

Four-Year B.Ed. Course Manual

Teaching and Assessing EG Maths









GOVERNMENT OF GHANA









FOREWORD

These Initial Teacher Education course manuals were developed by a team consisting of members from Colleges of Education and four universities namely 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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CORE WRITING TEAM

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

INTRODUCTION TO COURSE MANUALS

Welcome to this B.Ed. Course manual.

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

The manuals serve the following purposes:

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

Specifically, they also:

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

Who are course manuals for:

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

USING THIS MANUAL

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

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

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

Mathematics Course Manual

Resources for Course Manual Writing

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

Target Audience

College of Education Tutors

Teacher Education University Lecturers

- Student Teachers
- Mentors

The purpose of course manuals

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

Guiding principles of course manual writing

- 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 develop the plans in course manuals to fit the context they are teaching in and to support their teaching
- 4. They are aligned to the key principles and practices of the Teacher Education Reform Policy: the NTS, the NTECF and the New Four-Year B.Ed.
- 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

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

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

Guidance for completing the mathematics course manual writing

A. Course Information

Title Page

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

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

iii. Course Details: as in course specification unless important reason why not

Pre-	The programme / previous semester courses studied.
requisite/s	
Co-	Links to other courses being taught, support coherence in student experience and avoid duplication
Requisites	
Course	Course Code Credit Value 3
Level	

Table of contents

Each manual will include:

- 1. The goal for the subject or learning area
- 2. Course description
- 3. Key contextual factors
- 4. Core and cross cutting issues, including equity and inclusion
- 5. Course Learning outcomes
- 6. Course content
- 7. Teaching and learning strategies
- 8. Course Assessment components
- 9. Reading and reference list
- 10. Handouts, power points and other resources for lessons
- 11. Plans for each lesson in the semester

A. Course information

1. Goal for the Subject or Learning Area

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

2. Key contextual factors

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

3. Course Description

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

4. Core and transferable skills and cross cutting issues, including equity and inclusion

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

5. Course Learning Outcomes

These are in the course specification. The course learning outcomes should specify the expectations of what the student teachers will know, understand and be able to do at the end of the course *not* what student teachers will do **on** the course. They must be

6. Learning indicators

 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. appropriate and realistic to the learner's abilities, experience, the identified level of the course and content. They must be measurable – allowing assessment of student teacher achievement

 What the student teacher will need to do to show they have achieved the learning outcome. (in an inclusive lesson, this should vary and be responsive to student teacher's individual characteristic)

7. Course content

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

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

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 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

e 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

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 teacher knowledge, What links to previous knowledge / prior learning need to be built in to the lesson? Prior learning could be from: this course and previous lessons; from senior high sch										
description should be short, clear, and accessible to all students. Previous student teacher knowledge, What links to previous knowledge / prior learning need to be built in to the lesson? Prior learning could be from: this course and previous lessons; from senior high sch										
Previous student • What links to previous knowledge / prior learning need to be built in to the lesson? • Prior learning could be from: this course and previous lessons; from senior high sch										
teacher knowledge, • Prior learning could be from: this course and previous lessons; from senior high sch										
	• Prior learning could be from: this course and previous lessons; from senior high school;									
prior learning from supported teaching in school/practicum; from other courses. NB important to b	bliu									
(assumed) on work 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.lf the expected prior knowledge is not adequ	ate									
you will need to modify the lesson.										
Possible barriers to • What specific conceptual, linguistic, social, cultural, conceptual, gender, or ability relative to the conceptual of the conceptual	ted									
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 n	ed									
to plan to support and address this										
Points on equity, • You need to represent and address diversity in your lesson-plan. Are there mult	ple									
inclusivity (gender, diversity issues (see diversity wheel)?										
SEN), and addressing How would these issues be addressed with student teachers during activities for both to	neir									
diversity own learning and the learning of the students they will teach?										
How are issues of diversity (equity and inclusion) addressed in your lesson plan so to the second seco	hat									
student teachers can see diversity modelled during this teaching and learning activity?	iac									
How are issues of diversity (equity and inclusion) addressed in your lesson plan so the second of the second										
student teachers can learn how to address it with the students they will teach?										
For example: gender stereotype issues related to: PE, literacy and language, science	hne									
mathematics.	, , , , , , , , , , , , , , , , , , , ,									
Lesson Delivery – Face-to- Practical Work- Seminars Independent e-learning Practicum	า									
chosen to support face Activity Based Study opportunities										
students in achieving Leaning Leaning										
the outcomes										
Lesson Delivery – 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									
delivery chosen to led. It should not usually be the main mode.										
support student Practical Activity: enabling experimentation and the analysis and discussion of issues,	ractical Activity: enabling experimentation and the analysis and discussion of issues,									
support student teachers in achieving documents and materials, as well as physical activities. Practical Activity: enabling experimentation and the analysis and discussion of issues, documents and materials, as well as physical activities.										

outcomes.

development work (mostly TVET)

Seminars: to generate group and individual creativity, discussion and reflection: student and / or tutor led

Independent study: to enable students to engage with relevant and appropriate materials to promote individual and collaborative enquiry, more in-depth analysis and development. This can be part of any of the above modes

E-learning *opportunities* – involving the use of interactive packages and virtual learning environments. This can be part of any of the above modes of delivery. It is unlikely to be a delivery mode in its own right.

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.

- Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.
- What is the main thing you want student teachers to know, understand and be able to do as a result of this lesson?
- 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?
- This will relate back to the overall intention and learning outcomes for the course.
- Write in full aspects of the NTS addressed

Outcome for the

lesson, picked

and developed

from the course

specification

indicators for

each learning

Learning

outcome

Learning

Learning Outcomes

- The learning outcomes for the lesson will enable student teachers to achieve the purpose for the lesson.
- For example, in mathematics: student teachers are prepared to teach а 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.
- 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....'
- Learning outcomes may be developed and re-visited over a number of lessons
- Be realistic in terms of what can be achieved in any one lesson
- Some learning outcomes may address specific student teacher needs

Learning Indicators

- 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.
- What the student teacher will need to do to show they have achieved the learning outcome. (in an inclusive lesson, this should vary and be responsive to student teacher's individual characteristic)

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Content of lesson	Time or	Topics and sub-	Teaching and learning to	achieve learning outcomes:
picked and	stage	topics (if any):		mode selected. Teacher led,
developed from the	Identify		collaborative group work or	
course specification	how much		Teacher Activity	Student Activity
Unit/s covered from the course specification:	time will be required for each part of the lesson		 Plan to model what is expected of student teachers Plan for activities to support student teachers in working towards and / or demonstrating achieving the learning outcomes. Where possible set up activities with students as active participants Make links to other aspects of the New Four-Year B.Ed. programme or between subject and pedagogic knowledge State if team teaching involved or additional tutors contributing 	For example: Interactive and collaborative group and pair work, e.g., identifying, developing, presenting and evaluating suitable resources and materials picking out key points from education texts, raising questions and issues sharing practice and experience preparing for school visits self and peer assessment Other examples Student teacher led seminars ICT e.g. discussion using VLE Video observation of and analysis of teaching
			ritical thinking, problem solvii	Role-play ng, social skills, creative thinking
transferable skills will be used or	and comm	unication skills, use of I	CI	
developed and how Which cross cutting	ss cutting i	ssues include: assessme	ent literacy and assessing stud	dents' progress and professional
issues will be addressed or developed and how	values and	attitudes, reflection ar	nd classroom enquiry	
Lesson assessments – evaluation of			ing self-assessment by studen	
learning:of, for and			ustments so that they achieve ess. <i>This needs to be planned</i> ;	deeper understanding, occurs
as learning within the lesson	Assess of wor to be p Assess know, appropring learning to the period of the p	sment of learning: is usurly, placement etc. Weigh blanned for in the lesson sment for learning: is usunderstand and are abaches and to differentia	ually summative and is mostly thted Assessment Component n. sing assessment as a means of le to do and using that informate according to different stud	done at the end of a task, unit s in course outlines. <i>This needs</i> finding out what students
	Differenceand asThe approximately	entiation in lessons (UD ssessment strategies to oproach to assessment gies	motivate and reach all learne in lessons must be appropriate	e to the teaching and learning
Instructional				ren's work, video, ICT activities,
Resources Required Text (core)	examples of	of previous student tea	Liners Work	
Additional Reading				

Year of B.Ed. 3	Semester	1	Place of lesson in semester	123456789101112
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Title of Lesson	_	Counting, Patterns and Relationships (Teaching and Assessing) Lesson Duration 3 Hours								
Lesson description	This lesson and about develops. Relationsh mathematalso cover the Basic S Another a issues. He them to be specialism	This lesson focuses on developing an understanding of Teaching and Assessing EGMathematics and about how people think about mathematics and how an understanding of EG mathematics develops. It provides an in-depth knowledge of place value, fractions, Patterns and Relationships and explores student teachers' beliefs about mathematics and philosophies of mathematics implicit in the official mathematics curriculum and current classroom practice. It also covers children's developmental stages, how children learn mathematics with respect to the Basic School Mathematics curriculum, and other psychological factors influencing learning. Another area that is considered essential is developing awareness of equity and diversity issues. Here, student teachers are reminded that this is one of the courses that seek to prepare them to become well-groomed professional teachers in the Early Grade mathematics specialism. This first lesson introduces student teachers to the course learning outcomes in the three assessment components of the course.								
Previous student teacher knowledge, prior learning (assumed) Possible barriers to learning in the lesson	are famili exposed t some mat semester' Different about ma	Student-teachers have been thought theories in the teaching and learning of mathematics, and are familiar with concepts based on child growth, development, and maturation; they are exposed to number and numeration systems as well as handling dada; they have experienced some mathematics during their basic and secondary education period as well as their previous semester's mathematics courses. Different entry behaviours, Socio-cultural issues, different learning needs, misconceptions about mathematics and methods of teaching mathematics. Conscious efforts should be made								
				after the lesson.						
Lesson Delivery – chosen	Face-to-	Practical	Work-	Seminars	Independ	e-learning	Practicum			
to support students in	face	Activity	Based		ent Study	opportunities				
achieving the outcomes		\square	Leaning		\square					
achieving the outcomes			Leaning							
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	Face-to-fa • The f class • The e prope • Indep	ace and e-lea ace-to-face r exploration, e-learning op erties of num	arning opport mode will incl group preser portunities w abers and rela		or-initiated c air-share mor ing number g en and amor	lass discussions, ments, lecture, e games and activ ng sets of numbe	etc., ities to develop ers			
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the	Face-to-fa The f class The e prope Indep or jou The purpo Introd what develor well a Introd teach	ace and e-lead ace-to-face rexploration, e-learning operties of number bendent studiarnals. use of the lest duce student they are expop student to s, how to tead duce the studing mathema	arning opport mode will incl group preser portunities w abers and rela y would inclu son is to; t teachers to ected of in the eachers' unde ach mathema dent teachers atics, especial	unities ude lecturer/tuto itations, think-pa ill include explor tionships betwee de writing self-as	or-initiated coir-share moring number gen and amoressessment and to enable nature and de learners. model intermatics curric	lass discussions, ments, lecture, egames and activing sets of numbered presenting relationship importance of numbered presenting for active, and innovaling to Early Grant presenting the control of the control o	etc., ities to develop ers iflective papers p awareness of nathematics, as			
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. • Learning Outcome for the lesson, picked and developed from the course specification	Face-to-fa The f class The e prope Indepor jou The purpo Introc what develor well a Introc teach Prepa	ace and e-lea ace-to-face r exploration, e-learning op erties of num bendent stud urnals. use of the les duce student they are exp op student to s, how to tea duce the student ing mathema ire the stude	arning opport mode will incl group preser portunities w abers and rela y would inclu son is to; t teachers to ected of in the each mathema dent teachers atics, especial int teacher for	unities ude lecturer/tuto utations, think-pa ill include explor itionships betwee de writing self-as the course man is lesson. erstanding of the tics to Early Grac to prepare and ly School Mathei a future mathe	por-initiated contractions and amore seessment and amore seessment and to enable anature and de learners. model intermatics curricumatics classifications classifications and diversing address address and the sees address and the sees and	lass discussions, ments, lecture, egames and activing sets of numbered presenting relationship to the company of the company o	p awareness of mathematics, as ovative ways of radelearners. -cutting issueserable skills, and addressing ill these be oed?			
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. • Learning Outcome for the lesson, picked and developed from the course specification • Learning indicators	Face-to-fa The f class The e prope Indepor jou The purpo Introd what develor well a Introd teach Prepa Learning (ace and e-lea ace-to-face r exploration, e-learning operties of num- pendent stud- arnals. use of the les duce student they are exp op student to s, how to tea duce the stud- ing mathema re the stude	prining opport mode will incl group preser portunities w abers and rela y would inclu son is to; teachers to ected of in the each mathema dent teachers atics, especial ant teacher for Learning ge Pro	unities ude lecturer/tuto itations, think-pa ill include explor tionships betwee de writing self-as the course man is lesson. erstanding of the tics to Early Grac is to prepare and ly School Matheir a future mathe ag Indicators	por-initiated conir-share more ing number agen and amore seessment are unal to enable nature and de learners. model intermatics curric core inclus divers addre andre	lass discussions, ments, lecture, egames and activing sets of numbered presenting relationship in the development of the develo	p awareness of mathematics, as ovative ways of radelearners. -cutting issues-erable skills, and addressing ill these be ped?			
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. • Learning Outcome for the lesson, picked and developed from the course specification	Face-to-fa The face class The each proper or journ the purpor or	ace and e-lea ace-to-face r exploration, e-learning op erties of num bendent stud urnals. use of the les duce student they are exp op student to s, how to tea duce the student ing mathema ire the stude	arning opport mode will incl group preser portunities w abers and rela y would inclu son is to; t teachers to ected of in the each mathema dent teachers atics, especial ant teacher for Learning ge Pro inc	unities ude lecturer/tuto utations, think-pa ill include explor itionships betwee de writing self-as the course man is lesson. erstanding of the tics to Early Grace to prepare and ly School Matheir a future mathe ag Indicators	por-initiated conir-share more ing number agen and amore seessment are used to enable anature and de learners. model intermatics curric core inclus divers addre ared • Inc. su	lass discussions, ments, lecture, egames and activing sets of number and presenting relationship to the modern active, and innoculum to Early Groom If Which crossand transfestivity, equity a sity. How wessed or develop clusion and Equipporting studen	etc., ities to develop ers iflective papers p awareness of mathematics, as evative ways of radelearners. -cutting issues- erable skills, and addressing ill these be ered? ity: by at teachers to			
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. Learning Outcome for the lesson, picked and developed from the course specification Learning indicators for each learning	Face-to-fa The face class The each proper or journ the purpor or	ace and e-lead ace-to-face rexploration, e-learning operties of numbendent studiurnals. Use of the less duce student they are expop student to so, how to test duce the student re the stude of observation on class	arning opport mode will incl group preser portunities w abers and rela y would inclu son is to; t teachers to ected of in the each mathema dent teachers atics, especial ant teacher for Learning ge Pro inc	unities ude lecturer/tuto itations, think-pa ill include explor tionships betwee de writing self-as the course man is lesson. erstanding of the tics to Early Grac is to prepare and ly School Matheir a future mathe ag Indicators	por-initiated conir-share more ing number agen and amore seessment are unal to enable nature and de learners. model intermatics curric core inclus divers addresered • Income sures red	lass discussions, ments, lecture, egames and activing sets of numbered presenting relationship in the development of the develo	p awareness of mathematics, as ovative ways of radelearners. -cutting issueserable skills, and addressing ill these be ped? ity: by at teachers to onal and			

	School 1)			l	efforts to address them.
	(College & School	Provi	de records of		enorts to address them.
	induction by tutors,school		workactivities	•	Diversity: Support student
	heads, lead mentors and	and/o			teachers with the opportunities
	mentors)	1	erativelearning		to explore diversity within the
		for st	udent teachers		class/subject and potential
		durin	gobservations		barriers to inclusion (including
					personal bias, stereotypes and
	Demonstrate knowledge				institutional discrimination).
	and		evidence of		
	Understanding of the key features of the basic	-	ngrecords of	•	Managing transitions: by giving
	school curriculum (BSC);		fic observations wider school		orientation to student teachers
	and specifically focusing		onment and		to have an ability to incorporate/ integrate subjects (Knowledge of
	on mathematics	induc			the Early Grade curriculum) to
	curriculum and their	maac			approaches to T and L in
	associated expected				SHSbetween subjects subject.
	learning outcomes (NTS,	• Produ	uce a report on		, ,
	2a).		group	•	Collaboration:is fostered through
		discu	ssions with		assigning group projects and
			ors and peers on		presentation of various topics
	Carry out action research		ey features of the		across units.
	and classroom enquiry to		al basic school		
	improve practice in the upper primary classroom		culumand list		
	and reflect on their	in the	ified key features	•	Teaching:by giving support to
	teaching practices for		it a write-up of		the student teachers to grasp the understanding of the
	continuous professional		eveloping		subject content and ability to
	development (CPD) (NTS		ier's knowledge		teach this using teaching and
	1a, pg.12,NTS 3b, pg.14)		f-awareness,		assessment strategies
			fs, and values of		appropriate for EARLY GRADE.
			ing and learning		
		(pers	onal teaching	•	Communicative skillsof student
		philo	sophy)		teachers: can be enhanced
					through the examination,
		• Make			interrogation and presentation
			entations		to identify the specific literacy
			wledge gained		and language of the subject/s taught as well as supporting
			g inductionand vation by		pupils in acquiring these and in
			entteachers in		their ability to use language for
			groups.		academic purposes
Topic	Sub-topic(s)	Stage/	Teaching and lea	rnin	g to activities to achieve learning
		Time	outcomes deper	ndin	g on delivery mode selected.
				colla	aborative group work or
			independent.		
			Teacher Activity		Student Activity
	Review	40 mins	Introduces studer	nt	Participate in the discussion of
			teachers to the	اء ـ	various components of the
			Course Manual ar		course manual, take opportunity to ask questions about the
			components	13	Course Manual including
			including		assessment procedures.
			assessment		Outline their expectations and
			procedures (See		views about the mathematics
			Course Assessme	nt	course.
			Components),		
			(PD Theme 1)		

WEEK 1 Counting, Patterns and Relationships (Teaching and Assessing)	Introduction Counting and representing numbers in multiple of ways and indifferent bases Number patterns and relationships; numerical and non-numerical patterns;	20 mins 30 mins	Introduce the Upper Primary Mathematics curriculum, and relate it to Teaching and Assessing Early Grade Mathematics 1; (PD Themes 1 & 3) Engage student teachers in counting and representing numbers in multiple of ways and indifferent bases (PD Themes 1 & 3) Assign student teachers to explore Number patterns and relationships; numerical and nonnumerical patterns; (PD Themes 3 & 4) Monitor student	Listen attentively to the tutor or lecturer's verbal exposition and to supply responses to Teaching and Assessing Early Grade Mathematics 1 Engage in counting activities to represent numbers in multiple of ways and in different bases Engage in a think-pair-share session to explore Number patterns and relationships; numerical and non-numerical patterns such as triangular, square, calendar, figurative, etc 1 1+2 1+2+3 1+2+3+4 Use variety of tools and		
Counting, Patterns and Relationships (Teaching and Assessing) Lesson assessments – evaluation of learning: of,	relationships; numerical and non-numerical patterns; Investigations with numbers; sets of numbers – odd, even, composite, prime, Multiples, factors, LCM, HCF, relatively prime numbers, etc. (e.g. 10 ones = 1 ten 10 tens = 1 hundred, etc.) Summary Assessment Met Student teachers to	30 mins 30 mins hod: reflecto write a ref	teachers to explore Number patterns and relationships; numerical and non- numerical patterns; (PD Themes 3 & 4) Monitor student teachers as they investigations with numbers; sets of numbers – odd, even, composite, prime; (PD Theme 1) Engage student teachers in groups to explore multiples, factors, LCM, HCF, relatively prime numbers, etc. (e.g. 10 ones = 1 ten 10 tens = 1 hundred, etc.) (PD Themes 1 & 3) tive paper presentation effective paper on the fi	numerical and non-numerical patterns such as triangular, square, calendar, figurative, etc 1 1+2 1+2+3 1+2+3+4 Use variety of tools and strategies to investigations with numbers; sets of numbers – odd, even, composite, prime eg use of pairing of objects and rectangular designs, sieve of Eratosthenes, etc. Engage in a group discussion to explore the multiples, factors, LCM, HCF, relatively prime numbers, etc. using Cuisenaire rods, counters (through repeated addition), Multibase Arithmetic Blocks. Use investigations to explore relationships among the properties of prime and composite numbers (by using divisibility rules);		
for and as learning within the lesson		d approach		following week in groups. To be		
	Related CLOs: 1, 3 and 6 NTS: 1a) Critically and collectively reflects to improve teaching and learning. 2 b) Has comprehensive knowledge of the official school curriculum, including learning outcomes. 2b) Has comprehensive knowledge of the official school curriculum, including					

	learning outcomes
	31) Listens to learners and gives constructive feedback
	3m) Identifies and remediates learners' difficulties or misconceptions, referring
	learners whose needs lie outside the competency the teacher.
	Advance Preparation
	Student teachers to read on the principles for the selection of objectives, concepts and learning activities or experiences, using variety of resources including ICT tools as a preparation for the next lesson.
Instructional Resources	Posters; video clips; downloads; cardboards, models,EARLY GRADE curriculum, etc.
Required Text (core)	Arthur, J., Grainger, T. & Wray, D. (2006). Learning to Teach in the Early Grade. Canada: Taylor
	& Francis e-Library. https://www.pdfdrive.com/learning-to-teach-in-the-primary-school-
	<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 selected concepts
	based on themeaning, aims and course learning outcomes of the mathematics curriculum.
	Standards-based curriculum.
	How to manage content and methods of teaching maths at the same time.
	 Understand the various characteristics and uniqueness of Early Grade curriculum.
	 How to design tasks for assessment procedures for assessment of, as and for learning.
	Instructional strategies needed to consciously engage student teachers on how to design and produce portfolios, journals and STS reports based on Learning Objectives.
	design and produce portfolios, journals and STS reports based on Learning Objectives of the EG curriculum.
	oi the Ed curriculum.

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

Title of Lesson	Place valu	e: (Teaching	and As	sessing	:)		Le	esson Duration	3 Hours
Lesson description	This lesson focuses on developing an understanding of Teaching and Assessing Early Grade Mathematics and about how people think about mathematics and how an understanding of mathematics develops. It provides an overview of philosophies of mathematics and mathematics education and explores student teachers' beliefs about mathematics and philosophies of mathematics implicit in the official mathematics curriculum and current classroom practice. It also covers Teaching and Assessing Place value and outlined in the basic school curriculum. Another area that is considered is developing awareness of equity and diversity issues.								
Previous student teacher knowledge, prior learning (assumed)	are familia exposed to some mat semester'	ar with cond o number an hematics dur mathematics	cepts I d num ring th s cours	pased of the contraction of the	on child grown systems as cand second	vth, develo well as han lary educat	pmer dling ion pe	learning of math it, and maturati dada; they have eriod as well as t	on; they are experienced heir previous
Possible barriers to learning in the lesson	about mat		d met	hods of	teaching ma	athematics.		rning needs, mi cious efforts sho	
Lesson Delivery – chosen to support students in achieving the outcomes	Face-to- face	Practical Activity	Worl Base Lean	d	Seminars	Independ Study	ent	e-learning opportunities	Practicum
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes. • Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.	 Face-to-face and e-learning opportunities 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., The e-learning opportunities will include exploring number games and activities to develop properties of numbers and relationships between and among sets of numbers Independent study would include writing self-assessment and presenting reflective papers or journals. The purpose of the lesson is to; Introduce student teachers to the course manual to enable them develop awareness of what they are expected of in this lesson. develop student teachers' understanding of the nature and importance of mathematics, as well as, how to teach mathematics to Early Grade learners. Introduce the student teachers to prepare and model interactive, and innovative ways of teaching mathematics, especially, School Mathematics curriculum to Early Grade learners. Prepare the student teacher for a future mathematics classroom 								
Learning Outcome for the lesson, picked and developed from the course specification Learning indicators	Learning (g Indicators		these devel	s- core and inclusivity, essing diversity	ressed or
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 procedures • Provide records of group work activities and/or cooperative						su re pe le ef Di st	pporting studen cognize institution and sources commended and making and making forts to addressigital literacy: udent teach poortunity to development to de	t teachers to conal and of barriers to g conscious them. can affordners the

	Carry out action and classroom en improve practice upper primary cland reflect on the teaching practice continuous profedevelopment (CF 1a, pg.12,NTS 3b) Develop and use appropriate TLM locally available for upper primar 3j, pg. 14)	nquiry to e in the assroom eir ess for essional PD) (NTS o, pg.14) age s from materials	•	learning for student teachers during observations Show records of specific observations from wider school environment and induction Make oral presentations of knowledge gained to apply to age appropriate TLMs from locally available materials in their groups.	for reflective journals using digital tools. Managing transitions: by giving orientation to student teachers to have an ability to incorporate/ integrate subjects (Knowledge of the EARLY GRADE curriculum) to approaches to T and L in SHSbetween subjects subject. Characteristics and uniqueness of upper primary learners: By encouraging student teachers to develop awareness of how Knowledge and understanding of child growth, development and maturation support young children's learning 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
Topic	Sub-topic(s)	Stage/ Time		outcomes depending of	g to activities to achieve learning on delivery mode selected. Teacher- up 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;
WEEK 2 Place Value (Teaching and Assessing)	Concept of place value;	40 mins		Introduce the lesson by reviewing children background knowledge on place value and use it to establish the concept of place value. (PD Themes 1 &3)	respond to place value based enquiry and to ask questions where necessary *The value of a digit due its position in a number. eg. Hundre d 3 4 5 4 5 3 5 3 4 5 3 5 3 4 3=300 3=30 3=3 4=400 4=40 4=4

	Children's knowledge of and misconception s of place value; Meaning of and relationship between operations; mental strategies and other problem solving strategies; Dealing with operations on numbers up to 10,000,000.	40 mins 40 mins	Engage student teachers in a discussion to unravel their knowledge of and misconceptions of place value; (PD Themes 1 & 3) Assign student teachers to explore Meaning of and relationship between operations; mental strategies and other problem solving strategies; (PD Themes 3 & 4) Engage student teachers to design appropriate manipulatives for dealing with operations on numbers up to 10,000,000 (PD Theme 1	Engage in think-pair-share strategies to discuss the misconceptions of the learners with respect to place value. Use interactive collaborative group work to explore the place value structure of the base ten number system, to represent and compare whole numbers 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 Explore the appropriate strategies for solving place value up to 10,000,000and to discuss their findings in groups of five or six. Engage in a think-pair-share session to outline strategies for teaching place value				
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	Subject Portfolio Assign student teachers to write short notes(about one page) on how to establish the relationship between fractions and decimal number to be presented their next lesson period. This will also serve as advance preparation for the next lesson (Assessment as learning) Related CLOs: 1, 3, 5 NTS: 2b) Has comprehensive knowledge of the official school curriculum, including learning outcomes. 2f) Demonstrate value as well as respect for equity and inclusion in the mathematics classroom (knowledge) 3k) Integrates a variety of assessment modes into teaching to support learning. 1. Note: The assessment procedures should make room for differentiation - gender, equity,							
Instructional Resources	,		models, etc.					
	·			ach in the Early Grade Consider Tarder				
Required Text (core)	SEN, and inclusivity. Posters; video clips; downloads; models, etc. Arthur, J., Grainger, T. & Wray, D. (2006). Learning to Teach in the Early Grade. Canada: Taylor & Francis e-Library. https://www.pdfdrive.com/learning-to-teach-in-the-primary-school-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 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.							

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 selected concepts based on theories of learning in Early Grade mathematics. How to manage transition of home to school. Understand the various characteristics and uniqueness of Early Grade learners. How to design tasks for assessment procedures for assessment of, as and for learning. Instructional strategies needed to consciously engage student teachers on how to design and produce portfolios, journals and STS reports.

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

Title of Lesson	Fraction co	oncepts (Tea	ching	and Ass	essing)		Lesson Duration	3 Hours	
		, , , , , , , , , , , , , , , , , , ,	8		8/				
Lesson description	This lesson focuses on developing an understanding offractional concepts and about how people think about mathematics and how an understanding of mathematics develops. It provides an overview of philosophies of mathematics and mathematics education and explores student teachers' beliefs about mathematics and philosophies of mathematics implicit in the official mathematics curriculum and current classroom practice. It also covers common fractions, equivalent, decimal numbers, and percent and how they are related, and other psychological factors influencing learning of fractions in the upper Early Grade. Another area that is considered is developing awareness of equity and diversity issues.								
Previous student teacher knowledge, prior learning (assumed)	are familia exposed to some mat	ar with cond o number ar	cepts nd nui ring tl	based neration neir basi	on child growth n systems as we	, develop	and learning of mat ment, and maturat ing dada; they have n period as well as	ion; they are experienced	
Possible barriers to learning in the lesson	mathemat	ics and met	thods	of tead	hing mathemat		ning needs, misconc ious efforts should		
Lesson Delivery – chosen to support students in achieving the outcomes	Face-to- face	Practical Activity	Wor		Seminars	Independent Stud	_	Practicum	
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes. • Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.	 Face-to-face and e-learning opportunities 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., The e-learning opportunities will include exploring number games and activities to develop properties of numbers and relationships between and among sets of numbers Independent study would include writing self-assessment and presenting reflective papers or journals. The purpose of the lesson is to; Introduce student teachers to the course manual to enable them develop awareness of what they are expected of in this lesson. develop student teachers' understanding of the nature and importance of mathematics, as well as, how to teach mathematics to Early Grade learners. Introduce the student teachers to prepare and model interactive, and innovative ways of teaching mathematics, especially, School Mathematics curriculum to Early Grade learners. 								
Learning Outcome for the lesson, picked and developed from the course specification Learning indicators for each learning outcome	and skills o	ate knowledgof observation ting on class and wider divities (in a School by tutors,	_	Pro ind proPro wo coo stu	duce well-prepa uction schedule cedures vide records of grk activities and/ perative learning dent teachers ingobservations	and group or	Identify Which issues- core and skills, inclusivity, addressing diversithese be addeveloped? Inclusion and E supporting stude to recognize insum and personal sconding conscious address them.	transferable equity and ity. How will dressed or quity: by dent teachers stitutional ources of ing and	

	Use age appropriate subject knowledge, pedagogical knowled and pedagogical corknowledge to teach Basic School Curricu in a broad, balanced relevant and creativ manner (NTS 2c, pg. 3e & 3g, pg. 14) [NT P1 (3), pg. 20] Demonstrate knowleand understanding of key features of the backbool curriculum (Eand specifically focu on mathematics curriculum and their associated expected learning outcomes (2a).	dge ntent the lum l, e . 13, ECF edge of the pasic asc); esing	•	developing teacher's self- awareness, beliefs, and values of teaching and learning (personal teaching philosophy)		 Characteristics and uniqueness of upper primary learners: By encouraging student teachers to develop awareness of how knowledge and understanding of child growth, development and maturation support young children's learning 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 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 	
Topic	Sub-topic(s)	Stage Time	/		outcomes depending	to activities to achieve learning on delivery mode selected.	
					Teacher-lead collabora Teacher Activity	tive group work or independent. Student Activity	
	Review	10mi	ns		Review the previous lesson by asking student teachers questions on basic fractional concepts (PD Theme 1)	Participate in the discussion to review the previous lesson; $\frac{1}{6} \text{ (One-sixth)}$	
WEEK 3 Fraction concepts	Meaning of fractions; Building an understanding of common fractions,	20 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,	
(Teaching and Assessing)	Finding equivalent fractions;	40	mins		Assign student teachers in groups to explore equivalent fractions (PD Themes 3 & 4)	 a sport on the number line, part of a group, or comparing two sets, and a ration of two integers, using variety of manipulatives such as paper folding, Cuisenaire rods, linoleum, etc to represent 	

	,			
			Engage student	fractions as rational numbers,
			teachers in a	equivalent, and/or operator,
		40 mins	discussion to develop	
			and order common	Engage student-teachers to
	Comparing and		fractions	develop the concept of
	ordering fractions.			equivalent fractions using models
			Engage student	and multi-purpose chart
			teachers in a	(multiplication table), fractional
		30 mins	discussion based on	boards, sets, etc.
			decimal fractions and	
	Decimal fractions		percent	Use area model or any similar
	and percent			manipulative to explore the
				relationships among common
				fractions, decimal fractions, and
		20 mins	Group student	percent. Use knowledge of
			teachers to	equivalent fractions to compare
			brainstorm and	and order fractions.
	Application of		outline real life	
	fractions in real		situations.	Engage in a think-pair-share
	life situations.			session to outline the strategies
		1		and materials (TLMs) suitable for
				teaching fractions. They list real
				life activities that contribute to
Lesson assessments –	Subject Por	rtfolio		the understanding of fractions.
evaluation of learning:of,	•		develon equivalent fracti	ons from locally available resources
for and as learning within			gues in their small group	
the lesson	Related CLO		, aco tricii oa 8. cap	
	NTS:	,		
	2b) Ha	s comprehensive	e knowledge of the officia	al school curriculum, including
	learnir	ng outcomes.		
	3m) Identif	ies and remedia	tes learners' difficulties o	r misconceptions, referring
	learners whose need		·	etency of the teacher.
Instructional Resources	Posters; video clips;	downloads; mod	dels, etc.	
Required Text (core)	Arthur, J., Grainger,			n the Early Grade. Canada: Taylor &
	Francis e-Libra	ry. <u>https://</u>	www.pdfdrive.com/learn	ing-to-teach-in-the-primary-school-
	d20209294.html			
				o: Math Solutions Publications.
			g-number-sense-grade-1-	nking classroom assessment with
		•		learning, assessment of learning.
				ent-as-learning-assessment-of-
	learning-d6259529.l		icht for learning assessin	ent as rearring assessment or
			ective Teachers' Underst	anding of Addition and Subtraction
				thematics Preparation of School
	Teachers, 2.		-	
Additional Reading List				from. New York: Basic Books.
			s for teacher training in ${\mathfrak C}$	Ghana: Tutor notes. Accra: Unimax
	Publishers.			Share a Charles at the
		94). Mathematic	s for teacher training in G	Ghana: Students activities.Accra:
CPD Needs	Unimax Publishers.	sign and for use a	como innovativo matarial	s and ideas for teaching salested
CPD Needs		-	some innovative material s of learning in Early Grad	s and ideas for teaching selected
			of home to school.	e maniemanes.
		-		ess of Early Grade learners.
				assessment of, as and for learning.
		-		ge student teachers on how to
			ios, journals and STS repo	
	l design and	produce portfol	ios, journais and STS repo	JI LS.

Year of B.Ed. 3 S	Semester 1	Place of lesson in semester	1 2 3 4 5 6 7 8 9 10 11 12
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Title of Lesson	Operation	s on fraction	s: (Teaching a	and Assessme	nt)	Lesson Duration	3 Hours			
Lesson description	Assessme an overvie teachers' current cli multiplyin is conside	This lesson focuses on developing an understanding of Operations on fractions: (Teaching and Assessment) with respect to operations on fraction within the basic school curriculum. It provides an overview of philosophies of mathematics and mathematics education and explores student teachers' beliefs about fractions in real life implicit in the official mathematics curriculum and current classroom practice. It also areas such as mental strategies for adding, subtracting, multiplying and dividing by fractions; Basic applications of fractions to real life. Another area that is considered is developing awareness of equity and diversity issues.								
Previous student teacher knowledge, prior learning (assumed) Possible barriers to	relation to have expe previous s	Student-teachers have been thought theories in the teaching and learning of mathematics, in relation to common concepts of fractions. They are exposed to basic concepts of sharing; they have experienced some mathematics during their basic and secondary education period and the previous semester of the B. Ed. Programme. Different entry behaviours, Socio-cultural issues, different learning needs, misconceptions about								
learning in the lesson	address th	nem before, c	during and af	ter the lesson	•	ous efforts should				
Lesson Delivery – chosen to support students in achieving the outcomes	Face-to- face	Practical Activity	Work- Based Leaning	Seminars	Independent Study	e-learning opportunities	Practicum			
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes. • Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.	The f class The e prop Indepor joi The purpo Introd they a Introd well a Introd teach	exploration, e-learning opperties of number bendent studiurnals. use of the less duce student are expected op student to as, how to tead duce the studing mathema	node will incl group preser portunities w bers and rela y would inclu son is to; teachers to t of in this less eachers' und ach mathema dent teacher atics, especia	ude lecturer/intations, think ill include expandionships beto de writing selutionships beto de writing selutionships de course mason. erstanding of tics to Early Gos to prepare ly, School Ma	-pair-share mo loring number ween and amo f-assessment a nual to enable the nature an rade learners. and model inf	class discussions, snaments, lecture, etc games and activitie ng sets of numbers and presenting refle them develop awa d importance of m eractive, and innoviculum to Early Grad	es to develop ctive papers reness of what athematics, as			
Learning Outcome for the lesson, picked and developed from the course specification	Learning (ng Indicators	core inclu dive add	isivity, equity an rsity. How will essed or developed	rable skills, d addressing l these be d?			
Learning indicators for each learning outcome	know under forms	 Demonstrate knowledge and understanding of forms and features of assessment; Identify and explain the various forms of fractions and within the basic school curriculum and self-assessment Assessment literacy: through modelling the use of assessment for, as, and of learning to help student teachers engage in peer and self-assessment 								
	know under key fe basic curric	onstrate ledge and rstanding of t eatures of the school ulum (BSC); a fically focusin	ind the properties	oduce well-pr duction sched ocedures	ule and	Equity and inclusivi equitable learning of for all learners				

	on mathematics curriculum and associated expelearning outcom (NTS, 2a). Demonstrate knowledge and understanding or changing face or educational assessment Use differentiat instruction to cafor the needs of children in the uprimary classroof including those special education needs and creat safe, secure, hall and stimulating learning enviror (NTS 3c 3f, pg. 1)	their cted hes Program lead of the f Ou difference of all all pipper om, with spinal cing a ppy still an another their still and still an another their still an another their still and still an another their still an another their still and still an another their still a	ovide records of pup work activities d/or cooperative arning for student achers during servations withing similarities and afferences among the rms of assessment differences among practice; volve those with ecial educational eds and creating a fe, secure, happy and mulating in teaching differences.	 Social and communication skills: consciously develop presentation skills during classroom instructions to support student teachers to develop mathematical language Personal development: Through presentation and developing of arguments Prepare and present STS observation activities to peers in their groups. 		
Topic	Sub-topic(s)	Stage/			activities to achieve learning	
		Time			delivery mode selected. group work or independent.	
			Teacher Activity		Student Activity	
	Review	20mins	Review the previous lesson by asking setachers relevant questions on oper on fractions (PD To	tudent rations	Participate in the discussion on the operations on fractions	
WEEK 4 Operations on fractions: (Teaching and Assessment)	Mental strategies for adding, subtracting, multiplying and dividing by fractions; Basic applications of fractions to real life.	40 mins 60 mins	Introduce the less through verbal ex and discussion on purposes of differ forms of assessment mathematics lear EARLY GRADE1-3; (PD Themes 1 & 3) Engage student to the various forms assessment tool—observation guided questionnaire, int protocol, tests (PD Themes 1 & 3) Assign student test explore various to working at each of following steps: p	eachers outline of errview achers to est by	engage in verbal exposition and discussion on purposes of different forms of assessment in mathematics learning in EARLY GRADE1-3 • assessment for learning (AfL), • assessment of learning (AoL) and • assessment as learning (AaL) as well as • syllabus guidelines for classroom assessment; Discuss (supported with video clips where applicable) the various forms of assessment tool – observation guide, questionnaire, interview protocol, tests (e.g. BECE, performance assessment.) - one-on-one tests (viz.	

		questions one after the	multiple choice,
		other with answers.	constructed response),
		(PD Themes 3 & 4)	group tests, focus group
			interview protocol, etc.) as
		Monitor student teachers	well as how they are
		to evaluate some teacher	administered.
		made tests to see if they	
		meet the following five	Design a test by working at
		criteria of a good test	each of the following steps:
		(PD Theme 1	purpose, format, test blue-
			print, writing well-defined
			questions one after the
			other with answers.
			Use interactive and
			collaborative group work to
			develop strategies for
			adding and subtracting fractions.
			Student-teachers are
			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 following five criteria of a good test:
			clarity, validity, practicality,
			efficiency and fairness
Lesson assessments –	Subject Project		,
evaluation of learning:	Student teache	rs are assigned a project on place value,	, equivalent fractions, decimal
of, for and as learning	number ar	d their applications. The various forms of	of assessment procedures and
	number ar practices a		of assessment procedures and
of, for and as learning	number ar practices a (in groups)	d their applications. The various forms on dits responsiveness to equity and inclu	of assessment procedures and usivity and to produce reports
of, for and as learning	number ar practices a (in groups) o review past BECE	d their applications. The various forms on the distribution its responsiveness to equity and inclumathematics questions for clarity, correct	of assessment procedures and usivity and to produce reports
of, for and as learning	number ar practices a (in groups) o review past BECE well as, write ass	d their applications. The various forms of the distribution of the	of assessment procedures and usivity and to produce reports
of, for and as learning	number ar practices a (in groups) o review past BECE well as, write ass Related CLOs: 1,	d their applications. The various forms of the distribution of the	of assessment procedures and usivity and to produce reports
of, for and as learning	number ar practices a (in groups) o review past BECE well as, write ass Related CLOs: 1, NTS:	d their applications. The various forms of the desired their applications. The various forms of the desired their applications to equity and inclumathematics questions for clarity, correct essment tasks based on	of assessment procedures and usivity and to produce reports ctness, and completeness, as
of, for and as learning	number ar practices a (in groups) o review past BECE well as, write ass Related CLOs: 1, NTS: 2f) Demons	d their applications. The various forms of the distribution of the	of assessment procedures and usivity and to produce reports ctness, and completeness, as
of, for and as learning	number ar practices a (in groups) review past BECE well as, write ass Related CLOs: 1, NTS: 2f) Demons mathematic 3j) Produce	d their applications. The various forms of the responsiveness to equity and inclumathematics questions for clarity, correct essment tasks based on 4 trate value as well as respect for equity a cs classroom (knowledge) is and uses a variety of teaching and learning and learning the respect for equity and uses a variety of teaching and learning and learning and uses a variety of teaching and learning and le	of assessment procedures and usivity and to produce reports ctness, and completeness, as and inclusion in the
of, for and as learning	number ar practices a (in groups) review past BECE well as, write ass Related CLOs: 1, NTS: 2f) Demons mathematic 3j) Produce enhance led	d their applications. The various forms of the responsiveness to equity and inclumathematics questions for clarity, correct essment tasks based on 4 trate value as well as respect for equity a cs classroom (knowledge) is and uses a variety of teaching and learning	of assessment procedures and usivity and to produce reports ctness, and completeness, as and inclusion in the
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of, for and as learning	number ar practices a (in groups) review past BECE well as, write ass Related CLOs: 1, NTS: 2f) Demons mathematic 3j) Produce enhance led	In their applications. The various forms of the responsiveness to equity and inclumathematics questions for clarity, correct essment tasks based on 4 It trate value as well as respect for equity a cs classroom (knowledge) as and uses a variety of teaching and learning the 7th week of the semester.	of assessment procedures and usivity and to produce reports ctness, and completeness, as and inclusion in the
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	Martin, J. et. al. (1994). <i>Mathematics for teacher training in Ghana: Students activities</i> .Accra: Jnimax 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 EARLY GRADE1-3. How to manage transition of home to school. Understand the various characteristics and uniqueness of Early Grade learners. How to design tasks for assessment procedures for assessment of, as and for learning. Instructional strategies needed to consciously engage student teachers on how to design and produce portfolios, journals and STS reports. 						

Year of B.Ed. 3	Semester 1	Place of lesson in semester	1234 5 6789101112
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Title of Lesson	Micro Less	azıı bne znoz	of tec	hnology	y across Early Gra	ade	Lesson Duration	3 Hours		
Title of Lesson		: (Teaching a				aue	Lesson Daration	3110013		
Lesson description	This lesson focuses on developing an understanding of Micro Lessons and use of technology									
	across Early Grade numeracy: (Teaching and Assessing) and how an understanding of									
		mathematics develops from creative activities. It provides an overview of philosophies of								
							teachers' beliefs a			
							fficial mathematics			
	and currer	nt classroom	pract	ice. It al	so covers Micro	Lessons an	d use of technolog	y across Early		
	Grade nur	neracy, and a	associ	ated the	eories, and other	psycholog	ical factors influen	cing learning.		
	Another a	rea that is co	nside	red is de	eveloping awarei	ness of equ	uity and diversity is:	sues.		
Previous student teacher	Student-te	eachers have	been	though	t theories in the	teaching a	and learning of ma	thematics, and		
knowledge, prior learning	are famili	ar with con-	cepts	based	on child growth	, develop	ment, and matura	tion; they are		
(assumed)	exposed t	o number ar	nd nui	meratio	n systems as we	ll as hand	ing dada; they hav	e experienced		
	some mat	hematics dui	ring th	neir basi	c and secondary	education	period.			
Possible barriers to	Different	entry behav	viours	, Socio-	cultural issues,	different	learning needs, n	nisconceptions		
learning in the lesson	about mat	thematics an	d met	hods of	teaching mather	matics. Co	nscious efforts shou	uld be made to		
	address th	em before, o	during	and aft	er the lesson.					
Lesson Delivery – chosen	Face-to-	Practical	Wor		Seminars	Indepen		Practicum		
to support students in	face	Activity	Base			ent Stud	·			
achieving the outcomes			Lear	ning						
			Ш							
Lesson Delivery - main	_									
mode of delivery chosen	_	ice and e-lea	_							
to support student							class discussions,			
teachers in achieving the				-			oments, lecture, et			
learning outcomes.						-	r games and activit			
							ong sets of number			
	-		ly wou	ıld inclu	de writing self-as	ssessment	and presenting refl	ective papers		
		urnals.								
Purpose for the		se of the les								
lesson, what you						iual to ena	able them develop	awareness of		
want the students to		they are exp								
achieve, serves as					_		d importance of m	athematics, as		
basis for the learning outcomes. An					tics to Early Grad					
expanded version of							teractive, and inno	vative ways of		
the description.		_		-	ly, micro-teachin	-				
	Learning (пі теа		a future mathe	matics cias	Identify Which	cross-cutting		
Learning Outcome for the lesson picked	Learning	Julcomes		Learnin	g Indicators		issues- core and	•		
the lesson, picked and developed from							skills, inclusivity			
the course							addressing divers			
specification								ddressed or		
Learning indicators							developed?	auresseu or		
for each learning	Demonstr	ate knowled	ge	• De:	sign and produce	well-	Equity and in	clusivity.		
outcome		of observation			pared induction		Providing eq			
		ting on class			edule and proce			ortunities for		
	teaching a	-		551		. ==	all learners			
	school act			• Sho	ow evidence of k	eeping				
	School 1)	•			ords of group w		Assessment I	iteracv:		
	(College &	School			ivities and/or		through mod			
	induction				perative learnin	g for	effective rec			
	school hed				dent teachers du	-		. 0		
		nd mentors)			servations	3				
		•			-					

	Demonstrate knowle and understanding of the features of the basic school curriculum (E and specifically focu on mathematics curriculum and their associated expected learning outcomes (2a). Demonstrate skills in preparing and writing a persor teaching philosophy statemer (NTS, 1f)	discusion discusion de key control de key school de key school de key de		ssions with mentors eers on the key res of the official basic of curriculum fied key features in 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 tion and observation udent teachers in their os.	 Communication skills: through critiquing and presentations Personal development: Through developing and presentation of records Social and communication skills: consciously develop presentation skills during classroom instructions to support student teachers to develop mathematical language 		
Topic	Sub-topic(s)	Stage/ Time		Teaching and learning to activities to achieve learning outcomes depending on delivery mode selected.			
				Teacher-lead collaborative group work or independent.			
				Teacher Activity	Student Activity		
	Review	10mins		Review the previous lesson by asking student teachers relevant questions on the need for planning micro lessons. (PD Theme 1)	Participate in the discussion on the need for classroom assessment in mathematics during micro planning and teaching.		
WEEK 5 Micro Lessons and use of technology across Early Grade numeracy 1	Importance of lesson planning	40 mins		Introduce the lesson on verbal exposition and discussion on purposes of different forms of assessment in mathematics learning in EARLY GRADE1-3; (PD Themes 1 &3)	Initiate verbal exposition and discussions on importance of lesson planning, micro lesson planning formats and technology use in teaching mathematics at the Early Grade level.		
	Micro lesson planning formats	40 mins		Micro lesson planning formats Engage student teachers in planning and carrying out micro teaching with peers.	Engage in small group preparation using variety of locally available TLMs (observing and/or watching video clips) on teaching mathematics in the Early Gradeand doing a critic		
	Design of micro lessons	40 mins		Guide student teachers in planning micro lessons based on using mathematical learning pedagogy and resources to critique a mathematics lesson (PD Themes 1 & 3)	based on using verbal exposition and discussions on lesson planning, micro lesson planning formats and technology use in teaching mathematics across upper primary		
		30 mins		Engage students in post- lesson discussions using prepared guidelines for micro teaching.	Read teaching scenarios (and/or watching video clips) on teaching numeracy in the EG and doing a critic based on using mathematical learning theory		

Lesson assessments – evaluation of learning: of,	Engage in post-lesson discussion with colleagues to establish good practices in teaching mathematics in the Early Grade. Subject Portfolio Assign student teachers to plan, design, and prepare manipulatives and other models			
for and as learning within the lesson	 to teach selected concepts in Early Grademathematics using locally available and/or IT resources Prepare and model interactive, and innovative ways of teaching mathematics, including, micro-teaching to Early Grade learners, with emphasis on multiple teaching strategies that promote equity and inclusivity. Related CLOs: 1, 3, 4 			
	NTS: 2 b) Has comprehensive knowledge of the official school curriculum, including learning outcomes. 2b) Has comprehensive knowledge of the official school curriculum, including learning outcomes3m) Identifies and remediates learners' difficulties or misconceptions, referring learners whose needs lie outside the competency of the teacher.			
Instructional Resources	Posters; video clips; downloads; models, etc.			
Required Text (core)	Arthur, J., Grainger, T. & Wray, D. (2006). Learning to Teach in the Early Grade. Canada: Taylor & Francis e-Library. https://www.pdfdrive.com/learning-to-teach-in-the-primary-school-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 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. 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. 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. https://www.pdfdrive.com/sssessment-beachers (2014). Developing Prospective Teachers' Understanding of Addition 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 selected concepts based on Classroom assessment in mathematics in EARLY GRADE1-3. How to manage transition of home to school. Understand the various characteristics and uniqueness of Early Grade learners. How to design tasks for assessment procedures for assessment of, as and for learning. Instructional strategies needed to consciously engage student teachers on how to design and produce portfolios, journals and STS reports. 			

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

This of Lance	Di		··			D	
Title of Lesson	_		tion; assessmen		cords, L	esson Duration	3
Losson description	and monitoring progress: (Teaching and Assessing) This lesson focuses on developing an understanding of Diagnosis and remediation; assessment						
Lesson description							
					-	ssing) and how an u	_
		of mathematics develops. It provides an overview of philosophies of mathematics and mathematics education and explores student teachers' beliefs about mathematics and					
			•				
						curriculum and curr	
	-					ss Early Grade nume	-
				_	_	earning. Another are	ea that is
Burnitana atudant			ng awareness of				h
Previous student teacher knowledge,			_		_	nd learning of mat and maturation; the	
<i>J</i> ,				-	•		
prior learning					_	a; they have expe	nencea some
(assumed)			eir basic and sec				
Possible barriers to						ing needs, misconc	
learning in the lesson			_		. Conscious e	efforts should be ma	ide to address
Lesson Deliver			d after the lesso		I mada mara ara	a learning	Duo et acces
Lesson Delivery –	Face-to-	Practical Activity	Work-Based	Seminars	Independ	e-learning	Practicum
chosen to support	face		Leaning		ent Study	opportunities	
students in achieving				Ш			
the outcomes							
Lesson Delivery – main mode of delivery	Eaco to fa	so and a loa	rning annartuni	tios			
•	-		rning opportuni		::		
chosen to support						ass discussions, sma	an group in
student teachers in						nents, lecture, etc.,	A a damatan
achieving the learning						games and activities	to develop
outcomes.				-		g sets of numbers	. •
			y would include	writing self-as	ssessment ar	nd presenting reflect	tive papers or
5 ()	journ						
Purpose for the		se of the less	•				
lesson, what you					al to enable	them develop awar	eness of what
want the students	,		of in this lesson.				
to achieve, serves as basis for the						d importance of ma	itnematics, as
			ch mathematics				
learning						eractive, and innov	ative ways of
outcomes. An			tics, especially,				
expanded version	• Prepa	re the studer	nt teacher for a	future mathe	matics classr	oom	
of the description.	Loarning C	Jutcomoc	Learning I	ndicators	1	dentify Which	cross-cutting
Learning Outcome for the lesson	Learning C	outcomes	Learning I	ilulcators			transferable
for the lesson,						kills, inclusivity,	equity and
picked and developed from						ddressing diversit	
the course							•
specification							
• Learning	 Demonstrate Exhibit knowledge and Needs of the student 						
Learning indicators for each				_			the student
		ledge and		ation of learn	-	teachers: identify and	Consciously
learning outcome		standing of of plan, desig		y, content kno g children's	wieuge,	needs of stud	
				g children's opmental nee	ds and	and to inspir	
		evelop priato plan f		•		•	ransfer of
		priate plan for o lesson		o use these to			ansier of
	a micr	o iesson		to meet the	-	knowledge	
			grade	curriculum go	Jais		

	Demonstrate competencies in using differentiated instructional strategies, with a focus on a thematic approach and which promotes learner-centred to cater for the needs of all learners, including those with SEN (NTS 3f, pg. 14) Demonstrate knowledge and understanding of the key features of the basic school curriculum (BSC); and specifically focusing on mathematics curriculum and their associated expected learning outcomes (NTS, 2a). Demonstrate skills in preparing and writing a personal teaching	 Plan a lesson using strategies that match the level of thinking needed by EARLY GRADEpupils Show records of specific observations from wider school environment and induction Report on small group discussions with mentors and peers on the key features of the official basic school curriculum List identified key features in the BSC. Provide a write-up of the developing teacher's self-awareness, beliefs, and values of teaching and learning (personal teaching philosophy) 		 Respect and diversity: designing lesson for diverse learners with different learning styles 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 Communication skills: through critiquing and presentations 	
Topic	philosophy statement (NTS, 1f) Sub-topic(s)	Stage/	Teaching and learnin	g to activities to achieve learning	
·		Time outcomes depending		g on delivery mode selected. ative group work or independent.	
			Teacher Activity	Student Activity	
	Review	10mins	Review the previous lesson by asking student teachers relevant questions on lesson planning (PD Theme 1)	Participate in the discussion on micro lesson planning	
	Introduction	20 mins	Introduce the lesson on verbal exposition	Discusses feedback of previous micro lesson for feedback and	
WEEK 6 Diagnosis and remediation; assessment resources/records, and monitoring progress:	Misconception diagnosis, 50 min Classroom assessment resources and records nterpreting data/reports		and discussion on micro lessons (PD Themes 1 &3) Engage student teachers in a discussion to outline the various forms of	application. Design tools to diagnose misconceptions and designing/implementing remediation from the discussion of the various forms of lessons planning in mathematics	
(Teaching and Assessing)	on performance and providing feedback Evaluating performance and monitoring Progress,	60 mins	lessons planning in mathematics (PD Themes 1 & 3) Assign student teachers in groups to prepare lesson plans, discuss and model	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,	

	40.	mins	micro teaching in the class.	cumulative records forms, report forms, etc.,	
	401	1111115	Class.	Study and complete student's	
			(PD Themes 3 & 4)	cumulative record form	
			Monitor student teachers teaching skills (PD Theme 1	Analyse learners' performance (or assessment data) to provide feedback to stakeholders – students, colleagues and parents, PTA and role playing a School Performance Appraisal Meeting (SPAM)	
Lesson assessments –	Subject Portfolio Assign student teachers to critique the new lesson format and use it to prepare a sample lesson				
evaluation of learning: of, for and as learning	_			RLY GRADE mathematics curriculum	
within the lesson	through small group activity for			NET GRADE mathematics carriedam	
	Related CLOs: 1, 2, 3	, , , , ,			
	NTS:				
				ulum, including learning outcomes.	
	2b) Has comprehensive knowledge of the official school curriculum, including learning outcomes				
	3m) Identifies and remediates learners' difficulties or misconceptions, referring learners whose needs lie outside the competency of the teacher.				
	Note: The assessment procedures should make room for differentiation - gender, equity, SEN, and				
	inclusivity.				
Instructional	Posters; video clips; downloads;	model	s, etc.		
Resources					
Required Text (core)	Arthur, J., Grainger, T. & Wray, D. (2006). Learning to Teach in the Early Grade. Canada: Taylor &				
	Francis e-Library. https://www.pdfdrive.com/learning-to-teach-in-the-primary-school-d2020204 html				
	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 mind: assessment for learning, assessment as learning, assessment of learning.				
	https://www.pdfdrive.com/assessment-for-learning-assessment-as-learning-assessment-of-				
	<u>learning-d6259529.html</u> . 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, G. & Núñez, R. E. (2000). Where Mathematics comes from. New York: Basic Books.				
List	Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Tutor notes. Accra: Unimax				
	Publishers.				
	Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Students activities. Accra: Unimax Publishers.				
CPD Needs		:h math	nematics using the new	B. ED. Curriculum, NTS, NTECF, etc	
	 How to design and teach mathematics using the new B. ED. Curriculum, NTS, NTECF, etc How to design and/or use some innovative materials and ideas for teaching selected 				
	concepts based on Classroom assessment in mathematics in EARLY GRADE1-3.				
	 How to manage transiti 				
	Understand the various characteristics and uniqueness of Early Grade learners.				
	How to design tasks for assessment procedures for assessment of, as and for learning.				
	Instructional strategies needed to consciously engage student teachers on how to design				
	and produce portfolios, journals and STS reports.				

Year of B.Ed. 3 Semester	1 Place of lesson in semester	123456 7 89101112
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Title of Lesson	Shape, Spa	ace and Mea	surement: (Teaching and A	Assessment)	Lesson Duration	3 Hours	
Previous student teacher knowledge, prior learning (assumed)	This lesson focuses on developing an understanding of Teaching and Assessing Early Grade Mathematicsespecially, Shape, Space and Measurement: (Teaching and Assessment) and how an understanding of mathematics develops. It provides an overview of philosophies of mathematics and mathematics education and explores student teachers' beliefs about mathematics and philosophies of mathematics implicit in the official mathematics curriculum and current classroom practice. It also covers 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). Another area that is considered is developing awareness of equity and diversity issues. Student-teachers have been thought theories in the teaching and learning of mathematics, and are familiar with concepts based on child growth, development, and maturation; they are exposed to number and numeration systems as well as handling dada; they have experienced some mathematics during their basic and secondary education period, as well as the previous							
Possible barriers to learning in the lesson	mathemat	entry behavi	thods of te		ematics. Consc	ning needs, misconcious efforts should		
Lesson Delivery – chosen to support students in achieving the outcomes	Face-to- face	Practical Activity	Work- Based Leaning	Seminars	Independent Study	e-learning opportunities	Practicum	
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	 The factors The expression Independent 	exploration, -learning op erties of num pendent stud	node will in group prese portunities abers and re	clude lecturer/ entations, thinl will include exp lationships bet	c-pair-share mo oloring number ween and amo	class discussions, smoments, lecture, etc., games and activities ong sets of numbers and presenting reflec	s to develop	
Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.	The purpo Introd they a develor well a Introd teach learner	 they are expected of in this lesson. develop student teachers' understanding of the nature and importance of mathematics, as well as, how to teach mathematics to Early Grade learners. 						
Learning Outcome for the lesson, picked and developed from the course specification	Learning (acher for a future mathematics cla		Identify Which issues- core and skills, inclusivity, addressing diversit these be add	equity and	
Learning indicators for each learning outcome	and under concepts of how these to EARLY of (professio	ate knowled estanding of of integers ar e can be taug GRADE pupils nal values, e & practice)	nd a ht s	delect and use developmental appropriate montrategies for to the physical, community and development outlinessent learn development outlinessent development developmen	odels and eaching mphasize ognitive, social f the early	Ethics and value teaching: throus supporting stude to understand demonstrate the profession mind the unique characteristics adolescent lear	igh dent teachers and ne ethics of bearing in ie of the early	

	Demonstrate competencies in devising and using differentiated instructional strategies, with a focus on a thematic approach and which promotes practical-based learning to cater for the needs of all children in the EARLY GRADE classroom, including those with SEN (NTS 3f, pg. 14)		learners use in developing concepts in integers such as operations on integers • Use knowledge gained from earning theories in mathematics to design appropriate problemsolving tasks. • Recognise and use developmentally appropriate and positive behaviour management skills		 Problem solving, critical and creative thinking: through objective analysis of facts and concept that will lead to creative thinking 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 	
Topic	Sub-topic(s)	Stage	e/		activities to achieve learning on delivery mode selected.	
		111116			group work or independent.	
				Teacher Activity	Student Activity	
	Review	10mins		Review the previous lesson by asking student teachers relevant questions lesson planning (PD Theme 1)	Participate in the discussion on micro lesson planning	
	Spatial visualization; concept of space;	2	0 mins	Introduce the lesson on integers as shape and space. (PD Themes 1 & 3) Lead discussions on concept of shape and space. (PD Themes 1 & 3)	Initiate verbal exposition and discussions on integers and technology use in teaching of shape and space. Provide student-teachers with e-learning opportunities to explore the	
WEEK 7 Shape, Space and Measurement: (Teaching and Assessment)	line segments, angles and shapes; 3-D (faces, vertices, edges and their relationships) and 2-D shapes (types	40 mins 40 mins 70 mins		Assign student teachers in groups to determine perimeters and areas of 2-D shapes Establish individual/ group project work to help student teachers	Use models of 3-D shapes for practical investigation to explore the relationship among the number of faces, edges, and vertices of given shapes.	
	and properties); Measurable attributes of objects including length, angle, area, volume and capacity, mass, weight, time and money			develop understanding of such attributes as length, angle, area, volume and capacity, time, and money	Use guided independent study, student-teachers find areas and perimeters of 2-D shapes. Use individual/group project work to develop understanding of such attributes as length, angle, area, volume and capacity, time, and money.	

Lesson assessments –	Subject Portfolio
evaluation of learning:	Assign student teachers to complete teacher-made worksheets on length, angle, area, volume
of, for and as learning	and capacity, mass, weight, time and money(provide immediate feedback)
within the lesson	Related CLOs: 1, 2, 3
	NTS:
	2 b) Has comprehensive knowledge of the official school curriculum, including learning
	outcomes.
	2b) Has comprehensive knowledge of the official school curriculum, including learning
	outcome3m) Identifies and remediates learners' difficulties or misconceptions, referring learners
	whose needs lie outside the competency of the teacher.
	SubjectProject
	Collection and discussion of Projectto be graded later
	Note: The assessment procedures should make room for differentiation - gender, 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 Early Grade. Canada: Taylor &
	Francis e-Library. https://www.pdfdrive.com/learning-to-teach-in-the-primary-school-
	<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 teach mathematics using the new B. ED. Curriculum, NTS, NTECF, etc
	How to design and/or use some innovative materials and ideas for teaching selected
	concepts based on Classroom assessment in mathematics in EARLY GRADE1-3.
	How to manage transition of home to school.
	 Understand the various characteristics and uniqueness of Early Grade learners.
	 How to design tasks for assessment procedures for assessment of, as and for learning.
	 Instructional strategies needed to consciously engage student teachers on how to
	design and produce portfolios, journals and STS reports.

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

Title of Lesson	Handling [Data and Cha	nce: (Teachir	ng and Assess	ing)	Lesson Duration	3 Hours	
Previous student teacher knowledge, prior learning (assumed) Possible barriers to	This lesson focuses on developing an understanding ofTeaching and Assessing Early Grade Mathematics and about how people think about mathematics and how an understanding of mathematics develops. It provides an overview of philosophies of mathematics and mathematics education and explores student teachers' beliefs about mathematics and philosophies of mathematics implicit in the official mathematics curriculum and current classroom practice. It also covers Handling Data and Chance(Teaching and Assessing), and other psychological factors influencing learning. Another area that is considered is developing awareness of equity and diversity issues. Student-teachers have been thought theories in the teaching and learning of mathematics, and are familiar with concepts based on child growth, development, and maturation; they are exposed to number and numeration systems as well as handling dada; they have experienced some mathematics during their basic and secondary education period. Different entry behaviours, Socio-cultural issues, different learning needs, misconceptions about mathematics and methods of teaching mathematics. Conscious efforts should be made to							
learning in the lesson				_		cious efforts should	be made to	
Lesson Delivery – chosen to support students in achieving the outcomes	address the Face-to-face	em before, of Practical Activity	during and af Work- Based Leaning	Seminars	Independen Study	t e-learning opportunities	Practicum	
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	 The factorized class The expression proper Indeptorized class 	ace-to-face nexploration, learning operties of numberdent stud	group preser portunities w bers and rela	ude lecturer/ ntations, think ill include exp ntionships bet	c-pair-share moloring numbe ween and am	I class discussions, sm oments, lecture, etc., or games and activities ong sets of numbers and presenting reflec	s to develop	
Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the	 Introduction they a developed well a Introducteaching learner 	 they are expected of in this lesson. develop student teachers' understanding of the nature and importance of mathematics, as well as, how to teach mathematics to Early Grade learners. 						
description.	Prepa Learning C			r a future ma	thematics clas	Identify Which	cross-cutting	
Learning Outcome for the lesson, picked and developed from the course specification Learning indicators						issues- core and skills, inclusivity, addressing diversit these be addeveloped?	transferable equity and ty. How will dressed or	
for each learning outcome	EARLY GRA mathemat and learni covering n	nsive of the officition ADE cics curriculuing outcomes umber and ionships, wit	of no place tech mathem as a deep thin the control of no place the control of	v a good under umber relation when relation with a wall was for proper and means of proper number secontext of mudivision of interest of mudicipal managements.	nships and all as using actical estimation moting a ense within Itiplication	 Problem solving creative thinking objective analyand concept the creative thinking 	ing: through ysis of facts at will lead to	

	Demonstrate knowledge of instructional practices for teaching the EARLY GRADE mathematics curriculum(NTS 3e)	 can make children mathematically proficient using multiple strategies that are appropriate for concepts of integers show evidence of enjoying mathematics and have confidence in their abilities to do mathematics carry out basic mathematics instructional routines for EARLY GRADE pupils, including drill and practice, reinforcement activities and engage learners in mathematical discourse justify and explain one's instructional practices and reflect on those practices for improvementwithin the context of properties of integers plan effective instruction and solve problems that arise during instructioninvolving application of integers in real life 		 Problem solving, critical and creative thinking: through objective analysis of facts and concept that will lead to creative thinking Personal development: Through planning, teaching, and assessing both individually and in small groups, and sharing their experiences with peers 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 		
Topic	Sub-topic(s)	Stage/ Time		ng to activities to achieve learning on delivery mode selected.		
			Teacher-lead collabora	rative group work or independent. Student Activity		
			Teacher Activity	·		
	Review	10mins	Review student teachers knowledge of sets of objects (PD Theme 1)	Participate in the discussion on Data and Chance		
	Introduction Collecting, interpreting	20 mins	Introduce student teachers to what Data and Chance are (PD Themes 1 &3)	Initiate verbal exposition and discussions what Data and Chance are		
WEEK 8 Handling Data and Chance (Teaching and Assessing)	and presenting data in multiple ways; Measures of central tendencies, Graphical or pictorial, representation (including stem and leaf plots, five	60 mins	lead discussions on operation on integers, especially, multiplication and division of integers (PD Themes 1 & 3)	Use group and individual projects to collect data based on events happening within and out of the school organization. Use group and individual presentations to discuss how to organize, present, and interpret the data collected.		
	number summary, box plots). Chance: sample space; events; basic properties of chance.	60 mins	Assign student teachers in groups to outline how to Collect, interpret and present data in multiple ways Lead student	Use games and practical activities to introduce the concept of chance. Engage student-teachers through group work to explore the		

		50 mins	teachers to explore the concepts of sample space, events, and basic properties of chance through group activities	concepts of sample space, events, and basic properties of chance			
Lesson assessments –	SubjectProject	I					
evaluation of learning: of, for and as learning within the lesson	Student teachers are assigned to design appropriate teaching and learning materials for Collecting, interpreting and presenting data and chance10 th week Related CLOs: 3, 5, 6 NTS:						
	 2 b) Has comprehensive knowledge of the official school curriculum, including learning outcomes. 2b) Has comprehensive knowledge of the official school curriculum, including learning outcomes 3m) Identifies and remediates learners' difficulties or misconceptions, referring learners whose needs lie outside the competencyof the eacher. 						
	Note: The asses equity, SEN,			room for differentiation - gender,			
Instructional Resources	Posters; video clips; downlo		,				
Required Text (core)	Arthur, J., Grainger, T. & Wray, D. (2006). Learning to Teach in the Early Grade. Canada: Taylor & Francis e-Library. https://www.pdfdrive.com/learning-to-teach-in-the-primary-school-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 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. 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.						

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

Title of Lesson	Rational ar	nd Irrational I	Numb	per 1			Lesson Duration	3 Hours
Lesson description Previous student teacher	Mathemati mathemati mathemati philosophic classroom other psycl awareness	This lesson focuses on developing an understanding of Teaching and Assessing Early Grade Mathematics and about how people think about mathematics and how an understanding of mathematics develops. It provides an overview of philosophies of mathematics and mathematics education and explores student teachers' beliefs about mathematics and philosophies of mathematics implicit in the official mathematics curriculum and current classroom practice. It also covers Rational and Irrational numbers and associated theories, and other psychological factors influencing learning. Another area that is considered is developing awareness of equity and diversity issues. Student-teachers have been thought theories in the teaching and learning of mathematics, and						
knowledge, prior learning (assumed) Possible barriers to	are familia exposed to some math Different e	or with conce onumber and nematics duri ntry behavio	epts d nur ing th ours, S	based of meration leir basion culon	on child growth n systems as we c and secondary Itural issues, diff	, develope II as hand education erent lear	ment, and maturat ling dada; they have period. ning needs, miscond	ion; they are experienced eptions about
learning in the lesson					thing mathemat er the lesson.	ics. Consc	ious efforts should	be made to
Lesson Delivery – chosen to support students in achieving the outcomes	Face-to- face	Practical Activity	Wor Base Lean	k- ed	Seminars	Independent Studio	_	Practicum
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes. • Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.	The factors of the class of the eprope Indeproor jou The purpose Introdu what to develowell as Introducted teaching the class of the c	exploration, gelearning opporties of number endent study rnals. See of the less uce student hey are expenses, how to tear uce the student marg mathemar	on is teacher the control on is the control on its original original on its original origina	will include present inties with and related to; hers to of in this rs' under athemat eachers especially cher for	ide lecturer/tuto tations, think-pa Il include explori tionships betwee de writing self-as the course man s lesson. rstanding of the ics to Early Grad to prepare and y, Rational and In a future mathel	ir-share m ng numbe en and am sessment ual to end nature an e learners model intrational n	teractive, and innov numbers to Early Grassroom	es to develop ective papers awareness of athematics, as rative ways of ide learners.
Learning Outcome for the lesson, picked and developed from the course specification Learning indicators	Learning O	utcomes		Learnin	g Indicators		Identify Which issues- core and skills, inclusivity, addressing divers these be addeveloped?	transferable equity and
for each learning outcome	and unders key feature school curr and specifi on rational numbers (N Demonstra of socio-cu teaching ar	ite awarenes Itural issues	he ic); g al	exective active artist that mattern active amount active a	icipate in planning interesting instruction wities that can may adolescents be hematically profis, understand hematical ideas, age in logical reated on relationships the various and real number so	nal ake come icient; and soning ps spects	 Personal devel Through plann and assessing lindividually an groups, and sh experiences w Problem solving creative thinking objective and and concept the creative thinking 	ing, teaching, both d in small aring their th peers ag, critical and king: through lysis of facts at will lead to

	Demonstrate knowledge and conceptual understanding of number with focus on rational and irrational numbers Demonstrate competencies in using manipulative and TLMs including ICT in a variety of ways in teaching fractions and decimal concepts (NTS 3j) Value as well as respect equity and inclusivity in the mathematics classroom (NTS 2f; NTECF 39)	 identify and design tasks for teaching important mathematical ideas in number to EARLY GRADE pupils identify a variety of manipulative and TLMs for teaching important mathematical ideas such as operations and properties of rational and irrational numbers Use ICT as a tool in supporting EARLY GRADE pupils in learning number Appreciate the contributions of, and support, colleagues in the mathematics classroom Cooperate with colleagues in carrying out mathematical tasks in a variety of ways Engage in reflective thinking about how mathematics was taught in their basic school days. 		 Personal development: Through presentation and developing of arguments Use of ICT: Integrate ICT in developing number and in the mathematics classroom Use of ICT: Integrate ICT in developing number and in the mathematics classroom Respect and diversity: designing lesson for diverse learners with different learning styles Social and communication skills: consciously develop observation and presentation skills during classroom instructions to support student teachers to transfer this to STS 		
Topic	Sub-topic(s)	Stage/ Time		g to activities to achieve learning g on delivery mode selected.		
		Teacher-lead collai		aborative group work or		
			Teacher-lead colla independent.	borative group work or		
				Student Activity		
	Review	10mins	independent. Teacher Activity Review the previous lesson on rational numbers as related to real number system.			
	The Real number system	10mins	independent. Teacher Activity Review the previous lesson on rational numbers as related to real number	Student Activity Participate in the discussion on various aspects of the real		
WEEK 9 Rational and Irrational	The Real number system relationships among the various aspects of real number system	50 mins	independent. Teacher Activity Review the previous lesson on rational numbers as related to real number system. (PD Theme 1) Introduce the lesson on Real number system; (PD Themes 1 & 3) Lead discussions on how to connect the various real number systems	Student Activity Participate in the discussion on various aspects of the real number system. Initiate verbal exposition and discussions on integers and technology use in Real number system across the EARLY GRADE curriculum. Use manipulatives to establish the relationship between and among the various real number		
	The Real number system relationships among the various aspects of real		independent. Teacher Activity Review the previous lesson on rational numbers as related to real number system. (PD Theme 1) Introduce the lesson on Real number system; (PD Themes 1 & 3) Lead discussions on how to connect the various real number systems (PD Themes 1 & 3) Lead discussions on properties and	Participate in the discussion on various aspects of the real number system. Initiate verbal exposition and discussions on integers and technology use in Real number system across the EARLY GRADE curriculum. Use manipulatives to establish the relationship between and		
Rational and Irrational	The Real number system relationships among the various aspects of real number system Operations and properties of rational	50 mins	independent. Teacher Activity Review the previous lesson on rational numbers as related to real number system. (PD Theme 1) Introduce the lesson on Real number system; (PD Themes 1 & 3) Lead discussions on how to connect the various real number systems (PD Themes 1 & 3) Lead discussions on	Participate in the discussion on various aspects of the real number system. Initiate verbal exposition and discussions on integers and technology use in Real number system across the EARLY GRADE curriculum. Use manipulatives to establish the relationship between and among the various real number systems.		

			outline real number system.	application of rational numbers in real life.				
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	Subject Portfolio Assign student teachers to complete teacher-made worksheets on operations and properties of rational and irrational numbers as found in the EARLY GRADE mathematics curriculum (provide immediate feedback) Related CLOs: 1, 2, 3 NTS: 2 b) Has comprehensive knowledge of the official school curriculum, including learning outcomes. 2b) Has comprehensive knowledge of the official school curriculum, including learning outcomes 3m) Identifies and remediates learners' difficulties or misconceptions, referring learners whose needs lieoutside the competency of the teacher. Note: The assessment procedures should make room for differentiation - gender, equity, SEN, and inclusivity.							
Instructional Resources	Posters; video clips; downlo							
Required Text (core)	Arthur, J., Grainger, T. & Wray, D. (2006). Learning to Teach in the Early Grade. Canada: Taylor & Francis e-Library. https://www.pdfdrive.com/learning-to-teach-in-the-primary-school-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 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. 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. https://www.pdfdrive.com/sssessment-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.							

Year of B.Ed. 3 Semest	er 1	Place of lesson in semester	123456789 10 1112
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Title of Lesson	Fractions	1			Lesson Du	ration 3	Hours	
Lesson description	This lesson focuses on developing an understanding of Teaching and Assessing Early Grade Mathematics and about how people think about mathematics and how an understanding of mathematics develops. It provides an overview of philosophies of mathematics and mathematics education and explores student teachers' beliefs about mathematics and philosophies of mathematics implicit in the official mathematics curriculum and current classroom practice. It also covers children's developmental stages, how children learn mathematics and associated theories, and other psychological factors influencing learning of fractions. Another area that is considered is developing awareness of equity and diversity issues.							
Previous student teacher knowledge, prior learning (assumed) Possible barriers to	are famili exposed t some mat	Student-teachers have been thought theories in the teaching and learning of mathematics, and are familiar with concepts based on child growth, development, and maturation; they are exposed to number and numeration systems as well as handling dada; they have experienced some mathematics during their basic and secondary education period. Different entry behaviours, Socio-cultural issues, different learning needs, misconceptions about						
learning in the lesson	mathemat	tics and met	nods of tead	ching mathemater the lesson.		-		
Lesson Delivery – chosen to support students in achieving the outcomes	Face-to- face	Practical Activity	Work- Based Leaning	Seminars	Independ ent Study	e-learning opportunities	Practicum	
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes. • Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.	The free class The e prope Indepor jou Introduction Here purpo Introduction Here purpo	exploration, ge-learning opperties of number study urnals. Use of the less duce student they are experient they are experient to the student test, how to tear duce the student ing mathematics.	ode will inclustroup present ortunities with the control of the co	ude lecturer/tutor tations, think-particular include exploritionships between de writing self-asset the course manalis lesson. Erstanding of the tics to Early Grace to prepare and ly, fractions to Early the test to Early the test to Early Grace to prepare and ly, fractions to Early the test the tes	ir-share moring number gen and amoresessment are aual to enable nature and le learners. I model intearly Grade le	ments, lecture, egames and active games and active games and active games and active games and presenting reflection developments.	etc., ities to develop ers flective papers p awareness of	
Learning Outcome for the lesson, picked and developed from the course specification Learning indicators for each learning outcome	Prepare the student tea		• sho ial un nu m an s as pra inv de	Learning Indicators		Identify Which cross-cutting is core and transferable inclusivity, equity and addressed or developed? Respect and diversity: designers different learning styles Personal development: thr planning, teaching, and assessing both individually		

	Demonstrate know and understanding key features of the schoolmathematics curriculumwith em on Interpreting fractions (addition subtraction) Demonstrate competencies in us manipulatives and including ICT in a voof ways in teaching operations on com and decimal fractic concepts (NTS 3j)	of the basic s phasis ctions and sing TLMs ariety mon ons	adde sub pro lear for out ma mar pro con dev the Use too to e mar bas	n lesson based or dition and straction that see vide equitable rning opportunitial learner line activities that ke children thematically ficient by sidering the relopmental leve learners e manipulatives, las, and other TLI establish thematical princied on addition a straction of fracti	equitable learning opportunities for all learners • Problem solving, critical and creative thinking: through objective analysis of facts and concept that will lead to creative thinking • Personal development: through conscious modelling of planning, presentation and assessment ICT • Use of ICT: Integrate ICT indeveloping fraction concepts in the mathematics classroom
Topic	Sub-topic(s)	Stage/ Time		outcomes de	learning to activities to achieve learning pending on delivery mode selected
				Teacher-lead of Teacher	ollaborative group work or independent. Student Activity
				Activity Review the	Participate in the discussion by
<i>WEEK 11</i> Fractions 1	Introduction	10mins	•	previous lesson by reviewing student teachers knowledge on rational and irrational numbers (PD Theme 1)	answering questions and giving comments to enhance participation.
	Developing			Introduce the	00
	fraction concept, fractional parts, and naming fractions			concept of fractions by assessing the student	fractions by defining and giving examples of fractions such as $\frac{1}{2}$, $\frac{2}{5}$, $\frac{7}{3}$
		50 mins		teachers background on fractions. (PD Themes 1 &3)	Pay attention to the exposition for the correct naming of fractions such as one-half for $\frac{1}{2}$, two-fifths for $\frac{2}{5}$ and seventhird for $,\frac{7}{3}$ instead of one-over-two,
		60 ı	mins	Give exposition on the correct	three-over-five, and seven-over-three respectively.
		60 mins		naming of fractions such as one-half for $\frac{1}{2}$, two-	Engage in a collaborative group work to explore how fractions are represented and interpreted through ICT tools and
	Interpreting fractions (e.g. part-whole,			fifths for $\frac{2}{5}$ and seven- third for $\frac{7}{3}$	other manipulatives. Fractions as part-whole, ratio, linear, etc. Part of unit/whole, part of a group, ratio

ratio), models of fractions, equivalent fractions.

Operation of fractions: (Addition and subtractions) Whole number with a fraction, fraction with whole number and fraction with another fraction.

instead of one-overtwo, threeover-five, and seven-overthree respectively. (PD Themes 1 & 3)

Assign student to explore how fractions are represented and interpreted through ICT tools and other manipulatives . Include; Fractions as part-whole, ratio, linear, etc)

Use the multipurpose multiplication chart to explore equivalent fraction concepts (PD Themes 1 & 3)

Connect how knowledge of equivalent fractions can be used to introduce operations on fractions (eg. Addition and subtraction of fractions).

Assign student

Participate in the exploratory activity using the multi-purpose chart and other manipulatives to explore the concepts of equivalent fractions

1	<mark>2</mark>	3	4	5
2	4	6	8	10
<mark>3</mark>	<mark>6</mark>	9	12	15
4	8	12	16	20
5	10	15	20	25

Using the first two rows for an illustration, we can generate the equivalence fractions of $\frac{1}{2}$ as follows: $\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8}$, ...

Use the knowledge of equivalent fractions to explore operations on fractions (eg. Addition and subtraction of fractions).

Example, Solve $\frac{1}{2} + \frac{1}{3}$ Using the multi-purpose chart above, we

Jsing the multi-purpose chart above, w can write

$$\frac{1}{2} + \frac{1}{3} \operatorname{as} \frac{3}{6} + \frac{2}{6} = \frac{2+3}{6} = \frac{5}{6}$$

1	2	3
2	4	6
3	6	9
4	8	12
5	10	15
6	12	18

1	2
2	4
3	6
4	8
5	10
6	12

Work more examples on common fractions groups

1	2
1	2
2	4
3	6
4	8
5	10
6	12

Solve problems on fractions and also plan lessons on fractions in groups for peer review

			1	
			teachers in	
			groups to	
			outline	
			properties of	
			Integers	
			initiate	
			collaborative	
			group activity	
			identify areas	
			where	
			integers are	
			applied in	
			real life	
			Assign	
			student	
			teachers to	
			work more	
			examples on	
			common	
			fractions	
			Have student	
			teachers	
			solve	
			problems on	
			fractions and	
			also plan	
			lessons on	
			fractions in	
			groups for	
			peer review	
Lesson assessments –	Subject Portfolio:		1 1	l
evaluation of learning: of,	•	n and discussion	of Cumulative Lea	arning Portfolio for grading later.
for and as learning within				
the lesson				
Instructional Resources	Posters; video clips;	; downloads; mo	dels, etc.	
Required Text (core)	Arthur, J., Grainger	, T. & Wray, D. (2	006). Learning to	Teach in the Early Grade. Canada: Taylor &
	Francis e-Libra	ary https://w		/
		iry. <u>1100p3.//v</u>	www.pararive.co	m/learning-to-teach-in-the-primary-school-
	d20209294.html	<u>πτρ3.// ν</u>	www.pararive.co	m/learning-to-teach-in-the-primary-school-
	Confer, C. (2005	i). Teaching Nu	ımber Sense. :	Sausalito: Math Solutions Publications.
	Confer, C. (2005 https://www.pdfdr). Teaching Nuive.com/teaching	ımber Sense. : -number-sense-g	Sausalito: Math Solutions Publications. grade-1-d184198309.html
	Confer, C. (2005 https://www.pdfdr Manitoba Educatio	i). Teaching Nuive.com/teaching	ımber Sense. S -number-sense-g nd Youth (2006	Sausalito: Math Solutions Publications. rade-1-d184198309.html. A Rethinking classroom assessment with
	Confer, C. (2005 https://www.pdfdr Manitoba Educatio purpose in mind:	i). Teaching Nuive.com/teaching on, Citizenship a assessment for	ımber Sense. : -number-sense-g nd Youth (2006 earning, assessn	Sausalito: Math Solutions Publications. trade-1-d184198309.html. Description: Rethinking classroom assessment with ment as learning, assessment of learning.
	Confer, C. (2005 https://www.pdfdr Manitoba Educatic purpose in mind: https://www.pdfdr	i). Teaching Nuive.com/teaching on, Citizenship a assessment for ive.com/assessm	ımber Sense. : -number-sense-g nd Youth (2006 earning, assessn	Sausalito: Math Solutions Publications. rade-1-d184198309.html. A Rethinking classroom assessment with
	Confer, C. (2005 https://www.pdfdr Manitoba Educatio purpose in mind: https://www.pdfdr learning-d6259529.	i). Teaching Nuive.com/teaching on, Citizenship a assessment for ive.com/assessm .html.	umber Sense. ! -number-sense-g nd Youth (2006 learning, assessn ent-for-learning-a	Sausalito: Math Solutions Publications. trade-1-d184198309.html.). Rethinking classroom assessment with ment as learning, assessment of learning. assessment-as-learning-assessment-of-
	Confer, C. (2005 https://www.pdfdr Manitoba Educatio purpose in mind: https://www.pdfdr learning-d6259529. Roy, G. J. (2014). D	ive.com/teaching on, Citizenship a assessment for live.com/assessm.html.	umber Sense. ! -number-sense-g nd Youth (2006 learning, assessn ent-for-learning-a	Sausalito: Math Solutions Publications. trade-1-d184198309.html.). Rethinking classroom assessment with ment as learning, assessment of learning. assessment-as-learning-assessment-of- Understanding of Addition and Subtraction
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Additional Reading List	Confer, C. (2005 https://www.pdfdr Manitoba Educatic purpose in mind: https://www.pdfdr learning-d6259529. Roy, G. J. (2014). D with Whole Num Teachers, 2. Lakoff, G. & Núñez, Martin, J. et. al. (19 Publishers	ive.com/teaching on, Citizenship a assessment for ive.com/assessm.html. Developing Prospebers. Issues in a R. E. (2000). When 194). Mathematic.	amber Sense. Senumber-sense-gend Youth (2006) learning, assessment-for-learning-ective Teachers' leacher Undergraduates for teacher train	Sausalito: Math Solutions Publications. trade-1-d184198309.html.). Rethinking classroom assessment with ment as learning, assessment of learning. assessment-as-learning-assessment-of- Understanding of Addition and Subtraction ate Mathematics Preparation of School comes from. New York: Basic Books.
Additional Reading List CPD Needs	Confer, C. (2005 https://www.pdfdr Manitoba Educatio purpose in mind: https://www.pdfdr learning-d6259529. Roy, G. J. (2014). D with Whole Num Teachers, 2. Lakoff, G. & Núñez, Martin, J. et. al. (19 Publishers Martin, J. et. al. (19 Unimax Publishers.	ive.com/teaching on, Citizenship a assessment for live.com/assessm.html. Developing Prospebers. Issues in a R. E. (2000). Whe 194). Mathematics.	amber Sense. Senumber-sense-gend Youth (2006 learning, assessment-for-learning-sective Teachers' Undergraductive Undergraductive Mathematics of for teacher trains	Sausalito: Math Solutions Publications. grade-1-d184198309.html.). Rethinking classroom assessment with ment as learning, assessment of learning. assessment-as-learning-assessment-of- Understanding of Addition and Subtraction ate Mathematics Preparation of School comes from. New York: Basic Books. ning in Ghana: Tutor notes. Accra: Unimax
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GRADE1-3. How to manage transition of home to school. Linderstand the various characteristics and uniqueness of Early Grade learners.
 Understand the various characteristics and uniqueness of Early Grade learners. How to design tasks for assessment procedures for assessment of, as and for learning. Instructional strategies needed to consciously engage student teachers on how to design and produce portfolios, journals and STS reports.

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

Title of Lesson	Fractions 2	2				Lesson Duration	3 Hours		
Lesson description	This lesson focuses on developing an understanding of Teaching and Assessing Early Grade Mathematics and about how people think about mathematics and how an understanding of mathematics develops. It provides an overview of philosophies of mathematics and mathematics education and explores student teachers' beliefs about mathematics and philosophies of mathematics implicit in the official mathematics curriculum and current classroom practice. It also covers children's developmental stages, how children learn mathematics and associated theories, and other psychological factors influencing learning of fractions. Another area that is considered is developing awareness of equity and diversity issues.								
Previous student teacher knowledge, prior learning (assumed) Possible barriers to	are familia exposed to some mat	Student-teachers have been thought theories in the teaching and learning of mathematics, and are familiar with concepts based on child growth, development, and maturation; they are exposed to number and numeration systems as well as handling dada; they have experienced some mathematics during their basic and secondary education period. Different entry behaviours, Socio-cultural issues, different learning needs, misconceptions about							
learning in the lesson	mathemat	ics and me	thods of te	•		cious efforts should	•		
Lesson Delivery – chosen to support students in achieving the outcomes	Face-to- face	Practical Activity	Work- Based Leaning	Seminars	Independ ent Study	_	Practicum		
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes. • Purpose for the lesson, what you	 The factoring class The eprope Indeport or jou The purpo Introd 	exploration, i-learning op erties of num eendent stud urnals. se of the less luce student	mode will ind group prese portunities was abers and re by would inclusion is to; teachers to	lude lecturer/tuto ntations, think-pa vill include explori ationships betwee ude writing self-as the course manua	ir-share mo ing number en and amo ssessment a	class discussions, smoments, lecture, etc. r games and activitie ong sets of numbers and presenting reflects them develop awar	s to develop		
want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.	developmentdevelopmentIntroducteachi	s, how to tea luce the stu- ing mathema	eachers' un ach mathem dent teache atics, especia	derstanding of the atics to Early Grad	le learners. d model in arly Grade l	teractive, and innov learners.			
Learning Outcome for the lesson, picked and developed from the course specification Learning indicators	Learning C			ng Indicators		Identify Which issues- core and skills, inclusivity, addressing diversithese be addeveloped?	equity and		
for each learning outcome	and under key featur school ma curriculum on Interpr and Opera fractions (and division	n with empha eting fraction ition of multiplication on) through pased creativ	the cosic not the cosic not the cosic not the cosic not not the cosic not not the cosic not not not the cosic not	rticipate in activition make student-to make student-to mat is, understand mathematical ideas ompute fluently, so roblems, and engagical reasoning e mathematically roficient multiple	teachers ficient; s, solve		-		

	Demonstrate knowledge of instructional practices for teaching the EARLY GRADE mathematics curriculum(NTS 3e) Demonstrate understanding of syllabus guidelines for classroom assessment and skills of effective assessment for teaching mathematics in the EARLY GRADEspecialism including designing an assessment tools with the rubrics and design assessment tool with the rubrics	strategies that are appropriate for a developing multiplication and division of fractions • carry out basic mathematics instructional routines for EARLY GRADE pupils, including reinforcement activities and engaging learners in mathematical discourse • explain the steps and strategies involved in designing a good assessment tool with the rubrics for assessing mathematics learning in EARLY GRADE1-3 • explain syllabus guidelines for classroom assessment for learning (AfL), assessment of learning (AoL) and assessment as learning (AaL)[NTS 2b, 3l,		 Social and communication skills: consciously develop observation and presentation skills during classroom instructions to support student teachers to transfer this to STS Communication skills: by critiquing assignments and presentations using rubrics co-designed by tutors and student teachers Assessment literacy: through modelling of comprehensive strategies embedded with instruction 		
Topic	Sub-topic(s)	3m] Stage/	Teaching and learning	g to activities to achieve learning		
	,	Time	outcomes depending	g on delivery mode selected.		
				ative group work or independent. Student Activity		
			Teacher Activity	-		
	Review	10mins	Review the previous lesson on addition and subtraction of fractions (PD Theme 1)	Participate in the discussion by answering questions and giving comments to enhance participation.		
WEEK 12 Fractions 2	Operations on fractions (Multiplication and Division of fractions): Whole number with a fraction, fraction with whole number and fraction with another fraction. Connecting common and decimal fractions and percent	50 mins 60 mins 60 mins	Engage student teachers in discussingthe use of manipulative materials and other resources (including ICT tools) in modeling multiplication of fractions (PD Themes 1 &3) Assign student teachers to in collaborative groups to outline strategies for planning and teaching multiplication of fractions Engage student	Participate in the discussions based on the use of manipulative materials and other resources (including ICT tools) in modeling multiplication of fractions Outline strategies for planning and teaching multiplication of fractions in groups Discuss the use of models and manipulatives to develop the concepts involving division of fractions Work more examples on division of fractions		

		teachers in an					
		interactive group					
		discussion to					
		develop the					
		concepts involving					
		division of fractions					
		using variety of					
		models and					
		manipulatives (e.g	-	tention			
		fractional	on the	need f	or conr	necting	
		charts/boards, strips	comm	on and	decima	al fracti	ons
		of paper,	and pe	ercent			
		grids,Cuisenaire					
		rods, etc.,)					
		. 545, 5151,7	Partici	pate in	the gra	nun act	ivity
		Cive evacsition on			_		
		Give exposition on		nect co			
		the need for		ns and		_	
		connecting common	-	of mo			
		and decimal	and ot	her res	ources	includ	ing
		fractions and percent	draugh	nt board	d, grids	, the m	ıulti-
		,	_	se char	_		
		Engage student	, , , , , , ,				
		teachers in an					
		interactive group	_				
		activity to connect		e in a co		_	oup
		common and	work t	o conn	ect con	nmon	
		decimal fractions	fractio	ns, dec	imal fra	actions	, and
		and percent	percer	nt using	knowl	edge o	f
		(PD Themes 1 & 3)	-	lent fra		•	
		(1 - 1110111100 - 010)	1	2		4	5
				<u> </u>	<mark>3</mark>	4	3
	Applications and review			_			
A	Applications and review		2	4	6	8	10
A	Applications and review		2	4	<mark>6</mark>	8	
A	Applications and review	Engage student	2	6	9	12	15
A	Applications and review	Engage student teachers to connect	2		_		
A	Applications and review		2	6	9	12	15
A	Applications and review	teachers to connect	3 4	6 8	9	12 16	15 20
A	Applications and review	teachers to connect common fractions, decimal fractions,	3 4	6 8	9	12 16	15 20
A	Applications and review	teachers to connect common fractions, decimal fractions, and percent using	3 4 5	6 8 10	9 12 15	12 16 20	15 20 25
A	Applications and review	teachers to connect common fractions, decimal fractions, and percent using knowledge of	3 4 5	6 8 10	9 12 15	12 16 20	15 20 25
A	Applications and review	teachers to connect common fractions, decimal fractions, and percent using	3 4 5	6 8 10	9 12 15	12 16 20	15 20 25
A	Applications and review	teachers to connect common fractions, decimal fractions, and percent using knowledge of	3 4 5	6 8 10 ample,	9 12 15 when of	$ \begin{array}{c} 12 \\ 16 \\ 20 \end{array} $ convert $ \frac{1}{2} \text{ to a} $	15 20 25 ing
A	Applications and review	teachers to connect common fractions, decimal fractions, and percent using knowledge of equivalent fractions	3 4 5 For exithe co	ample, mmon	9 12 15 when of	$ \begin{array}{c} 12 \\ 16 \\ 20 \end{array} $ convert $ \frac{1}{2} \text{ to a can us} $	20 25 sing
A	Applications and review	teachers to connect common fractions, decimal fractions, and percent using knowledge of	3 4 5 For extithe codecimal chart a	ample, mmon al fracti	9 12 15 when cofraction	$ \begin{array}{c} 12 \\ \hline 16 \\ \hline 20 \\ \end{array} $ convert $ \frac{1}{2} \text{ to a} $ can us $ \cot us$	20 25 sing
A	Applications and review	teachers to connect common fractions, decimal fractions, and percent using knowledge of equivalent fractions	3 4 5 For exthe codecimal chart a form)	ample, mmon al fracti	9 12 15 when of fraction on, we on an expression on the contract of the contra	12 16 20 convert $\frac{1}{2}$ to a can us tended e equiv	20 25 ing e the d
A	Applications and review	teachers to connect common fractions, decimal fractions, and percent using knowledge of equivalent fractions Lead a discussion to establish the fact	For exthe codecimal chart a form) fraction	ample, mmon al fracti above (i to gene	9 12 15 when of fraction on, we on an exercise the given	12 16 20 convert $\frac{1}{2}$ to a can us tended e equivalent fraction	20 25 ing e the d valent on,
A	Applications and review	teachers to connect common fractions, decimal fractions, and percent using knowledge of equivalent fractions Lead a discussion to establish the fact that to decimal	For exthe codecimal chart a form) fraction	ample, mmon al fracti above (i to gene	9 12 15 when of fraction on, we on an exercise the given	12 16 20 convert $\frac{1}{2}$ to a can us tended e equivalent fraction	20 25 ing e the d valent on,
A	Applications and review	teachers to connect common fractions, decimal fractions, and percent using knowledge of equivalent fractions Lead a discussion to establish the fact that to decimal fractions are	For exithe codecimal chart a form) fraction	ample, mmon al fraction so fit to geneens of the first of the second sec	9 12 15 when of fraction on, we note the given the given $\frac{4}{8} = \frac{5}{10}$	12 16 20 convert $\frac{1}{2}$ to a can us tended e equivalent fraction.	25 ing e the d valent on, shows
A	Applications and review	teachers to connect common fractions, decimal fractions, and percent using knowledge of equivalent fractions Lead a discussion to establish the fact that to decimal fractions are common fractions	For extended that is, that $\frac{1}{2}$	ample, mmon all fractions of the street of	9 12 15 when of fraction on, we need the given $\frac{4}{8} = \frac{5}{10}$ 0.5, be	12 16 20 convert $\frac{1}{2}$ to a can us tended e equivalent fraction. This ecause	25 ing e the d valent on, shows
A	Applications and review	teachers to connect common fractions, decimal fractions, and percent using knowledge of equivalent fractions Lead a discussion to establish the fact that to decimal fractions are common fractions whose equivalences	For extended that is, that $\frac{1}{2}$	ample, mmon all fractions of the street of	9 12 15 when of fraction on, we need the given $\frac{4}{8} = \frac{5}{10}$ 0.5, be	12 16 20 convert $\frac{1}{2}$ to a can us tended e equivalent fraction. This ecause	25 ing e the d valent on, shows
	Applications and review	teachers to connect common fractions, decimal fractions, and percent using knowledge of equivalent fractions Lead a discussion to establish the fact that to decimal fractions are common fractions whose equivalences have denominators	For exithe co decimal chart a form) fraction that is, that $\frac{1}{2}$ denominating the form of the for	ample, mmon al fraction above (it to generate to gene	9 12 15 when of fraction on, we note a given the end of $\frac{4}{8} = \frac{5}{10}$ 0.5 , be of $\frac{5}{10}$ is	12 16 20 convert $\frac{1}{2}$ to a can us tended e equivalent fraction. This ecause	25 ing e the d valent on, shows
	Applications and review	teachers to connect common fractions, decimal fractions, and percent using knowledge of equivalent fractions Lead a discussion to establish the fact that to decimal fractions are common fractions whose equivalences have denominators (or fractional parts)	For exithe co decimal chart a form) fraction that is, that $\frac{1}{2}$ denominating the form of the for	ample, mmon al fraction above (it to generate to gene	9 12 15 when of fraction on, we note a given the end of $\frac{4}{8} = \frac{5}{10}$ 0.5 , be of $\frac{5}{10}$ is	12 16 20 convert $\frac{1}{2}$ to a can us tended e equivalent fraction. This ecause	25 ing e the d valent on, shows
	Applications and review	teachers to connect common fractions, decimal fractions, and percent using knowledge of equivalent fractions Lead a discussion to establish the fact that to decimal fractions are common fractions whose equivalences have denominators	For extended that is that $\frac{1}{2}$ denomination.	ample, mmon all fractions of the street of	when of fraction on, we nan express the given $\frac{4}{8} = \frac{5}{10}$ 0.5 , be of $\frac{5}{10}$ is $e^{\frac{1}{2}} = \frac{1}{1}$	12 16 20 convert $\frac{1}{2}$ to a can us tender e equivalent fraction. This ecause 10. $\frac{5}{0}$, we converted.	25 ing e the d valent on, shows
	Applications and review	teachers to connect common fractions, decimal fractions, and percent using knowledge of equivalent fractions Lead a discussion to establish the fact that to decimal fractions are common fractions whose equivalences have denominators (or fractional parts)	For exithe codecimal chart a form) fraction that is, that $\frac{1}{2}$ denom Similar repres	ample, mmon al fraction above (in the general section of the sect	$\begin{array}{c} 9 \\ \hline 12 \\ \hline 15 \\ \hline \end{array}$ when of fraction on, we man expressed the given of $\frac{4}{8} = \frac{5}{10}$ is $\frac{4}{10} = \frac{1}{10} = \frac{1}{10}$ is s follows	12 16 20 convert $\frac{1}{2}$ to a can us tended e equivalent fraction. This ecause 10. 5, we covs	25 ing e the d valent on, shows the
	Applications and review	teachers to connect common fractions, decimal fractions, and percent using knowledge of equivalent fractions Lead a discussion to establish the fact that to decimal fractions are common fractions whose equivalences have denominators (or fractional parts) which are 10 or	For exithe codecimal chart a form) fraction that is, that $\frac{1}{2}$ denom Similar repres	ample, mmon al fraction above (in the general section of the sect	$\begin{array}{c} 9 \\ \hline 12 \\ \hline 15 \\ \hline \end{array}$ when of fraction on, we man expressed the given of $\frac{4}{8} = \frac{5}{10}$ is $\frac{4}{10} = \frac{1}{10} = \frac{1}{10}$ is s follows	12 16 20 convert $\frac{1}{2}$ to a can us tended e equivalent fraction. This ecause 10. 5, we covs	25 ing e the d valent on, shows the
	Applications and review	teachers to connect common fractions, decimal fractions, and percent using knowledge of equivalent fractions Lead a discussion to establish the fact that to decimal fractions are common fractions whose equivalences have denominators (or fractional parts) which are 10 or	For extended that is that $\frac{1}{2}$ denomination $\frac{1}{4} = \frac{1}{2}$	ample, mmon al fraction above (it to generate of the state of the sta	when of fraction on, we rate the given $\frac{4}{8} = \frac{5}{10}$ is $e^{\frac{1}{2}} = \frac{1}{1}$ s follows $\frac{5}{10}$ is $e^{\frac{1}{2}} = \frac{1}{1}$	tonverth $\frac{1}{2}$ to a can use the equivalent of the cause $\frac{5}{0}$, we cover $\frac{25}{100}$. The cause $\frac{25}{100}$.	20 25 ing e the d valent on, shows the an
	Applications and review	teachers to connect common fractions, decimal fractions, and percent using knowledge of equivalent fractions Lead a discussion to establish the fact that to decimal fractions are common fractions whose equivalences have denominators (or fractional parts) which are 10 or	For exithe condecimal chart a form) fraction that is, that $\frac{1}{2}$ denom Similar representations shows	ample, mmon al fraction above (it to generate to gene	when of fraction on, we note a given by $\frac{4}{8} = \frac{5}{10}$ $\frac{4}{9} = \frac{1}{1}$ is $\frac{1}{9} = \frac{1}{1}$ s follow $\frac{5}{10} = \frac{25}{100} = \frac{25}{100}$	12 16 20 20 convert $\frac{1}{2}$ to a can us tended e equivalent fraction. This ecause 10. $\frac{5}{0}$, we covs $\frac{25}{100}$. The convertible of $\frac{25}{100}$ and $\frac{25}{100}$	25 ing e the d valent on, shows the an
	Applications and review	teachers to connect common fractions, decimal fractions, and percent using knowledge of equivalent fractions Lead a discussion to establish the fact that to decimal fractions are common fractions whose equivalences have denominators (or fractional parts) which are 10 or powers of 10	For exithe co decimal chart a form) fraction that is, that $\frac{1}{2}$ denom Similar representation $\frac{1}{4} = \frac{1}{2}$ shows Partici	ample, mmon al fraction above (it to geneens of the state of the stat	when of fraction on, we note that the given $\frac{4}{8} = \frac{5}{10}$ $\frac{1}{2} = \frac{1}{1}$ s follows $\frac{5}{10} = \frac{25}{100}$ the int	tonvert $\frac{1}{2}$ to a can us can us can us can us tended e equiva fraction This cause 10. $\frac{5}{0}$, we covs $\frac{25}{100}$. The	25 ing e the d valent on, shows the an
	Applications and review	teachers to connect common fractions, decimal fractions, and percent using knowledge of equivalent fractions Lead a discussion to establish the fact that to decimal fractions are common fractions whose equivalences have denominators (or fractional parts) which are 10 or powers of 10 Use interactive	For exithe co decimal chart a form) fraction that is, that $\frac{1}{2}$ denom Similar representation $\frac{1}{4} = \frac{1}{2}$ shows Partici	ample, mmon al fraction above (it to generate to gene	when of fraction on, we note that the given $\frac{4}{8} = \frac{5}{10}$ $\frac{1}{2} = \frac{1}{1}$ s follows $\frac{5}{10} = \frac{25}{100}$ the int	tonvert $\frac{1}{2}$ to a can us can us can us can us tended e equiva fraction This cause 10. $\frac{5}{0}$, we covs $\frac{25}{100}$. The	25 ing e the d valent on, shows the an
	Applications and review	teachers to connect common fractions, decimal fractions, and percent using knowledge of equivalent fractions Lead a discussion to establish the fact that to decimal fractions are common fractions whose equivalences have denominators (or fractional parts) which are 10 or powers of 10 Use interactive group activity to	For exithe co decimal chart a form) fraction that is, that $\frac{1}{2}$ denom Similar represepation $\frac{1}{4} = \frac{1}{2}$ shows Particing group	ample, mmon al fraction and fr	when of fraction on, we man express the given $\frac{4}{8} = \frac{5}{10}$ of $\frac{5}{10}$ is s follow $\frac{1}{2} = \frac{25}{100}$ the interior of idea.	tonvert $\frac{1}{2}$ to a can us can us can us can dece e equiva f. This cause 10. $\frac{5}{0}$, we covs $\frac{25}{100}$. The $\frac{25}{100}$ of the contraction of	ing e the divalent on, shows the end san
	Applications and review	teachers to connect common fractions, decimal fractions, and percent using knowledge of equivalent fractions Lead a discussion to establish the fact that to decimal fractions are common fractions whose equivalences have denominators (or fractional parts) which are 10 or powers of 10 Use interactive group activity to identify and outline	For exithe co decimal chart a form) fraction that is that $\frac{1}{2}$ denom Similar represepation $\frac{1}{4} = \frac{1}{2}$ shows Particing group outlining	ample, mmon al fraction and fr	when of fraction on, we man express the given $\frac{4}{8} = \frac{5}{10}$ is $\frac{4}{2} = \frac{1}{1}$ is s follow $\frac{5}{10} = \frac{25}{100} = \frac{25}{100}$ the integral of th	tonverte $\frac{1}{2}$ to a can us tendere e equivalent fraction. This ecause $\frac{5}{100}$, we cove $\frac{25}{100}$. The eraction of	25 ing e the divalent on, shows the end ons of
	Applications and review	teachers to connect common fractions, decimal fractions, and percent using knowledge of equivalent fractions Lead a discussion to establish the fact that to decimal fractions are common fractions whose equivalences have denominators (or fractional parts) which are 10 or powers of 10 Use interactive group activity to	For exithe codecimal chart a form) fraction that is that $\frac{1}{2}$ denom Similar represeparation $\frac{1}{4} = \frac{1}{2}$ shows Particing group outling the code is the code in th	ample, mmon al fraction and fr	when contraction on, we have a second on the second on th	tonverte $\frac{1}{2}$ to a can us stended e equivalent fraction. This ecause $\frac{5}{100}$. The eractivation of the control of the	25 cing e the divalent on, shows the can his 5. e end ons of
	Applications and review	teachers to connect common fractions, decimal fractions, and percent using knowledge of equivalent fractions Lead a discussion to establish the fact that to decimal fractions are common fractions whose equivalences have denominators (or fractional parts) which are 10 or powers of 10 Use interactive group activity to identify and outline	For extended that is that $\frac{1}{2}$ denomes Similar repressible shows Particing group outlined the co-course of the co-cours	ample, mmon al fraction and fr	when contraction on, we have a second on the second on th	tonverte $\frac{1}{2}$ to a can us stended e equivalent fraction. This ecause $\frac{5}{100}$. The eractivation of the control of the	25 ing e the divalent on, shows the end ons of
	Applications and review	teachers to connect common fractions, decimal fractions, and percent using knowledge of equivalent fractions Lead a discussion to establish the fact that to decimal fractions are common fractions whose equivalences have denominators (or fractional parts) which are 10 or powers of 10 Use interactive group activity to identify and outline potential applications of the	For exithe codecimal chart a form) fraction that is that $\frac{1}{2}$ denom Similar repression $\frac{1}{4} = \frac{1}{2}$ shows Particing group outling the codecimal control of the codecimal chart a form of the codecimal char	ample, mmon al fraction and fr	when contraction on, we have a second on the second on th	tonverte $\frac{1}{2}$ to a can us stended e equivalent fraction. This ecause $\frac{5}{100}$. The eractivation of the control of the	25 ing e the divalent on, shows the end ons of
	Applications and review	teachers to connect common fractions, decimal fractions, and percent using knowledge of equivalent fractions Lead a discussion to establish the fact that to decimal fractions are common fractions whose equivalences have denominators (or fractional parts) which are 10 or powers of 10 Use interactive group activity to identify and outline potential	For extended that is that $\frac{1}{2}$ denomes Similar repressible shows Particing group outlined the co-course of the co-cours	ample, mmon al fraction and fr	when contraction on, we have a second on the second on th	tonverte $\frac{1}{2}$ to a can us stended e equivalent fraction. This ecause $\frac{5}{100}$. The eractivation of the control of the	25 ing e the divalent on, shows the end ons of

	EARLY GRADE curriculum. Review of the various lessons Engage student within the course to ensure teachers in a review mathematical connection
	of the various lessons within the course to ensure mathematical connection
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	Provide feedback on Subject Portfolio Provide feedback on Subject Projects
Instructional Resources	Posters; video clips; downloads; models, etc.
Required Text (core)	Arthur, J., Grainger, T. & Wray, D. (2006). Learning to Teach in the Early Grade. Canada: Taylor & Francis e-Library. https://www.pdfdrive.com/learning-to-teach-in-the-primary-school-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 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. 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. https://www.pdfdrive.com/assessment-for-learning-assessment-for-learning-assessment-of-learning-d6259529.html . Roy, G. J. (2014). Developing Prospective Teachers' Understanding of Addition and Subtraction with Whole Numbers.

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

Title of Lesson	End of Ser	nester Revie	w (Lesso	ns 1-:	11)		Lesson	Duration	3 Hours
Lesson description	This lesson focuses much on the overview of the whole semester mathematics course: Teaching and Assessing Upper Early Grade 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.								
Previous student teacher knowledge, prior learning (assumed)	Student-teachers have studied Teaching and Assessing upper Early Grade mathematics and ca apply various mathematical concepts learnt, throughout the semester, in their assessment.								
Possible barriers to learning in the lesson	about mat	Different entry behaviours, Socio-cultural issues, different learning needs, misconception about mathematics and methods of teaching mathematics. Conscious efforts should be mad to address them before, during and after the lesson.							
Lesson Delivery – chosen to support students in achieving the outcomes	Face-to- face	Practical Activity	Work- Based Leaning	3	Seminars	Indepen ent Stud		earning portunities	Practicum
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	 The fain cla The educed Index 	ss exploratior -learning opp op properties	node will n, group portunition of num would i	inclu prese es wil bers a	nities de lecturer/tuto entations, think- l include explori and relationship le writing self-as	pair-share ng numbe s betweer	momer r games and am	nts, lecture, e and activitie nong sets of r	tc., s to numbers
 Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description. 	 The purpose of the lesson is to; Introduce student teachers to the course manual to enable them develop awareness what they are expected of in this lesson. develop student teachers' understanding of the nature and importance of mathemati as well as, how to teach mathematics to Early Grade learners. Introduce the student teachers to prepare and model interactive, and innovative ways teaching mathematics, especially, Rational and Irrational numbers to Early Grade learner. Prepare the student teacher for a future mathematics classroom 							athematics,	
 Learning Outcome for the lesson, picked and developed from the course specification Learning indicators 	Learning (Outcomes		Learn	ing Indicators		issues skills,		ransferable equity and
for each learning outcome	and under key featur school cur specifically rational ar numbers (Demonstr. socio-culti teaching a number co	ate awarenes ural issues in nd learning oncepts (NTS	ne c ; and s of	ar in th ac m th m er re va nu	articipate in plan nd executing structional active at can make ear dolescents becon athematicallypresat is, understan- athematical iden ngage in logical nasoning based collationships amoust arious aspects of umber system entify and designate in teaching impo	ities rly me oficient; d as, and on ong the the real	The teach book small that the period of will be the teach book small that the teach small tha	rough object facts and co	ng, ssessing ly and in nd sharing es with ng, critical thinking: ive analysis

	with focus on rational and irrational numbers Demonstrate competencies in using manipulatives and TLMs including ICT in a variety of ways in teaching fractions and decimal concepts (NTS 3j) Value as well as respect equity and inclusivity in the mathematics classroom (NTS 2f; NTECF 39)	numb pupils identify manip for tea mather as open propering irratio Use IC support pupils Apprecentri support mather contrination mather variety engages thinking mather pupils	ematical ideas in er to EARLY GRADE fy a variety of inulatives and TLMs exching important ematical ideas such erations and rities ofrational and nal numbers. The as a tool in ring EARLY GRADE in learning number ciate the butions of, and rt, colleagues in the ematics classroom erate with gues in carrying out ematical tasks in any of ways e in reflective in gabout how ematics was taught in basic school days.	Personal development: Through presentation and developing of arguments Use of ICT: Integrate ICT in developing number and in the mathematics classroom Use of ICT: Integrate ICT in developing number and in the mathematics classroom Respect and diversity: designing lesson for diverse learners with different learning styles Social and communication skills: consciously develop observation and presentation skills during classroom instructions to support student teachers to transfer this to STS	
Topic	Sub-topic(s)	Stage/ Time	Teaching and learning to activities to achieve learning outcomes depending on delivery mode selected. Teacher-lead collaborative group work or independent.		
			Teacher Activity	Student Activity	
	Review	10mins	Review the previous lesson on rational numbers as related to real number system. (PD Theme 1)	Participate in the discussion on various aspects of the real number system.	
WEEK 9 Rational and Irrational numbers 1	The Real number system relationships among the various aspects of real number system Operations and properties of rational numbers application of real number	50 mins	Introduce the lesson on Real number system; (PD Themes 1 & 3) Lead discussions on how to connect the various real number systems (PD Themes 1 & 3) Lead discussions on properties and operations of the real	Initiate verbal exposition and discussions on integers and technology use in Real number system across the EARLY GRADE curriculum. Use manipulatives to establish the relationship between and among the various real number systems.	

		1	1					
			Assign student teachers	Use manipulatives such				
			in groups to outline	as number line,				
			real number system.	Cuisenaire rods,				
				fractional charts, paper				
				folding to explore properties and operations				
				of the real numbers				
				of the real numbers				
				Explore possible further				
				application of rational				
				numbers in real life.				
Lesson assessments –	Subject Portfolio	1						
evaluation of learning:of,		Collec	ction of final portfolio for g	rading				
for and as learning within	Subject Project			-				
the lesson		Subm	ission of final project for as	ssessing and grading				
	NTS:							
	2 b) Has comprehensive know	ledge of th	e official school curriculum	, including learning				
	outcomes.							
	2b) Has comprehensive knowle	edge of the	official school curriculum,	including learning				
	outcomes							
	3m) Identifies and remediates learners' difficulties or misconceptions, referring learners whose							
	needs lie outside the compete			or differentiation ander				
				or differentiation - gender,				
Instructional Resources	equity, SEN, and inclusivity. Posters; video clips; downloads; models, etc.							
	• •							
Required Text (core)	Arthur, J., Grainger, T. & Wray		_					
		ps://www.p	odfdrive.com/learning-to-te	each-in-the-primary-school-				
		d20209294.html						
	Confer, C. (2005). Teaching Number Sense. Sausalito: Math Solutions Publications. https://www.pdfdrive.com/teaching-number-sense-grade-1-d184198309.html .							
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 $^{^{\}rm 1}\, {\rm See}$ rubrics on Subject Portfolio Assessment in Annex 6 of NTEAP

²Component 2: Subject Project Assessment (30% overall score)

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

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

NOTE

IT APPEARS EACH LESSON IN THE MANUAL WILL BE ASSESSED AND WEIGHTED 60%. PLEASE REVIEW. THERE SHOULD BE ONLY 3 ASSESSMENT COMPONENTS ACROSS THE SEMESTER. INDICATE WEEKS WITHIN WHICH THE 2 FORMATIVE ASSESSMENTS SHOULD OCCUR AND TOPICS TO BE COVERED AND WEIGHTED 30% EACH. END OF SEMESTER WILL BE 40%.

 $^{\rm 2}$ See rubrics on Subject Project Assessment in Annex 6 of NTEAP

