that learners learn in different ways and that this can be used to support their own learning and that of their peers. *(CLO 3)*
- **Problem solving**, **critical and creative thinking**: Mathematical critical thinking is based on objective analysis of facts which will lead creative thinking and problem-solving. Problem-solving is the central focus of mathematics instructions as well as an integral component of assessment.
- Problem-solving techniques should therefore be consciously employed in the teaching and learning of theories in learning of mathematics. *(CLO 1, 2)*
- **Social and communication skills**: Communication is an important skill in the teaching and learning of mathematics. Presentation of classroom instructions should support student teachers to develop mathematical language, including symbols and vocabulary. There is the need to promote interactive pedagogy in the mathematics classroom to enhance critical thinking and interpersonal relationship among student teachers for extended learning outcome. *(CLO 1)*
- **Use of ICT**: The influence of IT in this 21st century cannot be overemphasized. Introduction of technology tools in the teaching and learning of mathematics influence what and how mathematics is to be taught. There is a low competency level of early childhood teachers in integrating ICT into their teaching and learning process. Therefore, student teachers should be supported to learn to integrate ICT in the grade mathematics teaching and learning processes (**NTS**, **3**j)
- Cultural issues: The multicultural nature of the Ghanaian child calls for classroom instructional and assessment practices (including examples) shouldaddress socio-cultural issues emerging from the teaching and learning of mathematics (*CLO* 4).

Gender issues in Mathematics: Early childhood education is perceived by society as women's field and also not regarded as important as Primary and JHS, Discuss to demystify the notion that ECE is female dominated area–(*CLO 3*).

Course Learning Outcomes	Learning Indicators
 On successful completion of the course, student-teachers will be able to: 1. Demonstrate knowledge and understanding about how young children grow, develop and learn mathematics in early grade(professional values, knowledge & practice) (NTS, 2b) 	 Select and use developmentally appropriate strategiesfor teaching that emphasize the physical, cognitive, emotional and social development of the child. Use play-based learning strategies that match early grade children's level of thinking. Make connections between theories of learning mathematics in early grade and how to apply them in practical teaching.
Demonstrate knowledge and skills in developing a professional	Use appropriate ICT tools (audio, braille, embossers) to compile artefacts and reports from observations and otherachievements as contents in a professional portfolio and
portfolio with evidence from observations (NTS, 1a, e, & f)	also showing creativity in design
 Demonstrate knowledge of early years pedagogical knowledge and pedagogical content knowledge to deliver the ECE curriculum (NTS 2c, pg. 13, 3e & 3g, pg. 14) [NTECF P1 (3), pg. 20] 	 Use appropriate pedagogical content knowledge to deliver the ECE curriculum Reflect on and record their experiences in their professional portfolios during their STS school visits. Write a reflective learning journal that shows progress of student teachers' observation on how children learn mathematics.

 Demonstrate competencies in using differentiated instructional strategies, with a focus on a thematic approach and which promotes play-based learning to cater for the needs of all children in the early years` classroom, including those with SEN (NTS 3f, pg. 14) Demonstrateknowledge of age appropriate assessment strategies and recognise and support children's progress against appropriate developmental milestones and the expectations of the Early Grade mathematics Curriculum 	 Plan a lesson using play-based learning strategies that match early grade children's level of thinking. Undertake small scale classroom enquiry focussed on children's learning and progress, demonstrating an emerging ability to reflect on their developing understanding of teaching, learning and assessing children in early grade mathematics. (equity and inclusion) Outline strategies that cater for the needs of all children in the early years' classroom, including those with SEN Outline age appropriate assessment strategies for theories in learning mathematics in the ECE recognise and support children's progress against appropriate developmental milestones critique the expectations outlined for the Early Grade mathematics Curriculum
 (NTS 3k,pg. 14) Demonstrate skills in identifying traits of professionalismin school (NTS, 1d, 1f, 1g, & 2a) 5. Demonstrate the core and transferrable skills like problem solving and creativity and taking advantage of the affordances of ICT integrating it into teaching and learning (NTS) 	 Provide SR J recordings of demonstrated professional values and attitudes during engagements with people including pupils, mentors, tutors, and peers Use knowledge gained from earning theories in mathematics to design appropriate problem-solving tasks. Recognise and use developmentally appropriate and positive behaviour management skills
 Demonstrate competencies in carrying out classroom inquiry and action research and reflect on their teaching practices for continuous professional development (NTS 1a, 1b,1c 3b, NTECF: crosscutting issues; Core skills, Professional values and attitudes) 	 Carry out action research and classroom enquiry to improve practice in the upper primary classroom reflect on their teaching practices for continuous professional development (CPD) Reflect on and record their experiences in their professional portfolios – through this, student teachers will begin working towards meeting the NTS
 Observation techniques, Designing of reflective journa discussions of concepts and r investigations to arrive at get problem-solving strategies, collaborative activities (think multiple representations (Pri 	als and portfolios, misconceptions, neralizations,

Course Assessment Components

ASSESSMENT COMPONENT 1 – PORFOLIO (30%)

Summary of Assessment Method: Peer Review / Tutor assessment of portfolio of materials and resources amassed during the course:

Component 1 and 2 Coursework : teaching and learning portfolio, Course work, Individual/ Groupassignment, collaborative project, Group presentation, worksheet exercises, reflective papers for peer review, etc.

- In the final session of the course student teachers present the teaching and learning portfolios they have developed during the course for peer review and then tutor assessment and grading. this should include:
 - > reflections on the key components of the Early Grade mathematics Curriculum
 - notes on how the theories of learning addressed in the course impact on mathematics teaching,
 - journal entries based on student teachers experiences in how children learn mathematics in early grade.
 - Report of STS observation and small group teaching in early grade mathematics classroom.
 - > a personal teaching philosophy for teaching early grade mathematics,
 - a list of key lessons learned during the course and three targets for developing their skills, knowledge and understanding of teaching and learning further
 - Assessment for Learning (Presentations/Portfolio)

The final portfolio should include: all the items added throughout the course: presentations, TLMs, example plans for lessons and an up-

Weighting: 30 %

ASSESSMENT COMPONENT 2- PROJECT (30%)

- 1. As a student teacher how would you use the ideas of any of the following theorists: Friedrich Froebel, Maria Montessori, Jean Piaget, and Jerome Bruner in teaching a named concept in the Early Grade 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(*Poster/TLM*) (NTS 3j, pg. 14)

ASSESSMENT COMPONENT 3-40%

- WRITTEN EXAMINATION
- End of semester examination, projects, etc., for example
 - Undertake examination based on theories of learning in early grade mathematics. Student teachers will be expected to show their knowledge and understanding of how these theories can be applied in teaching early grade mathematics. This implies that student teachers should show comprehensive knowledge of the official school curriculum, including learning outcomes. (NTS 2b, pg. 13)

Note:

- In this semester, a greater focus should be school-based, organised, and directed learning experiences in school where students reflect on teachers' teaching and children's learning.
- The assessment procedures should make room for differentiation gender, equity, SEN, and inclusivity and focus should be age-appropriate and learner-friendly assessment formats.

Required Reading and Reference List Garegae, K. G. (2001). Teachers' beliefs about mathematics, its teaching and learning and the communication of these beliefs to students: A case study in Botswana. Unpublished Doctoral dissertation. University of Manitoba, Canada 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. Martin, J. et. al. (1993). Mathematics for teacher training in Ghana: Tutor notes, Accra: Unimax Publishers. Martin, J. et. al. (1993). Mathematics for teacher training in Ghana: Students activities. Accra: Unimax Publishers. Ministry of Education. (2019). Mathematics curriculum for primary schools (basic 1 - 3). Accra: Ministry of Education. Kashefi, H. (2017). Teaching and learning theories applied in Mathematics classroom among Primary school teachers DOI: 10.1109/WEEF.2017.8467070 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. Anghileri, J. (2006). Scaffolding practices that enhance mathematics learning. Journal of Mathematics Teacher Education, 9,33-52. doi:10.1007/s10857-006-9005-9 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 **Teaching and Learning resources** Maths posters Manipulatives and visual aids Computers and other technological tools Set of Mathematical instruments Geoboard (Geodot) Course related professional development for tutors/ lecturers

Year of B.Ed. 2	Semester	1	Place of	lesson in sem	ester	1 2 3	3456789	10 11	12	
Title of Lesson	Why do we	e teach math	nematics in s	Less	on Duration	31	Hours			
Lesson description Previous student teacher	about matl of philosop about matl curriculum children lea	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 student teachers' belie 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 mathematics and associated theories, and other psychological factors influencing learning. Another area that is considered is developing awareness of equity and diversity issues.								
knowledge, prior learning (assumed)	with conce	pts based o	n child grow	th, developm	ent, and	d matura	ation;			
Possible barriers to		-		-cultural issue	es, diffe	rent lea	irning needs, mi	isconcept	ions about	
learning in the lesson Lesson Delivery – chosen to support students in achieving the outcomes	number an Face-to- face	d numeration Practical Activity	Work- Based Leaning	Seminars	Indepe ent Sto		e-learning opportunities	Prac	cticum	
 Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes. Purpose for the 	brainstorm not usually Practical A and materi Seminars: tutor led Independe promote ir be part of a E-learning environme mode in its	ing, questio be the main ctivity: enable als, as well a to generate nt study: to advidual and any of the all opportunition nts. This car	n and answe n mode. Dling experir as physical a group and o enable stu d collaborati pove modes <i>es</i> – involvin n be part of	er, etc. This connected and a connectivities. Individual created and a connectivities and a connectivity of a connective and	an be tu d the an ativity, o ge with nore in-o nteracti	tor and alysis ar discussic relevan depth ar ve packa	of argument. It in / or student tea and discussion of on and reflection and appropriat nalysis and devel ages and virtual elivery. It is unlik	cher led. I issues, do n: student te materia lopment. learning	It should ocuments and / or als to This can	
lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.	they a • develo well as	re expected op student t s, how to tea	of in this les eachers' un ach mathem	sson. Iderstanding atics to early	of the r grade le	nature a earners.		of mathe	ematics, as	
Learning Outcome for the lesson, picked and developed from the course	Learning O	utcomes		ing Indicators	,	and tra and ad be add	y Which cross- ansferable skills ddressing divers lressed or develo	s, inclusiv ity. How oped?	ity, equity will these	
 specification Learning indicators for each learning outcome 	knowle of obs report teachin school School NTECF • Demod	nstrate	ills p j s p r ii, g	roduce well- repared indu chedule and rocedures rovide recorc roup workact nd/or cooper	s of ivities	tea exa pre in mu • Res	mmunicative achers:can be en amination, ir esentation of th developing a ultimedia spect and divers d planning lesso	nterrogati e various Ind usin ity: Appre	on and principles g varying	
		edge and standing of t		earning for stu eachers durin			cial and com rough developir	nmunicati ng speci		

	basi curr sper on c thei exp	features of the ic school riculum (BSC); a cifically focusin core subjects a ir associated ected learning comes (NTS, 2a	 Make oral support learners to communicate their mathematical thinking coherently for academic purposes Make oral support learners to communicate their mathematical thinking coherently for academic purposes Commitment and passion for teaching: by developing student teachers in their groups
	pre a pe tead	nonstrate skills paringand writi ersonal chingphilosoph ement (NTS, 11	ng with mentors and peers on the key features of the discussed.
Торіс	Sub-topic(s)	Stage/ Time	Teaching and learning to activities to achieve learning outcomes depending on delivery mode selected. Teacher-lead collaborative group
		- Time	work or independent.
			Teacher Activity Student Activity
		40 mins	Introduces student teachers to the Course Manual and discussParticipate in the discussion of various components of the coursethe various components including assessment procedures (See Course Assessmentmanual, take opportunity to ask questions about the Course Manual including assessment procedures.Course Assessment Components), (PD Theme 1)Outline their expectations and views about the mathematics course.
WEEK 1 Why do we teach mathematics in school?		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 after generations; (PD Themes 1 & 3)Listen attentively to the tutor or lecturer's verbal exposition and ask questions for clarification or provide comment(s) to ensure participation and understanding;Engage student teachers in a discussion based on how mathematics is used currently and its future prospects (PD Themes 1 & 3)Listen attentively to the tutor or lecturer's verbal exposition and ask questions for clarification or provide comment(s) to ensure participation and understanding;Engage in a think-pair-share session to outline the importance of Mathematics to people in various trades and professions in our Ghanaian cultural settings;Search the definition(s) and meaning of Mathematics on the internet and to discuss their findings in groups of five or six.
		20 mins	Assign student teachers to explore the meaning and definition(s) of Mathematics

		20 mins	through internet search and to discuss their findings; (PD Themes 3 & 4)	Alert peers of distortions of facts and principles as they present their findings;
		20 mins	Monitor student teachers as they search the internet for definitions of Mathematics and to refine any potential distortions or misconceptions in their narrations;	Use appropriate ICT tools to record teacher-pupils' classroom interactions and wider school activities in SR Js
		20 mins	(<i>PD Theme 1</i> Poses the question "How does Mathematics relate to society?" (<i>PD Theme 2</i>)	Engage in a group discussion to explore the application of Mathematics in the Ghanaian society.
	How does Mathematics relate to society?	20 mins	Use Power point presentation interspersed with questioning to discuss opposing views of how young children learn or develop certain Mathematical concepts; (PD Themes 1 & 3)	This discussion should also consider how our cultural practices and artefacts can be used in teaching of school mathematics in the Early Grade;
	What does it mean to	20 mins	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.	Pay attention to and also participate in the discussion of their own perception of how Mathematical concepts are learned
	learn and teach Mathematics ?		(PD Theme 1)	Use appropriate ICT tools to record teacher-pupils' classroom interactions and wider school activities in SR Js
				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				essional teaching portfolios (PTP) to be
assessments –			the 10 th week of the semester.	
evaluation of learning: of, for			e assigned to write a short reflective per's values and philosophy of mathem	
and as learning			ment as learning) NTS 1a- Critically a	
within the lesson	teachii	ng and learnin	g. This will be included in the profess	ional teaching portfolios (PTP)
	-		variety of teaching and learning reso	•
	learning.NTS 3h	i - sets meanir	igiui tasks triat encourages learner	collaboration and leads to purposeful
Instructional	Posters; video c	lips; download	ds; models, etc.	
Resources		E 11 1 1 10 -		
Required Text (core)		-	05). Theories of mathematics educat natics education research. Zentralbla	
			thematical Education), 37(6), 450–45	
Additional Reading)). Where Mathematics comes from.	
List			ematics for teacher training in Ghand	a: Tutor notes. Accra: Unimax
	Publish Martin, I. et. al.		ematics for teacher training in Ghanc	a: Students activities Accra: Unimax
	Publishers.		emanes jor teacher training in Ghund	
CPD Needs	How to	o design and/o	or use some innovative materials and	ideas for teaching selected concepts
	based	on theories of	learning in early grade mathematics	

How to manage transition of home to school.
 Understand the various characteristics and uniqueness of early grade learners.
How to design tasks for assessment procedures forassessment of, as and for learning.
Instructional strategies needed to consciously engage student teachers on how to design and
produce portfolios, journals and STS reports.

Year of B.Ed.	2	Semester	1	Place of l	esson in seme	ster	1 2 3 4	56789	10 1	1 12	
Title of Lesson				mathematics	and their	L	esson Dura	ation	3 Ho	ours	
Lesson descriptio Previous student		mathemat philosophi about mat and currer mathemat teachers w	relation to teaching 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 psychological factors influencing learning. Student teachers will be led to share their views of equity and diversity issues in the teaching of mathematics. Student-teachers have been taught psychological basis of teaching and learning and are familiar with								
knowledge, learning (assume Possible barriers		Student te	achers have	been introdu	velopment, an iced to the nat io-cultural issu	ture ai	nd importa			ceptions abo	
learning in the lesson Delivery – to support studer achieving the out	sson chosen nts in			Work-Based Leaning	n.	Inde	ependent Study	e-learnin opportuni	ng	Practicum	
serves as basis learning outcom	lesson, nt the achieve, for the nes. An	brainstorm usually be Practical A and mater Seminars: tutor led Independe promote in part of any E-learning environme mode in its The purpo • audit learning Early 0 develop st	ning, questic the main mo activity: enal ials, as well to generate ent study: to ndividual and of the abov opportuniti ents. This can s own right. se of the less content kno ng needs, pe Grade	an and answe ode. bling experim as physical ac group and ir b enable stud d collaborativ re modes es – involving a be part of a eson is to; bwledge and erceptions an	tended and co ctended and co c, etc. This can entation and t tivities. Idividual creat ents to engage e enquiry, mo the use of int ny of the abov experiences co d misconceptions ss of howteach	be tu he an ivity, o e with re in-o eracti e moo of stuo ons ab	tor and / o alysis and o discussion a relevant an depth analy ve package des of deliv dent teach pout the lea	r student tea discussion of and reflection nd appropria ysis and deve es and virtual ery. It is unlik ers to establ arning and te	cher led issues, n: stude te mate lopmen learnin cely to b lish and aching	d. It should no documents ent and / or erials to it. This can be g be a delivery d address the of numeracy	
expanded version description. • Learning Out for the lesson picked and developed fr course specif • Learning in for each outcome	come 1, om the ication	and u differe (belief mathe	Dutcomes Instrate know Inderstanding ent perspect fs and values ematics(NTS F Pillar 1)	vledge g of ives s) of	Outline and different per mathematic their differe similarities; Describe cor about mathe implicit in th beliefs;	analys rspect s and o nces a nceptic	se view of the second s	 issues- corr skills, inclu addressing these be add Problem creativet m-solvin mathem well as a of assess Commur enhance examina 	sivity, diversit ressed solvin; hinking g a ce atics in n integ ment. hicative d th tion, esentat	equity ar ty. How w or developed g, critical ar Makingprob ntral focus nstructions ral compone skills: will t hrough th interrogatic	

	profession	ding of relevant al values and n teaching Early	 Develop short personal beliefs about the teaching and learning of mathematics; Reflect critically on their own learning experiences and use the skills gained to plan for continuous personal and professional developmentto promote effective learning in the Early Grade mathematics classroom 	 developing and using varying multimedia Ethics and values of teaching: Consciously demonstrate the ethics of the profession to student teachers bearing in mind the unique characteristics of young children, as well as theTeachers' Standards, child's rights and laws protecting children as they learn in school. Personaldevelopment: Developing understanding of NTS through conscious effort and support from mentors, peers, and tutors 		
Торіс	Sub-topic(s)	Stage/ Time		vities to achieve learning outcomes selected. Teacher-lead collaborative		
			Teacher Activity	Student Activity		
	Definitions and interpretatio ns of the concepts: beliefs attitudes	20 mins	Review the previous lesson by asking student teachers to present their reflective paper to a peer on the importance of mathematics to society; (PD Theme 1)	Review the previous lesson; Peer share reflections and participate in the discussion on the importance of mathematics		
	and values	20 mins	Give an exposition based on the concepts, attitudes, beliefs, and values (PD Theme 3)	Listen attentively to the tutor or lecturer's verbal exposition on the concepts; attitudes, beliefs, and values and ask questions for		
Teacher beliefs about mathematics and how	Implications of teacher attitude on pupils' learning	50 mins	Engage student teachers in a discussion on how teachers' attitudes influence Early Grade learner's learning of mathematical concepts;	clarification or provide comment(s) to ensure participation and understanding; Engage in a think-pair-share		
this influences learning and teaching of mathematics in Early Grade.		20 mins	(PD Theme 1& 3) Assign student teachers to use a table to illustrate the differences and similarities among the concepts: values,	session to outline and discuss the effect of teachers' attitudes on the learning and teaching of mathematics at the Early Grade;		
	ofmathemati csin the Early Grade		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 Early		
			Use Power point presentation, interspersed with questioning, to discuss how learners' attitude and beliefs influence their own learning of Mathematical	Grade; Discuss the importance of Mathematics to people in various trades and professions in our Ghanaian cultural settings;		
		40	concepts; (PD Themes 1 & 3)			

	Making connections between teacher beliefs and practice and developing mathematic al task	30	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)	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 Mathematical concepts
Lesson assessments –	1. Stude	nt teachers are to	b begin recording important ideas	and experiences in their SRJ by
evaluation of learning:			their past experiences of mather	
of, for and as learning			. Ed. mathematics curriculum(Ass	
within the lesson				nd learning. This is to be included in
			hing portfolios (PTP).	
				ources including ICT, to be included
			loys a variety of instructional stra	ategies that encourages student
Instructional Resources		nd critical thinkin	-	clips downloaded from the internet;
instructional Resources				he context of mathematics teaching
	and learning	s based off belief	s, attitudes, and values within th	te context of mathematics teaching
Required Text (core)		(2001). Teachers	s' beliefs about mathematics, its t	eaching and learning and the
	-		to students: A case study in Bots	
		niversity of Mani		·
Additional Reading List	Radford, L. The	eories in Mathem	atics Education: A Brief Inquiry in	to their Conceptual Differences
			natics for teacher training in Ghar	na: Tutor notes. Accra: Unimax
	Publis			
			natics for teacher training in Ghar	na: Students activities. Accra:
CPD Needs	Unimax Publisl How t 		use some innovative materials an	d ideas for teaching solarted
				" word games to reinforce concept
	devel			Barrier to remote concept
			needed to consciously engage st	udent teachers to participate
			eady to share their past experience	
	Unde	rstand the variou	s characteristics and uniqueness	of early grade learners as suggested
		rious perspective		
		-	•	essment of, as and for learning to
		y early grade lear		
		-	to consciously engage student te	achers on how to design and
	produce portfo	olios, journals and	i SIS reports.	

Year of B.Ed.	2	Semest	er 1		Place of le	sson in sei	nester	12	3 4 5 6 7 8 9 1	.0 11 12	
Title of Lesson			underlying th um and inclu				cial		Lesson Duration	3 Hours	
Lesson description	on	This les classroo curricul from a activitie will use and m	curriculum and inclusive classroom practiceDurationThis lesson focuses on beliefs underlying the current Early Grade official curriculum and inclusive classroom practice. Areas of concentration include the Nature of Early Grade 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 interactive activities including independent study to develop an understanding of what the curriculum they will use to teach entails. Thus, the lesson provides an overview of philosophies of mathematics and mathematics education and explores the beliefs implicit in the official mathematics curriculum and current classroom practice. The lesson has the tendency to develop student								
Previous studen knowledge, prio		Student with co	t-teachers han ncepts based	ave b d on d	een taught child growth	psycholo n, develop	gical bas ment, ar	d mat		-	
(assumed)									portance of mathen		
Possible barriers			-		aviours, So	cio-cultur	al issues	, diffe	rent learning need	s, misconception	
learning in the le		Face-	Dut curriculu		Work-	Comin	Indore	nde		Dractiours	
Lesson Delivery - to support stude		Face- to-	Practical Activity		work- sedLeanin	Semin ars	Indepe nt Stu		e-learning opportunities	Practicum	
achieving the ou		face		Dds	g			uy			
 mode of deliver to support teachers in achi learning outcom Purpose for lesson, what want the stu achieve, ser basis for the outcomes. A expanded vo the descript 	the tyou idents to ves as learning in ersion of	not usu Practica and ma Semina tutor le Indeper promot be part E-learni environ mode in The pur provide beliefs i	 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; provide an overview of philosophies of mathematics and mathematics education and explores the beliefs implicit in the official mathematics curriculum and current classroom practice 								
 Learning Ou the lesson, p and develop the course specificatior Learning ind for each lear outcome 	bicked bed from n licators	und of d bel und cur Gra cur	-	•	Outline, d analyse di philosoph their perso coincide o those emb current Ea curriculun	escribe an fferent ies implici onal belief r otherwis bedded in rrly Grade	t in s that se with	and (and (be ac • () • ()	tify Which cross-cu transferable skills, addressing diversity ddressed or develop Critical thinking:is student teachers consciously express misconceptions, differentiated learni Communication skill critiquing and presen	inclusivity, equit y. How will thes ed? developed i when the their conception biases abou ng s: through	

	 classroom practice(NTS 2c, 3i, NTECF Pillar 1) Demonstrate an understanding of relevant professional values and attitudes in teaching Early Grade mathematics 	 teacher's philosoph mathema learning Write a sh philosoph learning o Early Grac Reflect cri own learn and use th plan for co personal a developm Describe o conceptio mathema 	tics in students' nort personal by of teaching and of mathematics in de itically on their ning experiences he skills gained to ontinuous and professional hent differing ons about tics based on eachers' own alues, and	f F F S S S S S S S S S S S S S S S S S	Personal development: can be fostered through individual and group presentation, examining various principles applied in the selection of the four basic components of the syllabus and the curriculum Ethics and values of teaching: modelling the demonstration of the ethics of the profession bearing in mind the unique characteristics of early grade children, the Teachers' Standards, child's rights, and laws protecting children Respect for diversity: by examining misconceptions about SEN and gender in relations to ways of evaluating, inclusivity auditing and storing learning resources developed
Topic Title	Sub-topic(s)	Stage/ Time	outcomes depen	nding c	g to activities to achieve learning on delivery mode selected. Teacher- pwork or independent.
			Teacher Activity		Student Activity
	Nature of Early Grade mathematics curriculum	10 mins	Project the learni outcomes and indicators for stu teachers to know what is expected them.	dent ′	Read the learning outcomes and indicators to help monitor what they are going through.
Beliefs underlying the current Early Grade official curriculum and inclusive classroom practice	Implications for classroom practice relating to the concepts of inclusion and equity from a reflective perspective	20 mins 60 mins 50 mins	them. Review the previous lesson by asking student teachers to present their reflective papers on the importance of mathematics to society; (PD Theme 1) Give an exposition based on inclusion and equity (PD Theme 3) Engage student teachers in a discussion on how teachers' knowledge and understanding of inclusivity and equity can influence their interpretation of the beliefs underlying		Participate in the discussion to review the previous lesson; 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; 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 Early Grade;

		40 mins	mathematics	Read further about what it means
		40 111113	curriculum	to reflect on the historical
	Making		(PD Theme 1& 3)	development of the numeration
	connections		(1.2.1110111012010)	system and the contributions of
	between teacher		Assign student	different civilizations and cultures
	beliefs and		teachers to write a	have made until the emergence of
	practice and		reflective paper on	the Hindu-Arabic base ten system
	developing		"What does it mean to	
	mathematical task		learn and teach	
			Mathematics as a	
			consolidation exercise	
			to be presented in the	
			next lesson.	
			(PD Theme 1)	
Lesson assessments –	1. Reflect criti	cally on their o		nd use the skills gained to plan for
evaluation of learning: of,		•		and to record this in their SRJ
for and as learning within		• •	•	ctively reflects to improve teaching
the lesson	and learning		,	, , , , , , , , , , , , , , , , , , , ,
		-		
	2. Write a one	paragraph per	sonal philosophy teaching	with respect to mathematics, to be
	included in	their SRJ (Asses	sment for learning) NTS 3	a - Plans and delivers varied and
	challenging	lessons, showi	ng a clear grasp of the inte	ended outcomes of their teaching.
Instructional Resources	Posters illustrating	people using i	mathematics in the jobs	; video clips downloaded from the
	internet;			
Required Text (core)	Garegae, K. G. (2001). Teachers' bel	liefs about mathematics, i	ts teaching and learning and the
	communication of th	nese beliefs to s	tudents: A case study in B	otswana. Unpublished Doctoral
	dissertation. Univers			
Additional Reading List	Radford, L. Theories	in Mathematic	s Education: A Brief Inquir	y into their Conceptual Differences
	Martin, J. et. al. (199	4). Mathematio	cs for teacher training in G	ihana: Tutor notes. Accra: Unimax
	Publishers.			
	Martin, J. et. al. (199	4). Mathematio	cs for teacher training in G	hana: Students activities. Accra:
	Unimax Publishers.			
CPD Needs	 How to desi 	ign and/or use	some innovative materials	and ideas for teaching selected
	concepts ba	ased on theorie	s of learning in early grade	e mathematics.
	 Understand 	l the various ch	aracteristics and uniquene	ess of early grade learners and how to
	use this in p	lanning to tead	h.	
	 How to desi 	ign tasks for ass	sessment procedures for a	ssessment of, as and for learning.
	 How to more 			ortfolios, journals and STS reports.

Year of B.Ed.	2	Semester	1	Place of less	son in semest	ter 1	1234	5678910) 11 12			
Title of Lesson		Beliefs und	Beliefs underlying the current Early Grade official Lesson Duration 3 Hours									
			curriculum and inclusive classroom practice 2									
Lesson descriptio	n		This lesson focuses on developing an understanding of what we know about how people think									
					-				des an overview			
								•	teachers' beliefs			
							-		natics curriculum w children learn			
				•			•		g learning. The			
							-	equity and dive				
Previous student	teacher								and are familiar			
knowledge, prior				n child growth,								
(assumed)	Ũ			-	-			ce of mathema	tics			
Possible barriers	to	Differe	nt entry be	haviours, Soc	io-cultural is	sues, d	different l	earning needs,	misconceptions			
learning in the le	sson	about	number and	numeration s	ystem.							
Lesson Delivery -		Face-to-	Practical	Work-	Seminars		pendent	e-learning	Practicum			
to support stude		face	Activity	Based	\square	Si	tudy	opportunities				
achieving the out	comes	\square	\square	Leaning				\bowtie				
Lesson Delivery mode of delivery to support teachers in achie learning outcome	y chosen student eving the es.	brainstorm not usually Practical A and materi Seminars: tutor led Independe promote in be part of a E-learning environmen mode in its	ing, question be the main ctivity: enable als, as well a to generate nt study: to dividual and ony of the able opportunitien nts. This can own right.	n and answer, mode. ling experiment is physical active group and ind enable studer collaborative pove modes es – involving t be part of any	etc. This can l ntation and th vities. ividual creation nts to engage enquiry, more he use of inte	be tuto ne analy vity, dis with re e in-dep eractive	or and / or ysis and di scussion al elevant an pth analys e packages	gument. It inclu student teache scussion of issu nd reflection: st d appropriate r is and develop and virtual lea ry. It is unlikely	r led. It should les, documents rudent and / or naterials to ment. This can			
 Purpose for t lesson, what want the stu achieve, serv basis for the outcomes. A expanded ve the descripti 	you dents to res as learning n rsion of	develop stu context of t	eaching and	ers' understand	nematics and	their in	mplication		es within the practice relative			

• Learning Outo for the lesson	, picked	Learning Outcomes	Learning	Indicators	transfera	Which cross-cutting issues- core and ble skills, inclusivity, equity and		
and develope the course	d from					ng diversity. How will these be d or developed?		
 specification Learning indicators for each learning outcome 		Demonstrate secure knowledge and understanding of relevant professional values and attitudes	 Critically reflect on their own learning experiences and teaching and use them to plan for continuous personal development 		 Ethics andvalues of teaching: through demonstration of the ethics of the profession with emphasis on the unique characteristics of early grade children, the Teachers' Standards, child's rights, and laws protecting children Communication skills: through critiquing and presentations 			
		Demonstrate an understanding of relevant professional values and attitudes in teaching Early Grade mathematics	 Analyse different perspectives on the need for developing professional values and attitudes Outline the need for developing values as well as to promote respect for equity and inclusivity in the mathematics 		instit barri	 Inclusion and Equity: by recognising institutional and personal sources of barriers to leaning and making conscious efforts to address them. 		
Topic Title	Topic Title Sub-topic(s)		classroom Stage/ Teaching and learning to a			activities to achieve learning outcomes		
			Time	depending on d	elivery mo	de selected. Teacher-lead collaborative		
				groupwork or in Teacher Activity		t. Student Activity		
	of bel values of tea mathe	rlying assumptions iefs, attitudes, and s within the context ching and learning ematics rations for	10 mins 20 mins	Project the learr outcomes and ir for student teac know what is ex them. Review the prev lesson by asking	ndicators hers to pected of ious	Read the learning outcomes and indicators to help monitor what they are going through. Participate in the discussion to review the previous lesson; Pay attention to the verbal exposition		
Beliefs underlying the current Early Grade official curriculum and inclusive classroom practice 2	classr relativ learni mathe	oom practice ve to understanding ng difficulties in ematics e.g.	60 mins	teachers to press reflective paper importance of mathematics to (PD Theme 1) Give an exposition on the concepts attitudes, beliefs values with resp how they influen implementation curriculum (PD Theme 3) Engage student in a discussion o	ent their on the society; on based , s, and ect to nce the of any teachers	on the concepts, attitudes, beliefs, and values and how they influence the implementation of a curriculum Reflect on the implications of the discussions held above on their classroom observation 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 Early Grade; Create a table that illustrates the similarities and differences among values, attitudes, and beliefs and how		
			40 mins	teachers' attitud influence early g learner's learnin mathematical co (PD Theme 1& 3	les grade g of oncepts;	these impact learning in Early Grade; the importance of Mathematics to people in various trades and professions in our Ghanaian cultural settings;		

	30 n Making connections between teacher beliefs and practice and developing mathematical task 20 n	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;	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 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		
1	1 Chudant to a character ((PD Themes 1 & 3)			
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	 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. Project work for the semester Assign student teachers, in their small groups to: Designand producedevelopmentally and age-appropriate TLMs from locally available materials that can be used to teach number, shape and patterns in the early grade mathematics. (NTS 3j, pg. 14) Write an accompanying guide for each of the TLM explaining how to use them and which aspects of teaching early grade mathematics they are designed to address. Identify the learning outcomes that likely to be achieved N/B: consider early gradelearners' cultural, linguistic, socio-economic and educational backgrounds in designing the TLMs as well as theoretical perspectives that influence the 				
		and they were produced. I: 11 th week of the semester			
Instructional Resources			ps downloaded from the internet;		
Required Text	Garegae, K. G. (2001). Teachers'	beliefs about mathematics, its te	aching and learning and the		
(core)			in Botswana.Unpublished Doctoral		
	dissertation. University o				
Additional Reading List	of Education, Science an Martin, J. et. al. (1994). <i>Mathemo</i>	nd Sports. atics for teacher training in Ghanc	ntics (Senior High School). Accra: Ministry n: Tutor notes. Accra: Unimax Publishers. n: Students activities. Accra: Unimax		
CPD Needs	(e.g. developing and usir developed)Instructional strategies r	ng the "Read my mind" number a	ideas for teaching selected concepts nd word games to reinforce concept athematical ideas, as well as, connect outside		

Year of B.Ed. 2	Seme	ster 1	Place of	lesson in sem	ester	1 2 3	4 5 6789	10 11 12		
						123		10 11 12		
Title of Lesson		Major theories of learning in Early Grade mathematicsLesson Duration3 Hoursin inclusive classrooms2								
Lesson description	This lesso develop a grade. Er mathema perspecti competer	This lesson focuses on developing an understanding of major theories of how early grade children develop and learn mathematics. It provides an overview of theories of learning mathematics in early grade. Emphasises will be placed on major theories of learning and teaching of Early Grade mathematics in inclusive classrooms. Specifically, socio-cultural, activity theory and situated cognition perspectives will be discussed to enable student teachers develop appropriate knowledge and competencies for handling children in early grade classrooms.								
Previous stude teacher knowledg prior learni (assumed) Possible barriers to	ge, concepts ng Student to	based child gro eachers have b	wth, develop een introduc	ment, and ma ed to the natu	turatior re and i	n; mportan	ice of mathema	and are familiar with atics isconceptions about		
learning in the lesso		per and numer			es, unic		ining needs, in	isconceptions about		
Lesson Delivery – chosen to support students in achievin	Face-to- face	Practical Activity	Work- Based Leaning	Seminars	Stu	endent udy	e-learning opportunities	Practicum s		
support stude teachers in achievi the learni outcomes. Purpose for the lesson, what yo want the students to achieve, serves	to usually be nt Practical materials Seminars tutor led Independ promote part of an E-learning This can b right. u deve pers	 ace: opportunity for an extended and coherent line of argument. It includes discussion, ming, question and answer, etc. This can be tutor and / or student teacher led. It should not e the main mode. Activity: enabling experimentation and the analysis and discussion of issues, documents and a swell as physical activities. to generate group and individual creativity, discussion and reflection: student and / or ent study: to enable students to engage with relevant and appropriate materials to ndividual and collaborative enquiry, more in-depth analysis and development. This can be y of the above modes gopportunities – involving the use of interactive packages and virtual learning environments are part of any of the above modes of delivery. It is unlikely to be a delivery mode in its own beso of the lesson is to; clop student teachers' understanding of socio-cultural, activity theory and situated cognition pectives and their implications for practice 						ues, documents and tudent and / or materials to ment. This can be rning environments. y mode in its own		
 basis for the learning outcomes. An expanded version of the description. Learning 	on Learning									
Outcome for the lesson, picked and developed from the course specification	e Outcome		Learning Indicators Identify Which cross-cutting issues- core transferable skills, inclusivity, equity addressing diversity. How will these addressed or developed?							
 Learning indicators for each learning outcome 	knowl	etical	children's	s based on bership in	٤ t ł	grade lea eachers (nowledg growth, c	rners: By encou	nd maturation		

	 learning mathematics in early grade Demonstrate knowledge and understanding of and appreciation for the contributions made by some theorists whose works are relevant to Early Grade practitioners 	diffe socia and theo thein learr matl Grac • Writ repo majo Froe Mon Piag Brur impl teac of m teac • Refle thein expe influ	ine similarities and prences among p-cultural, activity, situated cognition ories and to indicate or relevance in hing and teaching hematics in Early de classrooms e a two-page or to identify the prideas of Friedrich bel, Maria htessori, Jean et, and Jerome her and their ications for hing and learning athematical hing practices ect critically on or own learning eriences are enced by the prists listed above.	 creative central well as assessr Digital relevan discuss Commu critiqui Assessr providi to deve childret well as, learner formats 	literacy: searching the internet for at information on themes to be ed. unicative skills: through analysis, ng and presentations ment <i>for, as</i> and <i>of</i> learning:by ng student teachers an opportunity elop strategies to guide young n to engage in self-assessment, as , use other age-appropriate and -friendly assessment sassessment formats
Topic Title	Sub-topic(s)	Stage/ Time	depending on deli	very mode s	ities to achieve learning outcomes selected. Teacher-lead collaborative
			groupwork or inder Teacher Activity	bendent.	Student Activity
	 Socio-cultural perspectives Activity theory perspectives A situated cognition perspective 	20 mins 20 mins	20 minsReview the previous less through questioning tech and to connect key issues are emerging to the new lesson (PD Theme 1)20Project the learning outco and indicators for student		Participate in the discussion to review the previously learned material lesson Read the learning outcomes and indicators to help monitor what they are going through.
Major theories of learning and teaching of Early Grade mathematics in inclusive classrooms		50 mins	Give a short exposit on socio-cultural, ac theory and a situate perspectives (PD Theme 3)	tivity	Listen attentively to the tutor or lecturer's verbal exposition on the different theoretical perspectives under review.
		40 mins	Engage student tead discussion on the sin and differences of t theoretical perspect mentioned above. <i>(PD Theme 3)</i> Provide guided prace opportunities for str	milarities he tives tice	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

	N 4 - Line			
	Making		teachers to search for	session to search for information
	connections	20	information about Johann	about Johann Heinrich Pestalozzi,
	between the	30 mins	Heinrich Pestalozzi, Friedrich	Friedrich Froebel, Maria
	theoretical	mins	Froebel, Maria Montessori,	Montessori, Jean Piaget, and
	perspectives and		Jean Piaget, and Jerome Bruner	Jerome Bruner using cooperative
	learning of		using cooperative learning	learning technique and demand
	mathematics in		techniques (each group will	corrective feedback.
	early grade		search for information about	
			one of the theorists).	
			(PD Theme 1& 3)	
			Relate the various theories to	
			how they explain the way	
			early grade children learn mathematics	Take note of the accimment given.
		20	mathematics	Take note of the assignment given; Read further about other relevant
		mins	Assign student teachers to read	theoretical perspectives
		111113	Assign student teachers to read further on the topic treated to	theoretical perspectives
			prepare for the next lesson	
			(PD Themes 1 & 3)	
Lesson assessments –	PROJECT WORK			
evaluation of	1. As a student	t teacher l	now would you use the ideas of an	y of the following theorists: Friedrich
learning: of, for and as	Froebel, Ma	ria Monte	ssori, Jean Piaget, and Jerome Bru	ner in teaching a named concept in
learning within the	the Early Gr	ade math	ematics classroom?	
lesson				r locality and explain how any one of
				e Early Grade mathematics syllabus.
			aught board for teaching fractions	
			ural, linguistic, socio-economic an	d educational backgrounds in
	planning and	-		
				and teaching mathematics to early
	_			nal strategies appropriate for mixed
Instructional			nd multi-age classes.	
Resources	Posters mustrating pe	eopie usin	g mathematics in the jobs; video c	lips downloaded from the internet;
Required Text (core)	Kashofi H (2017) Ta	aching an	d learning theories applied in Mat	hematics classroom among Primary
nequired rest (core)	school teachers DOI:			nematics classroom among rinnal y
Additional Reading			eory of Education: From Early Brui	ner to Later Bruner.
List			(2006). Theories of Learning and	
	Educators? Washingt			J,,
			matics for teacher training in Ghar	<i>a: Tutor notes</i> . Accra: Unimax
	Publishers.	-		
	Martin, J. et. al. (199	4). Mathe	matics for teacher training in Ghar	a: Students activities. Accra: Unimax
	Publishers.			
CPD Needs			use some innovative materials an	
			ping and using the "Read my mind"	' number and word games to
	reinforce co			
		-	es needed to consciously connect n	
	connect ma	thematics	to other curriculum areas and to t	he world outside

Year of B.Ed.	2	Semeste	r 1		Place of I	esson in seme	ester	123	45 6 7891	10 11 12
Title of Lesson		Major theories of learning and teaching of EarlyLesson Duration3Grade mathematics in inclusive classrooms 2						3 Hours		
Lesson description Previous student te knowledge, learning (assumed) Possible barriers to learning in the lesson Lesson Delivery – ch	prior on	This lesson focuses on developing an understanding of what we know about how people about mathematics and how an understanding of mathematics develops. It provides an overvi philosophies of mathematics and mathematics education and explores trainee teachers' to about mathematics and philosophies of mathematics implicit the official mathematics curring and current classroom practice. It also covers children's developmental levels, how children mathematics and associated theories, and other psychological factors influencing learning. Student-teachers have been taught psychological basis of teaching and learning and are fa with concepts based child growth, development, and maturation; Student teachers have been introduced to the nature and importance of mathematics Different entry behaviours, Socio-cultural issues, different learning needs, misconcept about number and numeration system.							es an overview of teachers' beliefs natics curriculum ow children learn earning. and are familiar tics	
to support students achieving the outco	in	face	Activity		Based eaning	\square	S	tudy 🖂	opportunities	
 Purpose for the lesson, what yo want the studer achieve, serves basis for the learning outcom An expanded version of the 	nosen udent og the nu nts to as	brainstorm not usually Practical A and materi Seminars: tutor led Independe promote in part of any E-learning environme mode in its The purpos • develo	ing, questi be the ma ctivity: ena als, as well to generat nt study: f dividual ar of the abo opportunit nts. This ca cown right se of the le op student	popportunity for an extended and coherent line of argument. It in question and answer, etc. This can be tutor and / or student tea he main mode. sy: enabling experimentation and the analysis and discussion of is well as physical activities. enerate group and individual creativity, discussion and reflection udy: to enable students to engage with relevant and appropria lual and collaborative enquiry, more in-depth analysis and deven he above modes. portunities – involving the use of interactive packages and virtual This can be part of any of the above modes of delivery. It is unli				or student teache discussion of issu and reflection: st nd appropriate n ysis and developr es and virtual lear rery. It is unlikely ing e.g., cognitive	r led. It should es, documents udent and / or naterials to ment. This can be ming to be a delivery	
 description. Learning Outcon for the lesson, picked and developed from course specifica Learning indicat for each learnin outcome 	n the ntion tors	unders of Constru Behavid Cogniti theoret	strate dge and tanding uctivism purism, vism cical ctives of	•	facets of of Behaviou and discu learning Compare construct Behaviou	e different Constructivisn rism, Cognitiv ss their views and contrast	n, ism on the	and tran and add be addre • Digit for r be educ	sferable skills, in ressing diversity ssed or develope tal literacy: searc elevant informat	hing the internet ion on themes to analysing their ons : through

Topic Title	 Demonstrate knowledge and understanding of the implication of Constructivism Behaviourism and Cognitivism theoretical perspectives of learning Early Grade mathematics 	implicatior mentionec perspectiv	ns of the above- d theoretical es on the f mathematics at rade level	Characteristics and uniqueness of early grade learners: By encouraging student teachers to develop awareness of how Knowledge and understanding of child growth, development and maturation support young children's learning
		Time	outcomes depending	on delivery mode selected. Teacher- upwork or independent.
			Teacher Activity	Student Activity
Major theories of learning and teaching of Early Grade mathematics in inclusive classrooms 2	 A cognitive perspective Constructivism Behaviourism Implications for practice 	10 mins 20 mins 60 mins 60 mins 30 mins	Review the previous lesson through questioning technique (PD Theme 1) Project learning outcomes and indicators on a screen for student teachers to read and be aware of what is ahead. Give an exposition based on cognitive, behaviourism constructivism and their implications on the learning of mathematics in early grade (PD Theme 3) Engage student teachers in a discussion cognitivist, constructivist, behaviourism and other theoretical perspectives and how they explain the way early grade children learn mathematical concepts; (PD Theme 1 & 3) Assign student teachers to read on the theorists such as Lev Vygotsky, Skemp	 Participate in the discussion to review the previous lesson; Read the learning outcomes and indicators to develop awareness of the expectations in the lessons Pay attention to the verbal exposition on the on cognitive, constructivism and their implications on the learning of mathematics in early grade; Engage in a think-pair-share session to outline and discuss the effect of cognitivist, constructivist and other theoretical perspectives on the learning and teaching of mathematics in the Early Grade; Search on the internet for information about Lev Vygotsky, Skemp and other relevant theorists whose works explain how early grade children develop and learn mathematical concepts Read further about the importance of learning theories in the learning and teaching of mathematics in the learning and teaching of mathematics in the learning theories in the learning and teaching of mathematics in the learning and teaching of mathematics in the learning theories in the learning and teaching of mathematics in the learning

			ata and thair	
			etc. and their	
			contributions to the	
			learning of	
			mathematics in the	
			early grade	
			(PD Theme 1)	
Lesson assessments –	 Student teach 	ners to complete	worksheet based on cor	mparing and contrasting the
evaluation of learning:	Constructivis	n, Behaviourism	, and Cognitivism as lear	ning theories and their implication in
of, for and as learning	teaching num	eracy in the Earl	y Grade. (Assessment fo	r learning) NTS 3a - Plans and
within the lesson	delivers varie	d and challengin	g lessons, showing a clea	ar grasp of the intended outcomes of
	their teaching	J.		
	NTS 3h - Sets mea	aningful tasks th	at encourages learner c	ollaboration and leads to purposeful
	learning.	U	Ū	
Instructional Resources	Posters illustrating peo	ople using mathe	matics in the jobs; video	clips downloaded from the internet;
Deguined Tout (core)	Criromon D. 9 English	L (2005) Theo	rice of mothematics adu	estion A global survey of the protical
Required Text (core)	_			cation: A global survey of theoretical IblattfürDidaktik der Mathematik
	,			
	•		al Education), 37(6), 450	
Additional Reading List	,			nto their Conceptual Differences
	, , ,). Mathematics f	or teacher training in Gh	ana: Tutor notes. Accra: Unimax
	Publishers.			
). Mathematics f	or teacher training in Gh	ana: Students activities. Accra:
	Unimax Publishers.			
CPD Needs	 How to design 	n worksheets as	tools for assessment.	
	 How to design 	n and/or use son	ne innovative materials a	and ideas for teaching selected
	concepts (e.g	. developing and	using the "Read my min	nd" number and word games to
	reinforce con	cept developed)		
	 Instructional 	strategies neede	d to consciously connect	t mathematical ideas, as well as,
	connect math	nematics to othe	r curriculum areas and to	o 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	Children and Mathematics			Lesson D	Lesson Duration			3 Hours		
Lesson description	Thic Ic	scon focus	on develor	ing knowlod	and underst					
Lesson description	This lesson focuses on developing knowledge and understanding of what we know about how children in Early Grade 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.									
Previous student teacher	Student-teachers have been taught psychological basis of teaching and learning and are familiar									
knowledge, prior learning					oment, and matu	-	·	5		
(assumed)	Student teachers have been introduced to some major theories in the learning of mathematics in									
	the early grade									
Possible barriers to	Different entry behaviours, Socio-cultural issues, different learning needs, misconceptions									
learning in the lesson	ab	out number	and numerat	/		-				
Lesson Delivery – chosen	Face	Practical	Work-	Seminars	Independent		arning	Practicum		
to support students in	-to-	Activity	Based		Study		rtunities	_		
achieving the outcomes	face		Leaning				\boxtimes			
					· · · · ·					
Lesson Delivery – main	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									
mode of delivery chosen				swer, etc. This	s can be tutor an	a / or stu	dent teach	er led. It should		
to support student teachers in achieving the			main mode.	rimontation	and the analysis	and discu	ussion of issu	uas documents		
learning outcomes.			vell as physica		and the analysis	anu uiscu	1551011 01 155	ues, uocuments		
learning outcomes.			• •		reativity discuss	sion and r	reflection s	tudent and / or		
	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 	The purpose of the lesson is to;									
lesson, what you	• develop student teachers' understanding of how children learn mathematics at the early grade									
want the students to	level									
achieve, serves as										
basis for the learning outcomes. An										
expanded version of										
the description.										
the description.	1									

Learning Outcome			Learning Outcomes		Lea	arning Indicators	Identify Which cross-cutting issues- core		
	for the lesson, picked						and transferable skills, inclusivity, equity		
	and developed the course	from					and addressing diversity. How will these be addressed or developed?		
•	specification Learning indica for each learnir outcome		 Demonstrat knowledge understand of different Early Grade children lea mathematic 	and ing ways rn	•	Describe how respect for gender, equity and inclusivity in the mathematics classroom promote learning for all	 Communicative skills: through analysis, interrogation and presentation of the various principles in developing and using varying multimedia 		
			 Demonstration Demonstration of relevant 	y Id nce :e an ing	•	Identify theories and theoretical principles that are relevant to the learning and teaching of mathematics in the Early Grade classroom.	• Ethics andvalues of teaching: through demonstration of the ethics of the profession with emphasis on the unique characteristics of early grade children, the Teachers' Standards, child's rights, and laws protecting children		
			theories and principles or learning and their implications teaching Ea Grade mathematic	d f d s for rly	•	Analyse portions of the Early Grade official mathematics curriculum to identify which theoretical perspectives form the bases of the curriculum. Observe and write a report on how Early	 Communicative skills: through analysis, critiquing and presentations Digital literacy: searching the internet for relevant information on themes to be discussed and analysing their educational implications 		
			mathematic	.5	•	report on how Early Grade children (each student teacher will observe a couple of children) learn given mathematics concepts and to outline the implications of this for effective classroom instruction of mathematics for young children. 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 Early Grade mathematics	 Characteristics and uniqueness of early grade 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-to	pic(s)	Stage/	/		activities to achieve learning outcomes		
				Time	2		node selected. Teacher-lead collaborative		
						groupwork or independent	Student Activity		
						Teacher Activity			
			lren's Number iness			Review the previous lesson on major theories	Participate in the discussion to review the previously learned material;		
experie <u>Concep</u> <u>R</u> • Un size					of learning mathematics				
					in Early Grade (PD Theme 1) Engage student teachers to outline theorists whose work are relevant to the development of young	List from memory theoretical perspectives and principles of learning that are relevant to Early Grade children Listen attentively to the tutor or lecturer's verbal exposition on the concepts attitudes, beliefs, and values and ask questions for			

	1		1					
	• Ability to count verbally (first	mins	children and how they learn mathematics	clarification or provide comment(s) to ensure participation and understanding;				
	forward, then							
	backward)		Give an exposition on	Engage in a think-pair-share session to				
	Recognizing		theories that explain how	outline and discuss on logical and				
	numerals		children develop number	psychological approaches to learning				
	Identifying more	60	readiness such	mathematics.				
	and less of a	mins	Understanding size, shape					
	quantity		and patterns; Ability to					
	Understanding		count verbally;	Discuss theoretical principles that explain				
	one-to-one		Recognizing numerals; Understanding one-to-one	how children learn given mathematics concepts in Early Grade				
	correspondence (for example,		correspondence	concepts in Early Grade				
	matching sets or	40	(PD Theme 3)					
	knowing which	mins	Engage student teachers					
	group has four		in a discussion based on	Read further about how early children learn				
	and which has		logical and psychological	mathematics				
	five)		approaches to learning mathematics.					
	Logical and psychological		(PD Theme 1& 3)					
	approaches to							
	learning mathematics	40	Assign student teachers to					
		mins	discuss different					
			theoretical principles that					
			explain Early Grade children's learning of					
			mathematics.					
			(PD Theme 1)					
			Analyse portions of the					
			Early Grade official mathematics curriculum					
			to identify which					
			theoretical perspectives					
			form the bases of the					
			curriculum.					
Lassan	Ctudant taachars ta dis	ouss thair	(PD Theme 1)	arts in class for colleagues to criticus and give				
Lesson assessments –	Student teachers to discuss their mathematics related STS reports in class for colleagues to critique and give feedback for improvement. (Assessment of learning) NTS 3f - Pays attention to all learners, especially girls							
evaluation of	and students with Special Educational Needs, ensuring their progress.							
learning: of, for								
and as learning								
within the lesson Instructional	Postors illustrating poor		mathematics in the jobs: vide	a cline downloaded from the internet:				
Resources	Posters illustrating people using mathematics in the jobs; video clips downloaded from the internet;							
Required Text	Kashefi, H. (2017). Teac	hing and	learning theories applied in N	lathematics classroom among Primary school				
(core)	teachers DOI: 10.1109/WEEF.2017.8467070							
Additional			ractices that enhance mathen					
Reading List	iviathematics Teacher E	ducation,	9,33–52. doi:10.1007/s10857	/-006-9005-9				
	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 Plac	e of lesson in semes	ter	1 2 3 4 5 6 7 8 9 :	10 11 12				
Title of Lesson	Characteristics of	Characteristics of children's developmental stages Lesson Duration								
Lesson description	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.									
Previous studentStudent-teachers have been taught psychological basis of teaching and learning and are familiarteacher knowledge,concepts based child growth, development, and maturation;prior learningStudent teachers have been introduced to the nature and importance of mathematics(assumed)Concepts based child growth, development, and maturation;										
Possible barriers to learning in the lesson	number and num	eration system			nt learning needs, mi	-				
Lesson Delivery – chosen to support students in achieving the outcomes	Face- to-facePractic ActivitImage: Construction of the second s		Seminars	Indepo nt Sto	udy opportunities	Practicum				
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes. • Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An	 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 characteristics of children's developmental stagesand its implication for teaching at the early grade level 									
expanded version of the description.										
Learning Outcome for the lesson, picked and developed from	Learning Learning Ir Outcomes		naicators	Identify Which cross-cutting issues- core and transferable skills, inclusivity, equity and addressing diversity. How will these be addressed or developed?						
the course specification • Learning indicators for each learning outcome	Demonstrate understanding characteristics children's developmental stages	of theor of childr devel and tl classr learni • Analy	ibe differing etical views about en's opmental stages heir implications for boom teaching and ng of mathematics; se theoretical ectives which are	learn • k s l		derstanding and n, development and nrough analysis,				

Topic Title	Demonstr knowledgu understan of childrer physical, language, speech, sc emotional and cognit and intellectua developm		and grade Reflect critically on their own learning experiences and suggest theoretical perspectives that ex plain these modes of development. Pe Outline theories that explain physical, language, speech, social, emotional, and cognitive and intellectual development Discuss how early grade children physical, language, speech, social, emotional, and cognitive and intellectual development affect their learning of mathematics tage/ ime Teaching and learning depending on delivery		 Characteristics and uniqueness of early grade learners: By encouraging student teachers to develop awareness of how Knowledge and understanding of child growth, development and maturation support young children's learning Communicative skills: through analysis, critiquing and presentationsand consciously supporting student teachers to develop mathematical language, including symbols and vocabulary Social and communication skills:consciously engage student teachers toidentify the need for using Ghanaian Language as medium of instruction is essential to prepare children to transition into English as medium of instruction. g to activities to achieve learning outcomesry mode selected. Teacher-lead collaborative lent. 		
			groupwork or independe Teacher Activity	ent.	Student Activity		
Characteristics	Meaning and types of development e.g. Physical, language and speech, social and emotional, and cognitive development within the context of Early Grade teaching and learning of numeracy	10 mins	Review the previous through questioning bas how early children mathematics (PD d on Theme 1) Give a verbal exposition of meaning and types of development with empha physical, language and sp social and emotional, an cognitive development w the context of Early Grad (PD Theme 3)	sed on learn on the asis on peech, id vithin	Participate in the discussion to review the previous lesson; Pay attention to the verbal exposition on theories of learning mathematics in Early Grade and ask questions for clarification to ensure effective understanding; Discuss how		
of children's developmental stages		50 mins 120 mins	 (PD Theme 3) Assign student teachers (in small groups) to search for information on the internet about the contributions of any one of the following: Johann Heinrich Pestalozzi, Friedrich Froebel, Maria Montessori, Jean Piaget, and Jerome Bruner's in to understanding learning of 		Engage in a small group session to outline and discuss the contributions offered by given theorists to the learning of mathematics in Early Grade (each group will look for information on one theorist); Present information obtained briefly in class and to intensify the search outside class hours to write a paper on children's number readiness		

Lesson assessments	Assign student teachers in groups to outline activities that can promote early grade children's physical,						
- evaluation of	language, speech, social, emotional, and cognitive and intellectual development affect their learning						
learning: of, for and	of mathematics for the following week's class discussion. (Assessment of learning) NTS 3g - Employs						
as learning within	instructional strategies appropriate for mixed ability, multilingual and multi-age classes.						
the lesson	N/B: Each group to consider one aspect of development.						
Instructional	Posters illustrating people using mathematics in the jobs; video clips downloaded from the internet;						
Resources							
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	Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Tutor notes. Accra: Unimax Publishers.						
List	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						

Yea	r of B.Ed. 2	Seme	ster	1 Place	e of lesson in s	semester	12345678) 10 11 12			
Titl	e of Lesson	Multiple ir	ntelligences				Lesson Duration	3 Hours			
Les	son description	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 Early Grade. 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									
tea prio (as:	vious student cher knowledge, or learning sumed) ssible barriers to	Student-te concepts-l Student te	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 the characteristics of children's developmental stages								
	rning in the son	number aı	nd numeratio	on system.							
chc stu	son Delivery – osen to support dents in achieving outcomes	Face-to- face	Practical Activity	Work- Based Leaning	Seminars	Independ Study		Practicum			
ma del sup tea the	ivery chosen to oport student chers in achieving learning comes.	 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. 									
•	Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.	 The purpose of the lesson is to; audit knowledge and experiences of student teachers to establish and address their learning needs, perceptions and misconceptions in multiple intelligences. Prepare them for teaching at the early grade level to be competent and confidence in handling diverse learners 									
•	Learning Outcome for the lesson, picked	Learning (Dutcomes	Learnin	g Indicators		and transferable ski	s-cutting issues- core Ils, inclusivity, equity rsity. How will these			
•	and developed from the course specification Learning indicators for each learning outcome	meaning	nding of the and s of multiple	e prin d inte e • Des Hov	line and analy ciples of mult lligences cribe the dime vard Gardner's lligences	ple ensions of	 Communicative analysis, presentations Problem solv creativethinking 	e skills: through critiquing and			

Demonstrate knowledge understanding implications of intelligences classroom pra		and of of multiple in	 Reflect critically on their own learning experiences and how these relate to multiple intelligences 	mathematics instructions as well as an integral component of assessment. Characteristics and uniqueness of early grade learners: By encouraging student teachers to develop awareness of how Knowledge and understanding of child growth, development and maturation support young children's learning Communicative skills: through analysis, critiquing and presentations and consciously supporting student
			of Howard Gardner's multiple intelligences can be used in teaching early grade children	teachers to develop mathematical language, including symbols and vocabulary
Topic Title	Sub-topic(s)	Stage/ Time		ivities to achieve learning outcomes selected. Teacher-lead collaborative
			groupwork or independent.	
			Teacher Activity	Student Activity
The foundations of multiple intelligence		10 mins 50 mins	Review the previously learned material; (PD Theme 1) State the learning outcomes for the lesson	Participate in the discussion to review the previous lesson; React to the statement of the learning outcomes through giving comments or questioning.
	theory		(PD Theme 1) Plan and make a group presentation based on the previous week's assignment	Present in their small groups the previous week's assignment.
		50 mins	Use a short exposition to present a highlight of Gardner's principles of multiple intelligences <i>(PD Theme 3)</i>	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;
Multiple intelligences	Multiple		Assign student teachers 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
	intelligences theory and personal development	40 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 Early Grade mathematics classroom
	30mins Implications for teaching numeracy in the Early Grade		Use Power point presentation, interspersed with questioning, to discuss the implications of the multiple intelligence in the teaching and learning (PD Themes 1 & 3)	Engage in a think-pair-share session to outline and discuss the implications of the multiple intelligence in the teaching and learning

		Assign student teachers to read further on why student teachers have to develop understanding of multiple intelligences theory.	Read further on why they have to develop understanding of multiple intelligences theory.						
Compare multiple intelligences with learning styles and use this knowledge to plan a lesson in									
	-	•							
instru	instructional strategies that encourages student participation and critical thinking.								
Posters illustrating people using mathematics in the jobs; video clips downloaded from the internet;									
https://www.pdfdrive.com/multiple-intelligences-in-the-classroom-e888894.html									
Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Students activities. Accra: Unimax									
	Publishers.								
	<u>e.com/intelli</u>	gence-reframed-multiple-intelligenc	ces-for-the-21st-century-						
	and using the	Read my mind number and word	games to reinforce concept						
	l stratogics n	and ad to consciously connect math	amatical ideas, as well as connect						
	0	,	, ,						
	early instru Posters illustrating p <u>https://www.pdfdriv</u> Martin, J. et. al. (199 Martin, J. et. al. (199 Publishers. <u>https://www.pdfdriv</u> <u>d158133116.html</u> • How to desi developing developed) • Instructiona	early grade mather instructional strate Posters illustrating people using m <u>https://www.pdfdrive.com/multip</u> Martin, J. et. al. (1994). <i>Mathema</i> Martin, J. et. al. (1994). <i>Mathema</i> Publishers. <u>https://www.pdfdrive.com/multip</u> <u>https://www.pdfdrive.com/intellip</u> <u>d158133116.html</u> • How to design and/or use developing and using the developed) • Instructional strategies n	further on why student teachers have to develop understanding of multiple intelligences theory. Compare multiple intelligences with learning styles and u early grade mathematics in class. (Assessment for le instructional strategies that encourages student partic Posters illustrating people using mathematics in the jobs; video clips of https://www.pdfdrive.com/multiple-intelligences-in-the-classroom-ei Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: 50 Publishers. https://www.pdfdrive.com/multiple-intelligences-mi-the-theory-its-ir https://www.pdfdrive.com/multiple-intelligences-mi-the-theory-its-ir https://www.pdfdrive.com/intelligence-reframed-multiple-intelligence 4158133116.html • How to design and/or use some innovative materials and ide developing and using the "Read my mind" number and word developed)						

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 a	affect teachi	ng and lear	ning of		Lesson Du	iration	3 Hours
	numeracy in	numeracy in Early Grade						
Lesson description	This lesson focuses on developing an understanding of factors that affect children's learning of							
	mathematics	. It provides	an overviev	w of principl	es of tea	aching and	l learning Early G	rade Numeracy
				•			knowledge and	-
	of what youn	g children's	developme	ntally appro	priate s	trategies f	or learning math	ematics.
	Knowledge o	f the develo	pmental lev	els, how chi	ldren le	arn mathe	matics and assoc	ciated theories,
				-	-	m part of t	his lesson. Stude	nt teachers will
	also develop							
Previous student teacher							ng and learning	and are familiar
knowledge, prior learning	with concept	s-based chile	d growth, d	evelopment	, and m	aturation;		
(assumed)	Student teac	hers have be	en introdu	ced to the p	rinciples	s of multip	le intelligences	
Possible barriers to	Different	t entry beh	aviours, So	cio-cultural	issues,	different	learning needs,	misconceptions
learning in the lesson	about nu	umber and n	umeration	system.				
Lesson Delivery – chosen	Face-to-	Practical	Work-	Seminars		pendent	e-learning	Practicum
to support students in	face	Activity	Based			tudy	opportunities	
achieving the outcomes			Leaning			\boxtimes	\bowtie	
Lesson Delivery – main							rgument. It inclue	
mode of delivery chosen				, etc. This ca	n be tu	tor and / o	r student teache	r led. It should
to support student	not usually b							
teachers in achieving the					the ana	alysis and o	discussion of issu	es, documents
learning outcomes.	and material							
		o generate gi	oup and in	dividual crea	ativity, d	discussion	and reflection: st	udent and / or
	tutor led							
	-	-			-		nd appropriate m	
				e enquiry, m	ore in-d	lepth analy	sis and developr	nent. This can
	be part of an	•						
							s and virtual lear	
			e part of ar	ly of the abo	ive mod	les of deliv	ery. It is unlikely	to be a delivery
a Durnasa far tha	mode in its o The purpose	-	n is to:					
Purpose for the lesson, what you				ious factor	that	affact car	ly grado childra	n's loarning of
lesson, what you want the students to		awareness atics and ho						en's learning of
achieve, serves as	matilen	iatics and HU	w these tai	i morni tile	in teach	ing practic	C 3	
basis for the learning								
outcomes. An								
expanded version of								
the description.								
the description.	I							

•	Learning Outco		Learning		Lear	ning Indicators	Identify Which cross-cutting issues- core
	the lesson, pick		Outcomes				and transferable skills, inclusivity, equity
	and developed from the course specification						and addressing diversity. How will these be addressed or developed?
the course specification • Learning indicators for each learning outcome		 Demonstrate understandin g of factors that affect early grade children' learning and teaching of early grade numeracy Demonstrate knowledge and understanding of the Principles of teaching and learning in Early Grade Numeracy based on teacher-student factors 		 Outline and analyse different broad composition of factors; (teacher-based, home- based, school-based, natural and student based- factors) that affect early grade children' learning and teaching of early grade numeracy Describe conceptions about teacher-student ratio as pre-requisites of teaching and learning of Early Grade Numeracy Discuss the conceptions about the principles of teaching and learning in Early Grade Numeracy based on teacher-student factors Outline (some) principles of teaching and learning mathematics in the current Early Grade mathematics curriculum and analyse 		 Characteristics and uniqueness of early grade learners: By encouraging student teachers to develop awareness of how Knowledge and understanding of child growth, development and maturation support young children's learning Communicative skills: through analysis, critiquing and presentations and consciously supporting student teachers to develop mathematical language, including symbols and vocabulary Problem solving, critical and creative thinking: Making problem-solving a central focus of mathematics instructions as well as an integra component of assessment. 	
						curriculum and analyse	
	Topic Title	Sub-to	nic(s)	Stag	<u>ما</u>	their effectiveness	activities to achieve learning outcomes
	Topic The	505-10	ipic(s)	Time			ode selected. Teacher-lead collaborative
						Teacher Activity	Student Activity
tea lea	tors that affect ching and rning of neracy in Early de			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 teaching and learning of numeracy in Early Grade to highlight some principles of teaching and learning of early grade numeracy (PD Theme 3)	Participate in the discussion to review the previous lesson; Pay attention to the tutor or lecturer's verbal exposition on the principles of teaching and learning and ask questions for clarification to ensure understanding;
				50 m	nins	Engage student teachers in a discussion on how teachers' knowledge of major factors affecting children's learning can influence their classroom	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

[1	I		
	Teachers'		practice (PD Theme 1 & 3)	
	knowledge of the		Provide student teachers	
	major factors (that		with selected pages of the	
	affect early grade		Early grade mathematics	
	children's learning		curriculum to outline	Outline the principles of learning and
	of mathematics)		some specific learner-	teaching mathematics in Early Grade and
			teacher ratio factors	to describe how they will use such
			learning and teaching of	knowledge and understanding to support
			numeracy in Early Grade	their activities in their school visits.
			(PD Theme 1)	
		30 mins	Use presentation,	
			interspersed with	
			questioning, to discuss	Participate in the discussion of how
			how knowledge of factors	knowing the factors that affect children's
	To a shared		that influence the choices	learning of Mathematical concepts can
	Teachers'	40 mins	teachers make in their	influence teachers' teaching of mathematics.
	knowledge of learner-teacher	40 111113	instructional practices.	mathematics.
	ratio factor		(PD Themes 1 & 3)	
			Assign student teachers	
			to read further on why	
			student teachers have to	
			develop understanding of	
			factors affecting early	Write a brief report based on the
			grade children teaching	interview conducted for presentation in
			and learning and write a	class.
			reflective paper to be	
			presented in the next	
			class meeting.	
			(PD Theme 1)	
Lesson	1. Read and ma	ake short no	otes on the following: content	knowledge, pedagogical knowledge, and
assessments –				for teaching young children numeracy in
evaluation of				eaningful tasks that encourages learner
learning: of, for			to purposeful learning.	
and as learning	2. Prepare to s	ubmit their	PTP for grading by tutor/lectu	urer
within the lesson	De ete en ille eteratione en			a line alexandra da diferenza de a forte un at
Instructional	Posters mustrating pe	eopie using r	nathematics in the jobs; video	o clips downloaded from the internet;
Resources Required Text	$\lim_{n \to \infty} C(2003) An Over$	rview of Th	eories of Learning in Mathema	atics Education Research
(core)	Jiii C. (2005). All OVE		Lones of Learning III Mathema	
Additional	Povnter, A., & Tall D	Relating the	eories to practice in the teachi	ng of mathematics
Reading List				ana: Tutor notes. Accra: Unimax Publishers.
		•	· ·	ana: Students activities. Accra: Unimax
	Publishers.	,	, , , , , , , , , , , , , , , , , , , ,	
CPD Needs				and ideas for teaching selected concepts
		oing and usi	ng the "Read my mind" numb	er and word games to reinforce concept
	developed)			
		-		t mathematical ideas, as well as, connect
	mathematic	s to other cu	urriculum areas and to the wo	rld outside

Year of B.Ed.	2	Seme	ester	1	Place of lesson	in semester	12345	1 2 3 4 5 6 7 8 9 10 11 12		
Title of Lesson	Title of Lesson				eaching and lea	irning	Lesson Durat	tion	3 Hours	
				cy in Early G				a of footowoth	at affa at	
Lesson descriptio	n				on developing l	-		-		
					of mathematics					
					y and the Impli					
					ng a variety of s	-				
					en developmer					
			children's developmental levels. Discussions and use of instructional resources, as well as,							
			assigned tasks will focus on how Early Grade children 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							
Previous student	toochor		influence children's learning of mathematics. Student-teachers have been taught psychological basis of teaching and learning and are							
knowledge, prior					ots-based child				earning and are	
	learning					-			vildron's loarning	
(assumed)			of mathe					that affect Cf	nildren's learning	
Possible barriers	to learnin	o in		erent ent	ry behaviours	, Socio-cult	ural issues,	different l	earning needs,	
the lesson	to learning	ig ill						unerent	earning needs,	
Lesson Delivery -	chosen to	•	Face-	Practical	about number		Independent	e-learning	Practicum	
support students			to-face	Activity	Based		Study	opportuniti		
the outcomes	in acmevi	'''5			Leaning					
the outcomes										
Lesson Delivery	– main m	node	Face-to-	face: oppo	ortunity for an e		coherent line o	f argument. It	includes	
of delivery chos			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							
student teachers					ld not usually b				or student	
the learning outc								d discussion o	of issues.	
			Practical Activity: enabling experimentation and the analysis and discussion of issues, documents and materials, as well as physical activities.							
								on and reflecti	ion: student and	
			/ or tuto	-	0 - 1		, ,			
			•		to enable stud	lents to engag	ge with relevant	t and appropr	iate materials to	
			-						velopment. This	
					of the above mo			-		
			E-learnir	ng <i>opportui</i>	nities – involvin	g the use of in	iteractive packa	ages and virtu	al learning	
			environr	nents. This	can be part of a	iny of the abo	ve modes of de	livery. It is un	likely to be a	
			delivery	mode in its	own right.					
Purpose for t	the lesson,	Ι,	The purp	oose of the	lesson is to;					
what you wa	nt the		 deve 	elop in stu	dent teachers	an awarenes	s and underst	anding of ho	w socio-cultural	
students to a	ichieve,		factors, attitudes, beliefs, and anxiety can influence their learning and teaching of							
serves as bas			mat	hematics;						
learning out										
expanded ve	rsion of th	he								
description.										
Learning Out		the	Learning		Learning Indi	cators			-cutting issues-	
lesson, picke			Outcom	es					erable skills,	
developed fr									and addressing	
course speci									se be addressed	
Learning indi							or develo	-	durations f	
each learning	g outcome	e		onstrate		nd analyse			d uniqueness of	
				vledge and		factors that		y grade learne		
				erstanding		Early Grade			ent teachers to	
				fferent		s learning of		elop awarene		
				ors that	mathema	ILICS			nderstanding of	
				t Early					elopment and	
			Grad					uration suppo		
			child	rens			child	dren's learnin	g	

 this for classroo practice Demons knowled understa socio-cu factors; attitude anxiety influenc learning teaching Early Gr mathem 		ematics cations of or oom ice onstrate ledge and rstanding -cultural rs; de; ty that nce ing and ing of Grade	 Describe their views about how teacher content knowledge, pedagogical knowledge, and pedagogical content knowledge that affect children's learning of mathematics in Early Grade. Outline and analyse how socio-cultural factors; attitude and anxiety that influence learning and teaching of Early Grade mathematics; Reflect critically on the impact of socio-cultural factors; attitude; anxiety on classroom practices Discuss how the cultural dimensions Hofstede (1980) can be used in teaching early grade children 	 Inclusion and Equity: bysupporting student teachers to recogniseinstitutional and personal sources of barriers to leaning and making conscious efforts to address them. Characteristics and uniqueness of early grade learners: By encouraging student teachers to develop awareness of how Knowledge and understanding of 	
Topic Title	Sub-topic(s) Stage/ Time		Teaching and learning to activities to achieve learning outcomes depending on delivery mode selected. Teacher-lead 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 <i>that</i> affect teaching and learning numeracy in Early Grade	Implications for classroom practice	60 mins	Give an exposition based on socio-cultural factors, attitudes, beliefs, values and anxiety. (PD Theme 3) Engage student teachers in a discussion on how teacher content knowledge, pedagogical knowledge, and pedagogical content knowledge that affect	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; 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 Early Grade	
		40 mins	children's learning of mathematics in Early Grade (PD Theme 1& 3) Use Power point presentation, interspersed with	Create a table that illustrates the similarities and differences among values, attitudes, and beliefs and how these impact learning in Early Grade; Pay attention to and also participate in the discussion of how teachers'	

	20 min		professional values and attitudes remain				
		how teachers'	important factors in their teaching of				
		professional values and	Early Grade mathematics				
		attitudes remain					
		important factors in their					
		teaching of Early Grade	Do internet search and further reading				
		mathematics	to write reflective papers individually on				
		(PD Themes 1 & 3)	the topic "The role of the teacher in				
		Assign student teachers to	promoting effective learning of				
		write a reflective paper on	mathematics in Early Grade"				
		the topic "The role of the					
		teacher in promoting					
		effective learning of					
		mathematics in Early					
		Grade"to be submitted					
		the following week					
		(PD Theme 1)					
Lesson assessments –	Student teachers to submit the following;						
evaluation of learning:	1. a final portfolio in	mathematics, with emphasis on	Early Grade Curriculum and relative to				
of, for and as learning	theories of learnin	g, (Course work) (Assessment as	learning) NTS 3k - Integrates a variety of				
within the lesson	assessment modes into teaching to support learning.						
	2. Project work report on designing TLMs for teachingnumeracy in early grade. (Project)						
	(Assessment as learning) NTS 3h - Sets meaningful tasks that encourages learner						
	collaboration and leads to purposeful learning.						
Instructional	Posters illustrating people ι	ising mathematics in the jobs; vi	deo clips downloaded from the internet;				
Resources							
Required Text (core)	Tsafe, A. K. (2012). Effective	e Learning of Mathematics: Fron	n Theory to Practice. Volume 13 (2)				
Additional Reading List	Joan, M. E. & Katharine R. S	5. (). Integrating Social, Moral, ar	nd Cognitive Developmental Theory:				
	Implications of James Fowle	er's Epistemological Paradigm fo	r Basic Writers				
	Martin, J. et. al. (1994). Ma	thematics for teacher training in	Ghana: Tutor notes. Accra: Unimax				
	Publishers.	-					
	Martin, J. et. al. (1994). Ma	thematics for teacher training in	Ghana: Students activities. Accra: Unimax				
	Publishers.						
CPD Needs	 How to design and 	l/or use some innovative materi	als and ideas for teaching selected				
	concepts (e.g. dev	eloping and using the "Read my	mind" number and word games to				
	reinforce concept	developed)					
	 Instructional strate 	egies needed to consciously con	nect mathematical ideas, as well as,				
	connect mathema	tics to other curriculum areas ar	nd 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 learning and teaching of L numeracy in Early Grade				Le	esson Duration		3 Hours	
Lesson description Previous student teacher knowledge, prior learning (assumed) Possible barriers to learning in the lesson	numeracy in Early GradeThis lesson focuses on developing knowledge and understanding of factors that affect children'slearning of mathematics. Specific areas of interest include Social and emotional intelligence andhow these influence early grade children's learning of mathematics and its Implications forclassroom practice. Student teachers will be engaged using a variety of strategies to ensureeffective participation of all. The lesson will also look at the need for developing awareness ofequity and diversity issues as potential factors that can influence children's learning ofmathematics.Student-teachers have been taught psychological basis of teaching and learning and are familiarwith concepts based on child growth, development, and maturation;Student teachers have been introduced to socio-cultural factors; attitude and anxietyDifferent entry behaviours, Socio-cultural issues, different learning needs, misconceptionsabout number and numeration system.								
Lesson Delivery – chosen to support students in achieving the outcomes		Practical Activity	Work- Based Leaning	Seminars	Indepe Study	endent	e-learning opportunities	Practicum	
 Lesson Delivery – main mode of delivery chosen to support student teachers in achieving 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. 	discussion led. It shou Practical A document Seminars: or tutor le Independ promote i can be par E-learning environme delivery m The purpo • develuintelli learni	 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; 							
 Learning Outcome for the lesson, picked and developed from the course specification Learning indicators for 	Learning Outcomes		arning Indicators			Identify Which cross-cutting issues- core and transferable skills, inclusivity, equity and addressing diversity. How will these be addressed or developed?			
each learning outcome	Demonstr understan social emotional intelligenc how influences grade ch learning mathemat	ding of and ce and this early ildren's of	play in de emotiona Describe t for teachi intelligend Discuss th of emotio intelligend	roles that tea veloping child I intelligence reachers' conc ng emotional	lren's cerns lients	•	personal sour to leaning conscious eff them Communicative analysis, co presentations	nd Equity: by nstitutional and rces of barriers and making forts to address we skills: through ritiquing and and consciously tudent teachers mathematical	

	 Demonstrate knowledge and understandin g of how to validate the feelings of others in a busy classroom. De str int and inf understandin g of pourto source int pro- int 		pathy, personal tivation and relationships ls) velop a short personal ategies for identifying erpersonal and rapersonal intelligences d to discuss how these uence classroom practice lect critically on how early de children feel about rning of mathematics tline and analyse how ial and emotional elligence influences the motion of equity and lusivity in the thematics classroom	 language, including symbols and vocabularyUse of thematic approach for teaching and learning Personal development: Through presentation and developing of arguments. Characteristics and uniqueness of early grade 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)			activities to achieve learning outcomes ode selected. Teacher-lead collaborative	
		, Time	groupwork or independer	nt.	
			Teacher Activity	Student Activity	
Factors that affect learning and teaching of numeracy in Early Grade	Social and emotional intelligence and children's learning of mathematics	60 mins 20 mins	Review the previous lesson through (PD Theme 1) Project learning outcomes and indicators for student teachers to	Participate in the discussion to review the previous lesson; Read learning outcomes and indicators to become aware of what is expected of them.	
	What social qualities are to be nurtured in children to promote effective learning of mathematics in Early Grade classroom?	20 mins	read Provide verbal exposition on social and emotional intelligence Hold a discussion on the role of acceptance, tolerance, cooperation, striving for the common, and other values in promoting classroom learning and successful life for all.	Pay attention to the verbal exposition based on social and emotional intelligence and children's learning of mathematics Participate in the discussion on the role of acceptance, tolerance, cooperation, striving for the common, and other values in promoting classroom learning and successful life for all.	
		30 mins 30 mins	Leads a discussion on how teachers' knowledge of learners' social and emotional intelligence influence group formation and effective group activities Assign student teachers to write a reflective paper on "	Participate in the discussion on how teachers' knowledge of learners' social and emotional intelligence influence group formation and effective group activities Discuss their findings briefly in small groups on the implications of these for teachers' classroom instructional practices.	

	Review of lessons in the course	20 mins	Engage student teachers in a review of the lessons in the course	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.		
				Participate in the review of the lessons in the course		
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	Review of previous lessons and preparation for end of the semester examination based on learning theories in early grade mathematics.					
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). <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	 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 apply the knowledge gained as guidelines for forming groups and promoting effective group work to ensure inclusion. 					

www.t-tel.org