

SMOOTH SOLUTION DESIGNERS PRESENTS

# Designing Problem Solving Learning (PSL) Environments

*Function Primary School Edition*



**PROBLEM-BASED LEARNING ENVIRONMENT (PBLE)**

**EDID6509 -Designing Learning & Performance Solutions**

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## OVERVIEW

Jonassen (2011) notes that for many people, a problem is a situation or matter that presents a perceived difficulty. The problem here stems from the inability of learners to maintain working memory when executing tasks in a specific lesson. Working memory, according to Logie & Cowan (2015) is a holding mechanism in the mind for a small amount of information that is kept in a temporarily heightened state of availability. This allows for both the understanding of problems and the production of solutions on a given task. McMurray (2011) maintains that to support learners in the classroom effectively, it is necessary to recognise class activities that place demands on working memory. As such, it is imperative that educators understand how to manipulate tasks to ensure they stimulate and foster short term memory. One area for further exploration, according to Bray (2017) involves an investigation into how a response to a stimulus can be delayed during a task so as to maintain task-relevant information in the short term and by extension, the working memory of learners.

The learning environment uses a Problem-Based Learning Approach includes:

- Identify problem
- Define problem and use prior knowledge to brainstorm ideas
- Independent study commences
- Information sharing, peer teaching and working towards solution
- Solution presented, revision commences
- New knowledge and skills discussed using self, peer and coach review

## PBL Process



## **Case Study**

Improving working memory for 21st century skills and lifelong learning.

### **Problem Scenario**

The Junction Secondary school is located in St Thomas, Jamaica. There are approximately 560 students enrolled and 45 teachers to facilitate grades Seven (7) to Eleven (11). Miss James, who is a class 3 teacher with over 40 years' experience, has noticed that while the students in her Grade 10 class have demonstrated acceptable, age level reading skills, they have poor working memory and as a result, are unable to recall information provided in various tasks. She is very concerned about this observation.

### **Defined Problem**

Students lack the skills needed to capitalize on the use of working memory to improve in the ways in which they transfer comprehension skills to real life and real-world scenarios needed for 21st century skills and lifelong learning.

**Prototype URL:** <https://5v9a7t.axshare.com>

## Iteration 1: Defining the Problem

### Group Brainstorming Activities

1. The learners will watch a video highlighting the difficulties students face in using working memory to recall information presented in a prose passage.
2. The learners are invited to read the scenario, watch the video and then brainstorm to define the problem.
3. The learners brainstormed and defined the problem as “Students lack the skills needed to capitalize on the use of working memory to improve in the ways in which they transfer comprehension skills to real life and real world scenarios needed for 21st century skills and lifelong learning.”


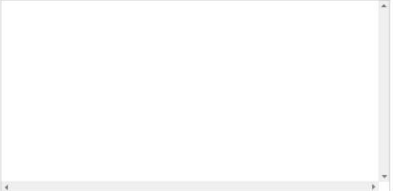
HOME What is PBL? CASE STUDY SESSION 1 **SESSION 2** SESSION 3 SESSION 4

**Session 1: Video Presentation Activity**

The Junction Secondary school is located in St Thomas, Jamaica. There are approximately 560 students enrolled and forty five teachers to facilitate grades Seven (7) to Eleven (11).

Miss James, who is a class 3 teacher with over 40 years experience has noticed that while the students in her Grade 10 class have demonstrated acceptable age level reading skills they have poor working memory, and as a result, are unable to recall information provided in various tasks. She is very concerned about this observation.

Let's define the problem.  
Week 1  
(February 21 - 25)

HOME What is PBL? CASE STUDY SESSION 1 **SESSION 2** SESSION 3 SESSION 4

**Session 1: Video Presentation Activity**

**Brainstorming Session Pt. 1 - Using Prior Knowledge**




HOME What is PBL? CASE STUDY **SESSION 1** SESSION 2 SESSION 3 SESSION 4

**Session 1: Video Presentation Activity**

**Brainstorming Session Pt. 2 - Problem Defined**

Working memory is needed for both our understanding of problems and our production of solutions, for both acting in and navigating around the world, and for both the comprehension and production of language. Ms. James and her team at Junction High should therefore design class activities to be problem-focused, student centered and self-directed.



## **Justification for Iteration 1**

### **Defining the Problem**

PBL is an instructional solution designed to improve learning by requiring students to learn content while solving problems (Jonassen 2010). As is demonstrated here, the Problem-Solving Learning Environment was designed to address the problem of students unable to utilize working memory during classroom activities; a problem that may follow students in their future endeavors. Logie & Cowan (2015) note that working memory is needed for both our understanding of problems and our production of solutions, for both acting in and navigating around the world, and for both the comprehension and production of language. Transference of working memory skills will assist students in navigating through jobs and lifelong learning programs.

Bransford & Stein (1984) maintain that one reason we need lifelong learning skills is that job requirements tend to change rapidly; that those who are able to learn new concepts and procedures will have a better chance at maintaining their jobs or advancing their careers. McMurray (2011) further argues that in order to support children in the classroom effectively, it is necessary to recognise class activities that place demands on working memory.

## Iteration 2: Lesson on Graphic Organizers to aid Recall

### Individual and Brainstorming Activities

1. Learners will watch a video, view an infographic and resources on Graphic Organizers.
2. Learners are then invited to brainstorm and present the Graphic Organizers that they presently use as well as the ones they have learnt from this activity.
3. The learners are invited to work individually by presenting Graphic Organizers they have used or currently prefer to use to map ideas.

Session 2: Lesson on Graphic Organizers to Aid Recall

Lesson: Graphic Organizers to Aid Recall  
Week 2  
(February 28 - March 4)

WEEK 2 INSTRUCTIONS

By March 1st:

- WATCH THIS VIDEO
- VIEW THIS INFOGRAPHIC
- READ RESOURCE 1
- READ RESOURCE 2
- READ RESOURCE 3

Graphic Organizers Brainstorming Session

What method can we use for this activity?

Hmm...so we know that graphic organizers are a collection of effective visual learning resources

While reading the resources and watching the video, we learned about the many types like venn diagrams, flow charts, the idea wheel and even the spider map.

The Idea Wheel sounds like a great idea...no pun intended!

Session 2



## **Justification for Iteration 2**

### **Lesson on Graphic Organizers to aid Recall**

Graphic Organizers are a useful learning tool for students of all ages, because they help students construct understanding through an exploration of the relationships between concepts. Teacher-created organizers are an effective scaffold for supporting student learning. They enable students to categorize large amounts of information, introduce a more refined lens to analyze a complex text, and recognize patterns and compare perspectives (Wise & Cooper, 2019). Graphic Organizers integrate both text and visuals. This method of teaching and learning has been scientifically proven to be effective. Using them can be extremely beneficial for both teachers and students, as they will make lessons more engaging and understandable and assist with improving memory of the subject area (Athuraliya, 2022).

By using this method within the PBL environment, students build their reasoning process through generating a hypothesis, analysis, information seeking, and making decisions while acquiring information (Moallem et al., 2019). As we should know by now, PBL encourages students to work as self-directed, active investigators and problem-solvers in small collaborative groups and because of this, it can be implemented using a collaborative approach in which students are placed in groups to encourage social interactions.

The instructor's primary role is to model, guide, and coach the learner through the learning and assessment process. It is more akin to that of a facilitator and coach of student learning, acting as a resource person at times, rather than knowledge-holder and disseminator.

## Iteration 3: Solving the Problem

### Group Activity

1. Learners are introduced to a video on good problem solvers and problem-solving procedures, inclusive of inference for skills and rapid decoding strategies using graphic organizers.
2. The learners are invited to brainstorm as a group and present Graphic Organizers they have used or currently prefer to use to map ideas employing their preferred strategies from the previous video.
3. The learners, in groups of 4, will use the suggested Idea Wheel Graphic Organizer from Session 2 to find the solution. They will then present their solution using Microsoft PowerPoint then upload group presentations into the portal.

WEEK 3 INSTRUCTIONS

Remember the **PROBLEM** in week one (1)?

**Let's Solve It!**

Watch Me

Watch Me

**BY MARCH 08TH**  
 YOU SHOULD HAVE WATCHED THE VIDEO ON PROBLEM SOLVING USING GRAPHIC ORGANIZERS.

**BY MARCH 09TH**  
 FORM GROUPS OF FOUR (4) AND CREATE A PRESENTATION USING MICROSOFT POWERPOINT TO SHOW HOW YOU WOULD SOLVE THE PROBLEM THAT MS. JAMES AND JUCTION HIGH SCHOOL IS CURRENTLY FACING.

**UPLOAD YOUR PRESENTATIONS TO THE ASSIGNMENT PORTAL WITH THE FORMAT: GROUPNAME\_PROBLEMSOLVING NO LATER THAN 3:59 P.M. ON FRIDAY, MARCH 11TH.**

**DOWNLOAD POWERPOINT HERE**

**ASSIGNMENT PORTAL**

Problem Solving Brainstorming Session

Ok guys, we have a problem to solve! How do we help Mr. James?

Let's use the graphic organizers to group what we have learnt!

I have an idea! We can use the Problem and Function wheel!

Yes! We can use it to identify the problem, have several steps towards the solution and resolution!

We need to understand strategies and roles.

Remember, there are eight steps to it!

Session 3

### **Justification for Iteration 3**

#### **Solving the Problem**

In this lesson, students are given the opportunity to present their understanding of the problem and come up with a solution. Like a good hammer, a memory tool can help us perform tasks that otherwise would be difficult or even impossible (Bransford & Stein 1984). Here, the students employ the use of Graphic Organizers to assist in aiding recall and by extension, working memory. Using the I.D.E.A.L framework as a scaffold, the learners were presented with a problem scenario and through resources provided, were able to analyze the problems more thoroughly and explore different strategies for solving the same problem. The IDEAL Approach to problem-solving (Bransford & Stein, 1984) includes:

**I**=Identify problems and opportunities

**D**=Define goals

**E**=Explore possible strategies

**A**=Anticipate outcomes and Act

**L**=Look back and Learn

The IDEAL framework is most useful when it is applied flexibly. The collaborative tasks of learners having to brainstorm as a group and present Graphic Organizers in tandem with using the suggested Idea wheel Graphic Organizer from Session 2 to find the solution presents an opportunity to engineer a solution as a group. The idea wheel is a hybrid of the circle map and the spider map. This Graphic Organizer encourages the learner to focus on creative thinking and arranging ideas within the same stage of development. The center of the chart houses the main area of focus. The goal of the Idea Wheel is to organize information numerically or as a series. Thoughts are applied to the main concept in particular sections and then clarified in the same

circle or with a shape that stems from it. Idea wheels are effective for freestyle strategizing and organizing information on a subject (Glorify, 2020). Learners were directed to explore Graphic Organizers as they act as a visual aid during the learning experience.

Stanford (2013) notes that children learn best when they are able to organize things visually and spatially; that these spatial thinkers have an appreciation for charts, graphs, maps, tables, illustrations, puzzles and anything eye-catching. Similarly, Ellison (2001) believes that children with spatial intelligence are best taught using pictures or photographs. Spatial intelligence, according to Nolen (2003) gives the child the ability to manipulate and create mental images in order to solve problems and apply concepts. The objective is to have students apply the newly learned concepts to other problem-solving activities.

## Iteration 4: Reflective Writing

### Individual Activity

1. The learners will watch the video on reflective writing.
2. The learners will then be invited to reflect on the problem-solving process and lessons learned.
3. The learner will then write a reflective essay in no more than 500 words addressing the following questions: How can you use the lesson learned in a classroom activity? What working memory strategies have you previously used? What working memory strategies will you now employ? Post your reflective essay in the discussion forum. Reflect on your experience, then read and respond to at least two peers; one whose strategy seems attractive to you and to another student whose approach is a bit more novel.

**Session 4: Let's Review!**

**Lesson: Reflective Writing using Gibbs Model**

**Week 4**  
(March 14 - March 18)

**WEEK 4 INSTRUCTIONS**

**WATCH THE VIDEO BELOW ON REFLECTIVE WRITING USING THE GIBBS MODEL BY MARCH 15TH.**

Write a reflective essay in no more than 500 words addressing the following questions:

1. How can I use the lesson learned in a classroom activity?
2. What working memory strategies have I previously used?
3. What working memory strategies will I now employ?

Post your reflective essay in the discussion forum using the format lastname\_firstname\_reflection no later than March 17th.

Continuing on your reflection process, by March 18th, read and respond to at least two (2) peers; one whose strategy seems attractive to you and to another student whose approach is a bit more novel.

**GIBBS VIDEO**

**DISCUSSION FORUM**

**THANK YOU SMOOTH SOLUTION DESIGNERS!**

**WE HAVE NOW SUCCESSFULLY COMPLETED PROBLEM BASED LEARNING.**

*Session 4*

## **Justification for Iteration 4**

### **Reflective Writing**

Reflective thinking helps problem solvers control their process and get the right strategy for the next step, better plan to solve new problems, and manage repetition (Kholid et al., 2020). The problem-solving activities presented invite learners to analyze the problem, evaluate his/her own understanding of the problem as well as formulate a solution to overcoming the problem. Bennett et al. (2016) argues that reflection is an essential part of students' critically reflective development, where students learn to engage in critical self-monitoring as they attend to their learning experiences. Student reflective writing was scaffolded through use of a video and prompted through specific questions given in the task. Learners completed Reflective Writing using the Gibbs' model.

Gibbs' engineered his "structured debriefing" to support Experiential Learning. It was designed as a continuous cycle of improvement for a repeated experience but can also be used to reflect on a standalone experience. Gibbs' (1988) Reflective Cycle helps persons to think clearly and systematically about the different experiences they have gone through during specific activity or similar situations and draw conclusions. Graham Gibbs believed that people learned from their experiences and if they did not think about how to do better next time, then they were not learning anything from the experience.

Gibbs' Reflective Cycle is one of the important teaching and learning methods that describes the situation and helps people to make sense, understand and reflect on how to do better next time. It is a cyclical model with a framework that puts focus on repeated experiences. The model includes six stages, where each stage helps students to engage and reflect on a specific learning experience. The six stages include:

1. Description -What happened
2. Feelings- Your reactions & feelings
3. Evaluation- What was good and bad
4. Analysis- Make sense of the situation
5. Conclusion- What have you learnt?
6. Action plan- What are you going to do differently?

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