Meno's paradox: The Role of Dialogue in the PBL classroom

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Abstract

Dialogue is the mainstay of PBL environments. Dialogue happens at multiple levels – amongst student teams, amongst a class and between student teams and a facilitator as well as between a lone student and a facilitator. This paper argues that in order to be pedagogically effective, the conversational framework in the PBL classroom must be situated within the discourse structure of the problems. The discussion makes a case for the conceptual, procedural and factual aspects of the discourse to be included fully in the dialogue between facilitators and students.

Introduction

The main aim of teaching is simple: it is to make student learning possible (Ramsden, 1992). This implies that the teacher must know something about student learning and what makes it possible. Among the various significant changes in academics in the recent times, the idea of 'situated cognition' is relevant for this discussion. The origins of this approach lie in Vygotsky's theory of the social character of learning (Vygotsky,1962). Vygotsky's idea that knowledge has a contextualised character is often used to express dissatisfaction with the models of formal knowledge and academic inquiry. This is based on the assumption that most teaching-learning situations focus on the acquisition of inert concepts – for example, algorithms, routines and decontextualised definitions – and are of no use because the students cannot transfer or apply their learning to other situations. This also leads to the view that situated knowledge is akin to the analogy of knowledge as a tool.

PBL as situated cognition

Common descriptions of Problem based Learning (PBL) often emphasise the 'active' 'situated' nature of learning that takes place in such environments.

The key arguments in favour of PBL are that

- It enables students to learn new information – using 'deep learning strategies' through the activation of their prior knowledge
- It prepares the students for the workplace through opportunities to learn social and communication skills
- It enhances the students' intrinsic interest in the subject matter

The major complaints about PBL are that

- It does not deliver the 'deep learning' that it promises (Glew, 2003)
- It encourages 'ritual behaviour' in students leading to the failure of inquiry and team learning (Dolmans et al, 2001)

There is enough empirical evidence to support both sets of arguments. There may be many reasons why PBL environments end up with ritual behaviour and the failure of the learning process.

Among them, those that are relevant to this discussion are:

- a separation of the process (facilitation) from the content (the discourse structure in the PBL problem)
- excessive emphasis on the 'concrete' or the experiential aspect of knowledge

The author argues that the in order to succeed, the dialogue (between the facilitator and students) must take place within the discourse structure of the problem – anything extrinsic will be reduced to ritual behaviour. This argument is based on the premise that there is a difference between experiential and academic knowledge structures and that every PBL problem contains an active, complex discourse structure with the characteristics of the subject domain of teaching- learning.

The author considers one aspect of the PBL framework – the iterative dialogue between the members of the learning group (student teams) – for a discussion of how and why it shapes the process of inquiry and learning. The issue of dialogue is important because of two reasons: Firstly, it is difficult to grasp of the complexity of 'coming to know' (What goes on to constitute perfect understanding?) Secondly, if there are multiple routes to a solution, then, the iterative dialogue plays a crucial role in 'leading' the learners to any one of them. While the pun is unintended, the paradox is clear and is part of the discussion. How can we learn from the world what we do not already know?

Brown et al (1989) argue against the decontextualising of knowledge by teaching abstractions. They use the analogy of of someone having a Swiss Army Knife with a device for getting stones out of horses' hooves. One can talk knowledgeably about it but would he/she know what to do when faced with a limping horse? Yes, it is important to ground the heuristic knowledge about a device into an 'authentic activity' – what is even more important is one learns the conceptual, heuristic knowledge structure behind the operation of a tool in a situation so that it can be applied in multiple situations. The promise of PBL is that it offers an environment for what Laurillard (2002) calls 'mediated learning' – where learning from a concrete situation/context is demonstrated in terms of the understanding of the underlying principle or heuristics.

Teaching as mediating learning involves the construction of environments which afford not only the learning of the world but also the learning of the descriptions of the world. The means of access to the two types of knowledge are different. One is direct while the other is mediated. As a result of its second order character, academic discourse uses symbolic representation as the medium through which it is known. This is usually language but also may be mathematical symbols, diagrams, musical notation, phonetics or any symbol system that can represent a description of the world. It is a misnomer to assume that PBL problems eschew the academic discourse. They encapsulate the academic discourse structure in a 'concrete' situation. So in order to solve a PBL problem, the students need to address both the experiential and academic aspects of the discourse structure.

PBL environments depend on two major factors for their success.

- a conversational framework which supports the action-feedback cycle
- a dialogic process which supports the students in
  (i) apprehending the discourse structure of the problem
  (ii) mediating the initial, common sense experiential conception of the structure and a more formal understanding of its underlying principle.

One day one problem approach at the Republic Polytechnic

The implementation of PBL at the Republic Polytechnic, Singapore is characterised by division of a given curriculum (say, of a module) into 16 PBL problems. A module is transacted in a semester and a semester comprises 16 weeks of contact study time. In effect, students work in teams on a given PBL problem for the span of a whole day (8 hours approximately). Each PBL problem carries a set of learning outcomes, a context for learning activities and exploration (articulated in the problem statement) and scope of assessment. Each day is structured into three meetings with the facilitator and two segments of time when learning is self-directed: individual study, pair work or team work. In the first meeting, the students are presented with the problem of the day and make an attempt to apprehend the discourse structure of the problem when they identify the learning issues for the day. Usually they use a template with three questions: 'What they know', What they do not know' and 'What do they need to find out' in order to solve the problem. In the second meeting, more discussions take place – with the facilitator's role focuses on listening and diagnostics. The students present and defend their solution in the third meeting. At the end of the day's work, a number of activities are carried out – a quiz, a Reflection Journal entry, self and peer evaluation. They receive a grade and diagnostic feedback on performance from the facilitator. This structure implies a conversational framework with the action-feedback cycle embedded within it. It is often grounded on the discourse structure of a given problem.

Written conversation and extrinsic feedback

Phenomenography is particularly successful at illuminating how students contend with structure and meaning. The two ways in which texts are processed – the deep approach where the student looks for meaning in a holistic way, preserving the intended discourse structure and meaning and the surface approach where the students focus on key words and processes the text in an atomistic way have been demonstrated in many earlier studies (Marton and Saljo, 1976; Marton et al, 1997; Ramsden, 1988, 1998; Marton and Booth, 1997).

Using the phenomenographic approach, the author analyses a sample of student work from the General Modules of Cognitive Processes and Problem Solving I and II offered in Year 1 of the three year Diploma Programmes.

The Reflection Journal entry is written individually by the students and is prompted by a question from the facilitator of the class. The author argues that that purpose of this activity is twofold: on the one hand, it encourages meta-cognitive ability on one's own learning process and on the other hand, it offers an opportunity for a student to reflect on/comment on one's own performance within the given discourse. It is possible that a given question can serve only one of these two goals at a time; the facilitator's discretion in deciding on the area is critical in this regard.

Given below is a sample of questions with their intended purposes as well as a descriptive synopsis of student response categories. (From the module G102: Cognitive Processes and Problem Solving II)

<u>Learning Outcome(s)</u> from the Problem Statement 'Misconception or Reality' (week 3 of semester 2)
The students should be able to:

- *Analyse and compare sources of information to check for reliability in supporting a surface conclusion*
- *Deduce how conclusions can be arrived at*

- *Appreciate the role of scepticism in critical thinking*

The question for Reflection Journal	Purpose of the Question	Categories of Student Response(s)
When I use a word," Humpty Dumpty said, in a rather scornful tone, "it means just what I choose it to mean - neither more nor less." The question is," said Alice, "whether you can make words mean so many different things." The question is," said Humpty Dumpty, "which is to be master - that's all." from Lewis Carroll*,* "Through the Looking Glass". *Can you attempt a personal definition of 'facts' and 'opinions'? How has your own thinking changed over time in dealing with information?*	To encourage reflection on one's performance over time – the quotation is used as a metaphor (scene focused on facts and opinions) and also as anchor for thought. The reference to facts and opinions draws attention to the principal learning issue of the problem.	Poor: Misses the point of the quotation. Writes a bookish narrative on facts and opinions. Average: Makes an attempt to relate what constitutes a fact and an opinion and why. Distinctions made within personal reference points. Good: In addition to making distinctions between facts and opinions from a personal reference point, makes an attempt to trace changes or progression – in individual perception, which is the dominant one? Has it changed over time, why and so on.

Learning Outcome(s) from the Problem Statement 'Bottoms up' (week 9 of semester 2) Students should be able to

- *Work backwards to determine causes*
- *Appreciate the use of empirical evidence in support of a hypothesis*

The question for Reflection Journal	Purpose of the Question	Categories of Student Response(s)
You can observe an event and predict its effects. You can also study the effects and then establish a cause. If you did the former in week 8 (last week) you must have done the latter today (week 9). What was different in the process? Illustrate with an example from your team's work today.	To encourage reflection on students' level of engagement with the discourse structure in the problem	Poor: Gives a bland narrative on observation and its outcomes. Average: Makes an attempt to give anecdotal evidence from the day's work – attempts to distinguish between working forward to effect(s) and working backward to cause(s) Good: Diagnoses/defends one's strategy during the day – makes a clear distinction between the two methods – observes that often effects tend to be many more than cause(s) and working backward to a cause therefore tends to have a narrower focus and so on.

Dialogue and ritual behaviour

Consider an excerpt from Plato's The Symposium. Here is a dialogue between Socrates and the Slave Boy of Meno where Socrates is trying to elicit the principles Euclidean theorem. Socrates is setting out to demonstrate that all knowledge is innate, even geometrical knowledge.

The argument structure in the problem is: To find a square, A, with an area which is double that of another square, B, A has to have a side equal to the length of B's diagonal". Prove this.

The dialogue starts:

Socrates: … Tell me Boy, is this not a square of four feet which I have drawn?
Boy: Yes…

Consider a series of responses from the Boy in isolation:

Boy: True
Boy: Yes
Boy: There are.
Boy: I do not understand
Boy: Yes
Boy: Four
Boy: 2

The end of this dialogue is the ultimate leading question:

Socrates: And that is the line which the learned call the diagonal. And if this is the proper name, then you, Meno's slave, are prepared to affirm that the double space is the square of the diagonal?
Boy: Certainly, Socrates

(Jowett 1953)

This dialogue provides evidence of the boy's knowledge of counting and logic. But it also shows that the method is driven by the teacher – all the work is done in Socrates' questions. The learner is involved only at most localised level of discourse structure. While the goal of Socrates is 'Truth' to be attained through philosophical inquiry, the method of question and answer seems to aim at reducing the interlocutor to helplessness: the admission that his own existing views upon the subject under discussion are completely mistaken. (Hamilton 1951)

The Socratic dialogue (as seen above) does not provide the student an opportunity to 'apprehend the structure' of the discourse in the problem because it is extremely authoritarian.

Dialogue as interaction

Compare this with an analysis of a dialogue between teams of students and the facilitator in the first meeting (The RP PBL process described elsewhere in this paper). The primary purpose of the first meeting in the RP PBL process is for the students to understand the discourse structure in a problem and identify the learning issues.

Problem Statement ‘Bottoms up’ (week 9 of semester 2)

The day after his 21st birthday bash, Alvin woke up feeling sick, and realized that perhaps all that drinking last night was not the smartest thing. He couldn’t remember much after the last taunt to drink up the whole jug of beer but he remembered making a fool of himself in front of his friends. He also wondered why some of his buddies seemed to have bottomless pits, yet never passed out. Alvin certainly has a lot going through his mind and he’s made some interesting observations. How should he go about finding out what alcohol really does to people?

Excerpt from observation notes from the classroom (repetitive responses weeded out)

Facilitator: So… how many of you have been drunk before?
Student(s): yes (laughter)… point at others…
Facilitator: What does it feel like? (addressed to a student)
Student 1: Feel hyper, nice
Student 2: Do crazy things
… More of the same responses….
Facilitator: Between Jack and Amanda, do you do the same crazy things?
Student 3 and 4: No… different things…
Facilitator: How can you tell? Is it just experience?
Student(s) No clear response
For 15 minutes of classroom interaction students share anecdotes – does a person who is drunk weigh more than usual? How can it happen? Why is it more difficult to carry a person who is unconscious? Sharing personal experience and discussing the physical symptoms of being drunk.
Facilitator: How should you go about solving the problem?
Student 5: You must get an idea of what alcohol does then you can say…
Meeting ends.

The author’s comments on this exchange are as follows. As a demonstration of participation and highly developed social skills in handling information, this example merits a high rating.

The academic discourse of this problem statement, however, focuses on establishing causality from observable phenomena to their underlying reasons and the confidence level one can demonstrate in showing cause.

The scenario in the problem statement presents observable phenomena.

The question then becomes critical that at what point and exactly how a student perceives the connection between the immediate symptoms and what causes those symptoms. The experiential aspect of the discourse dwells on the physical symptoms of ingesting alcohol. The academic aspect of the discourse focuses on the study of bio chemical reactions in the body to the ingestion of alcohol. Establishing the link of causality is an important cognitive act in this discourse.

The identification of learning issues is marked by the students demonstrating ability to make connections without recourse to the resources. One way in which this could have been done at the level of the ‘concrete’ is to draw linkages between the pleasant feelings (a high) followed by unpleasant ones (a hangover). Are there indicators for severity? What linkages can they find and so on.

The absence of markers from the students with regard to the move from the concrete to the abstract – from the obvious to the underlying factors – is a significant feature of this excerpt.

Discussion

While it is not possible to draw trends or even firm conclusions from the anecdotal evidence, the author makes certain observations in the process of handling PBL facilitation as a mode of dialogue with the students.

The conversational framework in the RP PBL process does comprise the narrative, discursive, adaptive and interactive elements presented as the building blocks for encouraging self-direction in learning (Laurillard, 2002). Extrinsic feedback (as for a Reflection Journal entry or team performance which accompanies the daily grade) is indeed a form of dialogue. Written conversation of this nature is effective when it deals with any one aspect of focus at a time – this allows for further reflection and if necessary, correction. As the anecdotal evidence shows, it is possible to ground this either in the domain of the discourse or at the level of the processes (for example, what strategy did you use today to increase the effectiveness of your team?).

The notion of dialogue is most dominant in the handling of the adaptive element in the classroom. The author argues that in order to achieve this, the facilitator must be able to demonstrate diagnostic skills in the processes of cognition within the discourse structure of a particular problem (also within a content domain).

Effective PBL facilitation cannot result from divorcing the process from the content domain of a problem. From this position, it follows that questioning (common to both the Socratic dialogue mode and PBL classrooms) needs to be integrated with the discourse structure of the problem.

Most importantly, the students need to engage with the PBL problem. The Socratic dialogue cannot achieve that end. However, building on student responses at the level of social interaction alone – eliciting information, asking for responses, getting consensus etc- may also fall short of the promised goals of 'deep learning' in PBL. Dialogue in the classroom is at its most effective when it engages the facilitator and the students in the acts of cognition which can only be situated within a content domain and an academic discourse.

The dialogue in a PBL classroom becomes a true conversation in so far it involves multiple points of access to information and interpretation of information. In order for this dialogue to be sustained, the facilitator will need a grasp of the conceptual, procedural and factual aspects of the discourse structure of the given PBL problem.

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