

PROFESSIONAL DEVELOPMENT PROGRAMME

Tutor Professional Development Handbook: B.Ed. in Initial Teacher Education - ICT Year 2 Semester 2

HANDBOOK FOR TUTORS





The Government of Ghana



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Foreword

It is a great pleasure and privilege to be asked to write the Foreword to this latest set of Professional Development Handbooks for the Bachelor of Education (B.Ed.) in Initial Teacher Education Year 2 Semester 2 courses.

These Professional Development Handbooks are at the heart of Ghana's ambitious teacher education reforms and have played a key role in the successes achieved to date. The Handbooks aim to ensure that tutors in Colleges of Education are reflecting critically on their methods of teaching and learning and supporting each other to implement the B.Ed. in line with the National Teacher Education Curriculum Framework and National Teacher Education Assessment Policy.

Tutors act as role models for student teachers. If tutors use the 'lecture-method' then this is what student teachers will imitate when they enter basic school classrooms. If tutors use a wide variety of interactive approaches, aligned with the National Teachers' Standards, then these approaches will become standard behaviour for beginning teachers when they graduate.

Over the last six years there is compelling empirical evidence that there has been a substantial shift in tutors' behaviour and approaches. This has had a tremendous impact on student teachers. An annual external evaluation of beginning teachers' classroom practices is carried out nationwide. In the 2015 evaluation only 2% beginning teachers demonstrated competencies and behaviours in the National Teachers' Standards. By 2019 this had increased to 42%. When one considers that these figures are derived from a national sample of all beginning teachers in the country it demonstrates that there has been a genuine transformation in Ghana's teacher education system.

This latest set of Professional Development Handbooks, developed by four mentoring universities (Kwame Nkrumah University of Science and Technology, University of Education, Winneba, University for Development Studies and University of Ghana) and tutors from their affiliated Colleges of Education, represents the first set of Handbooks developed since the onset of the COVID-19 pandemic. COVID-19 has had a significant impact on all of our lives and Colleges of Education should be commended for the way in which they rapidly responded to institutional closures and made the transition to emergency remote teaching and learning. These Handbooks have been designed to reflect the current realities of the blended learning approach which is being used in Colleges of Education and it is hoped that they will play a role in increasing the effectiveness of these new approaches.

These are also the first Professional Development Handbooks to be developed since Transforming Teaching, Education & Learning (T-TEL) was established as a Ghanaian not-for-profit organisation. I would like to take this opportunity to thank both the Ghana Tertiary Education Commission and Mastercard Foundation for their collaboration and support with the 'new T-TEL' which has made the development of these Handbooks possible.

Robin Todd
Executive Director, T-TEL
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The New approach to the Weekly Professional Development (PD) Sessions for Tutors

Overview

1. Background to the new approach to PD Sessions
2. Features of the B.Ed. PD Sessions
3. The Role of the PDC
4. The Role of the PDC in coordinating the introductory Session for tutors

1. Background to the new approach to PD

- For four years the CoE have been supported in leading weekly Tutor PD Sessions. The PD Sessions have focused on key themes, such as: the NTS, Action research and classroom enquiry among others. The ten theme-based PD modules have been vital in paving the way for the Reform of Teacher Education in Ghana. They have equipped tutors with important skills and knowledge to support the smooth transition to the New B.Ed.
- The New Four-Year B.Ed. will be implemented in CoEs, now affiliated to the Public Universities, and a new approach to the tutors' weekly PD is required. This new approach involves the Universities supporting their affiliated CoE in implementing the subject specific PD Sessions.
- The weekly PD Sessions are designed to prepare subject tutors to use the B.Ed. Course Manuals to teach the 12 lessons in the Course Manuals to student teachers. This means the PD Sessions will now be subject specific. This means there will be subject specific PD groups running each week in the CoEs and universities.
- The PD Sessions are designed to help operationalize the reform of teacher education at tutor and student teacher level and to support:
 - professionalising teaching by supporting teachers in developing communities of practice and raising the status of the teaching profession
 - improving the quality of new teachers by ensuring that they undergo a rigorous and practically focused, high-quality degree level programme
 - improving the learning outcomes and life chances for all children.

2. Features of the B.Ed. PD Sessions

- The universities will prepare the Subject Leads or HoDs from their affiliated CoE to lead the weekly subject tutor Sessions,
- The subject-tutor-groups can work at separate tables in one room. However, in exceptional cases a subject may need to work in another space in order to use specific materials or resources, e.g. video or science equipment,
- The main resources for the weekly tutor Sessions are the Subject Specific Course Manuals and the PD Guidance Notes on each Course Manual,
- Each PD Guidance Note is subject specific and contains two sections. The first section provides guidance for the Introductory Session for tutors. The second section is written to provide information to guide the weekly PD Sessions that are linked directly to the lessons in the Course Manual,
- The three-hour Introductory Session is to;
 - introduce the new approach to PD and organisation of the weekly Sessions
 - introduce the course manuals
 - provide guidance and activities to familiarise tutors with the important information contained in the Introductory Section of each course manual

- The weekly PD Sessions are to prepare tutors for teaching and assessing each of the twelve lessons in the Course Manual. They need to take place BEFORE the lessons they are preparing tutors to teach. The first weekly PD Session must happen in advance of lesson one,
- The weekly PD Sessions are an hour and a half,
- There are two versions of the of the PD Manual: one for the facilitators (SL/HoD) with prompts for leading the PD Session and the activities for tutors and one for the tutors containing only the activities and guidance for what they will do during the Session.
- The Introductory Session and the PD Sessions were written using the same template and timings for each subject.

3. The Role of the PDC

- To coordinate the PD Sessions and ensure that:
 - the subject tutor groups are organised appropriately;
 - the Sessions run on time according to the format of each Session – using the blank format
 - each subject group follows the appropriate guidance and has the required resources
 - the Subject Lead/HoD completes and submits the review of each Session
 - take up any issues arising from the Sessions with the mentoring university
- To remind tutors that they need to familiarise themselves with the relevant materials for each PD Session prior to the Session. This means studying the plan for the lesson/s in the manual, going through the resources and readings and noting down any issues they want addressed during the PD Session.
- To introduce and close each Session

4. The role of the PDC in the Introductory Session

- The role of the PDC during the introductory Session include;
 - briefly outline the purpose of the PD Sessions (See section 1 above: **Background to the new approach to PD**)
 - Introduce the new approach and main features of the PD Sessions (See section 2 above: **Features of the B.Ed. PD Sessions**)
 - Explain the PDC role and the SL/HoD roles
 - Remind tutors that it is essential that they read and know
 - The National Teachers’ Standards
 - The National Teacher Education Curriculum Framework
 - The introduction to the B.Ed. Curriculum

The Course Manual for their subject for Year two semester two

AGE PHASE: JHS

NAME OF COURSES: DATA COMMUNICATION AND NETWORKING (DCN)
APPLICATION DEVELOPMENT IN EDUCATION (APE)

Year 2 Semester 2

TUTOR PD SESSION FOR LESSON 1 IN THE COURSE MANUAL

TOPICS:

<p><i>Focus: the bullet points provide the frame for what is to be done. The guidance notes in italics identify the prompt the SL/HoD needs and each one must be addressed</i></p>	<p>Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each state of the Session) Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each state of the Session)</p>	<p>Time in Session</p>
<p>Introduction / lesson overview</p> <ul style="list-style-type: none"> • Reflection on previous PD Session (Introduction to the course manual) • Introduction and overview of the main purpose of the lesson in the course manual. • Highlight cross-cutting themes i.e., gender equality and social inclusion (GESI), ICT • Identification of important or distinctive aspects of the lesson <p>Reading and discussion of the introductory sections up to learning outcomes</p>	<p>Introduction</p> <ol style="list-style-type: none"> 1. Introduce yourself to the group. 2. Explain how the previous PD Session on Multimedia Authoring and Educational Technology will influence your teaching this semester, especially the assessment component. 3. Read through the course manual individually and write down the main features of the course manual. 4. Outline the important features identified in the course manual. Taking into consideration GESI (gender, equality, social inclusivity) 5. Refer to the course manual and read course learning outcomes and their corresponding Indicators. Let them read the Lesson 1 learning outcomes and their corresponding indicators and show how students' previous knowledge can help them to understand the lesson. Discuss any point that needs clarification. 6. Discuss the cross-cutting issues in the course manual. e.g., Digital Literacy and transferable skills, inclusivity, equity, addressing diversity 	<p>30 mins</p>

	<p>and how the learning outcomes of Lesson 1 can be used to help deliver the BSC as indicated in NTS 3j-p.14.</p> <p>7. Pair with a colleague and share your views about the link between the lesson and the BSC.</p> <p>Refer to lesson 1</p>	
<p>2. Concept Development (New learning likely to arise in this lesson):</p> <ul style="list-style-type: none"> • Identification and discussion of concepts • Identification of possible challenging areas in the teaching of the concept. This may include GESI and ICT related concepts • Identification of needed GESI responsive and ICT resources for the teaching and learning of the concept. 	<p>Concept Development</p> <ol style="list-style-type: none"> 1. Discuss sub-topics of Lesson 1 with colleagues and write points on the flipchart for presentation. 2. In pairs, discuss misconceptions and barriers in teaching and learning of the lesson. Share possible ways of solving/ overcoming the challenges. 3. Outline possible challenging areas in teaching system development and Data Communication taking into consideration GESI (e. g. identifying areas in the curriculum where stereotypes are reinforced and addressing these). 	
<p>3. Teaching and learning activities</p> <ul style="list-style-type: none"> • Reading of teaching and learning activities and identification of areas that require clarification especially GESI related activities. • Reading of teaching and learning activities and identification of GESI and ICT issues that require clarification. 	<p>Teaching and learning activities</p> <ol style="list-style-type: none"> 1. Watch a YouTube video on system development https://youtu.be/G-6qDY8UltUAPE 2. Discuss Data communication and networking models as indicated in Lesson 1, DCN 3. Suggest teaching and learning activities for the lesson taking into account GESI issues and refer to the activities outlined in the course manual for discussions. Explaining how your findings can improve the teaching of other courses/ subjects in the new 4-year B Ed. Curriculum and the BSC (through STS activities). 	30 mins

	<p>e.g.</p> <p>i. Making reasonable adjustments for physically challenged learners</p> <p>ii. Both male and female learners playing leading roles in a group task</p> <p>Ref: Writing the Weekly PD Session-p 3., NTS 1a, b, c, d, 2b, e, f, 3b, c</p> <p>4. Present your findings to the group</p>	
<p>4. Review of assessment component of Lesson</p> <p>Reading of assessment opportunities and ensuring they are aligned to the NTEAP and required course assessment: subject project (30%), subject portfolio (30%) and end of semester examination (40%) Working through one or two activities</p>	<p>Review of Assessment Components</p> <p>1. Review on the type of ICT lesson being discussed (KG, UP, JHS, etc). Mention the various components of assessment as in the first column (Review of Assessment Component)</p> <p>2. Read and identify the assessment component of Lesson1 e.g. <i>A project feasibility and requirement analysis report to be added to the project report</i> i.e. (AOL) of the course manual and compare with the components prescribed by NTEAP and review as appropriate.</p>	10 mins
<p>5. Resources</p> <p>Guidance notes for SL/HoD should</p> <ul style="list-style-type: none"> Identify any aspect of the lesson that might be challenging for tutors in terms of new learning, and which needs to be considered before taking tutors through the lesson activities “walk through”. Equity and inclusion issues, as well as ICT resources, need consideration The resources needed must be identified: literature – page referenced etc, on the 	<p>Resources</p> <p>1. Discuss and Present T/L resources needed for teaching. e.g., <i>Open Educational Resources (Including: YouTube, MOOCS-Udemy/Coursera, khan academy, TESSA) The iBox (CENDLOS)</i></p> <p>2. In pairs (NTS 3h), select a concept through balloting and design resources that can be used in the teaching and learning of the concept selected in both CoE and basic school classrooms (through STS activities) (NTS 3j).</p> <p>3. Discuss how to prepare samples of TLMs for the teaching of the lesson using local, low or no-cost materials.</p>	10 mins

<p>web, YouTube, physical resources, PowerPoint; how they should be used. Consideration needs to be given to local availability</p> <ul style="list-style-type: none"> • This section can build on the PD needs identified from the course manuals 		
<p>5. Evaluation and review of Session: Guidance notes for SL/HoD should</p> <ul style="list-style-type: none"> • Select activities, linked to CLO and indicators, from the lesson that is likely to be most different from tutors' previous experience. These could involve applying new content, e.g. from section 2, or approaches to teaching, learning and assessment, incl. gender responsive, differentiation and inclusive approaches and use of appropriate ICT tools. • Identify how any assessments during the lesson relate to course assessment components • The selected activities should be done with tutors in real or close to real-time • Anticipate any issues for clarification or questions which might arise as the tutors work through the activities and provide guidance on these. • Identify where, and which, core and transferable skills, including digital skills, are being developed or applied. • Makes links to the existing PD Themes with page 	<p>Reflective Activity</p> <ol style="list-style-type: none"> 1. Mentions the lessons learnt in the PD Session indicating how a GESI issue has been highlighted and/or addressed (NTS 1a, 3i). 2. Remember to identify a critical friend from a related discipline to observe as you teach Lesson 1 in class and provide feedback to you and report at the next PD Session. NTS: 1A. 3. Reflect on the activities in the Session and outline unresolved issues relating to the lesson. <p>Advance Preparation</p> <p><i>Please Remember to read materials on Lesson 2 from the PD manual before the next Session</i></p>	<p>10 mins</p>

<p>reference where they can support teaching, for example: action research, questioning and to other external reference material.</p> <ul style="list-style-type: none">• Identify where PowerPoint presentations or other resources need to be developed to support learning and provide guidance.• Identify resources required for any TLMs guide on their development.		
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TUTOR PD SESSION 2 FOR LESSON 2 IN THE COURSE MANUAL

COURSE / TOPICS:

- APPLICATION DEVELOPMENT IN EDUCATION (APE) - Systems Development Models and Methodologies
- DATA COMMUNICATION AND NETWORKING (DCN) - Data Communications and Networking II

<p><i>Focus: the bullet points provide the frame for what is to be done. The guidance notes in italics identify the prompt the SL/HoD needs and each one must be addressed</i></p>	<p>Guidance Notes on Tutor Activity during the PD Session. <i>What PD Session participants (Tutors) will do during each state of the Session)</i> Guidance Notes on Tutor Activity during the PD Session. <i>What PD Session participants (Tutors) will do during each state of the Session)</i></p>	<p>Time in Session</p>
<p>1. Introduction/lesson overview</p>	<p>Introduction</p> <ol style="list-style-type: none"> 1. Share your success stories and challenges as you taught Lesson1 after the PD Session as a reflection on the previous PD Session (Lesson 1) <p>i.e.</p> <ol style="list-style-type: none"> a. Overview of systems development process <i>APE</i> b. Data Communications and Networking <i>DCN</i> 2. Tutors who observed lesson1 share their experiences and how these experiences influenced their teaching in semester one. 3. Read the introductory sections (up to Learning Outcomes (LOs). Let tutors in pairs discuss the important or distinctive aspects of the lesson including vocabulary and fundamental concepts related to the components of the front mattersand discuss how the students’ relevant previous knowledge can help them to understand the lesson. <p>Distinctive aspects</p> <ol style="list-style-type: none"> a. Brainstorm on the types of Systems Development and methodologies <i>APE</i> b. Brainstorm on the types of Transmission Media <i>DCN</i> <ol style="list-style-type: none"> 4. Write on flip charts using concept cartoons, <ol style="list-style-type: none"> a. The Systems Development models and 	<p>30 mins</p>

	<p>methodologies e.g. Waterfall, Prototype, Incremental. <i>APE</i></p> <p>b. Transmission Media e.g., Physical Description, applications Transmission Characteristics (Twisted Pair cables, Coaxial Cable, Fibre Optic cables) <i>DCN</i></p> <p>5. Present your findings via <i>radio reporting</i>.</p>	
<p>2. Concept Development (New learning likely to arise in this lesson)</p> <ul style="list-style-type: none"> • Identification and discussion of concepts • Identification of possible challenging areas in the teaching of the concept. This may include GESI and ICT related concepts • Identification of needed GESI responsive and ICT resources for the teaching and learning of the concept. 	<p>Activity 2: Concept Development</p> <p>1. Discuss the below familiar and unfamiliar concepts in the lesson and discuss relevant connections between concepts in the lesson and those of other ICT lessons and the use of relevant resources.</p> <p>a. Systems Development models and methodologies <i>APE</i></p> <p>b. Transmission media for data communications mentioned above <i>DCN</i>.</p> <p>6. Discuss the possible challenges in teaching the concepts discussed.</p> <p>7. Identify and discuss the crosscutting issues – core and transferable skills, inclusivity, equity and addressing diversity and how the learning outcomes of Lesson 2 reflect these and apply to the BSC.</p> <p>8. Present your findings on post-it notes.</p>	30 mins
<p>3. Teaching and learning activities for the lesson</p> <ul style="list-style-type: none"> • Reading of teaching and learning activities and identification of areas that require clarification especially GESI related activities. • Reading of teaching and learning 	<p>Teaching and learning activities</p> <p>1. In pairs suggest teaching and learning activities for the lesson considering GESI issues and refer them to the activities outlined in the course manual after watching these videos</p> <p>a. On YouTube the various types of system development models e.g. Waterfall and Prototype. https://youtu.be/a7jDv_A25ZA <i>APE</i></p> <p>b. Write on Transmission Impairment and the relationships of the four concepts (Data rate, Bandwidth, Noise, Error rate) <i>DCN</i></p>	30 mins

<p>activities and identification of GESI and ICT issues that require clarification.</p>	<ol style="list-style-type: none"> 2. Discuss the strategies that must respond to inclusivity and equity-GESI (i.e., ICT as a tool for expanding learning to diverse learners on: <ol style="list-style-type: none"> a. The various methodologies <i>APE</i> b. Transmission Impairment and the relationships of the four concepts (Data rate, Bandwidth, Noise, Error rate) <i>DCN</i> in the new 4-year B Ed. Curriculum and the BSC (through STS activities). as stated in NTS 2e, 2f-p.13. 3. Brainstorm to come out with some pedagogical approaches and their likely related core competencies to be inculcated in CoE students and basic school learners. 4. Model a presentation of an activity using ICT tools and taking into consideration GESI issues in the B. EDcurriculum and the BSC. NTS 1a, b, c, d, 2b, e, 3b, 	
<p>4. Review of assessment component of Lesson</p> <ul style="list-style-type: none"> • Reading of assessment opportunities and ensuring they are aligned to the NTEAP and required course assessment: subject project (30%), subject portfolio (30%) and end of semester examination (40%) Working through one or two activities 	<p>Review of Assessment Components</p> <ol style="list-style-type: none"> 1. Read and identify the assessment component of Lesson 2 of the course manual and compare it with the components prescribed by NTEAP and review as appropriate. 2. Discuss the various ways you can support student teachers to build their portfolios before/during/after lessons. 	<p>10 mins</p>
<p>Resources</p> <p>Guidance notes for SL/HoD should</p> <ul style="list-style-type: none"> • Identify any aspect of the lesson that might be 	<p>Resources</p> <ol style="list-style-type: none"> 1. Write on a flip chart the T/L resources needed for teaching lesson 2 for large group discussion. E.g. <ul style="list-style-type: none"> • Productivity tools • Subject-based application software • Instructional Laboratories (with 	<p>10 mins</p>

<p>challenging for tutors in terms of new learning, and which needs to be considered before taking tutors through the lesson activities “walk through”. Equity and inclusion issues, as well as ICT resources, need consideration.</p> <ul style="list-style-type: none"> • The resources needed must be identified: literature – page referenced etc, on the web, YouTube, physical resource, PowerPoint; how they should be used. Consideration needs to be given to local availability. • This section can build on the PD needs identified from the course manuals 	<p>multimedia equipment and smartboards)</p> <p>2. Select a concept in unit two of the course manual and design resources that can be used in the teaching and learning of the concepts selected (NTS 3j)</p>	
<p>5. Evaluation and review of Session:</p>	<p>Reflective Activity</p> <ol style="list-style-type: none"> 1. Provide a summary of the main ideas of the PD Session for Lesson 2. 2. Remember to invite a critical friend from the same or related discipline to observe as you teach Lesson 2 in class and provide feedback. NTS: 1A, 1B 3. Reflect on the activities in the Session and identify unresolved issues relating to the lesson <p>Advance Preparation</p> <p>Read on Lesson 3 before the next PD Session.</p>	<p>10 mins</p>

TUTOR PD SESSION 3 FOR LESSON 3 IN THE COURSE MANUAL

COURSE / TOPICS

- APPLICATION DEVELOPMENT IN EDUCATION (APE) - SYSTEMS ANALYSIS & DESIGN 1
- DATA COMMUNICATION AND NETWORKING (DCN) - TRANSMISSION MEDIA I

Focus: the bullet points provide the frame for what is to be done. The guidance notes in italics identify the prompt the SL/HoD needs and each one must be addressed	Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each state of the Session) Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each state of the Session)	Time in Session
1. Introduction / overview to course manual	Introduction <ol style="list-style-type: none"> 1. Review and reflect on the previous PD Session Lesson2 and how useful it was on the following concepts from the course manual. <ol style="list-style-type: none"> a. The Systems Development models and methodologies <i>APE</i> b. Analog and digital transmission. <i>DCN</i> 2. Identify the lesson learning outcomes and learning indicators as stated in the course manual, and share your views with a colleague. Refer to (NTS 2c). 3. Discuss and Write on a flip chart the below distinctive aspect of the lesson. <ol style="list-style-type: none"> a. What System Feasibility is. <i>APE</i> b. Different components and their respective roles in a computer communication system. <i>DCN</i> 4. Tutors <ol style="list-style-type: none"> a. Brainstorm on Technical, economic, and operational Feasibility, Making a case for a system in Systems feasibility and present via poster. <i>APE</i> b. Discuss how to create wikis on network metrics and relate to network quality in school and their effects in supporting learning. <i>DCN</i> 5. Identify and report on flipchart cross-cutting 	30 mins

	issues – core and transferable skills, inclusivity, equity and addressing diversity and how the learning outcomes of Lesson3 apply to the BSC.	
2. Concept Development (New learning likely to arise in this lesson)	<p>Activity 2: Concept Development</p> <ol style="list-style-type: none"> 1. Tutors <ol style="list-style-type: none"> a. Brainstorm on Data collection methods and when the various methods are appropriate in an educational software project. <i>APE</i> b. Discuss in pairs and identify requirements of a typical school software project <i>APE</i> 2. Outline possible challenging areas in the teaching Lesson 3 taking into consideration GESI 	30 mins
3. Teaching and learning activities for the lesson	<p>Teaching and learning activities:</p> <ol style="list-style-type: none"> 1. identify familiar and unfamiliar concepts in the lesson and discuss relevant connections between concepts in the lesson with those in other lessons as well as the use of relevant resources as they undertake the activity below: <ol style="list-style-type: none"> a. Watch videos on Requirements Analysis (Functional, Non-Functional). Discuss then examines what Requirements Analysis is. https://youtu.be/Vz7TQ3eAQiUAPE b. Watch YouTube videos on the types and characteristics of guided transmission media (wired Media). https://youtu.be/fSjU2oE_cmYDCN <p>Practical activity</p> 2. In pairs, Tutors identify requirements of a typical school software project and further use examples to distinguish them into functional and non-functional requirements. <i>APE make reflective notes on Requirements Analysis. APE</i> 	30 mins

	<p>Practical activity</p> <p>3. Discuss the characteristics of the various transmission media e.g., <i>Twisted Pair cables, Coaxial Cable, Fibre Optic cables DCN</i></p> <p>4. Discuss the challenging areas in the teaching of the Lesson taking into consideration GESI (e. g. identifying areas where reasonable adjustments can be made to make the lesson more inclusive).</p>	
4. Review of assessment component of Lesson	<p>Review of Assessment Components</p> <p>1. Read the assessment component on Lesson3 of the course manual and compare it with the components prescribed by NTEAP and review as appropriate.</p> <p>E.g. AFL: <i>Individual and group presentations on requirements analysis during the lesson</i></p> <p>AOL: <i>A project feasibility and requirement analysis report to be added to project report</i></p> <p>2. Discuss the various ways you can support student teachers to build their portfolios before/during/after lessons</p>	10 min
5. Resources	<p>Resources</p> <p>1. Identify as many GESI responsive resources as possible that can be used in the teaching and learning of the concepts mentioned above.</p> <p>2. In pairs, write on a flip chart the T/L resources needed for teaching Lesson3. Refer to the course manual for reference.</p>	10 mins
6. Evaluation and review of Session:	<p>Reflective Activity</p> <p>a. Summarize what you have learnt in the PD Session on Lesson 3.</p> <p>b. Reflect on the activities in the Session and outline unresolved issues relating to the lesson.</p>	10 mins

	<p>c. Read on Lesson 4 before the next PD Session.</p> <p>d. Remember to invite a critical friend from the same or related discipline to observe as you teach Lesson 3 in class and provide feedback.</p> <p>NTS: 1A</p>	
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TUTOR PD SESSION 4 FOR LESSON 4 IN THE COURSE MANUAL

COURSE /TOPICS

- APPLICATION DEVELOPMENT IN EDUCATION (APE) System Analysis and Design II
- DATA COMMUNICATION AND NETWORKING (DCN) Transmission Media II

<i>Focus: the bullet points provide the frame for what is to be done. The guidance notes in italics identify the prompt the SL/HoD needs and each one must be addressed</i>	<i>Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each state of the Session)</i> <i>Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each state of the Session)</i>	<i>Time in Session</i>
1. Introduction/lesson overview	<p>Introduction</p> <ol style="list-style-type: none"> 1. Review and reflect on the previous PD Session (on Lesson3) and how it influenced your teaching. <ol style="list-style-type: none"> a. The Systems Analysis and Design I – APE b. Transmission Media I – DCN 2. Share your experiences from the teaching of observing Lesson 3 3. Investigate on <ol style="list-style-type: none"> a. Systems Development models and methodologies, I (APE) b. Transmission media I (DCN) 	30 mins
2. Concept Development (New learning likely to arise in this lesson)	<p>Concept Development</p> <ol style="list-style-type: none"> 1. Identify and discuss various strategies for the development of conceptual understanding of the activities below. <ol style="list-style-type: none"> a. Watch a video on System Modelling – APE https://www.youtube.com/watch?v=ayP5Ey-djgw b. Watch a video on wireless propagation. - DCN https://www.youtube.com/watch?v=HNrK_Ez280M 2. In pairs analyze the videos you watched and discuss misconceptions and barriers in teaching and learning of Lesson 4 	30 mins

	<ol style="list-style-type: none"> 3. Discuss the possible challenges in teaching the concepts in the lesson. 4. Identify and write the crosscutting issues – core and transferable skills, inclusivity, equity and addressing diversity and how the learning outcomes of Lesson 4 apply to the BSC. 	
3. Teaching and learning activities	<p>Teaching and learning activities:</p> <p>In pairs,</p> <ol style="list-style-type: none"> 1. read through the teaching and learning activities in Lessons 4 taking into account GESI issues and refer them to the activities outlined in the course manual. 2. Brainstorm and come up with some pedagogical approaches and their related core competencies likely to be inculcated in CoE students and basic school learners in facilitating Sessions on following topics: <ol style="list-style-type: none"> a. The differences between object concept and modelling using UML APE b. Context Diagrams, Data flow diagrams DCN c. Terrestrial Microwave, Satellite Microwave, Broadcast Radio Ground Wave Propagation, Sky Wave Propagation 3. Discuss and present the strategies that must respond to inclusivity and equity (i.e., ICT as a tool for expanding learning to diverse learners in the new 4-year B. Ed curriculum and the BSC NTS 2e, 2f-p.13.T 	30 mins
4. Review of assessment component of Lesson	<p>Review of Assessment Components</p> <ol style="list-style-type: none"> 1. Read the assessment component of Lesson 4 of the course manual and compare it with the components prescribed by NTEAP and review as appropriate. 2. Discuss the assessment strategies to be used during the teaching of the lesson (NTS 3k). 3. Discuss the various ways you can support student teachers to build their portfolios before/during/after lessons 	10 mins

<p>5. Resources</p>	<p>Resources</p> <ol style="list-style-type: none"> 1. In pairs, discuss and Present T/L resources needed for teaching this lesson for presentation and discussion. 2. Identify as many GESI responsive resources as possible that can be used in the teaching and learning of the concepts in the lesson. 	<p>10 mins</p>
<p>6. Evaluation and review of Session:</p>	<p>Reflective Activity</p> <ol style="list-style-type: none"> 1. Mention the lessons learnt in theSession. 2. Remember to call a critical friend from a related discipline to observe as you teach Lesson 4 in class and provide feedback. NTS: 1A. 3. Read the course manualand the PD Session guide ahead of time and identify any outstanding issues relating to this lesson for clarification. 4. Collect all resources (such as projector, flip chart and sticky notes) you need ahead of time, prepare samples of TLMs you may need and rehearse how these may be used to support the achievement of your goals. 	<p>10 mins</p>

TUTOR PD SESSION 5 FOR LESSON 5 IN THE COURSE MANUAL

COURSE / TOPICS

- APPLICATION DEVELOPMENT IN EDUCATION (APE) - SYSTEMS DEVELOPMENT 1
- DATA COMMUNICATION AND NETWORKING (DCN) - NETWORK FUNDAMENTALS I

<p><i>Focus: the bullet points provide the frame for what is to be done. The guidance notes in italics identify the prompt the SL/HoD needs and each one must be addressed</i></p>	<p>Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each state of the Session) Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each state of the Session)</p>	<p>Time in Session</p>
<p>1. Introduction / lesson overview</p>	<p>Introduction</p> <ol style="list-style-type: none"> 1. Write on a flip chart your experiences (successes and challenges) as you taught Lesson 4 after the PD Session 2. Tell how useful the previous PD Session was and how it influenced your teaching of application development and data communication courses. 3. Share your experience if you observed a colleague teach Lesson 4. 4. Tutors write sample <i>correct</i> program code in a particular programming language in Java, c++ <i>APE</i> 5. Identify specific hardware and software requirements for communication types and applying GESI (i.e., ICT as a tool for expanding learning to diverse learners e.g. People with visual impairment, dyslexia, dysgraphia). <i>DCN</i> 6. Brainstorm on issues arising in the use of ICTs (NTS 1c, d, f, G, 2c). <i>tutors share their views, linking views into coding using any programming language</i> 7. Read the introductory sections (up to Learning Outcomes (LOs). Let tutors in pairs discuss the important or distinctive aspects of the lesson. 	<p>30 mins</p>

<p>2. Concept Development New learning likely to arise in this lesson)</p>	<p>Activity 2: Concept Development</p> <ol style="list-style-type: none"> 1. Use Talk for learning to discuss the basic programming concepts to improve understanding. <i>APE</i> 2. Using Talk for learning, discuss the classification of networks based on architecture, geographic span and topology <i>DCN</i> 3. Discuss some potential misconceptions and barriers concerning the teaching and learning of the lessontaking into consideration <i>GESI</i> 	<p>30 mins</p>
<p>3. Teaching and learning activities</p>	<ol style="list-style-type: none"> 1. Watch a YouTube video to explain Pseudocode. Tutors engage in discussion on the development of Pseudocode for their software. https://youtu.be/HhBrkpTqzqg Search on YouTube, videos that explain Pseudocode and write salient points on a flip chart for presentation <i>APE</i> 2. Watch a video on the classification of networks based on architecture, geographic span and topology https://youtu.be/4_zSIXb7tLQDCN using radio presentation, present to colleagues in a larger group 3. Brainstorm and come out with some pedagogical approaches and their related core competencies likely to arise in your facilitating Lesson 5.1 4. Identify and write the cross-cutting issues – core and transferable skills, inclusivity, equity and addressing diversity and how these would affect teaching and learning the concepts in Lesson 5 (NTS 2A and 2D). 	<p>30 mins</p>
<p>4. Review of the assessment component</p>	<p>Review of Assessment Components</p> <ol style="list-style-type: none"> 1. Read the assessment component of Lesson 5 of the course manual and compare it with the components prescribed by NTEAP and review as appropriate. 2. Discuss the various ways you can support student 	<p>10 mins</p>

	teachers to build their portfolios before/during/after lessons.	
5. Resources	<p>Resources</p> <p>In pairs, search the internet for T/L videos and images needed for teaching Lesson 5. <i>Discuss your findings with the general group.</i></p>	10 mins
6. Evaluation and review of Session:	<p>Reflective Activity</p> <ol style="list-style-type: none"> 1. Provide a summary of the main ideas of the PD Session for Lesson 5. 2. Read on Lesson6 before the next PD Session. 3. Remember to invite a critical friend from the same or related discipline to observe as you teach Lesson 5in class and provide feedback. NTS: 1A. 	10 mins

TUTOR PD SESSION 6 FOR LESSON 6 IN THE COURSE MANUAL

COURSE / TOPICS

- APPLICATION DEVELOPMENT IN EDUCATION (APE) -SYSTEM DEVELOPMENT II
- DATA COMMUNICATION AND NETWORKING (DCN) -TRANSMISSION MEDIA II

<i>Focus: the bullet points provide the frame for what is to be done. The guidance notes in italics identify the prompt the SL/HoD needs and each one must be addressed</i>	<i>Guidance Notes on Tutor Activity during the PD Session.</i> <i>What PD Session participants (Tutors) will do during each state of the Session)</i> Guidance Notes on Tutor Activity during the PD Session. <i>What PD Session participants (Tutors) will do during each state of the Session)</i>	Time in Session
1. Introduction / Lesson overview	Introduction 1. Review and reflect on the previous PD Session (on Lesson 5) a. Systems Development I - APE b. Network Fundamentals –DCN 2. Share your experience on the Lesson5 you observed and your expectations of today’s PD Session. 3. Outline the important features of the course manual and how the concepts in the lesson will be taught. Remember to write down GESI (e.g. inclusivity) issues that may arise when teaching these lessons a. Develop a sample Algorithms and Data structures – APE b. Explain Network Devices – DCN 4. In pairs, discuss the important distinctive aspects like: a. Networking devices (Repeaters: Bridge: Switch: Routers: Gateways) DCN b. Arithmetic and logical statements – APE	30 mins
2. Concept Development (New learning likely to arise in this lesson)	Activity 2: Concept Development 1. Use interactive lecturette to explainfamiliar and unfamiliar concepts in the lesson and discuss relevant connections among concepts in the lesson with other lessons and the use of relevant resources for the following topics: a. Arithmetic and logical statements. Use videos to explain Arithmetic and logical statements. –	30 mins

	<p>APE https://youtu.be/xTmEqNRr9T4</p> <p>b. Network device configuration – DCN https://youtu.be/3xwrLLwSCag</p> <p>2. Discuss the possible challenges in teaching the concepts in the lesson.</p> <p>3. Identify and write the crosscutting issues – core and transferable skills, inclusivity, equity and addressing diversity and how the learning outcomes of Lesson 6 apply to the BSC.</p>	
<p>3. Teaching and learning activities</p>	<p>Teaching and learning activities:</p> <p>1. In pairs, suggest teaching and learning activities for the lesson considering GESI issues outlined in the course manual in teaching the following:</p> <p>APE:</p> <ul style="list-style-type: none"> i. The interface and features of a chosen software development environments. ii. Write a program code in a specific language. E.g., Java. iii. Use a video to explain algorithms and data structures. https://www.youtube.com/watch?v=bum_19loj9A <p>DCN:</p> <ul style="list-style-type: none"> i. Methods and processes of communication. <p>2. In pairs, discuss the strategies that must respond to inclusivity and equity (i.e., ICT as a tool for expanding learning) to diverse learners in the new 4-year B. Ed curriculum and the BSC NTS 2e, 2f-p.13.</p> <p><i>Present your findings</i></p>	<p>30 mins</p>
<p>Review of assessment component</p>	<p>Review of assessment component</p> <p>1. Read the assessment component of Lesson 6 of the course manual and compare it with the components prescribed by NTEAP and review as appropriate.</p> <p>2. Discuss the various ways you can support student teachers to build their portfolios before/during/after lessons.</p>	<p>10 mins</p>

<p>4. Resources</p>	<p>Resources</p> <ol style="list-style-type: none"> 1. Discuss and Present on a flip chart, the T/L resources needed for teaching lesson6. 2. Select a concept in Lesson6 of the course manual and design resources that can be used in the teaching and learning of the concepts selected (NTS 3j). 	<p>10 mins</p>
<p>5. Evaluation and review of Session:</p>	<p>Reflective Activity</p> <ol style="list-style-type: none"> 1. Summarisethe lessons learnt in the PD Session. 2. Remember to call a critical friend from a related discipline to observe as you teach Lesson6 in class and provide feedback. NTS: 1A. <p>Advance Preparation</p> <p><i>Please Remember to read materials on Lesson 7 from the PD manual before the next Session</i></p>	<p>10 mins</p>

TUTOR PD SESSION 7 FOR LESSON 7 IN THE COURSE MANUAL

COURSE / TOPICS

- APPLICATION DEVELOPMENT IN EDUCATION (APE) - SYSTEMS DEVELOPMENT III
- DATA COMMUNICATION AND NETWORKING (DCN) - THE INTERNET I

<p><i>Focus: the bullet points provide the frame for what is to be done. The guidance notes in italics identify the prompt the SL/HoD needs and each one must be addressed</i></p>	<p>Guidance Notes on Tutor Activity during the PD Session. <i>What PD Session participants (Tutors) will do during each state of the Session)</i> Guidance Notes on Tutor Activity during the PD Session. <i>What PD Session participants (Tutors) will do during each state of the Session)</i></p>	<p>Time in Session</p>
<p>1. Introduction / lesson overview</p>	<p>Introduction</p> <ol style="list-style-type: none"> 1. Write on a flipchart your experiences (successes and challenges) as you taught Lesson 6 after the PD Session and present your views. 2. Tutors who observed Lesson 6 share their experiences and how these experiences influenced their teaching. 3. Share your views on the relevance of teaching “data structures” in the new 4-year B.Ed. Curriculum as well as the BSC. 4. Read the introductory sections up to Learning Outcomes (LOs). Let tutors in pairs discuss the important or distinctive aspects of the lesson including vocabulary and fundamental concepts related to the components of the front matter and discuss how the students’ relevant previous knowledge can help them to understand the lesson. <p>Distinctive aspects</p> <ol style="list-style-type: none"> a. Explain the concept of Data Structures and give some examples APE b. Use a brainstorm session to elicit information on whether Networking devices can be used to communicate information on a global scale. DCN <p><i>Note: Refer to the course references in the course manual.</i></p>	<p>30 mins</p>

<p>2. Concept Development (New learning likely to arise in this lesson)</p>	<p>Concept Development</p> <ol style="list-style-type: none"> 1. Discuss the below familiar and unfamiliar concepts in the lesson and discuss relevant connections between concepts in the lesson. i.e. <ol style="list-style-type: none"> a. The uses of Algorithms and Data Structures in teaching and learning as well as in our daily activities as indicated in NTS 2C, 2d, 3j b. ISPs, End systems/hosts, APs and hot spot <i>DCN</i> 2. Discuss the possible challenges in teaching the concepts discussed. 3. Identify and discuss the crosscutting issues – core and transferable skills, inclusivity, equity and addressing diversity and how the learning outcomes of Lesson 7 reflect to these and apply to the BSC. 4. Present your findings on post-it notes. 	<p>30 mins</p>
<p>3. Teaching and learning activities</p>	<p>Teaching and learning activities</p> <ol style="list-style-type: none"> 1. Suggest teaching and learning activities for the lesson taking into account GESI issues e.g., Employ differentiated teaching approaches suitable for all learners in teaching the above concepts. 2. Discuss the strategies that will reflect inclusivity and equity in teaching these lessons: <ol style="list-style-type: none"> a. Exception Handling and Object-Oriented Programming concepts- Polymorphism, encapsulation <i>APE</i> b. Physical Addresses (MAC Addresses), logical addressing (IP Addressing) and ports to the larger group <i>DCN</i> 3. Write your findings on a flipchart and share with the larger group. 4. Brainstorm to come out with some pedagogical approaches e.g., interactive approach and their likely related core competencies to be inculcated in CoE students and basic school learners. 	<p>30 mins</p>

	<p>5. Model a presentation of an activity using ICT tools and taking into consideration GESI issues (e.g., both male and female learners playing leading roles in their groups and the demonstration of the use of ICT tools) in the B. ED curriculum and the BSC. NTS 1a, b, c, d, 2b, e, 3b</p>	
<p>4. Review of assessment component of Lesson</p>	<p>Review of assessment component</p> <ol style="list-style-type: none"> 1. Read the assessment component of Lesson 7 of the course manual and compare it with the components prescribed by NTEAP and review as appropriate. 2. Discuss the various ways you can support student teachers to build their portfolios before/during/after lessons. 	<p>10 mins</p>
<p>5. Resources</p>	<p>Resources</p> <ol style="list-style-type: none"> 1. In pairs search the Web for more images, videos that can be used for teaching Lesson 7 and present your findings to the larger group. 2. Select a concept in unit seven of their course manual and design resources that can be used in the teaching and learning of the concepts selected (NTS 3j). 	<p>10 mins</p>
<p>6. Evaluation and review of session:</p>	<p>Reflective Activity</p> <ol style="list-style-type: none"> 1. Provide a summary of the main ideas of the PD Session for Lesson 7. 2. Remember to invite a critical friend from the same or related discipline to observe as you teach Lesson 7 in class and provide feedback. NTS: 1A, 1B 4. Reflect on the activities in the Session and identify unresolved issues relating to the lesson. <p>Advance Preparation</p> <p>Read on Lesson 8 before the next PD Session</p>	<p>10 mins</p>

TUTOR PD SESSION 8 FOR LESSON 8 IN THE COURSE MANUAL

COURSE / TOPICS

- APPLICATION DEVELOPMENT IN EDUCATION (APE) SYSTEM DEVELOPMENT IV
- DATA COMMUNICATION AND NETWORKING (DCN) THE INTERNET II

<p><i>Focus: the bullet points provide the frame for what is to be done. The guidance notes in italics identify the prompt the SL/HoD needs and each one must be addressed</i></p>	<p>Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each state of the Session) Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each state of the Session)</p>	<p>Time in Session</p>
<p>1. Introduction / lesson overview</p>	<p>Introduction</p> <ol style="list-style-type: none"> 1. Review and reflect on the previous PD Session Lesson 7 and how useful it was on the following concepts from the course manual. <ol style="list-style-type: none"> a. Systems Development III –APE b. The Internet I –DCN 2. Identify the lesson learning outcomes and learning indicators as stated in the course manual and share your views with a colleague. Refer to (NTS 2c). 3. Discuss and Write on a flip chart the below distinctive aspect of the lesson. <ol style="list-style-type: none"> a. Decision Structures and Boolean Logic – APE b. The OSI Model – DCN 4. Identify and report on flipchart cross-cutting issues – core and transferable skills, inclusivity, equity and addressing diversity and how the learning outcomes of Lesson 8 apply to the BSC. 	<p>30 mins</p>
<p>2. Concept Development (New learning likely to arise in this lesson)</p>	<p>Activity 2: Concept Development</p> <ol style="list-style-type: none"> 1. Discuss below familiar and unfamiliar concepts in the lesson and discuss relevant connections between concepts in these lessons: <ol style="list-style-type: none"> a. The TCP/IP Protocol Architecture) – DCN and b. Input, Processing, Output – APE c. 2. Discuss the possible challenges in teaching the 	<p>30 mins</p>

	<p>concepts taking into consideration GESI (e.g., gender and inclusivity) in the lesson.</p> <p>3. Discuss some misconceptions and barriers concerning the teaching and learning of the lesson for presentation.</p> <p>4. Present your findings on post-it notes.</p>	
3. Teaching and learning activities	<p>Teaching and learning activities:</p> <p>1. In pairs, brainstorm on some pedagogical approaches (e.g., learner centered approach) and their related core competencies likely to be inculcated in teaching these Practical lessons:</p> <ul style="list-style-type: none"> a. The seven layers of the Open System Interconnection Model (OSI) DCN b. Repetition structures – APE <p>2. Discuss the strategies that must respond to inclusivity and equity-GESI (i.e., uses participatory methods such as group work, debates and role play; and ensures equal participation of females & males (giving extra encouragement where needed in the new 4-year B Ed. Curriculum and the BSC (through STS activities) as stated in NTS 2e, 2f-p.13).</p> <p>3. Ask tutors to outline possible challenging areas in the teaching of the lesson taking into consideration GESI (e. g. identifying areas where reasonable adjustments can be made to make the lesson more inclusive)</p>	30 mins
4. Review of assessment component of Lesson	<p>Review of assessment component</p> <p>1. Read the assessment component of Lesson 6 of the course manual and compare it with the components prescribed by NTEAP and review as appropriate.</p> <p>2. Discuss the various ways you can support student teachers to build their portfolios before/during/ after lessons</p>	10 mins
5. Resources	<p>Resources</p> <p>1. List some T/L to be used in teaching this lesson for presentation and discussion e.g. Open Educational Resources (Including YouTube, MOOCS,</p>	10 mins

	<p>Udemy/Coursera, khan academy, TESSA)</p> <ol style="list-style-type: none"> 2. In pairs (NTS 3h), select a concept through balloting and design resources that can be used in the teaching and learning of the concepts selected (NTS 3j) 3. Identify as many GESI responsive resources as possible that can be used in the teaching and learning of the concepts in the lesson. 	
<p>6. Evaluation and review of Session:</p>	<p>Reflective Activity</p> <ol style="list-style-type: none"> 1. Mention the lessons learnt in the PD Session. 2. Remember to call a critical friend from a related discipline to observe as you teach Lesson8 in class and provide feedback. NTS: 1A. 3. Collect all resources (such as projector, flip chart and sticky notes) you need ahead of time, prepare samples of TLMs you may need and rehearse how these may be used to support the achievement of your goals. 5. Read the course manual and the PD Session guide ahead of time and identify any outstanding issues relating to this lesson for clarification. 	<p>10 mins</p>

TUTOR PD SESSION 9 FOR LESSON 9 IN THE COURSE MANUAL

COURSE / TOPICS

- APPLICATION DEVELOPMENT IN EDUCATION (APE) - SYSTEMS DEVELOPMENT V
- DATA COMMUNICATION AND NETWORKING (DCN) - THE WORLDWIDE WEB I: INTRODUCTION TO WORLDWIDEBWEB & HTML

<p><i>Focus: the bullet points provide the frame for what is to be done. The guidance notes in italics identify the prompt the SL/HoD needs and each one must be addressed</i></p>	<p>Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each state of the Session) Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each state of the Session)</p>	<p>Time in Session</p>
<p>1. Introduction / lesson overview</p>	<p>Introduction</p> <ol style="list-style-type: none"> 1. Review and reflect on the previous PD Session Lesson 8 and how useful it was in your lesson taught. 2. Identify the lesson learning outcomes and learning indicators as stated in the course manual and share your views with a colleague. Refer to (NTS 2c). 3. Discuss and write on a flipchart the possible barriers of teaching these distinctive aspects of the lesson: <ol style="list-style-type: none"> a. Boolean logic and repetition structure and give some examples. <i>APE</i> b. Layers of the Open Systems Interconnection model (OSI model), the characteristics of each layer, the protocols that work in each layer and the characteristics of the protocols <i>DCN</i> 4. Identify and report on flipchart cross-cutting issues – core and transferable skills, inclusivity, equity and addressing diversity and how the learning outcomes of Lesson 9 apply to the BSC. 	<p>30 mins</p>
<p>2. Concept Development (New learning likely to arise in this lesson)</p>	<p>Activity 2: Concept Development</p> <ol style="list-style-type: none"> 1. Brainstorm and write at least 2 barriers in teaching and learning of the lesson on <ol style="list-style-type: none"> a. Functions: e.g. <ol style="list-style-type: none"> a. Call by-value 	<p>30 mins</p>

	<p>b. call-by-reference <i>APE</i></p> <p>b. Internet e.g.</p> <ol style="list-style-type: none"> a. the worldwide web (WWW) is and how it works. b. The structure of web pages, and <i>DCN</i> <p>2. Discuss the possible challenges that may arise in teaching the above stated concepts in the lesson.</p> <p>3. Identify and write the cross-cutting issues – core and transferable skills, inclusivity, equity and addressing diversity and how the learning outcomes of Lesson 9 apply to the BSC.</p>	
<p>3. Teaching and learning activities</p>	<p>Teaching and learning activities:</p> <ol style="list-style-type: none"> 1. Read through the teaching and learning activities in Lesson 9 considering GESI issues (e.g., given equal chances to females and males to ask and answer questions) and refer them to the activities outlined in the course manual. 2. Lead tutors to brainstorm and come up with some pedagogical approaches (e.g., group work, debates) and their related core competencies likely to be inculcated in CoE students and basic school learner in facilitating Sessions on the following topics: <ol style="list-style-type: none"> i. Call by-value ii. Call-by-reference <i>APE</i> iii. what the world wide web (WWW) is and how it works. iv. WWW syntax and how is written in HTML. <i>DCN</i> <p>Practical Activity.</p> <ol style="list-style-type: none"> 3. Demonstrate your skills on the Basic control structures (selection, iteration etc} on a flipchart for presentation. <i>APE</i> 4. Discuss the challenging areas in the teaching of the Lesson taking into consideration GESI (e. g. identifying areas where reasonable adjustments can be made to make the lesson more inclusive). 	<p>30 mins</p>

<p>4. Review of assessment component</p>	<p>Review of assessment component</p> <ol style="list-style-type: none"> 1. Read and identify the assessment component of Lesson 9 of the course manual and compare it with the components prescribed by NTEAP and review as appropriate. <p><i>e.g., Assessment of learning: Program code using function call and control structure concepts for a software project. Program code should be added to student teacher's e-portfolio as a CD.</i></p> <p><i>Assesses Learning Outcomes: CLO 4 Write computer programs and develop a programming style that is accepted industry practice.</i></p> <ol style="list-style-type: none"> 2. Discuss the various ways you can support student teachers to build their portfolios before/during/after lessons. 	<p>10 mins</p>
<p>5. Resources</p>	<p>Resources</p> <ol style="list-style-type: none"> 1. Search the Web inpairs for more images, videos and animated clip arts that can be used for teaching Lesson 9. 2. In pairs (NTS 3h), to select a concept and design resources that can be used in the teaching and learning of the concepts selected (NTS 3j). 3. Identify as many GESI responsive resources as possible that can be used in the teaching and learning of the concepts mentioned above. 	<p>10 mins</p>
<p>6. Evaluation and review of Session:</p>	<p>Reflective Activity</p> <p>Provide:</p> <ol style="list-style-type: none"> 1. Summarize what you have learnt in the PD session on Lesson 9. 2. Engage tutors to identify unresolved issues relating to this lesson for clarification. 3. Remember to invite a critical friend from the same or related discipline to observe as you teach Lesson9 in class and provide feedback. NTS: 1A 4. Read on Lesson10 before the next PD Session 	<p>10 mins</p>

TUTOR PD SESSION 10 FOR LESSON 10 IN THE COURSE MANUAL

COURSE / TOPICS

- APPLICATION DEVELOPMENT IN EDUCATION (APE) - INTRODUCTION TO ROBOTICS
- DATA COMMUNICATION AND NETWORKING (DCN) - THE WORLWORLDWIDE II – CSS

<i>Focus: the bullet points provide the frame for what is to be done. The guidance notes in italics identify the prompt the SL/HoD needs and each one must be addressed</i>	<i>Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each state of the Session)</i> Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each state of the Session)	Time in Session
1. Introduction / lesson overview	<p>Introduction</p> <ol style="list-style-type: none"> 1. Review and reflect on the previous PD Session (Lesson 9) on: <ol style="list-style-type: none"> a. Systems Development V – APE b. The worldwide web I - DC 2. Tutors who observed lesson 9 share their experiences and how these experiences influenced their teaching. DCN & APE 3. Read the introductory sections up to Learning Outcomes (LOs). Let tutors in pairs discuss the important or distinctive aspects of the lesson including vocabulary and fundamental concepts related to the components of the front matter and discuss how the students’ relevant previous knowledge can help them to understand the lesson. 4. <p>Distinctive aspects</p> <p>Discuss the following concepts:</p> <p>APE:</p> <ol style="list-style-type: none"> i. Components of robots (Simulation, sensors, actuators, controllers, Feedback for control) ii. programming single board computers. E.g., Raspberry Pi. <p>DCN:</p> <ol style="list-style-type: none"> i. CSS ii. The syntax iii. CSS selectors iv. Colours and borders 	30 mins

	<p>iv. Inserting style sheet</p> <p>5. Identify and report on a flipchart cross-cutting issues – core and transferable skills, inclusivity, equity and addressing diversity and how the learning outcomes of Lesson 10 apply to the Basic School curriculum (BSC).</p>	
<p>2. Concept Development (New learning likely to arise in this lesson)</p>	<p>Activity 2: Concept Development</p> <p>1. Using talk for learning, identify and discuss your understanding on familiar and unfamiliar concepts in the Lesson 10 for instance:</p> <ol style="list-style-type: none"> a. The concept of robotics. APE b. How to insert style sheet, colours, and borders. DCN <p>2. Discuss some potential misconceptions and barriers in teaching and learning of the lesson taking into consideration GESI e.g., programming is meant for Boys and girls.</p> <p>3. Tutors discuss the possible challenges in teaching the concepts in the Lesson 10.</p> <p>4. Identify and discuss the crosscutting issues – core and transferable skills, inclusivity, equity and addressing diversity and how the learning outcomes of Lesson 10 reflect these and apply to the BSC.</p> <p>5. Present your findings on post-it notes.</p>	<p>mins</p>
<p>3. Teaching and learning activities for the lesson</p>	<p>Teaching and learning activities:</p> <p>In pairs,</p> <ol style="list-style-type: none"> 1. Discuss the teaching and learning activities in Lessons10 considering GESI (i.e., providing constructive /positive verbal feedback to both females and males issues) and refer to the activities outlined in the course manual. 2. Brainstorm and come up with some pedagogical approaches and their related core competencies likely to be inculcated in CoE students and basic school learner learners through STS activities in facilitating Sessions on the following topics: 	<p>30 mins</p>

	<p>a. Components of CSS. DCN b. Tolerance and recovery. APE</p> <p>3. Discuss and present the strategies that must respond to inclusivity and equity (i.e., ICT as a tool for expanding learning to diverse learners in the new 4-year B. Ed curriculum and the BSC NTS 2e, 2f-p.13.</p>	
1. Review of assessment component of Lesson	<p>Review of assessment component of Lesson</p> <p>1. Read the assessment component of Lesson 10 of the course manual and compare it with the components prescribed by NTEAP and review as appropriate.</p> <p>2. Discuss the assessment strategies to be used during the teaching of the lesson – (NTS 3k).</p> <p>3. Discuss the various ways you can support student teachers to build their portfolios before/during/after lessons.</p>	mins
5. Resources	<p>Resources</p> <p>1. Identify as many as possible GESI responsive resources that can be used in the teaching and learning of the concepts in the lesson. E.g., Open Educational Resources other equally important T/L to be used for the lesson use Open Educational Resources (Including YouTube, MOOCS- Udemy/Coursera, khan academy, TESSA)</p> <p>2. In pairs (NTS 3h), select a concept to be taught in the unit from the course manual and identify resources that can be used in the teaching and learning of the concepts selected (NTS 3j).</p>	10 mins
6. Evaluation and review of Session:	<p>Reflective Activity</p> <p>1. Mention the lessons learnt in this PD Session.</p> <p>2. Reflect on the activities in the Session and outline unresolved issues relating to the lesson for clarification.</p> <p>3. Remember to call a critical friend from a related discipline to observe as you teach Lesson10 in class and provide feedback. NTS: 1A.</p>	10 mins

	<p>Advance Preparation <i>Please Remember to read materials on Lesson 11 from the PD manual before the next Session</i> <i>Collect all resources (such as projector, flip chart and sticky notes) you need ahead of time, prepare samples of TLMs you may need and rehearse how these may be used to support the achievement of your goals</i></p>	
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TUTOR PD SESSION 11 FOR LESSON 11 IN THE COURSE MANUAL

COURSE / TOPICS

- APPLICATION DEVELOPMENT IN EDUCATION (APE) - SYSTEMS DEPLOYMENT
- DATA COMMUNICATION AND NETWORKING (DCN) - THE WORLDWIDE WEB
III:CLIENT-SIDE ACTIVITIES

<p><i>Focus: the bullet points provide the frame for what is to be done. The guidance notes in italics identify the prompt the SL/HoD needs and each one must be addressed</i></p>	<p><i>Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each state of the Session)</i> <i>Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each state of the Session)</i></p>	<p><i>Time in Session</i></p>
<p>1. Introduction / Lesson overview</p>	<p>Introduction</p> <ol style="list-style-type: none"> 1. Review and reflect on the previous PD Session Lesson 10 and how useful it was in practice. 2. Tutors who observed Lesson 10 to share their experiences. 3. Read the introductory sections (up to Learning Outcomes (LOs). In pairs discuss the important or distinctive aspects of the lesson and discuss how the students’ relevant previous knowledge can help them to understand the lesson. 4. Discuss and share views on the following distinctive aspect of the lesson. <ol style="list-style-type: none"> a. The relevance of teaching of “Basic electronics: voltage, current, power, motors, sensors”. <i>APE</i> b. How to insert style sheet, colours, and borders. <i>DCN</i> 5. Identify and report on flipchart cross-cutting issues – core and transferable skills, inclusivity, equity and addressing diversity and how the learning outcomes of Lesson 11 apply to the BSC. 	
<p>2. Concept Development (New learning likely to arise in this lesson)</p>	<p>Activity 2: Concept Development</p> <ol style="list-style-type: none"> 1. Tutors: <ol style="list-style-type: none"> a. Brainstorm on Software deployment plans and training <i>APE</i> 	<p>30 mins</p>

	<p>b. Discuss client-side scripting language (e.g., JavaScript) and its syntax. <i>DCN</i></p> <p>2. Outline possible challenging areas in the teaching Lesson11 taking into consideration GESI (e. g. identifying areas in the curriculum where, inclusivity, gender issues may arise.)</p> <p>3. Identify and write the cross-cutting issues – core and transferable skills, inclusivity, equity and addressing diversity and how the learning outcomes of Lesson 11 apply to the BSC.</p>	
3. Teaching and learning activities	<p>Teaching and learning activities:</p> <p><i>Practical Session:</i></p> <p>1. Identify familiar and unfamiliar concepts in the lesson and discuss relevant connections between concepts in the lesson with those in other lessons as well as the use of relevant resources as you undertake the activities below:</p> <p>a. Deployment & training plans of system development. <i>APE</i></p> <p>b. Client-side scripting language (e.g., JavaScript) and its syntax <i>DCN</i></p> <p>2. Discuss the strategies that must respond to inclusivity and equity-GESI (i.e., ICT as a tool for expanding learning to diverse learners in the new 4-year B Ed. Curriculum and the BSC as stated in <i>NTS 2e, 2f-p.13.</i></p> <p>3. Brainstorm to come out with some pedagogical approaches (e.g., interactive approach) and their likely related core competencies to be inculcated in CoE students and basic school learners.</p>	30 mins
4. Review of assessment component of Lesson	<p>Review of Assessment Components</p> <p>1. Identify the assessment components of Lesson 11 of the course manual and compare it with the components prescribed by NTEAP and review as appropriate.</p> <p>2. Discuss the various ways you can support student teachers to build their portfolios before/during/after lessons</p>	10 mins

<p>5. Resources</p>	<p>Resources</p> <ol style="list-style-type: none"> 1. Surfthe Web inpairs for more images, videos and animated clip arts that can be used for teaching Lesson 11. 2. Identify as many GESI responsive resources as possible that can be used in the teaching and learning of the concepts mentioned above. 3. In pairs (NTS 3h), select a concept and design resources that can be used in the teaching and learning of the concepts selected (NTS 3j). 	<p>10 mins</p>
<p>6. Evaluation and review of Session:</p>	<p>Reflective Activity</p> <p>Tutors provide:</p> <ol style="list-style-type: none"> 1. Summary of what you have learnt in the PD session for Lesson 11. 2. Remember to invite a critical friend from the same or related discipline to observe as you teach Lesson 11 in class and provide feedback in the next session. NTS: 1A, 1B 3. Reflect on the activities in the Session and identify unresolved issues relating to the lesson. <p>Advance Preparation Read on Lesson12 before the next PD Session.</p>	<p>10 mins</p>

TUTOR PD SESSION 12 FOR LESSON 12 IN THE COURSE MANUAL

COURSE / TOPICS

- APPLICATION DEVELOPMENT IN EDUCATION (APE) SYSTEMS MAINTENANCE
- DATA COMMUNICATION AND NETWORKING (DCN) THE WORLDWIDE WEB IV – SERVER-SIDE ACTIVITIES

<p><i>Focus: the bullet points provide the frame for what is to be done. The guidance notes in italics identify the prompt the SL/HoD needs and each one must be addressed</i></p>	<p>Guidance Notes on Tutor Activity during the PD Session. <i>What PD Session participants (Tutors) will do during each stage of the Session)</i> Guidance Notes on Tutor Activity during the PD Session. <i>What PD Session participants (Tutors) will do during each stage of the Session)</i></p>	<p>Time in Session</p>
<p>Introduction/lesson overview</p>	<p>Introduction</p> <ol style="list-style-type: none"> 1. Review and reflect on the previous PD Session (on Lesson11) i.e. <ol style="list-style-type: none"> a. Systems Deployment iii - APE b. The worldwide web II: Client-Side Activities - DCN 2. Tutors who observed Lesson 11 to share their experiences and how these experiences influenced your teaching. 3. Read the introductory sections (up to Learning Outcomes (LOs). Let tutors in pairs discuss the important or distinctive aspects of the lesson including vocabulary and fundamental concepts related to the components of the front matter sand discuss how the students’ relevant previous knowledge can help them to understand the lesson. 4. Ponder on these distinctive aspects of the lesson and write their meaning on a flip chart for presentation. <ol style="list-style-type: none"> a. Server-side scripting. – DCN b. Maintenance Planning –APE 5. Present your findings via <i>radio reporting</i> 	<p>30 mins</p>

<p>Concept Development (New learning likely to arise in this lesson)</p>	<p>Activity 2: Concept Development</p> <ol style="list-style-type: none"> 1. Discuss the familiar and unfamiliar concepts in the lesson and discuss relevant connections between concepts in the lesson and those of other ICT lessons and the use of relevant resources. i.e. <ul style="list-style-type: none"> APE: <ol style="list-style-type: none"> a. Planning for system upgrades b. Planning for system repairs e.g., Linux, Windows. c. How to plan for system fixes. DCN: <ol style="list-style-type: none"> a. Server-side scripting languages e.g., PHP, Python. b. Server-side scripting language syntax. c. Write a simple sample code in one of the languages. 2. Discuss the possible challenges in teaching the concepts discussed in Lesson 12. 3. Identify and discuss the cross-cutting issues – core and transferable skills, inclusivity, equity and addressing diversity and how the learning outcomes of Lesson 12 reflect these and apply to the BSC. 4. Present your findings on post-it notes. 	<p>30 mins</p>
<p>Teaching and learning activities</p>	<p>Teaching and learning activities:</p> <ol style="list-style-type: none"> 1. In pairs, consider GESI (i.e, both male and females who may be shy or afraid to perform practical activity should be encouraged to participate) issues in teaching concepts like <ul style="list-style-type: none"> a. Planning for upgrades, repairs, and fixes. APE b. Writing a simple sample code in any of the languages e.g., PHP, Python, Pearl. DCN 2. Discuss misconceptions and barriers in teaching the lesson. 3. In pairs discuss strategies that will reflect inclusivity and equity- GESI (e.g., using ICT as a tool for expanding learning) to diverse learners on the lesson to be taught. 	<p>30 mins</p>

	<p>4. Brainstorm and come out with some pedagogical approaches (e.g., learner centered approach, discussion, group work) and their likely related core competencies to be inculcated in CoE students and basic school learners.</p> <p>5. Model a presentation of an activity in this lesson using ICT tools and taking into consideration GESI (e.g., both male and female learners playing leading roles in their groups and the demonstration of the use of ICT tools) issues in the B. ED curriculum and the BSC. NTS 1a, b, c, d, 2b, e, 3b, for presentation</p>	
Review of assessment component	<p>Review of assessment component</p> <p>1. Read and identify the assessment components of Lesson 12 of the course manual and compare it with the components prescribed by NTEAP and review as appropriate.</p> <p>2. Discuss and identify the various ways you can support student teachers to build their portfolios before/during/after lessons</p>	10 mins
Resources	<p>Resources</p> <p>1. Write on a flip chart the T/L resources needed for teaching Lesson12 for presentation and discussion on these subtopics e.g.</p> <ul style="list-style-type: none"> i. Vs code, sublime text DCN ii. Upgrades, Repairs APE <p>2. In pairs (NTS 3h), select a concept through balloting and design resources that can be used in the teaching and learning of the concept selected (NTS 3j). E.g., of the resources are Open Educational Resources (Including YouTube, MOOCS- Udemy/Coursera khan academy, TESSA) – DCN & APE</p>	10 mins
Evaluation and review of Session:	<p>Reflective Activity</p> <p>1. Provide a summary of what you have learnt in the PD sessions and how the new learning has impacted on their teaching of the lessons in the manual.</p>	10 mins

	<ol style="list-style-type: none">2. Reflect on the activities in the Session and outline unresolved issues relating to the lesson.3. <i>Remember to write all unresolved issues in the PD guide to PDC to report appropriately.</i>	
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College of Education Tutor Professional Development (TPD) Survey – Coordinators Survey

Introduction

This survey should be completed by the TPD Coordinators for each College of Education. This survey will be completed on the College of Education Management Information System (CEMIS). The survey should be completed each week after TPD sessions.

1. Name of College of Education	
2. Please enter the date of the session	

3. Did today's scheduled TPD session take place?		
Yes	1	Go to Q5
No and we did not reschedule.	2	Go to Q4
No but we rescheduled for later this week or for an additional slot next week	3	Go to Q4

4. If the TPD session did not take place, please explain why		
Conflict with other activities	1	End data submission.
No one showed up for the session.	2	
Other (please specify)	3	

5. How many male tutors attended?	Answer must be a number.....
6. How many female tutors attended?	Answer must be a number.....
7. Which session was it?	Answer must be a text.....

8. What was the level of tutor participation during today's session?	
75-100% of the tutors were engaged	1
50-75% of the tutors were engaged	2
25-50% of the tutors were engaged	3
0-25% of the tutors were engaged	4

9. Please rate yourself on how well you facilitated the session	
I was not prepared	1
I could have been better prepared.	2
I felt adequately prepared.	3
I was very prepared and knew the content well	4

10. Did anyone from your mentoring University visit your college to observe and participate in the PD session?		
Yes	1	Go to Q11
No	2	Skip to Q13

11. What kind of support was provided during the visit?	
The University team worked with me to prepare for the session.	1
The University team participated in the PD session.	2
The University team observed the session.	3
After the session, the University team gave feedback on how the session went	4

12. How valuable was the support to you?	
Not Valuable	1
Somewhat Valuable	2
Very Valuable	3

13. Do you think the tutors found the session valuable?	
Not Valuable	1
Somewhat Valuable	2
Very Valuable	3

14. How adequately do you think Gender Equality and Social Inclusion (GESI) issues were addressed throughout the session?	
Not Adequate	1
Somewhat Adequate	2
Very Adequate	3

15. How much impact do you think the session will have on the learning of students?	
Very Good	1

Good	2
Minimal	3

16. Based on the reflection on the session today, what percentage of tutors do you think are applying interactive teaching strategies learnt from the sessions in their classes?	
75-100% of tutors are applying interactive teaching strategies in their classes	1
50-75% of tutors are applying interactive teaching strategies in their classes	2
25-50% of tutors are applying interactive teaching strategies in their classes	3
0-25% of tutors are applying interactive teaching strategies in their classes	4

17. What percentage of tutors do you think are using ICT in their classes as teaching aids e.g., integration of videos, PowerPoint presentations and as a research tool?	
75-100% of tutors are using ICT as teaching aids in their classes	1
50-75% of tutors are using ICT as teaching aids in their classes	2
25-50% of tutors are using ICT as teaching aids in their classes	3
0-25% of tutors are using ICT as teaching aids in their classes	4

18. Did the Principal and/or Vice Principal attend, visit or monitor the PD session? (Choose one or more answer from the list)?	
The Principal	1
The Vice Principal	2
Neither the Principal nor Vice Principal attended	3

