

# Four-Year B.Ed. Course Manual

# **Mathematics: Teaching and Assessing**

















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# 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.

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# **INTRODUCTION TO COURSE MANUALS**

Welcome to this B.Ed. Course manual.

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

The manuals serve the following purposes:

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

Specifically, they also:

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

Who are course manuals for:

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

### **USING THIS MANUAL**

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

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

My teaching philosophy is .....

In view of this philosophy, I will facilitate this course by/through .....

<b></b>	
N	1athematics Course Manual
Re	sources for Course Manual Writing
•	Soft copies of the CWG. New Four-Year B.Ed. Curriculum introduction
•	Soft and hard copies of the course specifications for the subject for year one and two
•	Soft and hard Course Manual Writing Guide (CMWG)
•	Relevant subject texts
Tar	rget Audience
•	College of Education Tutors
Теа	acher Education University Lecturers
•	Student Teachers
•	Mentors
Inc	e purpose of course manuals
•	To provide a lesson by lesson overview of the course, building on, adapting and developing the material in the course
	Specifications
•	To provide a resource to support professional development sessions for futors/lecturers on now to plan for and teach
	To inform tutors /lecturers, student teachers and others working with student teachers about:
•	<ul> <li>what is to be taught and why</li> </ul>
	<ul> <li>how it can be taught</li> </ul>
	<ul> <li>how it should be assessed</li> </ul>
•	To support consistency in the implementation of the New Four-Year B.Ed. across institutions who train teachers
•	To ensure that all training information on skills, processes, and other information necessary to perform the teaching
	taskare together in one place.
•	To operationalize the Teacher Education Reform Policy; the requirements of the NTS & NTECF and the Four-Year B.Ed.
Gu	iding principles of course manual writing
1.	They are written with the learner, the student teacher, in mind: what they will be able to cope with and only include
	what student teachers need to know, understand, be able to do and be as a basic school teacher
2.	They take in to consideration the learner's, the student teacher's, context and possible barriers to, and enablers for,
	learning
3.	They are written with the tutors /lecturers who are going to teach the course in mind. Tutors must be able to adapt and
1	They are aligned to the key principles and practices of the Teaching III and to support their teaching
4.	New Four-Vear B Ed
5.	They are written to provide opportunities for student teachers to develop and apply knowledge during supported
	teaching in school
6.	They are written to reflect the stage of student teacher development, set out in the model for progress in the New Four-
	Year B.Ed.
7.	They are written to support progress in student teacher learning, including building on prior learning from the previous
	programme or course/s and supporting progress to the next course.
8.	They are to be used as self-study tools.
9.	They are written to have the following characteristics: easy to read; uses active voice and avoids jargon; uses bullet
	points to offset text; uses images
Wr	hat a teacher educator needs to know, understand and use to inform what they do
•	The aims and structure of the education system and Education strategic Plan
•	The Basic School Curriculum
•	The Inclusion Policy
•	of the New Four Year P. Ed
	Andragogy effective methods and practices for teaching adult learners
	Assessment Literacy Assessment for of and as learning Educative Assessment
Gu	idance for completing the mathematics course manual writing
	A. Course Information
Titi	le Page
	i. Course name: as in course specification unless important reason why not
	ii. The vision for the New Four-Year B.Ed. Curriculum
"Тс	o transform initial teacher education and train highly qualified, motivated new teachers who are effective, engaging and
full	y prepared to teach the basic school curriculum and so improve the learning outcomes and life chances of all learners they
tea	ch as set out in the National Teachers' Standards. In doing this to instil in new teachers the Nation's core values of

honesty, integrity, creativity and responsible citizenship and to achieve inclusive, equitable, high quality education for all							
iearners.	so Dotails, as in source specificatis	n unlocs i	montant reason why not				
Dro roquisito/s	The programme / provious some	stor course	os studiod				
Co Poquisitos	Links to other courses being tous	the support	es situtieu. et cohoronco in student ovr	ariance and avoid a	hunlication		
Course Level		in, suppoi		Credit Value			
Table of contents					3		
Table of Contents							
	for the subject or learning area						
1. The goal	or the subject of learning area						
2. Course de	escription						
3. Key conte	cross cutting issues including equi	ty and incl	usion				
5 Course Le	arning outcomes	ty and me	031011				
6 Course co	ntent						
7 Teaching	and learning strategies						
8 Course As	sessment components						
9 Reading a	and reference list						
10 Handouts	s nower points and other resource	s for lesso	ns				
11 Plans for	each lesson in the semester	5 101 105501					
	formation						
1 Goal for t	the Subject or Learning Area						
This can be found	in subject goal document. It should	l he a shor	t statement which canture	s what new teacher	s will know		
understand and be	able to do in this subject at the er	nd of their	training This statement sh	ould be linked to ac	hieving the		
vision for the curri	culum.		training. This statement si				
2. Key conte	extual factors						
This can be found	in the course specification. It sh	ould addre	ess what needs are to be	considered to refle	ect the Ghanaian		
context at local an	d national levels it includes potent	ial knowle	dge and skills gaps and an	v specific: gender. c	ultural. linguistic.		
conceptual, infras	tructural issues, for example, that	might be	barriers to learning forst	udent teachers and	eventually basic		
school children?	E.g. issues of subject related bias	that need	addressing. Potential ba	rriers to learning m	nust be explicitly		
addressed to enab	le student teachers to achieve the	learning o	utcomes.		,		
3. Course D	escription	0					
This can be found	in the course specification. This br	ief statem	ent should provide a clear	understanding of w	hat studying this		
course involves, w	hat student teachers will get out of	fstudying	this course.	Ū	, c		
4. Core and	transferable skills and cross cuttin	g issues, i	ncluding equity and inclus	ion			
This can be found	I in the course specification. Which	h core an	d transferable skills or cro	oss cutting issues w	vill be applied or		
developed throug	n this course? This needs to be mad	de explicit	to student teachers. Are the	here specific issues t	to do with equity		
and inclusion which	h must be addressed so that all stu	udent tead	hers can fully take part? F	or example, issues r	elated to gender		
and mathematics	or science.						
5. Course Learning Outcomes 6. Learning indicators							
These are in the	course specification. The course	Mea	asurable/assessable/observ	able performance	s that provide		
learning outcomes	s should specify the expectations	evid	ence of learning or othe	er changes taking p	place in student		
of what the studer	nt teachers will know, understand	teac	hers' behaviour which de	monstrate that the	ey have met the		
and be able to do	at the end of the course <b>not</b> what	lear	ning outcome/s.				
student teachers will do on the course. They must   • What the student teacher will need to do to show they have							
be appropriate and realistic to the learner's achieved the learning outcome. (in an inclusive lesson, this should							
abilities, experience, the identified level of the vary and be responsive to student teacher's individual							
course and <i>content</i> . They must be measurable – characteristic)							
allowing assessment of student teacher							
achievement							
7. Course co	ntent						
In the course spec	ification. This should provide an o	utline of tl	he academic and / or prac	tical content of the	course. It should		
be clear how this	content relates to the achievement	t of the int	tended learning outcomes.	The name of each u	init in the course		
should be <i>briefly</i> set out – the name should make it clear what the unit is about.							

Unit	Торіс	Sub-topic (If any)	Teaching and learning activities to achieve the learning outcome
1	Place value on 10,000,000 and numeration systems	Place value in numeration systems-base 2 and five	Demonstrating place value using ten structured materials i.e 100s, 10s and 1s, (bundled/loose sticks; a flat, long, and unit lego-blocks; flat strips and loose square cut-outs; etc. Using both English and a Ghanaian language;) Representing and counting numbers (10 to 10,000,000) using multiple of base ten structured materials (in both English and a Ghanaian language) Discuss numeration systems in ancient cultures and in some Ghanaian cultures Use manipulatives and/or technology to represent and write numbers in other bases particularly- base 2 and five.
2	The four basic operations on number and Number facts within 99	The four basic operations on number within 99; and then within 999	Discussions and peer presentations on the four basic operations on numbers within 99; and then within 999 Demonstrating the use of mental strategies in carrying out the four basic operations on numbers Developing and playing math games based for consolidating number facts Use manipulatives and/or technology to use the basic operations to represent numbers and statements in a multiple of ways.
3	Fractions, decimal fractions and percentages including ratio and proportion	Fractions: meaning of fractions, relationship between common fractions, decimals and percentages; Basic operations, PEDMAS; Mental strategies for multiplying and dividing by special fractions $\frac{1}{2}S, \frac{1}{5}S, \frac{1}{10}S, \frac{1}{100}S, \frac{1}{1000}S, etc.,$ Problem solving	Using manipulatives to demonstrate meaning of fractions as (i) equal part(s) of a whole, and as (ii) equal part(s) of a group of given objects Using manipulatives, number line and fraction chat to demonstrate the concept of equal (or equivalent) fractions, operation on fractions Using manipulatives, number line and fraction chat to demonstrate the relationship between common fractions, decimals and percentages; Demonstrating of mental strategies for carrying out basic operations (including the use of the BODMAS rule) as well as multiplying and dividing by special fractions $\frac{1}{2}s, \frac{1}{5}s, \frac{1}{10}s, \frac{1}{100}s, etc.$ , Engaging in micro lesson design on problem solving involving fractions, teaching with peers and doing critics
4	Diagnosis and remediation; assessment resources/records, and monitoring progress	Misconception diagnosis, classroom assessment resources and records interpreting data/reports on performance and providing feedback. Evaluating performance and monitoring progress	Designing tools to diagnose misconceptions and designing/implementing remediation Identification of resources that should be available in the classroom for effective assessment in specialism-including examples of standardised tests (NEA), teacher made tests, record sheets, cumulative records forms, reports forms, etc., Studying and completing student's cumulative record form Analysing learners' performance (or assessment data) to provide feedback to stakeholders- students, colleagues and parents, PTA and role playing a School Appraisal Meeting (SPAM)
5	Micro lessons and use of technology across upper primary numeracy	Importance of lesson planning Micro lesson planning formats Design of micro lessons Engagement in micro teaching with peers	Verbal exposition and discussions on importance of lesson planning, micro lesson planning formats and technology use in teaching numeracy in the across upper primary Reading teaching scenarios (and/or watching

		Exploring of technology use primary mathematics.	video clips) on teaching numeracy in the upper primary and doing critic based on using mathematical learning theory and knowledge of curriculum content pedagogy and resources to critique a mathematics lesson Engaging in micro lesson design, teaching with peers and doing critics Observing and reflecting upon how mathematics lessons are currently taught in schools
6	Shape and space	Informal geometry and spatial sense; Nets of 3-D shapes; Shapes and their properties; Hand sketching of common solids; Relationship among faces, edges and vertices;	Through interactive and collaborative group work, student-teachers explore 2D shapes and their properties; Construct 3D shapes from the nets; Investigate the properties of 2D and 3D shapes- congruencies, similarities, diagonals, parallel, symmetries, etc. Using ICT tools and other manipulatives to investigate properties of 2D and 3D shapes;
7	measurement	Concept of measurement; using non-standard and standard units of measurement; Angles Perimeter and areas of triangles Circumference and areas of circular regions; Surface area and volumes of prisms and pyramids;	Explore how student-teachers perceive children's understanding of the concept of measurement; Using manipulatives and other TLMs through mathematical discourse identify referent non-standard units for measuring length, mass and capacity Demonstrating with cut-out shapes and supported with video clip the process of deriving the formula for $\pi$ , circumference and area of a Demonstrating strategies for finding the surface area and volumes of prisms and pyramids.
8	Handling Data	Collecting, interpreting and presenting data ideas of chance and uncertainty	Verbal exposition, student-teacher presentations on collecting, interpreting and presenting data, and ideas of chance and uncertainty Finding examples of graphs in print and electronic media such as newspapers, magazines, and the internet and interpreting it. Engaging student collect, display, and analyse data to solve problems Engaging in micro lesson design on problem solving involving handling data, teaching with peers and doing critics

#### 8. Course Assessment Components

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

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

The guidance on assessing student teachers from the NTS, the NTECF the CWG and the New Four Year B.Ed. should be used.

#### 9. Teaching and learning strategies

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

#### 10. Required Reading and reference list

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

#### 11. Teaching and Learning Resources

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

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

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

#### B. Semester lesson plans

#### Guidance for Lesson planning

The expanded format is ddesigned to support writing lessons which address the key features of the new B.Ed. curriculum The completed format will be an important piece of evidence for CoE in being awarded **Transitional Support Funding (TSF)** 

Things to consider when writing and reviewing lessons:

- Will all student teachers be able to achieve the learning outcomes and demonstrate the indicators by undertaking the activities set out in the lesson?
- What might be barriers to learning? How can you address these barriers?
- How does the lesson support progress in and or consolidate student teacher learning; including building on prior learning and supporting progress to next lessons?
- How will you can address transition from school to CoE in the first semester?
- Are there explicit links between learning outcomes, learning indicators and assessments?
- Do all activities support student teachers in achieving the lesson learning outcomes?
- Is there an emphasis on interactive, learner focused approaches to training new teachers?
- Does it explicitly address cross cutting -issues: equity and inclusion, gender, SEN, ICT?
- Does it explicitly develop core skills, including: professional values and attitudes, classroom enquiry and reflection?
- Overall the lesson must be 'do-able' for the student teacher
  - in the time available
  - with the skills, knowledge and understanding they have

Title of Lesson	
Lesson Duration	
Lesson description	It is essential that student teachers know what this lesson is about. The lesson
	description should be short, clear, and accessible to all students.
Previous student	• What links to previous knowledge / prior learning need to be built in to the lesson?
teacher knowledge,	• Prior learning could be from: this course and previous lessons; from senior high school; from
prior learning	supported teaching in school/practicum; from other courses. NB important to build on work
(assumed)	from previous lessons
	• If you are unsure about previous knowledge or prior learning how you need to check for this
	as part of the activity in the lesson/s. If the expected prior knowledge is not adequate you will
	need to modify the lesson.
Possible barriers to	• What specific conceptual, linguistic, social, cultural, conceptual, gender, or ability related
learning in the lesson	issues might stop student teachers in achieving the learning outcomes; act as barriers to their
	learning?
	How will you address these?
	• Does this lesson require that student teachers examine their own bias? If so, you will need to
	plan to support and address this
Points on equity,	• You need to represent and address diversity in your lesson-plan. Are there multiple diversity
inclusivity (gender,	issues (see <u>diversity wheel</u> ) ?
SEN), and addressing	How would these issues be addressed with student teachers during activities for both their

diversity	<ul> <li>own learning and the learning of the students they will teach?</li> <li>How are issues of diversity (equity and inclusion) addressed in your lesson plan so that student teachers can see diversity modelled during this teaching and learning activity?</li> </ul>									
	<ul> <li>How are issues of diversity (equity and inclusion) addressed in your lesson plan so that student teachers can learn how to address it with the students they will teach?</li> <li>For example: gender stereotype issues related to: PE, literacy and language, science and the student is student in the student is stated to: PE, literacy and language, science and the student is student in the student is student.</li> </ul>									
Lesson Delivery – chosen to support students in achieving	Face-to- Pi face Ad	Face-to- face     Practical     Work- Based     Seminars     Independent     e-learning     Practicum       face     Activity     Based     Study     opportunities     Practicum								
the outcomes 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.	<ul> <li>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.</li> <li>Practical Activity: enabling experimentation and the analysis and discussion of issues, documents and materials, as well as physical activities.</li> <li>Work based learning: to allow students to undertake observation, enquiry and/or hands-on development work (mostly TVET)</li> <li>Seminars: to generate group and individual creativity, discussion and reflection: student and / or tutor led</li> <li>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</li> <li>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.</li> <li>Practicum (supported teaching in school): support to enable student teachers to experience and learn from the basic school context by doing observations and child study in Y1 to full class teaching in and action research in Y4.</li> <li>What is the main thing you want student teachers to know, understand and be able to do as a result of this lesson?</li> <li>Is this lesson aimed at: Learning or embedding a new concept? Developing a skill? Understanding how various concepts and skills come together to create a body of knowledge? Practicing the application of new knowledge?</li> </ul>									
<ul> <li>Write in full aspects of the NTS addressed</li> </ul>										
<ul> <li>Learning Outcome for the lesson, picked and developed from the course specification</li> <li>Learning indicators for each learning outcome</li> </ul>	<ul> <li>Learning Outcomes</li> <li>The learning outcomes for the lesson will enable student teachers to achieve the purpose for the lesson.</li> <li>For example, in mathematics: student teachers are prepared to teach a specific mathematics operation. In this instance, the learning outcomes would be the things the students would need to know and do in order to be able to teach the operation.</li> <li>What the student teacher will know and be able to do as a result of this lesson. 'By the end of the lesson the student will'</li> <li>Learning outcomes may be developed and re-visited over a number of lessons</li> <li>Be realistic in terms of what can be</li> <li>Learning Indicators</li> <li>Measurable/assessable/observable performances that provide evidence of learning or other changes taking place in student teachers' behaviour which demonstrate that they have met the learning outcome/s.</li> <li>What the student teacher will know and be able to do as a result of this lessons</li> <li>Be realistic in terms of what can be</li> </ul>									

	Some lear	ning outcomes n	nay address			
	specific stu	ident teacher nee	eds			
Content of lesson	Time or	Topics and	Teaching and learning to	achieve learning outcomes:		
picked and developed	stage	sub-topics (if	aepending on delivery mode selected. Teacher le			
from the course	Identify now	any):	collaborative group work or independent study			
specification	much time		Teacher Activity	Student Activity		
Unit /a covered from	will be		• Plan to model what is	For example: Interactive and		
the course	each part of		expected of student	collaborative group and pair		
specification.	the lesson		teachers	work, e.g.,		
specification.			• Plan for activities to	<ul> <li>identifying, developing,</li> </ul>		
			support student	presenting and evaluating		
			teachers in working	suitable resources and		
			towards and / or	materials		
			demonstrating	<ul> <li>picking out key points from</li> </ul>		
			achieving the learning	education texts, raising		
			outcomes.	questions and issues		
			• Where possible set up	<ul> <li>sharing practice and</li> </ul>		
			activities with students	experience		
			as active participants	<ul> <li>preparing for school visits</li> </ul>		
			Make links to other	<ul> <li>self and peer assessment</li> </ul>		
			aspects of the New			
			Four-Year B.Ed.	Other examples		
			programme or between	• Student teacher led		
			subject and pedagogic	seminars		
			Knowledge	ICI e.g. discussion using VLE		
			<ul> <li>State in team teaching involved or additional</li> </ul>	Video observation of and		
			tutors contributing	analysis of teaching		
			tutors contributing	Role-play		
Which core or	Core and transf	erable skills inclu	de: critical thinking, problem sol	ving, social skills, creative thinking		
transferable skills will	and communic	ation skills, use o	f ICT			
be used or developed						
and how						
Which cross cutting	ss cutting issue	s include: assess	ment literacy and assessing stu	dents' progress and professional		
issues will be addressed	values and atti	tudes, reflection	and classroom enquiry			
or developed and how						
Lesson assessments –	Assessmer	it as learning: on	going self-assessment by student	teachers reflecting on their		
evaluation of learning:	own learni	ng and making a	justments so that they achieve	deeper understanding, occurs		
of, for and as learning	throughou	t the learning pro	cess. This needs to be planned fo	or in the lesson.		
within the lesson	<ul> <li>Assessmer</li> </ul>	it of learning: is u	sually summative and is mostly (	aone at the end of a task, unit of		
	work, placement etc. Weighted Assessment Components in course outlines. This needs to be					
	plannea for in the lesson.					
	understan	d and are able to	do and using that information to	adant teaching approaches and		
	to differen	tiate according to	different student needs, it occu	irs through the learning process		
	may be pa	rt of the Assessm	ent components, and it occurs w	hen assessing prior learning		
	Differentia	tion in lessons (L	DL guidelines): the lesson needs	to include a range of teaching		
	and assess	ment strategies t	o motivate and reach all learners	S		
	The approx	ach to assessmen	t in lessons must be appropriate	to the teaching and learning		
	strategies		. FF - F			
Instructional Resources	This may inclu	de: handouts, p	ower points, examples of child	lren's work, video, ICT activities,		
	examples of pr	evious student te	achers' work			
Required Text (core)						
Additional Reading List						

Year of B.Ed.3Semester2Place of lesson in semester1 2 3 4 5 6 7 8 9	0 11 12
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Title of Lesson	Place Value	e (Teaching	and Assess	ing)	Les	Lesson Duration 3 Hours			
Lesson description	This is the Primary Sc include int Counting a bases two school cur	This is the first lesson which focuses on developing an understanding of Teaching and Assessing Primary School Mathematics and about the concept of place value. The topics to be considered include introduction of Course Manual, Place value in numeration systems-base 2 and five, and Counting and representing numbers in multiple of ways and in different bases, for example, bases two and five. It also covers Teaching and Assessing place value as outlined in the basic school curriculum.							
Previous student teacher knowledge, prior	Student-te numbers.	achers have	e been expo	ses to numbe	ers and num	ierals, number nam	es and counting		
learning (assumed)									
Possible barriers to	Different	entry beha	viours, Soci	o-cultural is	sues, differe	ent learning need	s, misconceptions		
learning in the lesson	about mat to address	hematics ai them befor	nd methods e. during ar	of teaching Ind after the le	mathematic esson.	cs. Conscious effort	s should be made		
Lesson Delivery – chosen	Face-to-	Practical	Work-	Seminars	Independe	ent e-learning	Practicum		
to support students in	face	Activity	Based		Study	opportunitie	es		
achieving the outcomes		$\bowtie$	Leaning		$\bowtie$				
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	<ul> <li>Face-to-face and e-learning opportunities</li> <li>The face-to-face mode will include lecturer/tutor-initiated class discussions, small group in class exploration, group presentations, think-pair-share moments, lecture, etc.,</li> <li>The e-learning opportunities will include exploring number games and activities to develop properties of numbers and relationships between and among sets of numbers</li> <li>Independent study would include writing self-assessment and presenting reflective papers or journals.</li> </ul>								
lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.	<ul> <li>Introduce student teachers to the course manual to enable them develop awareness of what they are expected of in this lesson.</li> <li>Develop student teachers' understanding of the nature and importance of the concept of place value to primary school learners.</li> <li>Introduce the student teachers to prepare and model interactive, and innovative ways of teaching mathematics, especially School Mathematics curriculum to Primary Schoollearners.</li> <li>Prepare the student teacher for a future mathematics classroom</li> </ul>								
<ul> <li>Learning Outcome for the lesson, picked and developed from the course specification</li> <li>Learning indicators</li> </ul>	Learning Outcomes         Learning Indicators         Identify         Which         cross-cu           issues- core and transfer         skills, inclusivity, equity         addressing         diversity. How           these be addressed         developed?         developed?         diversity.								
for each learning outcome	Demonstrate knowledge and skills of observation and reporting on class teaching and wider school activities (in School 1) (College & School induction by tutors, school heads, lead mentors and mentors)Produce well-prepared induction schedule and proceduresInclusion and Equ supporting studer to recognize instit personal sources of to leaning and ma conscious efforts them.•Show evidence of keepingrecords of specific observations from wider school environment and induction•Inclusion and Equ supporting studer to recognize instit personal sources of to leaning and ma conscious efforts them.•Diversity: Support teachers w opportunities						a Equity: by student teachers e institutional and urces of barriers nd making fforts to address Support student with the ies to explore within the		

	Demonstrate knowledge and Understanding of place value specifically focusing on mathematics curriculum and their associated expected learning outcomes (NTS, 2a). Carry out action research and classroom enquiry to improve practice in the upper primary classroom and reflect on their teaching practices for continuous professional development (CPD) (NTS 1a, pg.12,NTS 3b, pg.14)	<ul> <li>Produce a report on small group discussions with mentors and peers on the concept of place value.</li> <li>Submit a write-up of the developing teacher's knowledge of self-awareness, beliefs, and values of teaching and learning (personal teaching philosophy)</li> <li>Make oral presentations of knowledge gained during teaching and learning interaction on the concept of place value by studentteachers in their groups or individually.</li> </ul>		<ul> <li>class/subject and potential barriers to inclusion (including personal bias, stereotypes and institutional discrimination).</li> <li>Collaboration: is fostered through assigning group projects and presentation of various topics across units.</li> <li>Communicative skills of student teachers: can be enhanced through the examination, interrogation and presentation to identify the specific literacy and language of the subject/s taught as well as supporting pupils in acquiring these and in their ability to use language for academic purposes</li> </ul>	
Торіс	Sub-topic(s)	Stage/ Teaching and learnin		g to activities to achieve learning	
		Time	Teacher-lead collabo	g on delivery mode selected.	
			Teacher Activity	Student Activity	
Place value on	Review	20 mins	Introduces student	Participate in the discussion of	
10,000,000 and	Introduction of Course		teachers to the	various components of the	
numeration systems	Manual		Course Manual and	course manual, take opportunity	
			discuss the various	to ask questions about the	
			components	Course Manual including	
			including	assessment procedures.	
			assessment	Outline their expectations and	
			procedures (See	views about the mathematics	
			Course Assessment	course.	
			Components).		
			(PD Theme 1)		
			Introduce the Upper	Listen attentively to the tutor or	
			Primary	lecturer's verbal exposition and	
	numeration systems	20 mins	Mathematics	to supply responses to Teaching	
	have 2 and five		curriculum, and	and Assessing Primary School	
	Introduction		relate it to Teaching	Mathematics 1	
	Introduction		and Assessing		
			relevant Primary		
			School Mathematics		
			(PD Themes 1 &3)		
	Counting and				
	representing numbers in	20	Represent and	For any and the second state of the second sta	
	multiple of ways and	20 mins	counting numbers	Engage in counting activities to	
	indifferent bases, for		(10 to 10,000,000)	represent numbers in multiple of	
	example, bases two and		using multiple of	ways and in different bases	
	five		materials (in beth		
			English and a		
			Ghanaian languago)		
			(PD Themes 1 & 2)		

		30 mins	Assign student teachers to explore Number patterns and to develop understanding of large numbers including the use of the base ten and other place value systems (PD Themes 3 & 4)	Engage in a think-pair-share session to explore Number patterns and the development of understanding of large numbers including the use of the base ten and other place value systems	
		30 mins	Monitor student teachers as they develop and refine strategies for solving problems showing evidence of understanding the place value concept (PD Theme 1 (PD Themes 1 & 3)	Engage in a group discussion to explore strategies for solving problems showing evidence of understanding the place value concept	
		30 mins	Demonstrate place value using ten structured materials i.e 100s, 10s and 1s, (bundled/loose sticks; a flat, long, and unit lego- blocks; flat strips and loose square cut-outs; etc. Using both English and a Ghanaian language ;)	Discuss place value using ten structured materials i.e 100s, 10s and 1s, (bundled/loose sticks; a flat, long, and unit lego-blocks; flat strips and loose square cut- outs; etc. Using both English and a Ghanaian language ;)	
		30 mins	Engage student teachers in a discussion of the characteristics of our numeration system	<ul> <li>Participate in the discussion of the characteristics of the numeration system, that is. <ol> <li>Any amount can be expressed using only the basic 10 digits</li> <li>It is based on groupings (powers) of ten and other bases</li> <li>The value of any digit depends on its place</li> <li>Zero can represent both a value and an empty place</li> </ol> </li> </ul>	
Lesson assessments – evaluation of learning:	Subject Portfolio Summary Assessment Meth	hod: refle	ctive paper presentatio	n	
or, for and as learning within the lesson	Student teachers to write a reflective paper on the figurative numbers, using different but concrete based approaches to be presented the following week in groups. <i>To be</i> <i>included in their portfolio</i> <i>Related CLOs: 1, 3</i> and 6 <b>NTS:</b> 1a) Critically and collectively reflects to improve teaching and learning.				
	2 b) Has comprehensive k outcomes.	nowledge	of the official school cu	urriculum, including learning	

	2b) Has comprehensive knowledge of the official school curriculum, including learning outcomes
	31) Listens to learners and aives constructive feedback
	3m) Identifies and remediates learners' difficulties or misconcentions, referring learners
	whose needs lie outside the competency, the teacher
	Advance Drenaration
	Auvance Preputation
	Student teachers to read on the principles for the selection of objectives, concepts and
	fearing activities of experiences, using variety of resources including ich tools as a preparation
Instantional Deservation	Tor the next ressol.
Instructional Resources	Posters; video clips; downloads; cardboards, models, PRIMARY SCHOOL curriculum, etc.
Required Text (core)	Arthur, J., Grainger, T. & Wray, D. (2006). Learning to Teach in the Primary School. Canada:
	laylor & Francis e-Library. <u>https://www.pdfdrive.com/learning-to-teach-in-the-primary-school-</u>
	<u>d20209294.html</u>
	Confer, C. (2005). Teaching Number Sense. Sausalito: Math Solutions Publications.
	https://www.pdfdrive.com/teaching-number-sense-grade-1-d184198309.html.
	Manitoba Education, Citizenship and Youth (2006). Rethinking classroom assessment with
	purpose in mind: assessment for learning, assessment as learning, assessment of learning.
	https://www.pdfdrive.com/assessment-for-learning-assessment-as-learning-assessment-of-
	learning-d6259529.html.
	Roy, G. J. (2014). Developing Prospective Teachers' Understanding of Addition and Subtraction
	with Whole Numbers. Issues in the Undergraduate Mathematics Preparation of School
	Teachers, 2.
Additional Reading List	Lakoff, G. & Núñez, R. E. (2000). Where Mathematics comes from. New York: Basic Books.
	Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Tutor notes. Accra: Unimax
	Publishers.
	Martin, J. et. al. (1994). 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 the concepts of
	place value taking into consideration the learning outcome.
	<ul> <li>Instructional strategies needed to consciously engage student teachers on how to</li> </ul>
	design and produce portfolios, journals.
	<ul> <li>How to design tasks for assessment procedures for assessment of, as and for learning</li> </ul>

Year of B.Ed.	3	Semest	<b>er</b> 2	Place of lesson in semester			1 <b>2</b> 3 4 5 6 7 8 9 10 11 12				
Title of Lesson		The four Ba	The four Basic Operations: (Teaching and Assessing)Lesson Duration3 Hours								
Lesson descriptio	'n	This is the s Assessing P considered 10,000,000	second lesso Primary Scho include the ).	on whi ol Ma four t	ich focus athemat basic op	ses on develo ics and the fo erations and	oping an unde our basic ope Dealing with	erstai ratio oper	nding of Teachin ns. The topics to rations on numb	g and be ers up to	
Previous s teacher know prior le (assumed) Possible barriers learning in the le	tudent vledge, earning to sson	Student-tea are exposed some math semester' r Different en mathematic address the	student-teachers have been thought theories in the teaching and learning of mathematics, an are exposed to number and numeration systems as well as handling dada; they have experience some mathematics during their basic and secondary education period as well as their previou semester' mathematics courses. Different entry behaviours, Socio-cultural issues, different learning needs, misconceptions abour mathematics and methods of teaching mathematics. Conscious efforts should be made t address them before, during and after the lesson.								
Lesson Delivery – chosen to suppor students in achie the outcomes	t ving	Face-to- face	Practical Activity	Worl Base Lean	k- ed iing	Seminars	Independer Study	nt	e-learning opportunities 🖂	Practicum	
Lesson Delivery mode of d chosen to s student teache achieving the le outcomes.	– main lelivery support ers in earning	Face-to-face The face-to-face The face-to-face The e-to-face proper Independent or jour	<ul> <li>Face-to-face and e-learning opportunities</li> <li>The face-to-face mode will include lecturer/tutor-initiated class discussions, small group in class exploration, group presentations, think-pair-share moments, lecture, etc.,</li> <li>The e-learning opportunities will include exploring number games and activities to develop properties of numbers and relationships between and among sets of numbers</li> <li>Independent study would include writing self-assessment and presenting reflective papers or journals</li> </ul>								
<ul> <li>Purpose for t lesson, what want the stu to achieve, so as basis for t learning outo An expanded version of th description.</li> </ul>	:he you dents erves he comes. I e	<ul> <li>The purpos</li> <li>Introdutive are an operative are an operat</li> <li>Introdutive are an operat</li> <li>Introdutive are an operative are an operati</li></ul>	e of the less uce student t re expected o p student t ions on num uce the stud ng mathema rs.	ion is teach of in t teache bers i dent t atics,	to; ers to th this lesso ers' unc up to 10 teachers especi	ne course ma on. lerstanding ( 0,000,000. 5 to prepare ally, School	nual to enab of the four l and model i Mathematic	le the basic ntera	em develop awa coperations and active, and inno urriculum to P	reness of what d dealing with vative ways of rimary School	
<ul> <li>Learning Out for the lesson picked and developed fr the course specification</li> </ul>	n, om	Learning O	utcomes		Learnin	g Indicators		Ide iss ski ade the de	entify Which ues- core and Ils, inclusivity, dressing divers ese be ac veloped?	cross-cutting transferable equity and ity. How will ldressed or	
Learning indi for each lear outcome	icators ning	Demonstra and skills of and reporti teaching an school activ <b>School 1)</b> (College & S induction b school head mentors an Carry out p and classro improve pri- four basic of	te knowledg f observation ing on class nd wider vities (in School y tutors, ds, lead nd mentors) project work pom enquiry actice in the	to	<ul> <li>Proind pro</li> <li>Prowo wo coc stu obs</li> <li>Ma knot to a from</li> </ul>	duce well-pr uction sched cedures wide records rk activities a operative lead dent teacher servations ke oral prese owledge gain age appropria m locally ava	epared ule and of group ind/or rning for s during entations of ed to apply ate TLMs ilable is groups to	•	Inclusion and E supporting stud to recognize ins personal source to leaning and conscious effor them. Characteristics uniqueness of u learners: By en- student teache awareness of h and understand	quity: by lent teachers stitutional and es of barriers making ts to address and upper primary couraging rs to develop ow Knowledge ding of child pment and	

	reflect on their teaching practices for continuous	teach opera	the four basic ations of numbers	maturation support young children's learning
	professional development (CPD) (NTS 1a, pg.12,NTS 3b, pg.14) Develop and use age appropriate TLMs from locally available materials for upper primary (NTS 3j, pg. 14)			<ul> <li>Communicative skillsof student teachers: can be enhanced through the examination, interrogation and presentation to identify the specific literacy and language of the subject/s taught as well as supporting pupils in acquiring these and in their ability to use language for academic purposes</li> </ul>
Торіс	Sub-topic(s)	Stage/ Time	Teaching and learning outcomes depending Teacher-lead collabor	g to activities to achieve learning g on delivery mode selected. ative group work or independent.
			Teacher Activity	Student Activity
	Review	10mins	Review the previous lesson by asking student teachers to present their reflective paper on the importance of mathematics to society; (PD Theme 1)	Participate in the discussion to review the previous lesson;
	The four basic operations on whole number within	30 mins	Engage student teachers in a discussion based on the interpretation of the four basic operations on numbers within 99; and then within 999 (PD Themes 1 &3)	Engage in think-pair-share strategies to discuss the misconceptions of the learners with respect to place value.
The four basic operations on number and Number facts within 99	999	20 mins	Demonstrate the use of mental strategies in carrying out the four basic operations on numbers	Use interactive collaborative group work to explore mental strategies in carrying out the four basic operations on numbersand to engage in peer presentations
	Dealing with operations on numbers up to 10,000,000.	30 mins	Develop and play mathematical games for consolidating number facts with student teachers	Participate in the playing of mathematical games for consolidating number facts with student teachers
		30 mins	Use manipulatives and/or technology to support the teaching and learning basic operations on whole numbers and to encourage the use of multiple of ways representing mathematical	Use manipulatives and/or technology related strategies in a variety of ways to establish the relationships between addition and subtraction, as well as multiplication and division

			ideas (PD Themes 1		
			& 3)		
	20	) mine	Assign student	Evalors the meaning and	
	30	mins	teachers to explore	explore the meaning and relationship among the four	
			relationship between	operations, as well as, develop	
			operations; mental	appropriate mental strategies	
			strategies and other	and other problemsolving	
			problem solving	strategies for dealing with the	
			strategies;	operations on whole numbers	
			(PD Themes 3 & 4)	Engage in a chink-pair-share	
			Engage student	teaching and learning operations	
			teachers to design	on whole numbers up to 999	
	30	) mins	appropriate		
			manipulatives for	Design appropriate	
			dealing with	manipulatives for dealing with	
			numbers up to	operations of numbers up to 333	
			999( <b>PD Theme)</b>		
Lesson assessments –	Subject Portfolio				
evaluation of learning:	Assign student teachers to write	e short i	notes (about one page)	on how to establish the	
of, for and as learning	This will also sorve as advance n	and dec	imal number to be pres-	ented their next lesson period.	
within the lesson	Related CLOs: 1, 3, 5	preparat		Assessment as rearning)	
	NTS:				
	2b) Has comprehensive kno	owledge	of the official school cu	irriculum, including learning	
	outcomes.	as rospe	act for aquity and inclus	tion in the methometics classroom	
	(knowledge)	as respe			
	3k) Integrates a variety of a	assessme	ent modes into teaching	to support learning.	
	1. Note: The assessment proced	edures sh	ould make room for dif	ferentiation - gender, equity, SEN,	
Instructional Descurress	and inclusivity.	model	, etc		
Required Text (core)	Arthur, J., Grainger, T. & Wray, I	D. (2006	<ol> <li>Learning to Teach in vw pdfdrive com/learni</li> </ol>	the Primary School. Canada: Taylor	
	d20209294.html		ww.pululive.com/learni	ng to teach in the prinary school	
	Confer, C. (2005). Teaching	ig Num	ber Sense. Sausalito	: Math Solutions Publications.	
	https://www.pdfdrive.com/teac	ching-nu	umber-sense-grade-1-d1	<u>184198309.html</u> .	
	Manitoba Education, Citizensh	hip and	Youth (2006). Rethin	king classroom assessment with	
	https://www.pdfdrive.com/asse	essment	t-for-learning-assessment	nt-as-learning-assessment-of-	
	learning-d6259529.html.				
	Roy, G. J. (2014). Developing P	Prospect	ive Teachers' Understa	nding of Addition and Subtraction	
	with Whole Numbers. <i>Issues</i>	in the	e Undergraduate Mat	hematics Preparation of School	
	Teachers, 2.				
Additional Reading List	Lakoff, G. &Núñez, R. E. (2000).	. Where	Mathematics comes fro	m. New York: Basic Books.	
	Martin, J. et. al. (1994). Mathem	matics fo	or teacher training in Gh	ana: Tutor notes. Accra: Unimax	
	Publishers.				
	iviartin, J. et. al. (1994). Mathem Unimax Publishers.	matics fo	or teacner training in Gh	unu: Students activities. Accra:	
CPD Needs	<ul> <li>How to design and/or u</li> </ul>	use som	e innovative materials a	and ideas for teaching selected	
	concepts based on tead	aching ar	nd learning operations o	n whole numbers	
	How to manage transit	tion of h	ome to school.		
	Understand the various     How to design tasks for	us charac	teristics and uniquenes	s of Primary School learners.	
	Instructional strategies	s needer	to consciously engage	student teachers on how to	
	design and produce po	ortfolios,	, journals.		

Year of B.Ed.	3	Semester	2	Place	of lesson in sen	nester	123456789101112				
Title of Lesson		Fraction conce	Fraction concepts1 (Teaching and Assessing) Lesson Duration 3 Hours								
Lesson descriptio	'n	This is the third lesson which focuses on developing an understanding offractional concepts. The topics to be considered includes, Meaning of fractions; Building an understanding of common fractions and Finding equivalent fraction. It also covers the relationship between common fractions, equivalent, decimal numbers, and percent.									
Previous s teacher know prior la (assumed) Possible barriers	student wledge, earning to	Student-teach knowledge on Different ent	Student-teachers have been taught the four basic operations. They also have informal knowledge on the idea of part of a whole.								
learning in the learning	sson	about mather to address the	natics and m before,	methods during and	of teaching matl d after the lessor	hematics.	Conscious efforts sh	ould be made			
Lesson Delivery – chosen to suppor students in achie the outcomes	t ving	Face- Practice Acti	tical W vity B Le	/ork- ased aning	Seminars	Independ ent Study	d e-learning y opportunities	Practicum			
Lesson Delivery mode of c chosen to s student teache achieving the le outcomes.	– main delivery support ers in earning	<ul> <li>Face-to-face a</li> <li>The face-class exp</li> <li>The e-lea propertie</li> <li>Independor or journal</li> </ul>	to-face mo loration, g rning oppo s of numb lent study ls.	ning oppor ode will ind roup prese ortunities v ers and rel would incl	tunities clude lecturer/tut ntations, think-p will include explo lationships betwo ude writing self-a	tor-initiate air-share r ring numb een and an assessmen	d class discussions, s noments, lecture, et er games and activit nong sets of number t and presenting ref	small group in :c., :ies to develop rs lective papers			
<ul> <li>Purpose for t lesson, what want the stu- to achieve, so as basis for t learning outo An expanded version of th- description.</li> </ul>	the you dents erves he comes. I e	<ul> <li>The purpose of</li> <li>Introduce what they</li> <li>develop s well as, n equivaler</li> <li>It also in equivaler</li> <li>Introduce teaching learners.</li> </ul>	of the lesso student to are expect tudent teat heaning of t fraction. troduce the t, decimal the stude mathema	on is to; teachers to cted of in t achers' uno fractions; ne student numbers, ent teacher tics, espec	o the course ma his lesson. Ierstanding of th Building an unde t teachers to th and percent. rs to prepare an cially, School N	nual to er e nature a erstanding e relation d model ir lathematic	nable them develop nd importance of m of common fraction ship between comm nteractive, and inno ts curriculum to P	awareness of athematics, as ns and Finding mon fractions, vative ways of rimary School			
<ul> <li>Learning Out for the lesson picked and developed fr course specif</li> <li>Learning indi</li> </ul>	come n, om the fication cators	Learning Outo	omes	Learnin	g Indicators		Identify Which issues- core and skills, inclusivity, addressing diversi these be ad developed?	cross-cutting transferable equity and ity. How will dressed or			
for each lear	ning	Demonstrate knowledge an observation a reporting on o teaching and v school activiti <b>School 1)</b> (College & Sch induction by t school heads, mentors and r	d skills of nd lass wider es <b>(in</b> ool utors, lead nentors)	Prc ind prc     vo coc cor stu tea	oduce well-prepa uction schedule ocedures. ovide records of g rk activities and/ operative learnin ocept of fractions dent teachers du ching and learnin	red and group or g on the 5 for uring ng.	<ul> <li>Inclusion and Ed supporting stud to recognize ins personal source to leaning and r conscious effort them.</li> <li>Communicative student teache enhanced thro examination, in</li> </ul>	quity: by ent teachers titutional and s of barriers naking ts to address e skills of ers: can be ugh the nterrogation			

Use age appropriate subject knowledge, pedagogical knowledge and pedagogical content knowledge to teach fraction in a broad, balanced, relevant and creative manner (NTS 2c, pg. 13, 3e & 3g, pg. 14) [NTECF P1 (3), pg. 20] Demonstrate knowledge and understanding of fraction; and specifically focusing on mathematics curriculum and their associated expected learning outcomes (NTS, 2a).	<ul> <li>Providevel award value learni philos</li> <li>Make know teach by stu group</li> </ul>	de a write-up of the oping teacher's self- eness, beliefs, and s of teaching and ing (personal teaching sophy) oral presentations of ledge gained during ing and observation udent teachers in their os.	<ul> <li>and presentation to identify the specific literacy and language of the subject/s taught as well as supporting pupils in acquiring these and in their ability to use language for academic purposes</li> <li>Diversity: Support student teachers with the opportunities to explore diversity within the class/subject and potential barriers to inclusion (including personal bias, stereotypes and institutional discrimination).</li> </ul>		
Sub-topic(s)	Stage/ Time	Teaching and learning outcomes depending Teacher-lead collaborat	ng to activities to achieve learning ng on delivery mode selected.		
		Teacher Activity	Student Activity		
Review	10mins	Review the previous lesson by asking student teachers questions on basic division facts	Participate in the discussion to review the previous lesson;		
Meaning of fractions; Building an understanding of common fractions,	30 mins	Engage student teachers in a discussion towards building an understanding of common fractions using variety of TLRs (PD Themes 1 & 3)	Student-teachers explore the meaning and interpretations of fractions through small group activities and presentations. Eg. Fraction as equal shares or sized portions (Van de Walle, 2007) and represented as • part of a unit or whole, • a sport on the number line, • part of a group, or comparing two sets, and • a ratio of two integers,		
Developing an understanding of decimal fractions and to build relationship between common fractions decimal	40 mins	Assign student teachers in groups to explore equivalent fractions (PD Themes 3 & 4) Engage student teachers in a discussion based on relationship between common fractions and decimal fractions and percent	Use variety of activities such as paper folding, with appropriate manipulatives (e.g. Cuisenaire rods, linoleum, etc) to represent fractions as rational numbers, equivalent, and/or operator, Develop the concept of equivalent fractions using models and multi-purpose chart (multiplication table), fractional boards, sets, etc. Use area model or any appropriate model to explore		
	Use age appropriate subject knowledge, pedagogical knowledge and pedagogical content knowledge to teach fraction in a broad, balanced, relevant and creative manner (NTS 2c, pg. 13, 3e & 3g, pg. 14) [NTECF P1 (3), pg. 20] Demonstrate knowledge and understanding of fraction; and specifically focusing on mathematics curriculum and their associated expected learning outcomes (NTS, 2a). <b>Sub-topic(s)</b> Meaning of fractions; Building an understanding of common fractions, Finding equivalent fractions;	Use age appropriate subject knowledge, pedagogical knowledge and pedagogical knowledge teach fraction in a broad, balanced, relevant and creative manner (NTS 2c, pg. 13, 3e & 3g, pg. 14) [NTECF P1 (3), pg. 20]• Make know teach by stu group fraction; and specifically focusing on mathematics curriculum and their associated expected learning outcomes (NTS, 2a).• Stage/ TimeReview10minsMeaning of fractions; Building an understanding of common fractions,30 minsFinding equivalent fraction; and specifically focusing on mathematics curriculum and their associated expected learning outcomes (NTS, 2a).50 minsSub-topic(s)Stage/ TimeFinding of fractions; build relationship between common fractions decimal fractions decimal fractions50 mins	Use age appropriate subject knowledge, pedagogical knowledge and pedagogical content knowledge to teach fraction in a broad, balanced, relevant and creative manner (NTS 2c, pg. 13, 3e & 3g, pg. 14) [NTECF P1 (3), pg. 20]Provide a write-up of the developing teacher's self- awareness, beliefs, and learning (personal teaching philosophy)Demonstrate knowledge and understanding of fraction; and specifically focusing on mathematics curriculum and their associated expected learning outcomes (NTS 2a).• Make oral presentations of knowledge gained during or teaching and observation by student teachers in their groups.Sub-topic(s)Stage/ TimeTeaching and learning outcomes (NTS 2a).Sub-topic(s)Stage/ TimeTeaching and learning outcomes (NTS 2a).ReviewStage/ TimeTeaching and learning outcomes depending teacher activityReviewStage/ TimeTeacher ActivityReviewStage/ TimeTeacher activityReviewSo minsEngage student teachers in a discussion towards building an understanding of common fractions,So minsBuilding an understanding of dommon fractions;So minsEngage student teachers in groups to explore equivalent fractions decimal fractions and to build relationship between common fractions decimal fractions decimal fractions and to build relationshipSo minsFinding equivalent fractions and decimal fractions and teachers in a discussion		

			Group student	common fractions and decimal					
			teachers to brainstorm	fractions;					
	Developing conceptual	50 mins	and outline strategies	Francis a third ratio draw					
	understanding of		for teaching upper	Engage in a think-pair-share					
	multiplication and		primary children	session to outline the					
	division of common and		multiplication and	strategies and materials (TLIVIS)					
	decimal fractions		division of common	suitable for teaching					
			and decimal fractions	multiplication and division of					
				common and decimal fractions.					
				antribute to the					
				understanding of fractions					
Losson assassments	Subject Dortfol	io.		understanding of fractions.					
evaluation of learning.	Assign student te	iu Pachers to c	levelon equivalent fraction	s from locally available					
of for and as learning	resources to be s	hared amo	ng colleagues in their smal	Il group presentation					
within the lesson	Related CLOs: 1 2			ingroup presentation.					
within the lesson	NTS:	•							
	2b) Has com	prehensive	knowledge of the official	school curriculum, including					
	learning out	comes.	0	, 3					
	3m) Identifies an	d remediat	es learners' difficulties or i	misconceptions, referring					
	learners whose needs lie		outside the compet	ency of the teacher.					
Instructional Resources	Posters; video clips; down	Posters; video clips; downloads; models, etc.							
Required Text (core)	Arthur, J., Grainger, T. &	Wray, D.	(2006). Learning to Teach	in the Primary School. Canada:					
	Taylor & Francis e-Library	r. <u>https://w</u>	ww.pdfdrive.com/learning	g-to-teach-in-the-primary-school-					
	d20209294.html								
	Confer, C. (2005). Tea	aching Nu	mber Sense. Sausalito:	Math Solutions Publications.					
	https://www.pdfdrive.cor	n/teaching	-number-sense-grade-1-d1	184198309.html.					
	Manitoba Education, Cit	izenship ar	nd Youth (2006). Rethink	ing classroom assessment with					
	purpose in mind: assessi	ment for l	earning, assessment as le	earning, assessment of learning.					
	https://www.pdfdrive.cor	n/assessme	ent-for-learning-assessmer	nt-as-learning-assessment-of-					
	learning-d6259529.html.		ative Teachersel Destaurtes						
	Roy, G. J. (2014). Develop	oing Prospe	ctive leachers' Understan	ding of Addition and Subtraction					
	Togehore 2	ssues in t	ne Undergraduate Math	ematics preparation of school					
	reachers, 2.								
Additional Reading List	Lakoff G &Núñez R F (2	2000) Whe	re Mathematics comes fro	m New York: Basic Books					
	Martin. J. et. al. (1994). M	athematics	for teacher trainina in Gh	ana: Tutor notes. Accra: Unimax					
	Publishers.		, ,						
	Martin, J. et. al. (1994). M	athematics	for teacher training in Gh	ana: Students activities.Accra:					
	Unimax Publishers.								
CPD Needs	How to design ar	nd/or use so	ome innovative materials a	and ideas for teaching the					
	concepts of fract	ion based o	on the Primary School math	nematics.					
	<ul> <li>How to manage t</li> </ul>	ransition o	f home to school.						
	<ul> <li>Understand the v</li> </ul>	arious cha	racteristics and uniquenes	s of Primary School learners.					
	<ul> <li>How to design ta</li> </ul>	sks for asse	essment procedures for ass	sessment of, as and for learning					
	<ul> <li>Instructional stra</li> </ul>	tegies need	led to consciously engage	student teachers on how to					
	design and produ	ice portfoli	os, journals and STS report	ts.					

Ye	ear of B.Ed.	3	Semester	Semester         2         Place of lesson in semester         1234567891011								
Titl	e of Lesson		Fraction Co	Fraction Concepts 2: (Teaching and Assessment)Lesson Duration3 Hours								
Les	son descriptio	n t teacher	This the fou proportion: the basic sc proportion subtracting,	This the fourth lesson which focuses on developing an understanding ofpercent, ratio and proportion: (Teaching and Assessment) with respect to percent, ratio and proportion within the basic school curriculum. It also focuses on the relationship between percent, ratio and proportion and their application to real life. Areas such as mental strategies for adding, subtracting, multiplying and dividing by fractions; Basic applications of fractions to real life.								
kno (as:	owledge, prior sumed)	Iedge, prior learning       Itel they have been exposed to equivalent fractions, decimal fractions and to build relationsh between common fractions decimal fractions.							tionship			
Pos lea	sible barriers rning in the les	to sson	Different entry behaviours, Socio-cultural issues, different learning needs, misconcept about mathematics and methods of teaching mathematics. Conscious efforts should be n to address them before, during and after the lesson.									
Les to s ach	son Delivery – support studer ieving the out	chosen nts in comes	Face-to- face	Practical Activity 🖂	Work- Based Leaning	Seminars	Independen Study	t e-learning opportunities	Practicum			
Les mo to tea lea	son Delivery de of deliver support chers in achie rning outcome	<ul> <li>main</li> <li>y chosen</li> <li>student</li> <li>eving the</li> <li>es.</li> </ul>	Face-to-face The face in class The e-l develo Independent	e and e-lea ce-to-face r s exploratio earning op p propertie endent stud	rning opportu node will inclu n, group pres portunities wi s of numbers y would inclu	unities ude lecturer/ entations, th Il include exp and relations de writing se	tutor-initiated ink-pair-share ploring numbe ships betweer lf-assessment	class discussions, sr moments, lecture, e r games and activitie and among sets of l and presenting refle	nall group etc., es to numbers ective			
•	Purpose for lesson, what want the stud achieve, serv basis for the outcomes. An expanded ve the descriptio	the you dents to es as learning n rsion of on.	The purpose Introdu what th Develop with re focuses real life Introdu teachin learner	e of the less ince student hey are exp p an under spect to p s on the rela s. ince the stud ing mathem s.	son is to; teachers to ected of in thi rstanding of p ercent, ratio ationship betw dent teachers iatics, especia	the course n s lesson. percent, ratic and proporti veen percent to prepare a ally, School	nanual to ena o and proport on within the t, ratio and pro and model inte Mathematics	ble them develop a ion: (Teaching and a basic school curricu oportion and their a eractive, and innova curriculum to Prir	wareness of Assessment) Jlum. It also pplication to tive ways of nary School			
•	Learning Out the lesson, pi and develope the course specification Learning indi	come for icked ed from cators	Learning Outcomes Learning Indicators Identify Which cross-cuttin issues- core and transferabl skills, inclusivity, equity an addressing diversity. How wi these be addressed of developed 2									
	for each learn outcome	ning	Demon knowle underst ratios a proport and the relation	strate dge and tanding of ind tion, percer eir nships.	Ider     vari     with     curr nt     Prc     ind     prc	ntify and expl ous forms of in the basic iculum oduce well-pr uction sched ocedures	lain the fractions school repared lule and	<ul> <li>Equity and incl Providing equi learning oppor all learners</li> <li>Social and con skills: consciou presentation s</li> </ul>	usivity: table tunities for nmunication usly develop skills during			

	<ul> <li>Demonstrate knowledge a understandi ratios propo their applica real life focu mathematic: curriculum a associated e learning out (NTS, 2a).</li> <li>Use differen instruction t for the need children in tl primary clas including the special educ needs and cu safe, secure, and stimulat learning env (NTS 3c 3f, p</li> </ul>	and ling of ortion and ation to using on cs and their expected tcomes ntiated to cater ds of all the upper ssroom, nose with cational creating a e, happy ating vironment pg. 14)		Provide records of group work activities and/or cooperative learning for student teachers during and after teaching and learning interaction. Outline similarities and differences among ratios and proportion, percent and their implications for classroom practice and in real life. Involve those with special educational needs and creating a safe, secure, happy and stimulating in teaching and learning.	to develop mathematical language <ul> <li>Personal development: Through presentation and developing of arguments</li> </ul>	
Торіс	Sub-topic(s)	Stage/ Time		Teaching and learning to a outcomes depending on deli	ctivities to achieve learning very mode selected. Teacher- or independent	
				Teacher Activity	Student Activity	
Percent, ratio and proportion	Review	20mins		Review the previous lesson by asking student teachers relevant questions on operations on fractions(PD	Participate in the discussion on the operations on fractions	
	Developing the concepts of percent, ratio and proportion Building relationships among percent, ratio, and proportion Exploring basic applications of fractions, percent, ratio, and proportion to real life.	40 mins 60 mins 60 mins		Introduce the lesson through verbal exposition and discussion on purposes of different forms of assessment in mathematics learning in PRIMARY SCHOOL1-3; (PD Themes 1 & 3) Engage student teachers in a discussion to outline the various forms of assessment tool – observation guide, questionnaire, interview protocol, tests (PD Themes 1 & 3) Assign student teachers to explore various test by working at each of the following steps: purpose, format, test blue-print, writing well-defined questions one after the other with answers. (PD Themes 3 & 4)	<ul> <li>engage in verbal exposition and discussion on purposes of different forms of assessment in mathematics learning in PRIMARY SCHOOL1-3 <ul> <li>assessment for learning (AfL),</li> <li>assessment of learning (AoL) and</li> <li>assessment as learning (AaL) as well as</li> <li>syllabus guidelines for classroom assessment;</li> </ul> </li> <li>Discuss (supported with video clips where applicable) the various forms of assessment tool – observation guide, questionnaire, interview protocol, tests (e.g. BECE, performance assessment.) -</li> </ul>	

		Monitor student teachers to	multiple choice, constructed
		evaluate some teacher made	response), group tests, focus
		tests to see if they meet the	group interview protocol,
		following five criteria of a	etc.) as well as how they are
		(PD Theme 1	administered.
		(i b meme 1	Design a test by working at
			each of the following steps:
			purpose, format, test blue-
			print, writing well-defined
			questions one after the other
			Use interactive and
			collaborative group work to
			develop strategies for adding
			and subtracting fractions.
			engaged in using
			manipulatives and other
			models to develop strategies
			for multiplication and
			division of fractions.
			Evaluate some teacher made
			tests to see if they meet the
			good test: clarity, validity,
			practicality, efficiency and
			fairness
Lesson assessments – evaluation of learning: of	Subject Project Student teacher	rs are assigned a project on place valu	e equivalent fractions decimal
for and as learning within	number and	d their applications. The various forms	of assessment procedures and
the lesson	practices ar	nd its responsiveness to equity and inc	clusivity and to produce reports
	(in groups)	mothematics questions for elevity on	reathers and completeness
	as well as, write a	issessment tasks based on	nectiless, and completeness,
	Related CLOs: 1,	4	
	NTS:		
	2f) Demonstrate val	lue as well as respect for equity and in	clusion in the mathematics
	3j) Produces and us	es a variety of teaching and learning r	esources including ICT, to
	enhance learning		-
	N/B: To be submitted in th	ne 7 <sup>th</sup> week of the semester.	
Instructional Resources	Posters; video clips; downi	oads, models, etc.	
Required Text (core)	Arthur, J., Grainger, T. &	Wray, D. (2006). Learning to Teach i	n the Primary School. Canada:
	<u>d20209294.</u> html		
	Confer, C. (2005). Tea	ching Number Sense. Sausalito:	Math Solutions Publications.
	https://www.pdfdrive.com	n/teaching-number-sense-grade-1-d1	<u>84198309.html</u> .
	purpose in mind: assess	renship and routh (2006). Rethinkly nent for learning, assessment as lea	rning, assessment of learning
	https://www.pdfdrive.con	n/assessment-for-learning-assessment	t-as-learning-assessment-of-
	learning-d6259529.html.		
	Roy, G. J. (2014). Developi	ing Prospective Teachers' Understand	ing of Addition and Subtraction
	Teachers, 2.	sues in the ondergraduate widthe	indies reputation of school
Additional Reading List	Lakoff, G. &Núñez, R. E. (2	000). Where Mathematics comes fron	n. New York: Basic Books.
	Martin, J. et. al. (1994). Me	athematics for teacher training in Gha	na: Tutor notes. Accra: Unimax
	Martin, J. et. al. (1994). Mi	athematics for teacher trainina in Gha	na: Students activities.Accra:
	Unimax Publishers.		

CPD Needs	How to design and/or use some innovative materials and ideas for teaching selected concepts based on Classroom assessment in mathematics in PRIMARY SCHOOL1-3.
	How to manage transition of nome to school.
	<ul> <li>Understand the various characteristics and uniqueness of Primary School learners.</li> </ul>
	<ul> <li>How to design tasks for assessment procedures for assessment of, as and for learning</li> </ul>
	<ul> <li>Instructional strategies needed to consciously engage student teachers on how to</li> </ul>
	design and produce portfolios, journals and STS reports.

Ye	ear of B.Ed.	3	Semester	2	Place	e of lesson in	semester	1	123456789101112				
Titl	e of Lesson		Micro Lessons and use of technology across Primary Lesson Duration 3 Hours school numeracy: (Teaching and Assessing)										
Les	son descriptio	n	This is the fifth lesson which focuses on developing an understanding of Micro Lessons and use of technology across Primary school numeracy: (Teaching and Assessing) and how an understanding of mathematics develops from creative activities. The topics to be considered include; Misconception of diagnosis, Classroom assessment resources and records, Interpreting data/reports on performance and providing feedback and Evaluating performance and										
			monitoring pr	ogress.									
Pre tea prie	vious s cher knov or learning (as	student wledge, sumed)	, student-teachers have informal knowledge of classroom assessment resources and records.										
Pos	sible barriers	to	Different ent	ry behavio	ours, So	cio-cultural is	sues, differe	ent le	arning needs,	misconceptions			
lea	rning in the les	sson	about mather	, natics and	method	s of teaching	mathematic	s. Cor	nscious efforts	should be made			
	U		to address the	em before,	during a	nd after the le	esson.						
Les	son Delivery –		Face- Pra	actical W	/ork-	Seminars	Independe	nt	e-learning	Practicum			
cho	sen to suppor	t	to-face Ac	tivity Ba	ased		Study		opportunities				
stu	dents in achiev	ving		Le	eaning		$\boxtimes$		$\square$				
the	outcomes				7								
Les	son Delivery	– main	Face-to-face	and e-lear	_ nina opp	ortunities							
mo	de of delivery	chosen	The face	-to-face mo	ode will i	nclude lecture	er/tutor-initia	ated c	lass discussion	s. small group in			
to	support s	student	class exp	loration.g	roup pre	sentations, th	ink-pair-shar	e moi	ments, lecture.	etc			
tea	chers in ac	hieving	<ul> <li>The e-lear</li> </ul>	arning onno	ortunitie	will include e	exploring nur	mher	pames and acti	vities to develop			
the	learning outco	omes.	nronertie	of numb	ers and r	elationshins h	etween and	amor	parts of numb	ners			
			<ul> <li>Independent</li> </ul>	lont study	would in	clude writing	self-assessm	ent a	nd presenting r	eflective naners			
			or journa	acine seaury	would in	clude writing	3011 03303311		na presenting i	chective papers			
•	Burnoso for	the		ns. St the lesse	n is to:								
•	losson what	vou		s ctudont t	on is to,	to the course	n manual to	onah	la tham daval	on awaranass of			
	lesson, what	you domto	<ul> <li>Introduce</li> <li>what the</li> </ul>		eachers	to the course		enap	ie them dever	op awareness of			
	to achieve a			y are exper		this lesson.							
	to achieve, se	erves	<ul> <li>Expose si</li> </ul>	udent tea	cners to	strategies to	overcome m	liscon	ception of diag	nosis, classroom			
	as basis for th	ne	assessme	nt resour	ces and	records, In	terpreting	data/i	reports on p	erformance and			
	learning outc	omes.	providing	теебраск	and eval	lating perform	nance and m	ionito	ring progress.				
	An expanded												
	version of the	e											
	description.							Idam	+:f., ) ( / b : a b a way				
•	Learning Out	come	Learning Out	comes	Learn	ng indicators		Iden	tity which cros	ss-cutting issues-			
	tor the lessor	٦,						core	and tran	sterable skills,			
	picked and							dive	sivity, equity	and addressing			
	developed fr	om the						alve		will these be			
	course speci	ication	Domonstrato					auur	Esseu or uever	opeur			
•	Learning Indi	cators	knowledge an	d ckills of	• D	esign and pro	duce well-	•	Equity and inc	IUSIVITY:			
	for each lear	ning	choon ation a	nd	р	repared induc	tion		Providing equi	table learning			
	outcome		observation a		SC	nedule and p	rocedures		opportunities	for all learners			
			teporting on t	Jass			- f		A				
			cebool activiti	oc <b>(in</b>	• SI	now evidence	OT	•	Assessment lit	eracy: through			
				es (in	K	eeping record	s of group		modelling of e	ffective record			
				!	w	ork activities	and/or		keeping				
			(College & Sci	cooperative learning for									
			induction by t	utors,	st	udent teache	rs during	•	Communicatio	on skills: through			
1			school neads,	ieaa	0	oservations			critiquing and	presentations			
			mentors and	mentors)	1								
			Dama i i		• R	eport on smal	l group	•	Personal deve	lopment:			
			Demonstrate		d	scussions wit	h mentors		Through devel	oping and			
			knowledge ar		a	nd peers on th	ne key		presentation of	of records			
			understandin	g of the	fe	atures of the	otficial						
		<u> </u>	кеу teatures d	or the	b	asic school cu	rriculum						

	basic school curri (BSC); and specifi focusing on mathematics curriculum and th associated expect learning outcome (NTS, 2a). Demonstrate skill preparing and writing a pers teaching philosophy stater (NTS, 1f)	culum cally heir ted is s in sonal nent	f     f	List identified key reatures in the BSC. Provide a write-up of the developing teacher's self- awareness, beliefs, and values of teaching and earning (personal seaching philosophy) Make oral presentations of knowledge gained during induction and observation by studentteachers in their groups.	<ul> <li>Social and communication skills: consciously develop presentation skills during classroom instructions to support student teachers to develop mathematical language</li> </ul>
Торіс	Sub-topic(s)	Stage/ Time	,	Teaching and learning outcomes depending on lead collaborative group	to activities to achieve learning delivery mode selected. Teacher- work or independent.
				Teacher Activity	Student Activity
Diagnosis and remediation; assessment resources/records, and monitoring progress	Review	20mins 30 mins 40 mins 30 mins		Review the previous lesso by asking student teacher relevant questions on the need for exploring upper primary students' errors and misconceptions with respect to percent, ratio, and proportion (PD Theme 1)	n Participate in the discussion on s the need for exploring upper primary students' errors and misconceptions with respect to percent, ratio, and proportion
	Misconception of diagnosis,			Engage student teachers designing tools to diagnos misconceptions and to outline strategies for remediation	n Design tools to diagnose o misconceptions and to outline strategies for remediation
	Classroom assessment resources and records			Lead student teachers in discussion to Identii resources that should be available in the classroom for effective assessment specialism-including examples of standardise tests (NEA), teacher made tests, record sheet cumulative records form reports forms, etc.,	a Participate in a discussion to Identify resources that should be available in the classroom for effective assessment in specialism-including examples of standardised tests (NEA), teacher made tests, record sheets, cumulative records forms, reports forms, etc.,
	Interpreting data/reports on performance and providing feedback.			Have student teache study how to complet student's cumulativ Upper Primary student record form	rs Study how to complete student's cumulative Upper Primary students' record form s'
	Evaluating performance and monitoring progress	30 min	15	Engage student teachers i analysing Upper Primary learners' performance (or assessment data) to provide feedback to stakeholders-students, colleagues and parents,	n Analyse Upper Primary learners' performance (or assessment data) to provide feedback to stakeholders-students, colleagues and parents,

		30 mins	Have student teachers	Participate in dramatizing a						
			dramatize a School	School Performance Appraisal						
			Performance Appraisal	Meeting (SPAM)						
			Meeting (SPAM)							
Lesson assessments –	Subject Portfolio	Subject Portfolio								
evaluation of learning:	<ul> <li>Assign st</li> </ul>	udent teacher	s to plan, design, and prepare	manipulatives and other models						
of, for and as learning	to teach	selected conc	epts in Primary School mathen	hatics using locally available						
within the lesson	and/or I	T resources		, · · · · · · · · · · · · · · · · · · ·						
	Prenare	and model	interactive and innovative	ways of teaching mathematics						
	including	micro-teach	ning to Primary School learn	ers with emphasis on multiple						
	teaching	strategies tha	t promote equity and inclusivi	tv						
	Related (	$10s \cdot 1 + 3 = 4$	e promote equity and melusivi	cy.						
		203. 1, 3, 4								
	2 h)	Has comprehe	ensive knowledge of the officia	l school curriculum including						
	2 S) lear	ning outcomes								
	2h)	Has comprehe	,. nsive knowledge of the official	school curriculum including						
	Lo, lear	nina outcomes	site knowledge of the official	seneer curreatant, meraanty						
	3m) Ider	tifies and rem	, ediates learners' difficulties or	misconcentions referring						
	learners whose n	eeds lie outsid	e the competency	of the teacher						
Instructional Resources	Posters: video clir	os: downloads:	models etc							
Required Text (core)	Arthur I Grains	ver T & Wray	(D) (2006) Learning to Teac	h in the Primary School Canada:						
Required Text (core)	Taylor & Francis	e-Library http	s://www.ndfdrive.com/learning	n in the rinnery school. canada.						
	d20209294 html	c Elorary. <u>Incep</u>		ig to teach in the printing school						
	<u>Confer</u> C (20)	)5) Teaching	Number Sense Sausalito	· Math Solutions Publications						
	https://www.pdf	drive com/tea	ching-number-sense-grade-1-c	1184198309 html						
	Manitoba Educa	tion Citizensh	in and Youth (2006) Bethin	king classroom assessment with						
	nurnose in mind	· assessment	for learning assessment as	learning assessment of learning						
	https://www.pdf	drive com/asse	essment-for-learning-assessme	ent-as-learning-assessment-of-						
	learning-d625952	9.html.								
	Rov. G. J. (2014).	Developing P	rospective Teachers' Understa	nding of Addition and Subtraction						
	with Whole Nu	mbers. <i>Issues</i>	in the Undergraduate Mat	hematics Preparation of School						
	Teachers, 2.		, , , , , , , , , , , , , , , , , , ,							
Additional Reading List	Lakoff, G. &Núñe	z, R. E. (2000).	Where Mathematics comes fro	om. New York: Basic Books.						
5	Martin, J. et. al. (	, 1994). Mathen	natics for teacher training in G	hana: Tutor notes. Accra: Unimax						
	Publishe	rs.	, ,							
	Martin, J. et. al. (	1994). <i>Mathen</i>	natics for teacher training in G	hana: Students activities.Accra:						
	Unimax Publisher	·S.	ý							
CPD Needs	How to a	design and/or	use some innovative materials	and ideas for teaching the						
	concept	of ratio and pr	oportion, percent and applicat	tion to real life.						
	How to i	, nanage transit	ion of home to school.							
	Underst	and the variou	s characteristics and uniquene	ss of Primary School learners.						
	<ul> <li>Instructi</li> </ul>	onal strategies	needed to consciously engage	e student teachers on how to						
	design a	nd produce po	rtfolios, journals.							

Year of B.Ed.	3	Semester	ster 2 Place of lesson in semester				12345 <b>6</b> 789101112			
Title of Lesson		Diagnosis and	d remediat	ion; assessm	ent resources	/records,	Le	esson	3 Hours	
Lesson descriptio	n	and monitoring progress: (Teaching and Assessing)DurationThis is the sixth lesson which focuses on developing an understanding ofDiagnosis and remediation; assessment resources/records, and monitoring progress: (Teaching and Assessing) and how an understanding of mathematics develops. The topics to be considered include;Importance of lesson planning, Micro lesson planning formats, Design of micro lessons. It also covers Micro Lessons and use of technology across Primary school numeracy								
Previous student	teacher	and associate Student-teac	ed theories hers have	been though	t theories in	the teach	ing ar	nd learning of	mathematic	cs,
knowledge, prior (assumed)	learning	and are fam lesson planni	iliar with : ng.	some assess	ment resourd	ces. They a	are ex	posed to info	mal ways	of
Possible barriers learning in the learning	to sson	Different ent about mathe to address th	try behavion matics and em before	ours, Socio-c methods of during and	ultural issues teaching mat after the less	s, different thematics. on.	t leari Consc	ning needs, m tious efforts sh	sconception ould be mad	ns de
Lesson Delivery – to support studer achieving the out	chosen nts in comes	Face-to- face A	ractical ctivity	Work- Based Leaning	Seminars	Independ Study	ent	e-learning opportunities	Practicur	m
Lesson Delivery     mode of deliver     to support     teachers in achie     learning outcome     Purpose for     lesson, what     want the stu     achieve, serv     basis for the     outcomes. At     expanded ve	- main y chosen student eving the ess. the you dents to es as learning n rsion of	<ul> <li>Face-to-face</li> <li>The face in class e</li> <li>The e-lead develop</li> <li>Indepen papers of</li> <li>The purpose</li> <li>Introduce what the</li> <li>Expose so formats,</li> <li>Introduce teaching</li> </ul>	and e-lear e-to-face m exploration arning opp properties dent study or journals. of the less e student e student ter Design of e the stude mathemat	ning opportu ode will inclu a, group prese ortunities wi of numbers would includ on is to; teachers to t cted of in thi achers to the micro lessons ent teachers cics, especiall	nities ade lecturer/t entations, thi Il include exp and relations de writing sel he course m s lesson. e importance s. to prepare an y, micro-teac	eutor-initiat nk-pair-sha loring num hips betwe f-assessme anual to en e of lesson nd model in hing to Prin	ted cla are mo aber ga een an ent and nable nable nterac mary S	ass discussions, oments, lecture ames and activi ad among sets of d presenting re them develop ning, Micro les ctive, and innov School learners	small group , etc., ties to of numbers flective awareness son plannir ative ways	p of ng of
<ul> <li>Learning Out the lesson, p and develope the course specification</li> <li>Learning indi</li> </ul>	on. come for icked ed from cators	Learning Out	comes	Learnin	g Indicators		Ident issues skills, addre these devel	ify Which s- core and inclusivity, essing diversit be add oped?	cross-cuttir transferab equity ar y. How w ressed	ng ble nd <i>r</i> ill or
for each lear	ning	<ul> <li>Demonstiknowled, understaknowled, understaknowled, and deversion approprial a micro la Demonstic competer using difficient instruction strategie focus on approach promoter</li> </ul>	trate ge and inding of alan, desigr elop ate plan fo esson trate encies in ferentiated onal es, with a a themation n and whic is learner- to cater for	Exh app the child r dev and pla the cur Pla stra child stra child stra	ibit knowled, ilication of le ory, content weledge, your dren's relopmental n l how to use n a lesson to early grade riculum goals n a lesson usi ategies that n level of thinl dool pupils	ge and arning ng needs, these to meet ng natch king ARY	•                                     	Needs of the st teachers: Conso dentify and ado needs of studer and to inspire t effective transf knowledge Respect and div designing lesso earners with di earning styles ocial and comm kills: conscioush bservation and kills during class estructions to su	Jdent iously fress the it teachers nem for er of rersity: n for diverse fferent unication y develop presentatic sroom upport	e on

	the needs of all learners, including those with SEN (NTS 3f, pg. 14)		•	<ul> <li>Show records of specific observations from wider school environment and induction</li> <li>Report on small group discussions with mentors and peers on the key features of the official basic school curriculum.</li> </ul>		tudent teachers to transfer nis to STS espect and diversity: esigning lesson for diverse earners with different earning styles ommunication skills: nrough critiquing and resentations
Торіс	Sub-topic(s) Stage/ Time			Teaching and learning to outcomes depending on	activit delive	ties to achieve learning ry mode selected. Teacher-
				Teacher Activity	WOIK	Student Activity
Micro lessons and use of technology across upper primary numeracy	Review	10mins		Review the previous lesso asking student teachers relevant questions on how diagnose a student's erro given concept (PD Theme 1)	on by w to r in a	Participate in the discussion on identifying students' errors based on given mathematics concepts
	Importance of lesson planning	20 mins of ing 20mins		Have student teachers ex the need for organizing m lessons (or teaching) in th training of prospective teachers (PD Themes 1 &3)	plain nicro ne	Discuss the need for organizing micro lessons (or teaching) in the training of prospective teachers
	Micro lesson planning formats Design of micro lessons			Engage student teachers discussion to outline the various forms of lesson planning in mathematics (PD Themes 1 & 3) Guide student teachers in	in a	Discuss and outline the various forms of lesson plans in mathematics, includingmicro lesson planning formats
	Engagement in micro teaching with peers	30 mins	i	planning micro lessons be on using mathematical learning Assign student teachers in groups to prepare lesson plans, discuss and model micro teaching in the clas	ased n s	Participate in the discussion based on planning micro lessons and to carry out micro teaching with peers Engage in small group
		<b>40 mins</b> 30 mins 30 mins		(PD Inemes 3 & 4) Assign student teachers to read teaching scenarios (and/or watch video clips teaching numeracy in the upper primary and doing critic based on using mathematical learning th	o } on a	of locally available TLMs (observing and/or watching video clips) on teaching mathematics in the PrimarySchool and doing a critic based on using verbal exposition and discussions on lesson
	Exploring of technology use primary mathematics.			Monitor student teachers teaching skills (PD Theme 1) Engage student teachers in post-lesson discussions using prepared guidelines for micro		planning, micro lesson planning formats and technology use in teaching mathematics across upper primary Read teaching scenarios (and/or watch video clips) on teaching numeracy in the upper primary and

using mathematical learning theory Engage in post-lesson discussion with colleague to establish good practice	
learning theory Engage in post-lesson discussion with colleague to establish good practice	
Engage in post-lesson discussion with colleague to establish good practice	
discussion with colleague to establish good practice	
to establish good practice	es
	es
in teaching mathematics	in
the Primary School.	
Lesson assessments – Subject Portfolio	
evaluation of learning: of, Assign student teachers to critique the new lesson format and use it to prepare a	
for and as learning within sample lesson plan meant for teaching selected mathematics topics in the PRIMARY	<i>'</i>
the lesson SCHOOL mathematics curriculum through small group activity for peer review	
Related CLOs: 1, 2, 3	
NTS:	
2 b) Has comprehensive knowledge of the official school curriculum, including	
iedning outcomes.	
20) Hus comprehensive knowledge of the official school carricularit, including	
3m) Identifies and remediates learners' difficulties or misconcentions, referring	
learners whose needs lie outside the competency of the teacher	
Note: The assessment procedures should make room for differentiation - gender, equity, SE	N.
and inclusivity.	,
Instructional Resources Posters; video clips; downloads; models, etc.	
Derwined Text (seve) Arthur L. Crainger T. 8. Wray, D. (2006) Learning to Teach in the Drimony School, Canad	101
Taylor & Francis o Library, https://www.ndfdrive.com/learning.to.teach in the primary school. Called	id:
school-d20200294 html	<u>y-</u>
Confer C (2005) Teaching Number Sense Sausalito: Math Solutions Publication	16
https://www.pdfdrive.com/teaching-number-sense-grade-1-d184198309.html.	13.
Manitoba Education, Citizenship and Youth (2006), Rethinking classroom assessment wi	th
purpose in mind: assessment for learning, assessment as learning, assessment of learning	ng.
https://www.pdfdrive.com/assessment-for-learning-assessment-as-learning-assessment-of-	
learning-d6259529.html.	
Roy, G. J. (2014). Developing Prospective Teachers' Understanding of Addition and	nd
Subtraction with Whole Numbers. Issues in the Undergraduate Mathematics Preparation	of
School Teachers, 2.	
Additional Reading List Lakoff, G. & Núñez, R. E. (2000). Where Mathematics comes from. New York: Basic Books.	
Martin, J. et. al. (1994). <i>Mathematics for teacher training in Ghana: Tutor notes</i> . Accra:	
Unimax Publishers.	
Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Students activities.Accra	:
Unimax Publishers.	
How to design and teach mathematics using the new B. ED. Curriculum, NTS, NTECH     otc	·,
How to design and/or use some innovative materials and ideas for teaching selecte	Ч
concents based on Classroom assessment in mathematics in PRIMARY SCHOOL 1.3	u
How to manage transition of home to school	
Understand the various characteristics and uniqueness of Primary School learners	
How to design tasks for assessment procedures for assessment of as and for	
learning.	
Instructional strategies needed to consciously engage student teachers on how to	
dorign and produce pottfolios, journals and CTS constra	

Year of B.Ed.	3	Semester	2	2 Place of lesson in semester			123456789101112		
Title of Lesson		Shape and Sp	pace: (Tea	ching and <i>i</i>	Assessment)		Lesson Duration	3 Hours	
Lesson descriptio Previous student knowledge, prior (assumed)	n t teacher · learning	This is the seventh lesson which focuses on developing an understanding of Teaching and Assessing Primary School Mathematics especially, Shape and Space: (Teaching and Assessment. The topics to be considered includes. Spatial visualization; the concept of space; line segments, angles and shapes; 3-D (faces, vertices, edges and their relationships) and 2-D shapes (types and properties). Student-teachers informal knowledge of shape and space. Student teachers make use of 2I and 3D objects at home.							
Possible barriers learning in the learning in	to sson	Different en about mathe to address th	try behave matics ar nem befor	viours, Soci nd methods re, during a	o-cultural iss of teaching r nd after the le	ues, different mathematics. esson.	t learning needs, min Conscious efforts sho	sconceptions ould be made	
Lesson Delivery – to support studer achieving the out	chosen nts in comes	Face- Praction Action face	ctical \ ivity E [	Nork- Based .eaning	Seminars	Independer Study 🖂	e-learning opportunities	Practicum	
<ul> <li>Purpose for learning outcome</li> <li>Purpose for lesson, what want the stu achieve, serv basis for the outcomes. Ai expanded ve the description</li> </ul>	- main y chosen student eving the es. the you dents to es as learning n rsion of on.	<ul> <li>Face-to-face</li> <li>The face in class</li> <li>The e-le develop</li> <li>Indeper papers of</li> <li>The purpose</li> <li>Introduct what the</li> <li>Develop line segr 2-D shap</li> <li>Introduct teaching</li> </ul>	and e-lea e-to-face is exploration arning op properties of properties of the less ce student ey are exp student ments, an pes (types ce the student sc student ments, an pes (types ce the student sc student ments, an pes (types ce the student sc student	arning oppo mode will in on, group p oportunities es of numbridy would in s. sson is to; t teachers to bected of in teachers' u gles and sh and prope dent teacher hatics, espe	ortunities include lecture resentations, will include e ers and relation clude writing to the course this lesson. inderstanding apes; 3-D (fair rities). ers to prepare ecially, Teach	er/tutor-initia think-pair-sha exploring num onships betwo self-assessme manual to en g of spatial vis ces, vertices, e and model in ing shapes a	ted class discussions, are moments, lecture ober games and activi een and among sets o ent and presenting ref nable them develop a sualization; the conce edges and their relati nteractive, and innova nd space in the Bas	small group , etc., ties to if numbers ilective awareness of ept of space; onships) and ative ways of sic School to	
<ul> <li>Learning Out the lesson, p developed fr course specif</li> <li>Learning indi for each lear</li> </ul>	come for icked and om the ication cators ning	Learning Out	tcomes	Learnir	g Indicators		Identify Which issues- core and skills, inclusivity, addressing diversit these be add developed?	cross-cutting transferable equity and cy. How will ressed or	
outcome		Demonstrate knowledge a understandir concepts of s space and h can be taugh PRIMARY SCI pupils (profe values, know practice) (NT Demonstrate competencie devising and differentiate	e nd ng of shape and ow these it to HOOL ssional /ledge & <b>'S, 2b)</b> es in using d	<ul> <li>Select and use developmentally appropriate models and strategies for teaching shape and space that emphasize the physical, cognitive, emotional and social development of the early adolescent learner</li> <li>Outline and analyse strategies early adolescent learners use in developing concepts in shape and space such as 2D and 3D</li> <li>Ethics and values of teaching: through supporting student teachers to understa and demonstrate the ethics of the profess bearing in mind the characteristics of the adolescent learner</li> <li>Problem solving, and creative th through objective a of facts and concer will lead to compared</li> </ul>					

	instructional strategies, with a for on a thematic approach and whic promotes practical based learning to c for the needs of all children in the PRIMARY SCHOOL classroom, includin those with SEN (NT <b>3f, pg. 14</b> )	focus focus ch il- cater ll ng TS			knowledge gained earning theories in hematics to design opriate problem- ng tasks. gnise and use lopmentally opriate and positive viour management	•	Ethics and values of teaching: through supporting student teachers to understand and demonstrate the ethics of the profession bearing in mind the unique characteristics of young children Respect and diversity: designing lesson for diverse learners with different learning styles	
Торіс	Sub-topic(s)	Stag	e/		Teaching and learning	to act	ivities to achieve learning	
			-		Teacher-lead collabora	ative g	group work or	
					independent. Teacher Activity		Student Activity	
Shape and Space:					Review the previous le	sson	Participate in the	
(Teaching and Assessment)	Review	10m	ins		by asking student teach	hers	discussion on micro	
					relevant questions less	lesson planning		
					(PD Theme 1)			
	Informal geometry and				Introduce the lesson on integers as shape and		Initiate verbal exposition and discussions on	
	spatial sense;	20 m	nins		space.		integers and technology	
					(PD Themes 1 &3)		use in teaching of shape and space.	
		40 m	nins		Lead discussions on the concept of shape and space. (PD Themes 1 & 3) Provide student-teachers with e-learning opportunities to explore the concept of shape and space.		Provide student-teachers with e-learning opportunities to explore the concept of shape and	
		40 m	nins				Use e-learning opportunities to explore the concept of shape and	
	Shapes and their properties;				Engage student teache explore shapes and the properties	ers to eir	space.	
	Hand sketching of common solids	70 m	nins		Assign student teacher hand sketch some com solids Assign student teacher	rs to imon	Use ICT tools and other manipulatives to investigate properties of 2D and 3D shapes	
	Spatial visualization; concept of space; Nets of 3-D shapes				use models of 3-D shapes for practical investigation to explore the relationship among the number of faces, edges, and vertices of given shapes.		Hand sketch some common solids with the aid of their nets Use models of 3-D shapes for practical investigation to explore the relationship among the number of faces, edges, and vertices of given shapes. Through interactive and	

				collaborative group work,
	Relationship			student-teachers explore
	among faces,			2D shapes and their
	edges and			properties;
	vertices;			
				Construct 3-D shapes
				from the nets;
				Investigate the properties
				of 2D and 3D snapes-
				diagonals, parallol
				symmetries etc
Lesson assessments –	Subject	Portfolio	<u> </u>	symmetries, etc.
evaluation of learning: of.	Assign student	teachers to com	olete teacher-made workshee	ts on length, angle, area.
for and as learning within	volume and ca	pacity, mass, wei	ght, time and money (provide	immediate feedback)
the lesson	Related CL	<b>Os</b> : 1, 2, 3	8,	
	NTS:	, ,		
	2 b) ⊦	las comprehensiv	e knowledge of the official scl	hool curriculum, including
	learni	ing outcomes.		
	2b) H	as comprehensive	e knowledge of the official sch	ool curriculum, including
	learn	ing outcomes		
	3m) Ident	ifies and remedia	tes learners' difficulties or mis	sconceptions, referring
	learners whose nee	eds lie	outside the competen	cy of the teacher.
	Subject	Project 1		
	Collection and disc	ussion of Project	1 to be graded later	intian conder aquity CEN
	and inclusivity	ent procedures sr	ioula make room for alfferenti	ation - gender, equity, SEN,
Instructional Resources	Posters: video clins	· downloads· mc	idels etc	
		, downodds, me		
Required Text (core)	Arthur, J., Grainge	r, T. & Wray, D.	(2006). Learning to Teach in t	the Primary School. Canada:
	Taylor & Francis	s e-Library. <u>htt</u>	os://www.pdfdrive.com/learn	ing-to-teach-in-the-primary-
	$\frac{SC1001-020209294}{Confor}$	<u>.num</u> ) Tooching Nu	mbor Sonso Sousolito: Ma	th Solutions Publications
	https://www.pdfdu	rive com/teaching	number-sense-grade-1-d18/	1198309 html
	Manitoba Educatio	on Citizenshin a	nd Youth (2006) Rethinking	classroom assessment with
	purpose in mind:	assessment for l	earning, assessment as learni	ing, assessment of learning.
	https://www.pdfdi	rive.com/assessm	ient-for-learning-assessment-a	as-learning-assessment-of-
	learning-d6259529	.html.		
	Roy, G. J. (2014	). Developing F	rospective Teachers' Under	standing of Addition and
	Subtraction with V	Vhole Numbers.	Issues in the Undergraduate I	Mathematics Preparation of
	School Teachers, 2.			
Additional Reading List	Lakoff, G. &Núñez,	R. E. (2000). Whe	ere Mathematics comes from.	New York: Basic Books.
	Martin, J. et. al. (19	994). Mathematic	s for teacher training in Ghan	a: Tutor notes. Accra:
	Unimax Pi	ublishers.	a fan tanah an tunining in Chan	a. Chudanta antivitian Anna.
	Martin, J. et. al. (1	994). <i>Mathemati</i> t	s for teacher training in Ghan	a: Students activities.Actia.
CPD Needs	How to de	osign and teach m	athematics using the new R	D Curriculum NTS NTECE
	etc		athematics using the new D. I	
	How to de	esign and/or use s	some innovative materials and	l ideas for teaching shape
	and space	based on Classro	oom assessment in mathemati	cs in PRIMARY SCHOOL1-3.
	<ul> <li>Understar</li> </ul>	nd the various cha	aracteristics and uniqueness o	f Primary School learners.
	How to de	esign tasks for ass	essment procedures for asses	sment of, as and for
	learning.			
	Instruction	nal strategies nee	eded to consciously engage stu	ident teachers on how to
			ten terrende and CTC versente	

Year of B.Ed.	3	Semester	2	Place o	Place of lesson in semester		1	12345678910111		
Title of Lesson		Measurement: (Teaching and Assessing)						n Duration	3 Hours	
Lesson descript	tion	This is the eigh Primary School include the Co Measurement	This is the eighth lesson which focuses on developing an understanding of Teaching and Assessing Primary School Mathematics about the concept of measurement. The topics to be considered include the Concept of measurement; using non-standard and standard units of measurement; Measurement of angles							
Previous st teacher know prior lea (assumed) Possible barriers t	udent ledge, arning to	Student-teache school using no Different entry	itudent-teachers have informal knowledge of measurement of items/objects both at home and chool using non-standard units.							
learning in the les	sson	mathematics a them before, d	nd methoo uring and	ds of teach after the le	ing mathema sson.	tics. Consci	ous eff	forts should be	made to address	
Lesson Delivery – chosen to suppor students in achiev the outcomes	t ving	Face-to- face Acti	tical W vity B Lo	Vork- ased eaning	Seminars	Independ Study	ent e-learning opportunities		Practicum	
Lesson Delivery – mode of de chosen to su student teacher achieving the les outcomes.	- main elivery upport rs in arning	Face-to-face an The face-t class explo The e-lear properties Inc	<ul> <li>Face-to-face and e-learning opportunities</li> <li>The face-to-face mode will include lecturer/tutor-initiated class discussions, small group in class exploration, group presentations, think-pair-share moments, lecture, etc.,</li> <li>The e-learning opportunities will include exploring number games and activities to develop properties of numbers and relationships between and among sets of numbers <ul> <li>Independent study would include writing self-assessment and presenting reflective papers or journals.</li> </ul> </li> </ul>							
lesson, what want the stud to achieve, se as basis for th learning outcomes. An expanded ve of the descrip	you dents erves he n rsion otion.	<ul> <li>Introduce s</li> <li>they are ex</li> <li>develop st standard u</li> <li>Introduce teaching n School lear</li> </ul>	student te spected of udent tean nits of me the stude nathemation mers.	achers to t in this less chers' undu asurement nt teacher cs, especia	the course ma con. erstanding Co ;; Measureme s to prepare ally, Teaching	anual to ena oncept of m ent of angle and mode g measuren	able th neasure s. I inter nent in	nem develop av ement; using r ractive, and ini n the Basic So	vareness of what ion-standard and novative ways of chool to Primary	
Learning Out for the lessor picked and developed fro the course	come n, om	Learning Outco	omes	Learnin	g Indicators		Iden issue inclu dive addr	ntify Which es- core and tr usivity, equity rrsity. How ressed or deve	cross-cutting ansferable skills, and addressing will these be loped?	
specification • Learning indi for each learn outcome	cators ning	Demonstrate a comprehensive knowledge of t PRIMARY SCHC mathematics cu and learning ou covering measu of objects or ite both standard a nonstandard u the measureme angles(NTS 2b) Demonstrate k of instructional for teaching	he official IOL urriculum itcomes urement ems using and nits and ent of nowledge practices	<ul> <li>Show of me or ite as us pract mear deep the c meas</li> <li>Can r math using that a conce</li> </ul>	a good under easurement of ms and angle ing technique ical mathema s of promoti er number se ontext of surement. make childrer ematically pr multiple stra are appropria epts of measu	erstanding of objects es, as well es for atics as a ng a .nse within oficient itegies te for urement.	•	Problem solv creative thi objective ana concept that creative think Problem solv creative think Problem solv creative think Personal Through pla and asso individually groups, and experiences w	ing, critical and nking: through lysis of facts and t will lead to ing ing, critical and nking: through lysis of facts and t will lead to ing development: nning, teaching, essing both and in small l sharing their vith peers	

	measurement using th PRIMARY SCHOOL mathematics curriculum(NTS 3e)	<ul> <li>Show e mather confide to do n</li> <li>Carry o instruct PRIMAl includin reinfor engage mather</li> <li>plan ef and sol arise du involvir measure</li> </ul>	<ul> <li>evidence of enjoying matics and have ence in their abilities nathematics</li> <li>but basic mathematics tional routines for RY SCHOOL pupils, ng drill and practice, cement activities and elearners in matical discourse fective instruction twe problems that uring instruction ng application of rement in real life</li> </ul>	social and communication skills: consciously develop observation and presentation skills during classroom instructions to support student teachers to transfer this to STS Respect and diversity: designing lesson for diverse learners with different learning styles	
Торіс	Sub-topic(s)	Stage/ Time	Teaching and learning to a outcomes depending on d Teacher-lead collaborative	activities to achieve learning elivery mode selected. e group work or independent.	
			Teacher Activity	Student Activity	
Measurement;	Review	10mins	Review student teachers knowledge of sets of objects (PD Theme 1)	Explore how student-teachers perceive children's understanding of the concept of measurement;	
	measurement; using non-standard and standard units of measurement;	20 mins	Assign student teachers in groups to outline how to	Using manipulatives and other TLMs through mathematical discourse identify referent non-	
		40 mins	Initiate verbal exposition and discussions	standard units for measuring length, mass and capacity	
		60 mins	Use games and practical activities to introduce the concept of	Use group and individual	
	Measurement of angles	30 mins 20 mins	Lead student teachers to explore the concepts of Use group and individual projects to Engage student-teachers through group work to explore	presentations to discuss how to.	
Lesson assessments -	Subject Proje	oct	the concepts		
evaluation of learning: of, for and as learning within the lesson	Student tea Collecting, in 10 <sup>th</sup> week Related CLOs: NTS:	chers are assign nterpreting and 3, 5, 6	ed to design appropriate tea presenting data and chance	ching and learning materials for	
	2 b) Has learning 2b) Has o learning	comprehensive outcomes. comprehensive k outcomes	knowledge of the official sch knowledge of the official scho	nool curriculum, including	
	3m) Identifie: whose needs lie outsic <i>Note: The a</i> <i>SEN, ar</i>	s and remediate de the competer ssessment proce nd inclusivity.	es learners' difficulties or mis ncy of the teache edures should make room for	conceptions, referring learners er. r differentiation - gender, equity,	

Instructional Resources	Posters; video clips; downloads; models, etc.
Required Text (core)	<ul> <li>Arthur, J., Grainger, T. &amp; Wray, D. (2006). Learning to Teach in the Primary School. Canada: Taylor</li> <li>&amp; Francis e-Library. <u>https://www.pdfdrive.com/learning-to-teach-in-the-primary-school-d20209294.html</u></li> <li>Confer, C. (2005). Teaching Number Sense. Sausalito: Math Solutions Publications. <u>https://www.pdfdrive.com/teaching-number-sense-grade-1-d184198309.html</u>.</li> <li>Manitoba Education, Citizenship and Youth (2006). Rethinking classroom assessment with purpose in mind: assessment for learning, assessment as learning, assessment of learning. <u>https://www.pdfdrive.com/assessment-for-learning-assessment-as-learning-assessment-of-learning-d6259529.html</u>.</li> <li>Roy, G. J. (2014). Developing Prospective Teachers' Understanding of Addition and Subtraction with Whole Numbers. <i>Issues in the Undergraduate Mathematics Preparation of School Teachers, 2</i>.</li> </ul>
Additional Reading List	<ul> <li>Lakoff, G. &amp;Núñez, R. E. (2000). Where Mathematics comes from. New York: Basic Books.</li> <li>Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Tutor notes. Accra: Unimax Publishers.</li> <li>Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Students activities. Accra: Unimax Publishers.</li> </ul>
CPD Needs	<ul> <li>How to design and teach mathematics using the new B. ED. Curriculum, NTS, NTECF, etc</li> <li>How to design and/or use some innovative materials and ideas for teaching measurementbased on Classroom assessment in mathematics in PRIMARY SCHOOL1-3.</li> <li>How to manage transition of home to school.</li> <li>Understand the various characteristics and uniqueness of Primary School learners.</li> <li>How to design tasks for assessment procedures for assessment of, as and for learning.</li> <li>Instructional strategies needed to consciously engage student teachers on how to design and produce portfolios, journals and STS reports.</li> </ul>

Year of B.Ed.	3	Semester	r 2	Place of	Place of lesson in semester		12345678910111		
Title of Lesson		Measurement 2 Lesson Duration						3 Hours	
Lesson descriptio	n	This is the nir Primary Scho include, Perin area and volu	This is the ninth lesson which focuses on developing an understanding of Teaching and Assessing Primary School Mathematicsabout the concept of measurement. The topics to be considered include, Perimeter and areas of triangle, Circumference and areas of circular regions; Surface						
Previous s teacher knov prior le (assumed) Possible barriers	student wledge, earning to	Student-teac Measuremen Different ent	tudent-teachers have developed the use of non-standard and standard units of measurement; Aeasurement of angles. Different entry behaviours, Socio-cultural issues, different learning needs, misconceptions about						
learning in the lea	sson	mathematics address them	and meth h before, du	nods of tead Iring and aft	ching mathe er the lesson	matics. Consc	ious efforts should	I be made to	
Lesson Delivery – chosen to suppor students in achier the outcomes	- rt ving	Face-to- Pr face A	ractical ctivity	Work- Based Leaning	Seminars	Independent Study	e-learning opportunities	Practicum	
Lesson Delivery mode of d chosen to s student teache achieving the le outcomes.	– main lelivery support ers in earning	<ul> <li>Face-to-face</li> <li>The face class exp</li> <li>The e-le properti</li> <li>Indepen or journ</li> </ul>	<ul> <li>Face-to-face and e-learning opportunities</li> <li>The face-to-face mode will include lecturer/tutor-initiated class discussions, small group in class exploration, group presentations, think-pair-share moments, lecture, etc.,</li> <li>The e-learning opportunities will include exploring number games and activities to develop properties of numbers and relationships between and among sets of numbers</li> <li>Independent study would include writing self-assessment and presenting reflective papers or journals</li> </ul>						
<ul> <li>Purpose for lesson, what want the stu- to achieve, su as basis for ti learning outo An expanded version of the description</li> </ul>	the you dents erves he comes. d e	<ul> <li>The purpose</li> <li>Introduc they are</li> <li>Develop and area</li> <li>Introduc teaching Circumfe</li> </ul>	of the lesso e student to expected o student tea s of circular the stude mathema erence and	on is to; eachers to th f in this lesse achers' unde r regions; Su ent teachers tics, especi areas of c	ne course ma on. erstanding of rface area ar s to prepare ally, measu ircular regic	nual to enable Perimeter and d volumes of J and model in rement of Pe ons; Surface a	them develop award d areas of triangle, prisms and pyramids teractive, and innove erimeter and area rea and volumes of	reness of what Circumference 5. vative ways of s of triangle, of prisms and	
Learning Out for the lesson picked and developed fr the course specification	tcome n, rom	Learning Out	tcomes	Learnin	g Indicators		Identify Which issues- core and skills, inclusivity, addressing diversi these be ad developed?	cross-cutting transferable equity and ity. How will dressed or	
Learning indi for each learn outcome	icators ning	Demonstrate and understa key features school curricu and specifica on measuren perimeter an triangle, circu and areas of regions; Surfa volumes of p pyramids.(NT Demonstrate of socio-cultu teaching and	e knowledge anding of th of the basic ulum (BSC); Ily focusing nent of id area of umference circular ace area an risms and rS, 2a). e awareness ural issues in learning	e Pa e exe ea ea ma tha en ba d am of an reg n py	rticipate in p ecuting instru- tivities that c rly adolescen athematically at is, underst athematical in gage in logica sed on relation nong perimet triangle, circu d areas of cir gions; Surface lumes of pris ramids.	lanning and uctional an make the become or proficient; and deas, and al reasoning bonships ter and area umference cular e area and ms and	<ul> <li>Personal deve Through plann and assessing individually an groups, and sh experiences w</li> <li>Problem solvin creative thinki objective anal- and concept th creative thinki</li> <li>Personal deve Through prese developing of</li> </ul>	lopment: ning, teaching, both id in small haring their rith peers ng, critical and ng: through ysis of facts hat will lead to ng lopment: entation and arguments	

Торіс	perimeter and area of triangle, circumference and areas of circular regions; Surface area and volumes of prisms and pyramids.(NTS 2f) Demonstrate competencies in using manipulatives and TLMs in a variety of ways in teaching measurement concepts (NTS 3j) Value as well as respect equity and inclusivity in the mathematics classroom (NTS 2f; NTECF 39) <b>Sub-topic(s)</b>	<ul> <li>ident for te math perin trian, areas Surfa of pr PRIM</li> <li>Ident mani for te math perin trian, areas Surfa of pr</li> <li>Coop in ca math varie</li> <li>Enga think math their</li> </ul>	cify and design tasks eaching important mematical ideas in neter and area of gle, circumference and s of circular regions; ice area and volumes isms and pyramids to IARY SCHOOL pupils cify a variety of pulatives and TLMs eaching important mematical ideas such as neter and area of gle, circumference and s of circular regions; ice area and volumes isms and pyramids. merate with colleagues rrying out mematical tasks in a ty of ways ge in reflective ing about how mematics was taught in basic school days. Teaching and learning	<ul> <li>Respect and diversity: designing lesson for diverse learners with different learning styles</li> <li>Social and communication skills: consciously develop observation and presentation skills during classroom instructions to support student teachers to transfer this to STS</li> <li>to activities to achieve learning</li> </ul>	
		Time	outcomes depending on delivery mode select		
			Teacher Activity	Student Activity	
Measurement	Review	10mins	Review student teachers previous knowledge on shape and space. (PD Theme 1)	s' Participate in the discussion on shape and space	
	Perimeter and areas of triangles	20 mins	Introduce the lesson on perimeter and areas of triangles; (PD Themes 1 &3)	Participate in the discussion based on the perimeter and area of triangles.	
		20 mins	Lead discussions on how to connect the perimete and areas of various triangles (PD Themes 1 & 3)	<ul> <li>Explore strategies for</li> <li>connecting the perimeter</li> <li>and areas of various</li> <li>triangles</li> </ul>	
	Circumference and areas	30 mins	Demonstrate with cut- out shapes and supported with video cli the process of deriving the formula for π,	Participate in the activity to derive the formula for π Use this relation to solve related problems	
	Surface area and volumes of prisms and pyramids	20 mins	Lead student teachers to explore with models and other materials to develop the formula for finding the circumference and area of a circle	<ul> <li>Explore with models and</li> <li>other materials to develop</li> <li>the formula for finding the</li> <li>circumference and area of a</li> <li>circle</li> </ul>	

30 minsLead discussions on the relationship between the volume of a cylinder and a cone (with same base areas and height)Work in groups to explore the relationship between the volume of a cylinder and a cone (with same base and height)30 minsAssign student teachers in groups to outline the volumes of given solids
Assign student teachers Outline strategies for findin in groups to outline the volumes of given solids
volumes of given solids including the sphere
Lesson assessments – Subject Portfolio
evaluation of learning: Assign student teachers to complete teacher-made worksheets on operations and propertie
of, for and as learning of rational and irrational numbers as found in the Primary School Mathematics Curriculum
within the lesson (provide immediate feedback)
NTS:
2 b) Has comprehensive knowledge of the official school curriculum, including
learning outcomes.
2b) Has comprehensive knowledge of the official school curriculum, including
iearning outcomes
whose needs lie outside the competency of the teacher.
Note: The assessment procedures should make room for differentiation - gende
equity, SEN, and inclusivity.
Instructional Resources Posters; video clips; downloads; models, etc.
Required Text (core) Arthur, J., Grainger, T. & Wray, D. (2006). Learning to Teach in the Primary School. Canada: Tayle
& Francis e-Library. <u>https://www.pdfdrive.com/learning-to-teach-in-the-primary-schoo</u>
<u>d2U2U9294.html</u> Confer C (2005) Teaching Number Sense Sausalito: Math Solutions Publication
https://www.pdfdrive.com/teaching-number-sense-grade-1-d184198309.html.
Manitoba Education, Citizenship and Youth (2006). Rethinking classroom assessment with
purpose in mind: assessment for learning, assessment as learning, assessment of learnin
https://www.pdfdrive.com/assessment-for-learning-assessment-as-learning-assessment-of-
Roy G L (2014) Developing Prospective Teachers' Understanding of Addition and Subtractic
with Whole Numbers. Issues in the Undergraduate Mathematics Preparation of Scho
Teachers, 2.
Additional Paading List Lakoff G. & Núžaz, P. E. (2000). Where Mathematics somes from New York: Pasis Peaks
Martin, J. et. al. (1994). <i>Mathematics for teacher training in Ghana: Tutor notes</i> . Accra: Unimax
Publishers.
Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Students activities. Accra:
Unimax Publishers.
How to design and teach mathematics using the new B. ED. Curriculum, NTS, NTECF, et     How to design and/or use some inpovative materials and ideas for teaching
measurement concepts based on Classroom assessment in mathematics in PRIMARY
SCHOOL1-3.
How to manage transition of home to school.
Understand the various characteristics and uniqueness of Primary School learners.
How to design tasks for assessment procedures for assessment of, as and for learning.
design and produce portfolios, journals and STS reports.

Year of B.Ed.	3	Semester	2	Place	Place of lesson in semester		123456789 <b>10</b> 11 12			
Title of Lesson		Handling Data 1 (Teaching and Assessing)   Lesson Duration   3 Hours								
Lesson description Previous stud teacher knowled prior learn (assumed)	ent Ige, iing	This is the tenth lesson which focuses on developing an understanding of Teaching and Assessin Primary School Mathematics about Handling data. The topics to be considered include Collecting, interpreting and presenting data. Student-teachers have informal knowledge of collecting and handling data. They have bee introduced to counting and record keeping.								
Possible barriers to learning in the lesso	n	Different entry l mathematics ar address them be	Different entry behaviours, Socio-cultural issues, different learning needs, misconceptions about mathematics and methods of teaching mathematics. Conscious efforts should be made t address them before, during and after the lesson.							
Lesson Delivery – chosen to support students in achievin the outcomes	g	Face- Practition to-face Activity	cal Wo ty Bas Lea	ork- sed aning	Seminars	Independent Study	e-learning opportunities	Practicum		
<ul> <li>Lesson Delivery – m mode of deliv chosen to supp student teachers achieving the learn outcomes.</li> <li>Purpose for the lesson, what yo want the studen to achieve, serv as basis for the learning outcomes. An expanded versite</li> </ul>	ain rery port in ning u u nts es	<ul> <li>Face-to-face and e-learning opportunities</li> <li>The face-to-face mode will include lecturer/tutor-initiated class discussions, small group in class exploration, group presentations, think-pair-share moments, lecture, etc.,</li> <li>The e-learning opportunities will include exploring number games and activities to develo properties of numbers and relationships between and among sets of numbers</li> <li>Independent study would include writing self-assessment and presenting reflective paper or journals.</li> <li>The purpose of the lesson is to;</li> <li>Introduce student teachers to the course manual to enable them develop awareness what they are expected of in this lesson.</li> <li>Develop student teachers' understanding of include collecting, interpreting and present datato Primary School learners.</li> <li>Introduce the student teachers to prepare and model interactive, and innovative ways teaching mathematics, especially, collecting and handling data.</li> </ul>								
<ul> <li>Learning Outcon for the lesson, picked and developed from the course specification</li> <li>Learning indicat for each learnin outcome</li> </ul>	me cors g	Demonstraticomprehenication     Schooling     Schooling     mathematice     substantiation	mes ce a sive of the MARY	Eearnin     Sho     of     an     usi     pra     the	g Indicators ow a good un number relat d place value, ng technique actical activiti e developmer	derstanding ionships , as well as s for es involving at of	Identify Which issues- core and skills, inclusivity, addressing diversi these be ad developed? Respect and div designing lessor learners with di learning styles Personal develo through plannin	cross-cutting transferable equity and ty. How will dressed or ersity: n for diverse fferent opment: ng, teaching, oth		
		<ul> <li>learning out covering ha data 1as we principles b these conce (NTS 2b)</li> <li>Demonstrat knowledge</li> </ul>	comes ndling Ill as the ehind pts ce and	<ul> <li>Pla</li> <li>add</li> <li>that</li> <li>add</li> <li>that</li> <li>equ</li> <li>op</li> <li>Ou</li> <li>chi</li> </ul>	numg data C pmote mathe nking n lesson base dition and sul at seeks provi uitable learni portunities fo tline activitie ldren mather	ed on btraction de ng or all learner s that make matically	<ul> <li>and assessing be individually and groups, and sha experiences wit</li> <li>Equity and incl Providing equit opportunities f</li> <li>Problem solving creative thinking objective analys</li> </ul>	in small ring their h peers usivity: table learning for all learners g, critical and g: through sis of facts and		

	<ul> <li>understanding of the concept of collecting and handling data with emphasis on Interpreting.</li> <li>Demonstrate competencies in using manipulatives and TLMs including ICT in a variety of ways in teaching operations on common and decimal fractions concepts (NTS 3j)</li> </ul>		<ul> <li>proficient by considering the developmental level of the learners</li> <li>Use manipulatives, ICT tools, and other TLMs to establish mathematical principles based on handling and collecting data.</li> </ul>		•	concept that will lead to creative thinking Personal development: through conscious modelling of planning, presentation and assessment Use of ICT: Integrate ICT in developing fraction concepts in the mathematics classroom
Торіс	Sub-topic(s)	Stage/ Time		Teaching and learning outcomes depending	g to g o	activities to achieve learning n delivery mode selected.
				Teacher-lead collabora	ative	group work or independent.
				Teacher Activity		Student Activity
Handling Data (Teaching and Assessing)	Introduction	10min	S	Review student teache previous knowledge lesson on collecting and handling data (PD Theme 1)		Participate in the discussion by answering questions and giving comments to enhance participation.
		20mins 20 mins		Introduce the concept of data and engage student teachers in a discussion based on how data is related to information (PD Themes 1 &3)		Participate in the discussion based on how data is related to information
	Collecting, interpreting and presenting data			Assign student teacher to look for examples of graphs in print and electronic media such newspapers, magazine and the internet and	rs f as	Find examples of graphs in print and electronic media such as newspapers, magazines, and the internet and interpreting it.
				Use verbal exposition t	:0	Systematically collect, organize and describe data Construct, read, and interpret
		30 min	15	introduce student teachers to strategies for creating, labelling, and interpreting line graphs and other graphs to draw conclusions		tables, charts, and graphs Engage in micro lesson design on problem solving involving handling data, teaching with peers and doing critics
		20 min	15	collecting, interpreting and presenting data	n	
		30 min	15	Engage student teache to collect, display, and analyse data to solve problems	ers	Pay attention to the presentation based on collection, presentation, and interpretation of data

		30 mins	Assign student teachers to make inferences and convincing arguments	Collect, display, and analyse data to solve problems					
			based on data analysis						
		20 mins	Have student teachers evaluate arguments that are based on data analysis	Make inferences and convincing arguments based on data analysis Evaluate arguments that are based on data analysis					
Lesson assessments –	Subject Portfolio:								
evaluation of learning:	Collection	and discussion o	of Cumulative Learning Portfo	olio for grading later.					
of, for and as learning									
within the lesson	Destave, vide e aliza, d								
Instructional Resources	Posters; video clips; downloads; models, etc.								
Required Text (core)	Arthur, J., Grainger,	Arthur, J., Grainger, T. & Wray, D. (2006). Learning to Teach in the Primary School. Canada:							
	Taylor & Francis e-L	ibrary. <u>https://v</u>	www.pdfdrive.com/learning-	to-teach-in-the-primary-school-					
	<u>d20209294.html</u>	Tarahiran Nu	under Course Courseliter						
	Conter, C. (2005).	Teaching Nu	Imper Sense. Sausalito:	Math Solutions Publications.					
	Manitoba Education	Citizenshin a	nd Youth (2006) Rethinkir	risosos.ntml. og classroom assessment with					
	purpose in mind: as	sessment for I	earning, assessment as lea	rning, assessment of learning.					
	https://www.pdfdrive.com/assessment-for-learning-assessment-as-learning-assessment-of-								
	learning-d6259529.ht	learning-d6259529.html.							
	Roy, G. J. (2014). De	Roy, G. J. (2014). Developing Prospective Teachers' Understanding of Addition and Subtraction							
	with Whole Numbers. Issues in the Undergraduate Mathematics Preparation of School								
	Teachers, 2.								
Additional Reading List	Lakoff. G. &Núñez. R.	E. (2000). When	re Mathematics comes from.	New York: Basic Books.					
, i i i i i i i i i i i i i i i i i i i	Martin, J. et. al. (1994	4). Mathematics	for teacher training in Ghan	a: Tutor notes. Accra: Unimax					
	Publishers.								
	Martin, J. et. al. (1994	4). Mathematics	for teacher training in Ghan	a: Students activities.Accra:					
CDD Neede	Unimax Publishers.		all a secolar all a secolar D						
CPD Needs	<ul> <li>How to design to design</li></ul>	gn and teach ma	athematics using the new B.	ED. Curriculum, NTS, NTECF, etc					
	and handling	data concents	hased on Classroom instruct	ion and assessment of					
	mathematic	s in PRIMARY SC	CHOOL1-3.						
	<ul> <li>How to man</li> </ul>	age transition o	f home to school.						
	Understand	the various chai	racteristics and uniqueness c	f Primary School learners.					
	<ul> <li>How to design</li> </ul>	gn tasks for asse	essment procedures for asses	ssment of, as and for learning.					
	<ul> <li>Instructional</li> </ul>	l strategies need	ded to consciously engage st	udent teachers on how to					
	design and p	oroduce portfolio	os, journals and STS reports.						

Ye	ar of B.Ed.	3	Sem	nester	2	Plac	e of lesson i	in semester	12	12345678910 <b>11</b> 12		
Title	e of Lesson		Handling [	Data 2					Lesson	Duration	3 Hours	
Less	son descriptio	n	This the elevenths lesson which focuses on developing an understanding of Teaching and Assessing Primary School Mathematicsabout Ideas of chance and uncertainty.									
Prev tead pric (ass	vious stud cher knowlec or learr sumed)	ent Ige, iing	Student-teachers have been taught collecting, interpreting and presenting data, and are familiar with tossing a dice of coin.									
Pos lear less	sible barriers t ming in the son	to	Different mathemat them befo	Different entry behaviours, Socio-cultural issues, different learning needs, misconceptions about nathematics and methods of teaching mathematics. Conscious efforts should be made to address them before, during and after the lesson.								
Less cho stud achi out	son Delivery – sen to suppor dents in ieving the comes	t	Face-to- face	Practica Activity	l Wo Bas Lea	rk- ed ning	Seminars	Independent Study	e-le opp	arning portunities	Practicum	
Less mai deli sup tead ach lear	son Delivery in mode ivery chosen port stud chers ieving rning outcome	- of to ent in the s.	<ul> <li>Face-to-face and e-learning opportunities</li> <li>The face-to-face mode will include lecturer/tutor-initiated class discussions, small group in class exploration, group presentations, think-pair-share moments, lecture, etc.,</li> <li>The e-learning opportunities will include exploring number games and activities to develop properties of numbers and relationships between and among sets of numbers</li> <li>Independent study would include writing self-assessment and presenting reflective papers or inversels</li> </ul>									
•	Purpose for t lesson, what you want the students to achieve, serv as basis for th learning outcomes. An expanded version of the description.	the es ne n	<ul> <li>The purpose of the lesson is to;</li> <li>Introduce student teachers to the course manual to enable them develop awareness of what they are expected of in this lesson.</li> <li>Develop student teachers' understanding of ideas of chance and uncertainty.</li> <li>Introduce the student teachers to prepare and model interactive, and innovative ways of teaching mathematics, especially, ideas of chance and uncertainty.Prepare the student teacher for a future mathematics classroom</li> </ul>									
•	Learning Outcome for lesson, picked and develope from the courspecification	the d ed rse	Learning (	Dutcomes	5	Learnir	g Indicators		lder issu skil add the dev	ntify Which les- core and ls, inclusivity lressing diver se be a reloped?	cross-cutting d transferable v, equity and sity. How will ddressed or	
•	Learning indicators for each learning outcome		<ul> <li>Demoi knowle unders experi theore probal to use detern probal event</li> <li>Demoi knowle instruct</li> </ul>	nstrate edge and standing of mental ar etical bility and them to nine the bility of ar or outcor nstrate edge of ctional pro-	of nd how n ne actices	<ul> <li>pari ma ma is, u ide pro rea</li> <li>use mu app exp tea pro</li> </ul>	cicipate in act ke student-te thematically understand m as, compute blems, and e soning mathematica tiple strateg propriate for eriments me ching the cor bability	tivities that can eachers proficient; that nathematical fluently, solve ingage in logica ally proficient ies that are developing eant for neept of	· · ·	Problem solvi creative thir objective and and concept t creative think Social and o skills: consci observation presentation classroom in support stude transfer this t	ing, critical and aking: through alysis of facts that will lead to ing communication ously develop and skills during nstructions to ent teachers to o STS	

	for teaching the Upper Primary S mathematics curriculum with emphasis on chance(NTS 3e)	chool	<ul> <li>carry instru Prima reinfa enga math</li> <li>expla invol asses rubri math</li> <li>PRINV</li> <li>expla classs learn learn as lea 3m]</li> </ul>	out basic mathematics uctional routines for Upper ary School pupils, including orcement activities and ging learners in ematical discourse in the steps and strategies wed in designing a good sment tool and design an sment tool and design an sment tool with the cs for assessing ematics learning in ARY SCHOOL1-3 in syllabus guidelines for room assessment for ing (AfL), assessment of ing (AoL) and assessment arning (AaL)[NTS 2b, 3l,	<ul> <li>Communication skills: by critiquing assignments and presentations using rubrics co-designed by tutors and student teachers</li> <li>Assessment literacy: through modelling of comprehensive strategies embedded with instruction</li> </ul>
Торіс	Sub-topic(s)	Stage Time	/	Teaching and learning to outcomes depending on o lead collaborative group w	o activities to achieve learning lelivery mode selected. Teacher- vork or independent.
				Teacher Activity	Student Activity
	Review	20mins		Review the previous lesson on handling data (PD Theme 1)	Participate in the discussion by answering questions and giving comments to enhance participation.
	Ideas of chance and uncertainty	40 mi	ns	Engage student teachers in discussing the use of manipulative materials and other resources (including ICT tools) in modeling situations by constructing a sample space to determine probabilities (PD Themes 1 &3)	Participate in the discussions based on the use of manipulative materials and other resources (including ICT tools) in modeling situations by constructing a sample space to determine probabilities
Handling Data2		40 mins		Assign student teachers to in collaborative groups to outline strategies for determining experimental and theoretical probabilities	Model situations by devising and carrying out experiments or simulations to determine probabilities
		40 mi	ns	Engage student teachers in an interactive group to make predictions based on experimental or theoretical probabilities	Determine experimental and theoretical probabilities through collaborative group discussions
40 mins		ns	Assign student teachers to investigate probabilities for the possible outcomes of a simple experiment	Make predictions based on experimental or theoretical probabilities Investigate probabilities for the possible outcomes of a simple experiment	

Provide feedback on Subject Portfolio
Provide feedback on Subject Projects
Posters; video clips; downloads; models, etc.
Arthur, J., Grainger, T. & Wray, D. (2006). Learning to Teach in the Primary School. Canada: Taylor &
Francis e-Library. <u>https://www.pdfdrive.com/learning-to-teach-in-the-primary-school-</u>
<u>d20209294.html</u>
Confer, C. (2005). Teaching Number Sense. Sausalito: Math Solutions Publications.
https://www.pdfdrive.com/teaching-number-sense-grade-1-d184198309.html.
Manitoba Education, Citizenship and Youth (2006). Rethinking classroom assessment with purpose
in mind: assessment for learning, assessment as learning, assessment of learning.
https://www.pdfdrive.com/assessment-for-learning-assessment-as-learning-assessment-of-
learning-d6259529.html.
Roy, G. J. (2014). Developing Prospective Teachers' Understanding of Addition and Subtraction with
Whole Numbers. Issues in the Undergraduate Mathematics Preparation of School Teachers, 2.
Lakoff, G. & Núñez, R. E. (2000). Where Mathematics comes from. New York: Basic Books.
Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Tutor notes. Accra: Unimax
Publishers.
Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Students activities. Accra:
Unimax Publishers.
How to design and teach mathematics using the new B. ED. Curriculum, NTS, NTECF, etc
<ul> <li>How to design and/or use some innovative materials and ideas for teaching selected</li> </ul>
concepts based on Classroom assessment in mathematics in PRIMARY SCHOOL1-3.
How to manage transition of home to school.
• Understand the various characteristics and uniqueness of Primary School learners.
<ul> <li>How to design tasks for assessment procedures for assessment of, as and for learning.</li> </ul>
<ul> <li>How to design tasks for assessment procedures for assessment of, as and for learning.</li> <li>Instructional strategies needed to consciously engage student teachers on how to design</li> </ul>

Ye	ear of B.Ed.	3	Sen	nester	2	Place	e of lesson in s	emester	1234567891011 12			
	<i>.</i>											
Titl	e of Lesson		End of S	emester F	Review (	Lessons	1-11)		Lesson Duration	3 Hours		
Les	son descriptio	n Jdent	This is the twelfth lesson which focuses much on the review of the whole semester mathematics course: Teaching and Assessing Upper Primary School mathematics. It serves as buffer to contain any unresolved conceptual issues that occurred within the semester. Here issues of how end of semester examination are to be conducted and to prepare the student teachers psychologically enough for incident-free end of semester examinations. Student-teachers have studied Teaching and Assessing upper primary school mathematics are conducted approximately account the semester is the student teachers have studied teaching and Assessing upper primary school mathematics are conducted approximately account the semester is the student teachers in the semester is the semicover in the semicover is the semicover is the semicover in the semicover is the semicover in the semicover is the semicover in the semicover is the semicover is the semicover in the semicover is th									
tea prio (as	cher knowl or lea sumed)	edge, rning	can app assessm	can apply various mathematical concepts learnt, throughout the semester, in their teaching and assessment of related concepts.								
Pos	ssible barriers rning in the les	to sson	Differen mathem	Different entry behaviours, Socio-cultural issues, different learning needs, misconceptions about mathematics and methods of teaching mathematics. Conscious efforts should be made to address								
Les	son Delivery –		Face-	Practica	I Wo	rk-	Seminars	Independ	l e-learning	Practicum		
chc stu the	osen to suppor dents in achie	t ving	to-face	Activity	Bas Lea	ed ning		ent Study	opportunities			
Les ma del sup tea the out	son Deliver in mode ivery choser oport stu- chers in achi- comes. Purpose for lesson, what want the students to achieve, serv basis for the learning outcomes. An expanded ve of the description.	y – of udent eving rning the you res as n rsion	<ul> <li>Face-to-face and e-learning opportunities</li> <li>The face-to-face mode will include lecturer/tutor-initiated class discussions, small group in class exploration, group presentations, think-pair-share moments, lecture, etc.,</li> <li>The e-learning opportunities will include exploring number games and activities to develop properties of numbers and relationships between and among sets of numbers</li> <li>Independent study would include writing self-assessment and presenting reflective papers or journals.</li> <li>The purpose of the lesson is to;</li> <li>Introduce student teachers to the course manual to enable them develop awareness of what they are expected of in this lesson.</li> <li>Develop student teachers' understanding of the nature and importance of mathematics, as well as, how to teach mathematics to Primary School learners.</li> <li>Introduce the student teachers to prepare and model interactive, and innovative ways or teaching mathematics, especially, with emphasis on using developmentally appropriate strategies for teaching Upper Primary School learners.</li> </ul>							as, small group in , etc., ivities to develop bers reflective papers or awareness of what of mathematics, as innovative ways of entally appropriate		
•	Learning Outcome for lesson, picke and develope	the d ed	Learning	g Outcome	es	Learnin	g Indicators		Identify Whi issues- core and inclusivity, equi diversity. How	ch cross-cutting transferable skills, ty and addressing will these be wolened?		
	specification	rse	Demons	trate		<ul> <li>iden</li> </ul>	tify and design t	asks for	Personal dev	veloped:		
•	Learning indicators for each learning outcome	r 3	understa syllabus classroo and skill assessm	anding of guidelines m assessn s of effect ent for tea	s for nent ive aching	teac impo idea cono valu	hing and assessi- ortant mathema s in number and tepts including p e, fractions, as w	ng tical other lace yell as	Through plan and assessin and in small sharing their peers	nning, teaching, g both individually groups, and experiences with		
			Upper P specialis designin assessm the rubr assessm	rimary Sch m includir g an ent tools v ics and de <u>ent too</u> l w	nool ng with sign vith	• Use supp SCH	ICT as a tool pupil ICT as a tool in porting PRIMARY DOL pupils in lea cted concepts	s s irning	<ul> <li>Problem so creative t objective an concept th creative thin</li> </ul>	lving, critical and hinking: through alysis of facts and at will lead to king		

Торіс	the rubrics Value as well as equity and inclu the mathematic classroom (NTS NTECF 39) Sub-topic(s)	respect sivity in s 2f; Stage/	Teaching and learning	<ul> <li>Use of ICT: Integrate ICT in developing number and other concepts in the mathematics classroom</li> <li>Use of ICT: Integrate ICT in developing number and in the mathematics classroom</li> <li>to activities to achieve learning</li> </ul>
		Time	outcomes depending o	n delivery mode selected. Teacher-
			Teacher Activity	Student Activity
Review of concepts			Introduce the review	Participate in the discussion on the
taught in the previous lessons	Review	10mins	of the previous lessons on place value and other concepts taught in the previous lessons (PD Theme 1)	previous lessons on place value and other concepts taught in the previous lessons
		50 mins	Lead discussions on how to connect the various concepts that are related to fractions (PD Themes 1 & 3)	Use manipulatives such as number line, Cuisenaire rods, fractional charts, paper folding to explore operations of relationship among common fractions, decimal fractions, percent, ratio, proportion, probability, and others Explore possible further application of rational numbers in real life.
		60 mins	Highlight important ideas that have been developed in the previous lessons and have student teachers outline how these ideas can be used in teaching Upper Primary School students (PD Themes 1 & 3)	Participate in the discussion of the ideas highlighted and outline how these ideas can be used in teaching Upper Primary School students
		60 mins	Discuss the nature of the End of Semester Examination with student teachers	Participate in the discussion based on the nature of the End of Semester Examination with student teachers
Lesson assessments –	Subject Portfoli	0 ant teachors to con	onlete teachar made work	sheets on onerations and properties
learning: of, for and	of rational a	ind irrational numb	pers as found in the PRIMA	RY SCHOOL mathematics curriculum
as learning within the	(provide imi	mediate feedback)		
lesson		<b>CLOs</b> : 1, 2, 3		
	2 t	) Has comprehens	ive knowledge of the offici	al school curriculum, including
	lea	rning outcomes.		
	2b, Ieo	) наs comprehensiv Irnina outcomes	ve knowledge of the officio	n scriool curriculum, including
	3m) Ide	entifies and remedi	ates learners' difficulties of	or misconceptions, referring learners
	whose needs lie	The sec	outside the competency o	f the teacher.
	Note: S	EN, and inclusivity.	oceaures snoula make roo	orn jor alfferentiation - gender, equity,

Instructional	Posters; video clips; downloads; models, etc.
Resources	
Required Text (core)	Arthur, J., Grainger, T. & Wray, D. (2006). Learning to Teach in the Primary School. Canada: Taylor
	d20209294.html
	Confer, C. (2005). Teaching Number Sense. Sausalito: Math Solutions Publications.
	https://www.pdfdrive.com/teaching-number-sense-grade-1-d184198309.html.
	Manitoba Education, Citizenship and Youth (2006). Rethinking classroom assessment with
	purpose in minu: assessment for learning, assessment as learning, assessment of learning. https://www.pdfdrive.com/assessment-for-learning-assessment-as-learning-assessment-of-
	learning-d6259529.html.
	Roy, G. J. (2014). Developing Prospective Teachers' Understanding of Addition and Subtraction
	with Whole Numbers. Issues in the Undergraduate Mathematics Preparation of School
	Teachers, 2.
Additional Reading	Lakoff C. S.Nuíñaz P. E. (2000). Whata Mathematics somes from New York: Pasia Pooks
List	Lakoli, G. & Nullez, R. E. (2000). Where Mullerhalics comes from New York. Basic Books.
LIST	Publishers.
	Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Students activities. Accra:
	Unimax Publishers.
CPD Needs	How to design and teach mathematics using the new B. ED. Curriculum, NTS, NTECF, etc
	<ul> <li>How to design and/or use some innovative materials and ideas for teaching selected</li> </ul>
	concepts based on Classroom assessment in mathematics in PRIMARY SCHOOL1-3.
	<ul> <li>How to manage transition of home to school.</li> </ul>
	<ul> <li>Understand the various characteristics and uniqueness of Primary School learners.</li> </ul>
	<ul> <li>How to design tasks for assessment procedures for assessment of, as and for learning.</li> </ul>
	Instructional strategies needed to consciously engage student teachers on how to design
	and produce portfolios, journals and STS reports.
	mponent 1: Subject Portfolio Assessment (30% overall)
	<ul> <li>Selected items of students work(2 of them 10% each)-30%</li> <li>Midterm assessment 20%</li> </ul>
	Millerin assessment -20%     Beflective journal 40%
	<ul> <li>Organization of the subject portfolio-10% (how it is presented /organized</li> </ul>
	organization of the subject portiono 10% (now it is presented / organized
	<sup>2</sup> Component 2: Subject Project Assessment (30% overall score)
	<ul> <li>Introduction; a clear statement of aim and purpose of the project-10%</li> </ul>
	Methodology; what the student teacher has done and how achieve the purpose of the
	project-20%
	Substantive or main section-40%
	• Conclusion – 30%
	Component 3: End of Semester Examination- (40% overall)

 $<sup>^1</sup>$  See rubrics on Subject Portfolio Assessment in Annex 6 of NTEAP  $^2$  See rubrics on Subject Project Assessment in Annex 6 of NTEAP

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