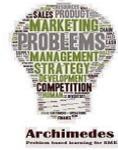


## Unit 10: Synthesising a solution, reflection and reapplication



### Introduction

Once you have gathered enough information to satisfy the learning objectives we enter the closing (discussion) phase. This phase involves three steps (steps 7-9). Each lesson in this unit corresponds to one of these steps. The unit will cover:

Lesson 1: Synthesising a solution (Step 7)

Lesson 2: Reflection (Step 8)

Lesson 3: Reapplication (Step 9)

### Lesson 1: Synthesising a solution.

This step involves the PBL group meeting to discuss the findings of their self-study and how they achieved the learning objectives. The main purposes are<sup>1</sup>:

- To consolidate knowledge by putting it into words and discussing it.
- To assist each other in understanding difficult concepts. If you have come to understand a difficult concept you are the best person to help a peer who is struggling with it.
- To elaborate and enhance each student's pool of knowledge. Sharing different answers to the same questions elaborates upon the learning of individual students.
- To critique and correct any misconceptions. Pooling information provides opportunities for students and the PBL Facilitator to correct each other, resolve conflicts raised during the data gathered in Self-study and add new learning.
- To identify the limits of existing knowledge by reflecting on the answers the group has found.
- To encourage you to judge the validity of information by its source (is it from a reputable author/source) and cross checking different sources (if one website suggests a particular tool is the best way of approaching a problem do other people say the same thing, you need to use more than one source)

In the closing discussion you should come prepared to talk through and share the work you have done on each of the set learning outcomes. It is possible that during the discussion not all issues will be resolved and new ones may appear. These are dealt with in the same way as for the first session, by identifying fresh learning outcomes. These are then studied privately for the remainder of the week and the result brought back and shared with the group on the following PBL session before the new problems are seen.

### The discussion leader

Again the discussion leader is responsible for the closing discussion. There are many different

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<sup>1</sup> from [https://www.york.ac.uk/media/law/documents/pbl\\_guide.pdf](https://www.york.ac.uk/media/law/documents/pbl_guide.pdf)

methods you can adopt and you may need to experiment to find a method that works best for you.

- It is important that you send around an agenda to the team members prior to the meeting.
- You could go round each team member asking an individual to lead the discussion on a particular outcome and the rest of the group follow.
- You may feel it appropriate for an individual or a sub-group to make a short presentation on their learning outcomes and follow it with group discussion.

It is important that the team members and the discussion leader probe the learners about their rationale behind making certain decisions if they do not articulate these. This is done by asking open ended questions that help you and other learners to develop critical thinking. Questions you might ask may be:<sup>2</sup>

- What are the other possibilities that you may have not thought of?
- What is the facts or evidence to support that idea?
- What are your thoughts to that ideas proposed?
- What do you mean by ....?
- How do you know that the information is reliable?
- How will this information help us to manage the problem?
- How does this information support or not support our original idea?
- What have we learned from this problem?
- In what way has working through this problem help with understanding (example how branding helps in positioning of the product)

The discussion leader should summarise and clarify what each person said.

The discussion must summarise with a solution to the problem with a strong rationale for choosing this solution and an action plan of how to implement the solution. Or a list of learning objectives which must be further pursued in order to further explore successful solutions.

### **The team member**

The team member should participate fully in the discussion. Indicating what information they gathered to address the learning objectives, the sources of that information and how it met and addressed the learning objectives they were responsible for. They should also listen actively to other peoples contributions and build upon these using the principles of accountable conversations discussed in Unit 8.

The should also question other peoples information (using the questions in the previous section) for clarity to enable them to understand it better.

### **The observer and the scribe**

The scribe should record a summary of each contribution from each team member and how it addresses the learning objectives as well as an overview of the final solution to the problem with the agreed action plan and/or areas for further exploration and the learning objectives associated with this .

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<sup>2</sup> Chye, S.H., Neo, W.K. and Chyn, K.Y., From Sage-on-the-Stage to Guide-by-the-side: Effective Tutor Skills in Problem-based Learning. *Temasek Business School* < [http://pbl. tp. edu. sg/Facilitation/Articles/SimWee. pdf](http://pbl.tp.edu.sg/Facilitation/Articles/SimWee.pdf)> with a bibliography referring inter affiliato the works of Professor Howard S. Barrows.

The observer again is responsible for watching how people interact in the closing session and identify the strengths of each person and areas for improvement. These are discussed at the end of the closing session. The observer should contribute their findings from the self study stage.

An example of a solution synthesis is below

**Example**  
**For our cash flow problem.**

As forecasting requires very little data and once the data is entered the formula can be applied to several periods. Initially two types of forecasting will be used exponential smoothing and seasonal indices. We will measure the forecast using MAPE (as it is the easier of the two to calculate).

Sales and order (from procurement) data for the past year will be entered into an excel spreadsheet and will be used to calculate the forecast for the next period.

## **Lesson 2: Reflection**

One of the key aspects of problem based learning is reflection and reflective learning. We discussed this in Unit 3. In the problem design the learner is asked to conduct some formative and summative evaluation. Formative evaluation was conducted prior to the self-study stage and at its completion.

Summative reflection can be done as part of the closing discussion or each learner can reflect individually using a reflective learning diary. A combination of both is recommended as often individuals will not reflect truly in a group situation.

For summative evaluation it is recommended that you examine (Hung, Hmelo Silver, 2004)

1. What were the main difficulties you had during the PBL process and how did you address them?
2. How confident are you using PBL? How well do you understand how you learn?
3. What did you learn and what skills did you develop specific to the problem and not specific to the problem?
4. What was the process you used to research the information related to this problem?
5. Did you have any difficulties during this process and how did you overcome them?
6. What key points you linked together to develop a solution? Why did you feel linking these was necessary? Do you have alternative hypotheses and solutions?
7. Why did you select the solution?
8. Was the solution successful or not and why?
9. What impact has the solution had to the business?
10. How you would solve this problem differently if given a chance to start over" in the PBL problem)
11. What were the main challenges dealing with other learners and what was your strategy for overcoming them?
12. What did you do well?

13. What do you think could be improved?

An example of student reflection is below

**Example  
For our cash flow problem.**

**What I learned specific to the problem**

- The different forecasting methods
- What data is required for forecasting
- How to calculate a forecast using these methods
- How to use excel to implement these forecasting methods

**What I learned which was not specific to the problem**

- How to collaborate with customers
- How to find information to help me solve a problem
- How to apply this information to a business problem

**Rational for decisions made**

I chose two methods of forecasting as once the data is gathered and input into excel the formulae are fairly easy to apply. Also the accuracy of the forecasting techniques can vary depending on the company. As we are not sure if the change in sales is due to seasons or other factors I decided to use two approaches and measure the accuracy of the most appropriate one.

I chose excel as there is no cost associated with it as we have it here in our company. Also there are a lot of templates and guides in how to use this software for forecasting. There would be no benefit in purchasing specific software for this function.

I decided to include collaboration with the customers in addition to the quantitative methods of forecasting as there may be other factors that quantitative data may not be able to capture which may influence the forecast.

**What I would do differently**

If I was to do this process again, I think I would approach the customers differently. I only managed to get a response from three customers. I think I would perhaps accompany one of the sales people as they have more experience in dealing with the customers. I would have all of my information gathered before I would speak to anyone externally so I appear more organised and professional.

Also the number of products sold by each of our customers will be gathered from the relevant customers to get a picture of how much of each product was sold over the 12 month period and we can derive seasonal indices. Exponential smoothing and seasonal

### **Lesson 3: Reapplication**

To facilitate continuous learning it is necessary to look for opportunities to apply your learning further. This can be done in the closing session or with the reflection stage after the PBL group has met. Questions which may be used are:

- Outline future problems which the PBL process could be applied to. Why would this problem be suitable for PBL?
- What other solutions could be further explored and why are they worthwhile exploring?
- Could the solution be applied to other problems in the organisation? How can it be adapted to do this?
- Does your solution impact on other work areas and if so how can this be addressed?
- How can use what you have learned in the PBL process to other aspects of your job?
- Develop a plan of how you plan to use PBL of what you have learned from PBL in the future.

**Example**  
**For our cash flow problem.**

I found a number of self-study resources that provided a lot of learning material that could be applied in other areas. For example, the SME toolkit contained a lot of resources. For example I found some resources on low cost market research that might enable us to increase our domestic customers fairly easily.

I plan to use this information to examine how we might increase our sales to the domestic customer market. In particular I plan to examine

- The size of the market in Ireland (in terms of revenue)
- The number of customers
- Who are our competitors and what products they offer?
- Research the 5 Ps our customers have preference for.

**Assignment**

1. Synthesise the information you have created in unit 9 (self-study) into a comprehensive solution
2. Reflect on what you have learned throughout the PBL process using the question set in lesson 2
3. Identify opportunities for reapplication of what you have learned.