Promoting Technology Literacy Skills through Problem-based Learning Integrated with TPCK Model

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Updated Research Question

Q. (a) In what ways does PBL help teachers integrate technology with content knowledge?

(b) In what ways does PBL help teachers integrate technology with pedagogical knowledge?

(c) In what ways does PBL help teachers integrate content knowledge with pedagogical knowledge?

(d) In what ways does PBL help teachers integrate technology with content and pedagogical knowledge?

Sequencing of Modules

Steps	Time
Learners encounter the problem	**50 minutes**
Learners explore the problem	
Learners identify and define the problem	**20 minutes**
Learners research about the problem	**40 minutes**
Learners investigate the problem	**20 minutes**
Learners implement a solution	**1 Hour**
Learners integrate their knowledge and skills to the practical world	**40 minutes**

Overall Structure

PBL	TPCK
Encounter the problem (Scaffolding resource, Problem Scenario) **Explore the problem** (Connections with background knowledge and real-world situations. Discussion questions. Brainstorming, reflections, Cognitive, metacognitive skills) **Identify and Define the Problem** (Self-directed Learning, Group work, collaboration, communication, skills, conceptual scaffolding) **Research about the Problem** (Web search, group work, skills) **Investigate Solutions** (Problem scenario: part 2) Suggesting solutions, practicing Google Classroom, Skills, Motivation, Independent learning) **Implementation** (Peer work, procedural scaffolding) **Integration** (transfer of skills)	TPCK Framework has been used to design this plan. Technology is incorporated to design various pedagogical methods and content knowledge.

Instructional Plan

Module 1: Problem-Centric Task and Activation

Instructor briefly discussed the purpose of this training before starting the intervention.

Theoretical Support: "Instruction should activate relevant cognitive structures in learners by having them recall, describe, or demonstrate relevant prior knowledge or experience. Instruction should have learners share previous experiences with each other. Instruction should have learners recall or acquire a structure for organizing new knowledge (Merrill, 2009).

Part 1: Meet and Explore the Problem (PBL)

Objectives: Learners encounter the problem Learners explore the problem Learners make connections with their background knowledge
Time: 50 Minutes

Steps:

1. Instructor conducts a pre-interview about LMS and PBL

   Pre-Interview

2. Problem presented by the instructor

   Problem Scenario (Part 1)

   By encountering this problem, the learners may come to know that delivering the content only is not enough. And like Annie, if they do not know how to manage their online classes, they will also face the same problems as she did. This problem will give them an insight into their own experiences where they encountered such difficulties. The instructor wants the learners to think of keeping their content material, pedagogical methods, and technological intervention synchronized on a single platform. Through this activity, they may be able to realize how haphazard Annie's methods were to deliver the content online.

3. The instructor asks the learners to write down the key points (Direct Instruction)
4. Learners read the scenario and answer the questions on a Doc sheet prepared by the instructor for everyone (Individual Task). The name of the prepared sheet is 'Learners' Space 1'.

Brainstorming incites open and continuing partnership to solve problems and generate new ideas. Through brainstorming learners can generate many ideas within less time, which can be polished and combined to create an ideal solution. The use of brainstorming instructions is essential to the production of many good ideas (Rossiter & Lilien, 1994).

5. The instructor will conduct an open discussion based on the answers of the learners.

"It is important that teachers' questions should not be viewed as an end in themselves. They are a means to an end—producing desired changes in student behavior" (Gall, 1970).

Material: Writing pads, pens,

Tools: Zoom, Google Docs, Google Forms

Resources: Problem Scenario Document

Skills and Scaffolding

Technological Skills: The instructor will guide the learners to use technology for problem solving. Reading the problem scenario from Google Docs is an authentic example. The instructor will help them click on the link provided for the problem. They will be scaffolded to reach the document.

Pedagogical Skills: Brainstorming by engaging the learners in collaborative discussion and helping them develop independent learning will be a feasible pedagogical method. This approach will also develop their cognitive, critical thinking and communicative skills.

Content-Concept: Instructor asks questions about the scenario and engages students in a brainstorming activity through open discussion. The specific concepts to be scaffolded would be based on the understanding of the problem based on the problem scenario.

Part 2: Define the Problem (PBL)

Objectives: Learners identify the problem

Learners define the problem

Time: 20 Minutes

Steps:

1. Instructor presents questions about identification of the problem through a Google Docs sheet already prepared. The name of the sheet is Learners' Space 2.
2. Learners answer those questions in their assigned spaces on the sheet (Individual Task)
3. After they complete the activity, the instructor engages learners in a brainstorming activity through open-ended collaborative discussion.

   (Flexibility in instruction, Facilitating the learners by appreciating each response)
4. Learners come with their own ideas of what the problem is. (Autonomy increases motivation and self-regulated learning)
5. Instructor gives feedback

"Feedback is most valuable when students have the opportunity to use it to revise their thinking as they are working on a unit or project" (Bransford et al., 2000)

Material: Writing Pads, Pens (Personal Use)

Tools: Zoom, Google Docs

Task: Individual

Skills and Scaffolding

Technological Skills: By now, the learners will be able to reach the document themselves. Still, if they find any problem, the instructor will help them open the link provided for the questions. They will be scaffolded to reach the document and perform the activity.

Pedagogical Skills: Brainstorming by engaging the learners in collaborative discussion and helping them develop independent learning will be a suitable pedagogical method. This approach will also develop their cognitive, critical thinking and communicative skills. **Content-Concept:** The specific concept to be scaffolded would be based on the identification of the problem.

Module 2: Demonstration

Rationale: According to Merrill (2009), the demonstration principles are as under.

1. Instruction should provide a demonstration of the skill consistent with the type of component skill: kinds-of, how-to, and what-happens.
2. Instruction should provide guidance that relates the demonstration to gen-eralities.
3. Instruction should engage learners in peer discussion and peer demonstra-tion.
4. Instruction should allow learners to observe the demonstration through media that are appropriate to the content.

Part 1: Research the Knowledge (PBL)

Objective: Learners will research about the problem
Time: 40 Minutes

(Collaboration, Self-directed Learning and Motivation)

Steps:

1. Instructor asks learners to divide themselves in 2 groups (3 members in each group)
2. Learners use different web resources of their own choice to research about the problem (Self-directed Learning)
3. **(**Demonstration of the Activity**)** The instructor will share her Google Drive with the learners and will ask them to choose any article, read it, pen down the main points, and discuss them with each other

   LMS: Iteration 2
4. Instructor conducts discussion after the learners have completed their tasks (Brainstorming)
5. Learners share their research resources, why they chose them, what results did they derive and how the articles have developed their understanding of the problem (if they helped them at all)
6. Instructor gives feedback

Material: Writing pads and pens,

Resources: PDFs

Tools: Zoom, Google Drive, Google Scholar

Activity: Group Work

Skills and Scaffolding:

Technological Skills: By now, the learners will be able to reach the document themselves. Still, if they find any problem, the instructor will help them open the link

provided for the articles. They will be scaffolded to reach the document and perform the activity.

Pedagogical Skills: Brainstorming by engaging the learners in collaborative discussion and helping them develop independent learning will be a suitable pedagogical method. This approach will also develop their cognitive, critical thinking and communicative skills.

Content-Concept: The specific concept to be scaffolded would be based on the exploration of the problem.

Part 2: Investigate the Solutions (PBL)

Objective: Learners will investigate the solutions
Time: 20 Minutes
Demonstration of Instruction, Students Collaboration, Self-directed Learning and Motivation **Steps:** 1. Instructor asks learners to think about a solution, write down the possible solutions and discuss them openly 2. Instructor gives feedback 3. Instructor shares the remaining part of the problem scenario in which Head of the Girls branch had proposed a solution to Annie Problem Scenario (Part 2) (Continued from Part 1)

4. Instructor asks the learners to read the remaining part, discuss it in group, and compare it with the solutions that the learners had thought of
5. The instructor engages the learners in discussion

Material: Writing pad and pen,

Tool: Zoom, Google Docs

Activity: Group Work

Resources: Problem Scenario (Part 2) Document

Skills and Scaffolding:

Technological Skills: By now, the learners will be able to reach the document themselves. Still, if they find any problem, the instructor will help them open the link provided for the problem scenario part 2. They will be scaffolded to reach the document and perform the activity.

Pedagogical Skills: Brainstorming by engaging the learners in collaborative discussion and helping them develop independent learning will be a suitable pedagogical method. This approach will also develop their cognitive, critical thinking, problem solving and communicative skills.

Content-Concept: The specific concept to be scaffolded would be based on the investigation of the problem.

Module 3: Applying

According to Merrill (2009), the demonstration principles are as under.

1. Instruction should provide a demonstration of the skill consistent with the type of component skill: kinds-of, how-to, and what-happens.

2. Instruction should provide guidance that relates the demonstration to generalities.
3. Instruction should engage learners in peer discussion and peer demonstra-tion.
4. Instruction should allow learners to observe the demonstration through media that are appropriate to the content.

Present and Support the Possible Solutions (PBL)

Objective: Learners will implement the solution
Time: 1 Hour

(Demonstration of the Activity and Implementation of the Solutions)

Steps

1. Instructor proposes a hands-on Group Work activity to design an online classroom based on the solution provided by the head in the problem scenario
2. The instructor asks the learners to role play. As an example, they create a Google Classroom and navigate through different options there. (Learners can create their own learning management system also. Google Classroom is chosen for a collaborative task). Detailed instructions will be given to integrate content and pedagogical knowledge with the help of technology.

"Basically, role playing calls for a student's stepping outside the accustomed role that he plays in life, relinquishing his usual patterns of behavior in exchange for the role and patterns of another person" (Chesler & Fox, 1966).

3. (Self-directed Learning) Learners perform the activity (The instructor creates her own Google Classroom to be on the same page with the learners and to assist them during the procedure) **(**Procedural Scaffolding**)**
4. Open Discussion and Feedback (Learners share their experience and describe whether Google Classroom can be an effective tool to solve Annie's problem or not)

Material: Writing Pads and pens,

Tools: Zoom, Google Classroom

Activity: Group Work

Skills and Scaffolding

Technological Skills: If the learners find any problem, the instructor will help them open the link provided for the Google Classroom tutorial. The instructor will create a classroom herself for procedural scaffolding.

Pedagogical Skills: Role playing will help the learners adopt a different strategy for their own classrooms where they can let their students implement the solutions in their own way. This hands-on activity will help them go deep into the problem, find a solution, and implement it in a practical way. Giving learners the autonomy to work on a task is an effective method. This approach will also develop their cognitive, critical thinking, problem solving and communicative skills.

Content-Concept: The specific concept to be scaffolded would be based on the implementation of the solution.

Module 4: Integration

Rationale: According to Merrill, (2009) the integration principle

1. should integrate new knowledge into learners' cognitive structures by having them reflect on, discuss, or defend new knowledge or skills.
2. should engage learners in peer critique.
3. should have learners create, invent, or explore personal ways to use their new knowledge or skill.
4. should have learners publicly demonstrate their new knowledge or skill.

Review Performance (PBL)

Objective: Learners integrate their newly learned knowledge and skills to real-world settings
Time: 30 Minutes

Transfer of Skills, Self-directed Learning and Motivation, Demonstration of the Content Knowledge, and the Tasks

Steps:

1. The instructor demonstrates the importance of online PBL skills through PowerPoint presentation
2. Discussion with the learners about their overall experience of this training session and what they have learned through it. The instructor will ask the learners to answer some questions related to LMS and online PBL. The interview questions are prepared on Google Forms. The learners will complete it after the training and submit it through Google Classroom. (Individual Task)

   Post-Interview: Iteration 2
3. Assigns tasks to the learners. The instructor will provide a hypothetical problem to the learners. (Group Work) They will be asked to find a solution by following all 7 steps of Problem-based learning. They will provide rationale why this solution will be effective. They can use any tool for this assignment and submit responses to the instructor.

   Problem Scenario for Homework
4. Instructor asks the learners to complete checklist for self-assessment and give their feedback about this training through a survey
5. SME will go through the entire recording of both the training sessions and will also check the homework. She will give her feedback to all individuals about their performance during the training sessions. Lastly, she will give her feedback to the groups for their homework assignments as well.

Checklist: Iteration 2

Post Survey: Iteration 2

Resources: Google Scholar, SME

Material: Writing pads, Pens (Personal use)

Tools: Zoom, Google Classroom, Google Forms, Google Docs, Microsoft Powerpoint

Activity: Individual Task, Group Work (For homework)

Skills and Scaffolding

Technological Skills: The instructor will demonstrate the importance of LMS through Microsoft PowerPoint. The learners will be directed to reach the required sheet for the interview questions prepared on Google Forms. They will also be scaffolded to respond and submit the responses in Google Classroom.

Pedagogical Skills: By demonstrating the importance of LMS, the instructor will scaffold the content knowledge with technology. The instructor will scaffold different tasks by guiding the learners about the steps, responses, and submission procedures. These steps will help learners adopt the same strategies for their classrooms.

Content-Concept: Specific concept to be scaffolded would be based on the integration of the solution.

Assessment and Evaluation

The term *evaluating* refers to the process of using measurement or assessment to make judgements about something. The terms *measuring* and *assessing* are used interchangeably to denote the systematic collection of data about programs or people (Morrison et. al, 2010). Online meetings with the SME and two CTIs, and pre-survey conducted with 11 students helped recognize the need for this intervention. The question prompts used via both Learners' Space sheets, overall discussions, training recordings, and homework assignments will be used to assess the performance of the learners. Pre-interview and post-interview will be used to compare the existing knowledge and skills of the learners with their newly learned knowledge and skills. The SME will provide feedback for homework assignments and individual feedback will also be given via Google Docs. This feedback will also help in the evaluation of the learners' performance. The assessment will be made based on the understanding, motivation, navigation skills, overall attitude, and interactive skills. A Line Chart will be used to evaluate the performance of the learners in the above-mentioned categories. The checklist will be used for self-assessment of the learners and post-survey will help in the evaluation of the training.

Implementation, Data Collection and Analysis

Participants

Sidra, Maheen, Asifa, Faiza, Asra, and Maria (Participants did not have any objection to sharing their names that's why no codes or alternatives have been used). First five new hires are the teachers from the same college. I could not manage to have a 6th participant for this iteration, so I requested Maria Idrees, one of my class fellows to be a participant in this training. I thought of her as she was also a teacher in Pakistan, and she could share her experiences with us when she attended classes as a new teacher during the pandemic.

Activity 1: Individual Task (Pre-Interview)

For this iteration, I included a Pre-Interview, containing almost the same questions as the post-Interview. The reason for including similar questions was to see and compare the progress of the learners from the beginning till the end. I wanted to see the improvement in the skills and knowledge of the new teachers regarding online PBL and the importance of LMS in online learning after the training ends. This interview consisted of 10 questions. Learners were given an open space to answer the questions whether the answers were short or long. The results of the pre-interview are as under.

Pre-Interview

Analysis and Reflection

25 minutes were given to complete this interview. I analyzed the results through the following table.

Are you familiar with the Learning Management Systems? If yes, which are they? All of them were already familiar with LMS. A few of them, like Faiza and Maria, had used Schoology (It was a new addition to my knowledge) and Easyclass. Faiza and Maria are the teachers who had some experience of teaching already and the institutions where they taught used Schoology and Easyclass. They had experienced using LMS quite well. In the previous iteration, no one had used LMS before, but they were a little familiar with what LMS was. I felt that this time, participants may not face the difficulties which the participants did in the last iteration as beginners.
According to you, how effective can LMS be keeping in view the COVID-19 pandemic or any emergency like this? All the participants responded in favor of using LMS especially in emergency situations like

COVID. They believed that Learning Management Systems had made their lives easy and the communication or connection between students and teachers had improved and became more convenient. I liked Sidra's response above all as she came up with some figures from UNESCO showing how 8 million students were deprived of education due to COVID-19 and not having a proper Learning Management System. The only problem was that she had not given the reference of the resource where she got these figures from. When I asked her in our discussion later, she said that she googled some random resources. I liked her approach as she sounded more authentic when she provided the figures. I also liked that she scrolled through various pages and explored the problem without even asking to do so. This suggested that it would not be more complex for this lot of participants to learn about LMS and PBL as it was for the previous participants. I somehow got this feeling from Sidra's response that she might also be familiar with PBL already as she was already digging deep into the problem.

Which kind of learning do you prefer? For example, Synchronous, Asynchronous, Blended or In-person. Please give your rationale in each case.

For this question, most responses were in favor of Synchronous and Blended classrooms. They provided the reasons for their preferences also. They believed that Synchronous classes help in getting immediate responses and students and teachers can communicate with each other easily. Asifa did not provide rationale for liking synchronous and blended learning. Sidra liked Asynchronous classes as she liked to have a flexible timetable so that she could just open the class, see the instructions, watch a video, and respond whenever she liked. Asra liked In-person classes because she felt that students could understand the instructions in a better way when they have in-person classes. Faiza's response was a little confusing for me. She said that

she preferred Synchronous and Blended environments as she did not have to spend much time. I could not figure out how synchronous classes take less time than the in-person classes. Things would be clearer if she had given more explanation about the less time consumption of the Synchronous classes.
Which Learning Management System will you prefer for your classes and why? All the participants preferred Google Classroom except Faiza who liked Schoology more. Participants wanted to use Google Classroom as it was easy to access in Pakistan and was easy to use. Faiza liked Schoology as she thought that it was a good platform to develop students' understanding. Her response did not still clarify how Schoology was better than others in facilitating the understanding of the students.
Which features of LMS do you like the most and why? The features all participants mentioned include Calendar to follow the due dates, flexibility in using LMS anytime from anywhere, data tracking, posting assignments/grades/instructions at one platform, communication with students, and observing activities of students. By the responses of the participants, I was happy that they had better knowledge of LMS already.
Which difficulties do you face in online learning? Maheen simply responded by saying None. It seemed as if she did not read the question carefully or knew much about online classes already. There is another possibility that she might have considered the problems unmentionable. Other responses for this question suggested that the participants faced technological issues, students' engagement problems, feeling bored in online classes, digital illiteracy, students' absenteeism because they are unable

to afford good devices or stable WIFI connections to attend the online classes, communication problems, lack of motivation and decorum in online classes as compared to in-person classes, and Internet connection issues etc. Sidra had mentioned financial hardships and affordances of digital devices. She also mentioned the problem of digital illiteracy and boring content material. I had expected the same answers especially in the context of Pakistani learning environments. I could not agree with the answers like online classes are usually boring, students lack engagement in them, or they cannot communicate well in online classes. All these situations occur because the lessons are not well planned, and instructions are not properly designed. It is not logical to blame LMS if students feel bored or lose interest in classes.

Are you able to solve different problems that you encounter in online classes? Please first name the problems and then explain how you solve them.

Sidra responded in a general way but did not provide her own examples. She suggested that the Government should provide funds for students so that they can buy devices for online learning, and there must be training for online learning. Asifa mentioned that she faced technological issues as she was not much familiar with the online learning tools. She said that whenever she was stuck, she sought the help of various tutorials and videos. Asra and Maria did not mention how they solved their problems. Through the responses of the participants, I felt that almost everyone faced the same kinds of difficulties and the most common of them were lack of communication, grading problems, and lack of stable internet connections. Faiza suggested managing time, evaluation processing and inclusion of query sessions in online learning to keep students engaged. In the previous question, Maheen had replied that she did not face any

online problems. But for this question, she mentioned the problem of internet connection and she said that she used to make a copy of all the documents she wanted to use in her classes so that she may not lose them, and she always had a backup plan in case of emergency. As I mentioned in my analysis for the previous question, she might not have felt it to be a big issue in online learning as she had the skills to deal with this kind of issues and for this question when participants were supposed to specify the difficulties, she just randomly thought of this difficulty and mentioned it here. I liked Faiza's responses as they showed that she had experienced different problem-solving techniques during her online classes.

How is Problem-based learning an effective way to learn?

Faiza, Maheen, Sidra, and Maria described the benefits of PBL. They mentioned benefits like development of critical thinking skills, communication skills, effective way of problem solving, and practical way of solving problems. Maria's response was not clear to me. I think she wanted to say that PBL provides a platform where learners research the knowledge, use their existing knowledge, and find knowledge to solve a problem themselves. For Asra, it was totally a new concept. Asifa said that she did not know much about PBL.

Have you ever implemented problem-based learning in your online classes? Please share your experience.

Maria was well familiar with PBL as she had studied the theory thoroughly in her classes but as a teacher, she had never implemented it. Maheen knew what it was, but she never implemented it in her classes. Asra and Asifa did not know what it was. Sidra and Faiza had got a chance to implement it in their classes which made me very hopeful about the upcoming

activities of the training. Through this question, I got to know about participants' knowledge of PBL. This knowledge will help me compare participants' existing knowledge of PBL and LMS with the knowledge and skills they gain from this training.
What according to you is the importance of Self-directed learning in online Problem-based learning environments? The benefits of self-directed learning were well explained by all the participants. It showed their good understanding of self-directed learning.

Problem Scenario: Problem Scenario (Part 1)

25 minutes were decided for this activity. It was about encountering and exploring the problem. Part 1 of a problem scenario was presented to the participants. They were supposed to read it and write down the key points. The purpose of this activity was to realize that delivering content knowledge was not enough. My expectation from the learners was that they may start thinking of keeping their content material, pedagogical methods, and technological intervention synchronized on a single platform. They must realize how haphazard Annie's methods were to deliver content online. It was also expected that the learners would be able to relate this problem to their background knowledge. A Google Docs sheet named 'Learners' Space 1' was created for the participants. I shared the link to this document in the chat box. The questions and responses of the learners can be found through the link given below.

Learners' Space 1

I made sure that I had shared the document with all of them. 25 minutes were planned for this activity and learners completed the activity almost in time. Only Asifa and Sidra took a few minutes extra just because of the slow internet. The page was taking time to open and let Asifa

and Sidra type. I was not planning to be strict about the time limit so that the learners may not feel any kind of pressure and I wanted them to feel comfortable while completing the task instead of worrying about the time. I made sure that I had shared the document with all of them. The responses of learners on the Learners' Space 1 were almost similar. I felt that they were going in the right direction. The questions asked and the responses of learners are as under.

Q1. What is the scenario all about?

Majority of the learners' responses indicated that Annie did not know how to manage online classes and this mismanagement frustrated her although she was an enthusiastic teacher. Sidra pointed out that Annie lacked digital literacy skills. Asifa said that although Annie had some potential teaching skills still, she lacked some important skills that were necessary for online learning and teaching like advanced technological skills and instructional skills. Faiza's response was more of a general nature as she did not talk about Annie's problem. Her response seemed to be more of a suggestion rather than indicating the problem. She said that the problem was about an online teaching experience during COVID and said that difficulties exist whether it's online class or in-person but difficulties in both cases are different. According to Asra, the problem indicated here is about an inexperienced teacher who is new to the field but is quite enthusiastic and hardworking. That is why she could not communicate well with her students. According to her, the first mistake Annie committed was to send the homework via email which according to her is not a good idea. Maria's response was very accurate and the point as she said that the problem was about a teacher's struggle to make online teaching effective. Learners had responded quite well. They could see clearly what Annie was going through and what were the causes of her difficulties.

Q2. Do you think that there is a problem in this scenario? Give your rationale in both

cases, Yes or No.

Everyone responded in Yes. All believed that Annie did not possess sufficient online literacy and communication skills. Asifa and Maria believed that Annie was not trained before taking the online classes and this was the major problem. The responses to this question were also satisfactory.

Q3. Have you ever been in a situation like Annie's? If so, tell us about your experience.

Everyone had experienced the same problems as Annie. Most of them mentioned their experience in the context of Covid. Sidra teaches English and she said that she was in Australia when COVID hit. She was a student then and it was her last semester. She had to take her classes online and it was very difficult for her to access the content, understand the instructions, submit the assignments, and communicate with the instructors and peers. Maheen and Asra belong to the Information Technology Department and Asifa is a Physics teacher. They have recently joined the service. They mentioned almost the same problems as Annie was facing because they had never used any Learning Management System before. We had an open discussion after the participants had completed 'Learners' Space 1'. Maria and Faiza gave a detailed overview of their experiences during COVID. Maria was teaching Psychology to Graduate students in Pakistan while Faiza is a Lecturer in Zoology. She is taking Intermediate classes. Maria said that she faced problems like late submissions of assignments due to poor internet connections, absenteeism in classes as students used to click on the homework assignments and did not prefer to attend the online lectures. As a result, they usually committed mistakes in completing their assignments correctly. She mentioned another interesting thing that students were supposed to do Case based Study for different course requirements. For that they used to visit different patients, observed, and studied their conditions, prepared reports and analyzed their findings before

reaching the conclusions. Due to Covid, they could not experience real cases and Maria had to share certain links for assumed cases. The result was that students felt disengaged and did not show much interest in online Case based Learning. She also shared her screen with us and showed how she had managed her online classes. I could see that she had uploaded the assignments with instructions and submission dates. She had graded the assignments in time and students' responses were almost in time. Maria said that she tried to be as flexible as she could about the due dates. Likewise, Faiza teaches Zoology. She said that she had the experience of using Schoology as a student and when she came here as a teacher, she observed that there was no Learning Management System in the college. She faced many problems like dealing with the massive strength of students in Zoom meetings. She had planned to use Schoology as a personal preference, but she could not make it possible for all the students as some students did not have internet at their homes and a few did not have any technological device to use for online learning. These students used their family members' phones or devices to get connected with the instructors. Students were not familiar with the use of Schoology. They found it extremely hard in the beginning. Although she has overcome many issues with the passage of time, still she faces certain problems like engaging students effectively and motivating them to complete their assignments efficiently. From the responses of the students, I realized that Maria had learned some good skills of online engagement of the learners. She had a good experience of using LMS. After talking to Maria, I realized that although she had uploaded assignments in time with instructions, used to grade the assignments in time, still there were some students who preferred not to attend the lectures and sometimes they felt disinterested. The reason might be the lack of efficient pedagogical methods, interesting content material, engaging activities, and insufficient feedback for the students. Faiza's problem was also clear that she had failed to engage students

in online learning. There can be several reasons for demotivation and disengagement of students like poor instructional strategies, lack of diverse activities in the classrooms, irrelevant content material, lack of effective pedagogical skills and scaffolding

Q4. What would you do if you were at Annie's place?

The diverse answers of the participants amused me. Like the previous iteration, I had some feedback in my mind for everyone, but I kept that to myself. I will just highlight the feedback in brackets that I wanted to give for each participant's response but could not. I did not want to confuse the participants and it is not the soul of PBL to pass judgements. It was the first stage of PBL. I did not want students to reach any conclusion yet based on my feedback. I just got the responses and encouraged everyone for whatever they had said. Sidra thought of dividing the students in groups and pairs. She would communicate with them, and they would try to find out the solution together. (It did not seem to be resolving the issue as grouping or pairing and discussions with the students could not solve the problems that Annie was facing). Maheen also wanted to work on her communication skills with the students, but she did not specify them. (Was it enough to have conversations with the students who had even lesser experience of online classes than the teachers themselves. How could they help them through conversations or communication?) Asifa's response seemed a lot better as she directly said that first she would learn online learning skills first and then would practice them in the classrooms. Faiza said that she would keep her communication more specific and clearer, but she did not tell how. Also, she mentioned that WhatsApp should be used only for announcing about the assignments and deadlines. (Can Whatsapp be an effective online learning tool by any means?). I did not expect this answer from Faiza as she had already used LMS, and I was expecting an answer related to LMS based on Faiza's experience of using various online learning tools. Asra and Maria's

responses were also good as they wanted to learn online teaching skills before teaching.

Q.5 What would have the Head of the Girls Branch suggested to Annie that solved her problem.

All participants' responses were good for this question. It would be great if they had given examples of good online literacy skills. When we had a discussion after this activity, Faiza and Maria gave very good examples of online literacy skills. Faiza said that a teacher must be aware of interpersonal skills, organizational skills, management skills, multitasking skills, innovative skills and data entry skills to experience an effective online teaching experience. Maria believed that lesson planning skills, formulating strategies for each activity, incorporation of different activities, step by step instruction, common platform for all students and the instructor, proper time allocation for assignment submissions and grading, including discussion forums and providing feedback for students at every step will lead teachers to build a strong online learning environment. She also said that through her classes as a student, she has learned a lot about incorporating various models, theories, rubrics, charts, graphs, tools, and scaffolding techniques which she never used when she was a teacher. She believed that if she had to teach again, she would try to gain maximum benefit from the classes that she has taken and is going to take in future. Except Maria and Faiza, other participants also participated in the discussion quite vigilantly. They also agreed with Maria and Faiza. It was a good end to the first activity and things went along according to the set time. I was also happy to see the level of involvement from each participant. Everyone was quite quick in their responses, and they had good communication skills. They seemed much more confident and participating as compared to the previous group. They used the chat box also to appreciate one another, to ask questions and to give feedback to each other.

Activity 2: Individual Task

20 minutes were decided for this activity. This activity was to identify and define the problem. The learners were asked some questions through 'Learners' Space 2'. They used their spaces on that Google Docs sheet and after that an open-ended discussion was conducted based on the responses of the learners. Please click the link below to see the questions and students' responses.

Learners' Space 2

Analysis and Reflection

Like the previous iteration, learners completed this activity in time as they did not find difficulty in accessing the page and were getting familiar with the flow of the training session. All the participants were able to clearly identify and define the problem. Their responses were well elaborated, and they indulged themselves in a good discussion. Maheen's response for Q3 caught my attention. While having discussion with the learners, she responded with the same ideas that she had put on paper. The question was 'what did you learn from Annie's problem?'. Maheen learned that she should start learning about online literacy skills. She should set clear goals before planning instruction. She should plan strategies to design instructions according to her goals. She also believed that she must learn how to incorporate online literacy tools with the pedagogical methods and content material. She also emphasized the value of designing scaffolding for all the activities of an instruction.

When I asked her to give an example how she would provide scaffolding in an online learning environment where technological tools should be efficiently used, and they must support the pedagogical methods and content material keeping in view her own subject. She took a while and responded in a detailed way. After watching the recording, I summarized her answer.

She said that she would plan everything, like choosing a suitable online tool for instruction and engagement with the students, uploading relevant content, setting achievable goals and targets, time limitation, choosing effective pedagogical methods (like initiating an activity, providing direct instructions, using multimedia, explaining the content, providing feedback, helping students access tools to be used, generating challenges for students, motivating students by offering different incentives, asking students questions to know about their prior knowledge, setting high expectations, repeating concepts, rewarding efforts of students through a smile or encouraging words, giving equal time to all students, keeping such an environment where students feel comfortable and secure) and scaffolding methods (like using visual aids e.g flash cards, images, videos, ppt slides, graphics, and posters etc and using them with the required expertise, providing instructions to use or access a certain point, breaking learning into chunks so that students may not feel overburdened, including step by step instruction and facilitating instruction by being there, avoiding negative feedback, helping students think aloud because it will help students process their thoughts, gradually transferring responsibilities to students for various tasks, asking open-ended questions as it is a good tool for scaffolding, Using pre-teaching vocabulary or key words about the topic so that students may become familiar with the difficult or unknown words before they jump to the next step, and assessing the knowledge of students through various means like MCQs, Short Qs, surprise questions, surveys, rubrics, quizzes and more so that they may choose how much scaffolding and what kind of scaffolding is required in a certain area). Maheen's response was totally unexpected, and it pleased me a lot. I literally felt that she knew much better than I did. Other participants also agreed with her and came up with almost the same ideas. This activity went really well, and I did not expect anything

like Maheen's response as her pre-interview and Activity 1 responses were not that far-fetched or well-conceived.

Activity 3: Group Work

40 minutes were planned for this activity. I told the participants that it is a group activity and I needed two groups. I gave them this choice to divide themselves in groups. They took 2 to 3 minutes to do that. Each group consisted of three members. Maheen, Asifa, and Asra were in Group A. Maria, Faiza, and Sidra were in Group B. I shared a link from my Google Drive account containing 10 articles about the importance of LMS and how different subjects are taught online via LMS. The learners were supposed to choose any article, read it, take notes, and discuss what they found out through their own resources and the resources provided to them by me. I had instructed them to inform me once they made their choice about the article. After they were done reading and taking notes, we discussed different points based on the learners' responses. It was an interactive discussion.

PDFs for Articles: LMS

Responses of the Learners:

Group A chose the following article to read

Cavus, N., & Alhih, M. S. (2014). Learning management systems use in science education. *Procedia-Social and Behavioral Sciences*, *143*, 517-520.

Group B chose the following article

Chow, J., Tse, A., & Armatas, C. (2018). Comparing trained and untrained teachers on their use of LMS tools using the Rasch analysis. *Computers & Education*, *123*, 124-137.

Both the groups easily accessed the page. Faiza and Sidra took some extra time to access the document. Both the groups took 5 minutes to decide which article they read, and they

informed me via chat box about their choices. They started reading it and I could see that they were writing points while all of them were reading the articles. Group A chose the article covering Science subject and Group B chose the article about comparing trained and untrained teachers on the use of LMS. After reading the articles, they took some time in the groups to compile the notes about the article and they finalized the points they would discuss later.

Points Noted by Group A:

Group A came up with the following points

- LMS has made the lives of both teachers and students easy
- LMS promotes Higher Order thinking skills and learning skills
- LMS is a constructivist approach towards teaching and learning Science
- Students learn Scientific literacy skills through digital means and advanced technologies
- E-learning is dynamic and interactive
- E-learning promotes self-directed learning
- LMS allows for the delivery and administration of content and resources to all students and teachers
- LMS manages student registration
- LMS can deliver, track, and manage training and education
- LMS are best sources of Collaborative Learning Environments
- LMS is a great source of posting assignments, grading them, discussing stuff related to anything that is relevant to the course, selecting due dates, recording test scores, tracking students' progress, notifying, and announcing about the upcoming assignments or tasks
- Self-paced learning modules give students the freedom to work at their own pace

- LMS builds interdisciplinary community in education and innovative instructions for better learning outcomes
- Martín and Fernández (2009) created an online learning community which helps both teachers and students to have a virtual space where we can share knowledge through different kinds of supervised activities, chats, and forums.
- Related research has proved that LMS has changed the lives of people in a positive and constructive way

Points Noted by Group B:

Group B had noted the following points from the article they chose

- Rasch Analysis was used to evaluate teachers' LMS usage activity
- Teachers who had got the LMS training workshops had higher LMS activity level than the untrained teachers
- Trained teachers used 'grade center' and 'assessment tools' more while untrained teachers paid more attention towards 'content'
- LMS is a platform where students can perform various learning activities such as downloading notes, accessing grades, performing tests and quizzes, and participating in online discussions
- Keeping in view the demand of time, teachers need to adopt online literacy skills
- At the institutional level, the administration needs to develop and evaluate the capacity of online teachers for sustainable development of teaching and learning
- Common roles of teachers in online teaching are social, managerial, technical, and instructional design
- Instructional design is the most important of all roles

- Different researchers have identified different competency roles for teachers who teach online
- The article focuses on the professional development of teachers through training and observations
- Online teachers must be ready to accept different digital changes and they must be trained to accept different digital challenges every time
- Rasch analysis has been explained in detail to evaluate the teachers' performance both for trained and untrained teachers
- Rasch analysis indicates whether the use of LMS tools differs between trained and untrained teachers
- Results indicate that almost 99% of teachers used 'Content' in their LMS course sites, while over a quarter had an average of 120 or more clicks on 'Content' per LMS site
- The use of LMS tool called 'Announcements' was moderate
- For some LMS tools, the usage was very less. For example, zero activity was recorded for over 90% of teachers on tools such as 'Task', 'Message', 'Collaboration', 'Wikis', and 'Journals or Blogs'
- Total of 18 cases were excluded and 1439 teachers were included in the final analysis
- The Rasch analysis provided several indices for examining the scale under examination: person separation index, person reliability index, item separation index, and item reliability index.
- The mean of the person measures for the teachers was much lower than the mean of the item measures for the LMS tools, suggesting a relatively low LMS activity level among teachers overall

- The group comparisons of the Rasch measures showed that the trained teachers showed a higher average person measure than the untrained teachers, which implied that trained teachers had higher LMS activity level than the teachers who did not participate in training.
- Findings suggested that when untrained teachers were compared with teachers trained with three or more LMS workshops, the trained teachers showed relatively higher activity than expected in some LMS tools.
- Implications of training workshops on online teaching, implications for professional development on online teaching, and implications for evaluation of training workshops suggested that all three areas must be considered to make online teaching worthwhile and to prepare teachers for an effective online teaching and learning environment

Analysis and Reflection

40 minutes were planned for this activity, but both the groups took extra time especially Group B. They took extra 20 minutes to complete the task and Groups A took 7 to 8 extra minutes. I did not mention time before them, and I did not stop them at any point because I did not want to disturb the momentum. Both the groups had done a brilliant job and all of them participated enthusiastically in the discussion later. Everyone realized the importance of LMS, and they were excited that they got a chance to know more about it. Asra especially mentioned that she enjoyed working with her team members and she learned much from them. Group B had taken much time and because of them, we had to wait. While they were finishing their tasks, I joined Group A and asked about their experience of the activity and if they found anything difficult. They did not point out any difficulty. Maheen said that she had already started thinking of using an LMS for her subject, which is Information Technology. She said that she would have

to work on each aspect of online teaching with great effort and consideration. She also mentioned that some topics were already hitting her brain and how she was planning to teach them through various online literacy skills. Asra also agreed with that and said that this activity was like a turning point for her as she learned much about LMS through it. Group B found their article to be a little more technical and difficult. They said that they had never heard about the Rasch Analysis, and they were happy that they got to know about it. They still needed some time to understand it completely. They also mentioned that they needed two or three more readings of the article to understand it well and to reflect on it more openly and clearly. Maria said that one thing was sure, and her group members agreed to it that training workshops, professional development of teachers and evaluation of training workshops were inevitable to make online teaching successful. I was very satisfied with the responses of both the groups. I would especially like to give more credit to Group B for putting extra effort to understand totally new concepts like Rasch Analysis and for their detailed account of the article.

Activity 4: Group Work

20 minutes were assigned to this activity. This activity was about investigating possible solutions. This was also a Group Activity and the same groups agreed to participate in this task. I asked the learners to think and write down the possible solutions and discuss them openly. I shared the remaining part of the problem scenario in which the Head of the Girls branch had proposed a solution to Annie. I asked the learners to read the remaining part, discuss it in group, and compare it with the solutions that they had thought of. The next part of Problem Scenario is given below.

Problem Scenario (Part 2) (Continued from Part 1)

Responses of the Learners:

Both groups' responses were much improved especially after Activity 3. They had performed well in Activity 3. When we had discussion about the remaining part of the problem, almost all participants agreed that it was a right solution and both the groups had thought about LMS to be an effective solution for Annie's problems.

Analysis and Reflection

We completed the activity almost in time. It seemed to be a good idea to divide the problem in two parts and let the learners think about the possible solutions that were in Part 2. I think this gap between encountering and defining the problem helped the learners think more critically and attentively. I felt that learners took it as a challenge to find a possible solution themselves and see whether they were close to the solution in Part 2 of Problem Scenario or not. Both the groups enjoyed doing it and they liked this idea of solving problems by depending on their own critical thinking, metacognitive and technological skills. Until now they had developed self-learning to a good extent and even they said that they were feeling very confident after this activity. I was happy to know that they were thinking about their own subjects, various topics from their subjects and had started planning to use this technique of presenting a problem first and then finding solutions for it. Maria reflected on the situation by saying that being a student here, she had read about solving problems independently through this theory and she provided references about some other approaches like Guided Inquiry Design, Game Based Learning, Adult Learning Theory, and Project based learning. When she was talking about these theories, other participants felt a little lost as they did not know much about them. One thing was clear till this point that they knew they were practicing Problem-based Learning. In my previous iteration, participants had got this idea, but they were not as clear in the execution of their thoughts as participants were this time. The major factor of this difference is that they had not attended the

Pre-Interview. They had not come across the questions related to PBL or LMS. So, when I added Pre-Interview for this iteration, it gave an opportunity to the participants about PBL if they were not familiar with it. Through the Pre-Interview I came to know that participants were mostly familiar with it although they had never implemented it in their classes. The other possibility was that once they heard about PBL, they started searching about it on their web pages. Because I did not expect from almost all the participants that they would be familiar with the concept. Whatever it was, I was happy that the participants were enjoying and exploring with the help of PBL, and they were very enthusiastic to do whatever came along.

Activity 5: Group Work

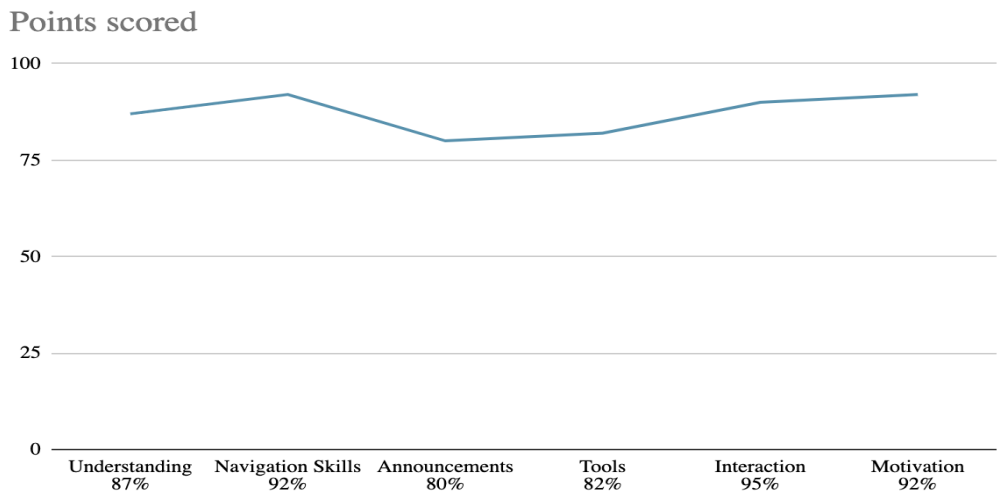
1 hour was assigned to this activity. This activity was about applying the solutions. I proposed a hands-on Group Work activity to design an online classroom based on the solution provided by the head in the problem scenario. Groups remained the same. I asked the learners to role play. As an example, they created a Google Classroom and navigated through different options there. (Learners could create their own learning management system also. Google Classroom was chosen for a collaborative task). For this iteration, I did not use any video as it was very hectic for learners in the previous iteration to watch a 33 minute long video and absorb everything in just one sitting. (I created my own Google Classroom to be on the same page with the learners and to assist them during the procedure). Learners were supposed to think about their own subjects while posting assignments, giving instructions, using tools and resources. Their interaction with each other, motivational level and navigation skills would also be observed through this activity. After the activity, learners shared their experience and described whether Google Classroom could be an effective tool to solve Annie's problem or not)

Responses

I created a chart to check the progress of the learners and analyzed their performance in the following areas. Understanding, Navigation Skills, Announcements, Tools, Interaction, and Motivation. I used a Line Chart containing 100 scores to assess the performance of learners in above mentioned areas. I changed the Line Chart a little bit for Iteration 2 as I felt last time that I did not include Announcements category and I did not have a parameter to assess how the participants posted their assignments and how well their instructions were about their assignments. This time I skipped the 'Attitude' category as I could assess that through 'Interaction' and 'Motivation' categories. I also wrote the exact %age below each category just to make sure that readers get the exact percentage. I didn't do it in the previous iteration.

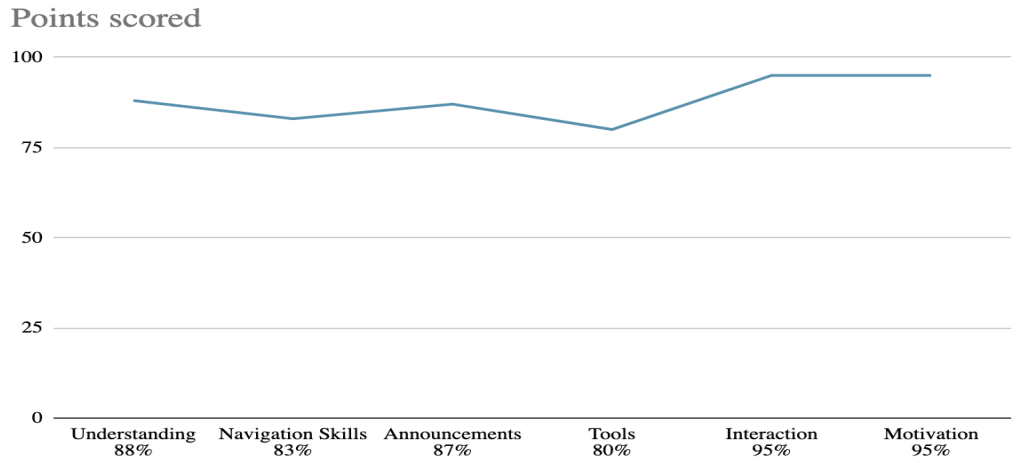
Points Scored by Group A

Figure 3



Points Scored by Group B

Figure 4



Analysis and Reflection

Participants completed the activity almost in time. They took almost 8 to 10 minutes more than the assigned time. It was fine with me. After looking at Figure 3 and Figure 4, it seems that both the groups had done a good job. Group A's understanding level was very good. They were better in their navigation skills and the usage of relevant tools to support their content, but they were a little weak in creating instructions and providing details about the assignments. When I looked at the examples of their postings, I realized that they had mostly uploaded the content only and provided minimal detail about how to complete the assignment. They had tried one posting per person. The topics they chose to create assignments were Cognitive Computing (Maheen), Cryptography (Asra), and Special Relativity (Asifa). The content uploaded seemed to be relevant, but instructions provided with the content were not sufficient. If they post their assignments like this, it might create difficulty for their students to understand the content or the requirements of the assignments. They used tools like Google Docs, Web links and Excel Spreadsheet for making rubrics. It was a good effort, but they could do more. Students were not given details about how to make use of each tool and content posted in Google Docs sheet and Excel Spreadsheet was not much clear. Good thing was that they tried. They tried to practice

TPCK. They seemed a little weak in executing their pedagogical and scaffolding skills. Still these participants had done far better than the people from the previous iteration. The interaction of Group A was superb. They were helping each other at every step. They assisted each other in navigating the tools. Asra was amazing in her technological skills. She was super helpful in assisting her group members Maheen (IT) and especially Asifa (Physics). Last but not the least, they seemed highly motivated.

Group B was also as vigilant as Group A. If we make a comparison, they were better in the 'Announcements' area as they uploaded the content with detailed instructions. Their understanding was as good as Group A's. Their organization in posting the content, creating instructions, and using relevant tools seemed a little better than Group A. Their navigation skills were a little less than Group A and it was understandable because Group A had two members from the IT department and Group B had diverse participants. One from Zoology, one from English and one from Psychology. Each of them tried creating the assignment according to their subjects as Group A had done. Faiza chose 'Reconstruction of the Phylogeny of Invertebrates', Sidra chose 'Critical Analysis of Jinnah's Letters' and Maria selected 'Racism and its Effects on Minority Groups' to use for their assignments. They did well. They uploaded the assignments with a detailed account of the requirements. The instructions were clearer as compared to Group A. They had also used the tools from the given options in Google Classroom. They used Images from different Web resources and uploaded them in the Classwork with the assignments. They also used a video for Maria's content material whereas Sidra had used a Google Docs sheet to present the speech only. There was no additional tool for her content. Also, like Group A, they had not scaffolded the tools as well as they could. But at this level, whatever they came up with was totally unexpected. They had performed immensely well, and I was happy with both groups'

performance. Group B was equally interactive. Maria and Faiza were very helpful and vigilant. They helped Sidra during various navigation tasks. They were even more motivated than Group B as they never expressed laziness and asked several questions during the activity through the chat box which indicated that they were taking much interest in this activity. Overall, it was a tremendous job from both the groups.

Activity 6: Individual Task

30 minutes were decided for this activity. This activity was about integration of the knowledge and skills the learners learned from this training. I demonstrated the importance of online PBL skills through a brief PowerPoint presentation

I discussed with the learners about their overall experience of this training session and what they had learned through it. I asked the learners to answer some questions related to LMS and online PBL. The interview questions were prepared on Google Forms and these questions were prepared as a post-Interview. Please click the link below to find the interview questions and responses of the learners.

Post-Interview

Analysis and Reflection

After the learners had performed this activity, I analyzed the results through this table.

Q1. Were you familiar with the Learning Management Systems before this training? If yes, which were they? All were familiar with LMS before this training. Maheen, Asifa, Asra, and Sidra knew what it was, but they never got a chance to use it whereas Maria had the experience of easyclass.com and Faiza was familiar with Schoology before this training.

Q2. According to you, how effective can LMS be keeping in view the COVID-19 pandemic or any emergency like this? All of them agreed that it is very effective, and they provided details about it.
Q3. After attending this training, what kind of learning will you prefer? For example, Synchronous, Asynchronous, Blended or In-person. Please give your rationale in each case. Most responses were in favor of synchronous and asynchronous learning, and everyone provided rationales for their liking. They responded keeping in view the context of COVID. No one preferred In-person classes, but they were thinking of COVID or emergency situations only. I wonder what their responses would be if it were not COVID.
Q4. Will this training help you use a Learning Management System? If yes, which LMS will you prefer for your classes and why? Everyone responded in Yes.
Q5. Which features of LMS do you like the most and why? The responses included that LMS is authentic and reliable, No time constraints, Access from anywhere, Management of lectures and assignments, Data recording, Integration, Data Tracking, Grading and Feedback options through discussions.
Q6. Which difficulties did you face in using Google Classroom during this training? Sidra said that there were some login difficulties initially. After that it was fine. Maheen did not face any problem and she responded to this question in the same way as she had for the same question in the Pre-Interview. Now I could clearly say after observing her performance in

using Google Classroom that she was really skilful in using technology. Likewise, Asifa, Maria, and Faiza did not face any significant problem. Asra's response seemed to be irrelevant as she said that she would have problems in future about the coordination with her students.
Q7. Were you able to solve different problems that you encountered during the training sessions? Please first name the problems and then explain how you solved them. Maheen said that she had a little problem with the internet connection and electricity shortage, but she had managed to be on the track without us tracking. She used her phone by turning on her package and did this until the issue was resolved and it was about 10 to 15 minutes. Sidra also had poor connection sometimes, but it was not much of a hurdle, and she faced difficulty in the login part during Activity 5. Asifa said that she faced a little problem in managing the lecture and assigning it to students. She also found it a little difficult to understand the grading part. Faiza, Maria, and Asra did not face any significant problem.
Q8. Was Problem-based learning an effective way to learn? If Yes/No, please give reasons. All responses were in Yes and they gave details about the significance of PBL.
Q9. Do you feel self-sufficient in using LMS after taking this training? Please give reasons in both cases i.e Yes or No All learners responded in Yes and Sidra said that there is always room for improvement.
Q10. What according to you is the importance of Self-directed learning in online Problem-based learning environments? Responses were detailed as everyone justified the use of self-learning by saying that it helps

learners to identify their needs, goals, and objectives, learners can analyze themselves and become more confident, learners use their cognitive abilities, and they think critically, and it increases self-efficacy in learners

After observing the results of the Post-Interview, I compared it with the Pre-Interview. The answers were the same for some questions and for some questions, the answers had improved. These teachers already knew much about LMS, and a few were familiar with PBL also. When we discussed both the concepts in class, they all agreed and were planning to use them for their own classes. They said it does not matter whether the administration purchases an LMS or not. They will use some free source to get connected with their students and to make their and their students' life easy. They also seemed enthusiastic about using PBL in their classrooms.

Activity 7: Group Work

At the end of the training, I assigned some tasks to the learners. I provided a hypothetical problem to the learners. The groups were the same. They were asked to find a solution by following all 7 steps of Problem-based learning. They could use any tool for this assignment and submit responses to the instructor. The SME gave her feedback on assignments and sent it to me. I also asked the learners to complete a checklist for self-assessment and give their feedback about this training through a survey.

Instructions for the Homework

Please read the problem scenario from the link provided Problem Scenario for Homework. After reading it, please find out the solution by following the steps of PBL as we did in the training. Describe the online platform that you will use and why. The format of this

assignment is not specific. You can give essay type responses or just come up with bullet points. The requirement is to provide a rationale for the solutions of the identified problem and strategies that you will use for better motivational skills. Please use Google Docs for your responses. Your assignments will be checked by one of our subject specialists. Please submit your responses through the Google classroom that I created for you and do not forget to mention your group. For your ease, I have created columns for PBL. You can fill up the information there (Its Optional)

Name of the Group:

Online Platform Chosen	Rationale

Encounter the Problem
Identify the Problem
Define the Problem
Research about the Problem
Find Solutions
Implement the Solution

Integrate Knowledge

Artifacts of Students for Homework

Please click the links below for learners' homework sheets.

Group A: Response

Group B: Response

Feedback of SME on Homework Assignments

Please click the following link for the feedback

Feedback of SME for Homework

Analysis and Reflection

After going through the Homework assignments of the participants, the SME was glad and surprised to see the efforts of both the groups. She liked their ways of using PBL for their classes. She also liked their ways of implementing the solutions to motivate students. Most of her feedback consists of appreciation at different points. According to her, both the groups this time were aware of LMS already and were very quick learners. She observed that all participants were quite confident this time and they were super helpful to each other. She was impressed by their technology literacy skills, and she acknowledged the fact that participants took PBL as a challenge and enjoyed learning about it through all the stages. She observed that some participants were very inquisitive and after finishing a task they wanted to jump into the other one. She felt that learners had learned to incorporate technology in their content and pedagogy. She realized that everyone had worked hard and were very good at incorporating content with technology, but they still need to work on the pedagogy more. Although they have tried to keep all three components together, there is still a lot of room for improvement. She said that the

participants had very little time to practice a lot. If they are given more time and they get an opportunity to practice more, they will learn a lot. Overall, she liked artifacts from both the groups.

Overall Feedback of the SME about the performance of Learners

Please click the following link to access the overall feedback.

Overall Feedback for Participants

Analysis and Reflection

Overall feedback of the SME for everyone suggests that she was satisfied with the performance of all participants. She has appreciated them all for their hard work, quick responses, their helping nature, and their enthusiasm throughout the training sessions. She also appreciated their teamwork, and she acknowledged the fact that they had very less time to learn a lot of stuff, still, they did not feel burdened. She also appreciated their online literacy skills and their active participation in all the activities. She was glad about the fact that they learned much about PBL and especially for online classes that can be more challenging. Her feedback is a source of encouragement for these participants.

Checklist

For each question, I used a linear scale starting from 1 to 5 indicating the degree from Yes to No. The results can be seen through this hyperlink.

Result Summary for Checklist- Iteration 2.

Analysis and Reflection

Responses to the Checklist were quite satisfactory. The answers remained between 1 to 2 and for 2 questions, 2 teachers chose Number 3. The questions were about using multiple tools during various activities conducted in the training and providing effective feedback to peers.

Two teachers' felt that they had some trouble in using multiple means of technology at the same time and they were not satisfied with their peer support. I liked it that they were able to see themselves where they needed improvement and how they could help their peers more. At Least they got this idea how they should be a support for their peers.

Post- Survey

Please click the following hyperlink to see the results of all three parts of the survey.

Result Summary for Post Survey- Iteration 2

Analysis and Reflection

The responses to post-Survey suggested that learners had a good experience overall and by the end of the training, they were willing to take more training sessions like this and wanted to practice the skills that they learned during the training. The survey also suggested that they had acquired knowledge about PBL in detail. Although they were familiar with LMS through this training, they got a chance to use this system. They also practiced application of PBL quite maturely and keenly. For Question 1, most responses were in 'Yes' but for the question about providing real life examples by the trainer, Asra and Maheen felt that the real-life examples that I provided were not sufficient. I need to work on that for my Future work. For the question, 'Did you have enough time to complete the activities in the learning environment?' Asra chose the option 'Somewhat. I can understand that time was less for the learners, but I did not mention time during the entire sessions and gave them free time to perform all the activities. I am glad that the thing she could not talk about during the training, she mentioned it through this survey. According to my analysis, I found that Asra was one of the most vigilant and responsive participants. Her response is helpful for me because in the Future if I plan to train for something, I shall keep the time slots more flexible or will increase the number of training sessions. For the

question, ‘Was the multimedia used within the training helpful to understand the topics?’Asra believed that the multimedia used was somewhat satisfactory. For my previous iteration, I had added a YouTube video but this time I did not include it because last time I felt that learners got bored, and it was very tiring for them and they had mentioned it directly. From Asra’s feedback, I realize that all tools that I used during the training or for the content of the training might not be sufficient. In future, I plan to add media or tools that may be more integrating and effective. Overall, I got good feedback as everyone else responded in the favor of multimedia usage during the training. Still, I shall work on that. The second part of the survey consisted of questions. I got diverse responses. Asra felt that time duration should be increased or there should be multiple sessions of this training and Maria felt that it could be much better if it was in-person training. Sidra added that it would be better if more charts or visual aids were added in the training. Maheen said this training should be evaluated. I think she meant to say that some expert should evaluate the effectiveness of this training and thankfully I have my SME to evaluate it. Lastly, everyone agreed that this type of training must be recommended to other colleagues and students for a smooth flow of online education process.

Plans for Future Research

Through the participation of the learners, discussion with them, their responses to the Post Survey, and Checklist, I have concluded that I need to work on the following areas for future work

1. Increase the time duration or number of sessions of the training
2. I must have more than one sitting with the learners who will be participating in the research

3. I should have sufficient time to give detailed instructions (about the training, tools being used, the content being presented, the activities the learners will be performing, ethical concerns about respecting each other or helping everyone) and to know about the background knowledge of the learners
4. The media or tools that I choose, should be chosen wisely and they must help the learners in an effective way. Although overall I was satisfied that learners did not complain much about the use of media, still I need to work more.
5. I also wanted to see how the learners would perform now after seeing the feedback from the SME for their artifacts. Next time if I get the opportunity, I shall try to conduct a session with the same participants and will assign them a task just to know how much they have improved or how skillful they have become
6. One major problem that I always faced was that I did not know many people here and I had to connect to my acquaintances from my job back home. It was extremely tiring and nerve wrenching for both sides. The Main problems were the time difference, not getting dates and time from the learners because of their busy schedules, getting stuff back from them with many delays as they responded according to their availability. Next time if I do some research, I shall try to choose participants from the closest locations and the people who I can access easily. I would like to have in-person meetings with the participants before the implementation of the design which I could not do for this training.
7. I must work on incorporating more peer work, group discussions and next time I am planning to use a proper platform like Jam board for discussions only instead of using Zoom chat box. Learners used it well, but they had to scroll again and again to see other people's responses which wastes time and is an extra effort

8. After the training, I believe that my updated research question was answered to a great extent. The only weakness that I felt was about incorporating the pedagogical knowledge with the content and technology. Both the groups had done a great job though, still they must work on the pedagogical and scaffolding side of instruction.

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