

Learners and Learning

Section Two: Learning to know
what we don't know

Writers | Ian Moll, Jill Bradbury, Gisela Winkler,
Maggie Tshule, Merlyn van Voore, Lynne Slonimsky

○ **Editor** | John Gultig

The SAIDE Teacher Education Series

Saide 
South African Institute
for Distance Education



Learners and Learning

ISBN 978 0 620 46731 5

© 2010 SAIDE



This work, a digital version of the SAIDE/Oxford publication of 2002, is released under the Creative Commons Attribution 3.0 licence.

1ST EDITION SERIES EDITOR: John Gultig

1ST EDITION AUDIOTAPE: George Lekorotsoana (producer) and John Gultig (concept and script)

DESIGN FOR DIGITAL VERSION: Michelle Randell

ILLUSTRATIONS: Andre Plant

SAIDE

PO Box 31822

Braamfontein 2017

T: (011) 403 2813

F: (011) 403 2814

www.saide.org.za; www.oerafrica.org

The first edition was funded by the WK Kellogg foundation. This digital version has been funded through the International Association of Digital Publications.

SECTION TWO

Learning to know what we don't know

2.1	Introduction	23
2.2	How do we begin to know what we don't know?	25
2.3	Learning by guessing	33
2.4	Learning by questioning	47
2.5	Learning by imagining	57
2.6	Learning and OBE	64
2.7	Conclusion and key learning points	66

Introduction

2.1

In Section One we introduced you to some of the key questions about learning that will be explored in this module. Can you remember what you learnt? Did your understanding of the half-truths change by the end of the section?

What will you learn in this section?

Section Two begins to focus on *how* we learn in greater detail. In particular, it explores the following question:



How is it possible for those who do not know something to come to know it?



We tackle this question by exploring the ways in which human minds:

- construct **connections** between ideas;
- use what is **known** to understand new and unknown things;
- are challenged to change old misunderstandings by new and **contradictory** understandings.

We will also be looking at how teachers can use spontaneous learning actions – those characteristics which learners naturally possess – to create mental pathways between what learners already know and what we want them to know (the unknown).

We begin by investigating **how we learn** (Section 2.1). Then, based on this understanding, we explore how we can teach so that learning happens. The section suggests three possible strategies to move learners from the known to the unknown:

- First, by encouraging **guessing** – by taking risks and making mistakes. We examine how Piaget's ideas of **accommodation** and **assimilation** can help us keep a balance between the risk of new, unfamiliar ideas and the stability of old, known ideas in teaching (Section 2.2).
- Second, by encouraging and using **questioning** – by listening to learner questions and asking good teaching questions. We explore a variety of question types and how they can be used in lessons (Section 2.3).
- Third, by encouraging **imagining** – by using and escaping from the known, to imagine the unknown (Section 2.4).

Learners often use these strategies independently as they learn. But our task is to find out how we, as teachers, can use these strategies. In order to do this we need to understand how they **both** enable and constrain (block) learning.

More half-truths to guide your learning

Before we begin we'd like to activate your minds again by asking you to consider these half-truths about learning:



Statement about learning	What is true about the statement?	What is inaccurate or false about the statement?
Learning involves acquiring, retaining, and reproducing information.		
As we become better at learning we should make less and less mistakes.		
For every question there is only one answer.		
A good teacher will be able to answer all questions raised in the classroom.		
The use of metaphors and analogies in teaching promotes understanding.		
Children are curious and active and therefore learn spontaneously.		

Approach this exercise in the same way as you did when you thought about the statements made by Dwyer in Section One (page 12). In each case, think about why the statement might be considered to be true, why false, and how you might challenge and question each statement.

It is important for you to note that the statements simply present *possible* understandings of the issues under discussion. Sometimes, by working out why a particular understanding is flawed, we can refine our understanding of a phenomenon and clarify our own position and our reasons for holding it.

Remember, these statements should also focus your attention on the *key issues* to be dealt with in this section. In this sense they act as learning outcomes. At the end of the section we will reconsider our views on these issues.

How do we begin to know what we don't know?

2.2

What do we know?

Ask yourself this question, '*What do I know?*'

The short answer to this question is, '*A lot!*' In fact, each of us knows *so much* about all kinds of things that reporting this knowledge would be impossible.

So, let's refine the question and ask one that is more focused about your knowledge in *relation to something* in particular, '*What do you know about the game of soccer?*'

STOP. THINK.

What do you know about soccer? Write down everything you know about the game in three minutes.



Take some time to reflect on the issue being raised here.



What do we know about soccer?

How did you manage this activity?

- Perhaps you responded by listing famous players, such as Pele, Ronaldo, Doctor Khumalo, Lucas Radebe, Benni McCarthy, David Beckham, or Siyabonga Nomvete?
- Perhaps you named the winning teams of the important soccer competitions in recent years, for example Mamelodi Sundowns: Premier Soccer League 1998, 1999, and 2000; Manchester United: Premiership, FA Cup, and the European Cup

in 1999 (the treble); France: World Cup 1998 and Euro 2000?

- Perhaps you started to describe the way in which the off-side rule is applied or under what conditions a corner is awarded?

Regardless of what approach you took, or where you started, you probably found that **one idea led to the next one**. In the end, you more than likely wrote down many more things than you initially thought you would.

If you are not a soccer fan, this activity might have been a lot more difficult (or even seemed pointless). You may only have been able to answer the question with a simple statement like, 'It's a game played by two teams that kick a ball towards the goals at either end of a field.' You may even have responded with something like, 'I know nothing at all about soccer.' But this would not have been true.

At the very least, all of us know that soccer is a **game** and that it is played with a **round ball**. If we proceed from this starting point, most of us would probably be able to produce a lot of other information about soccer: that you play the game on a **field**, that you **kick** the ball, that you win by **scoring goals**. And so we find that those who thought they knew 'nothing at all' about soccer, in fact know quite a few useful and correct facts – knowledge that is shared by many soccer fans – but these facts seemed so obvious that they were not recognised as knowledge.

This activity illustrates a number of important points about learning and knowing:

- First, it is difficult to describe what we know, because we tend to 'forget' that we know things that we have known for a **long time**. This knowledge is so **natural** to us that it no longer seems like knowledge, or like anything worth learning.
- Second, we also ignore things we know if they don't seem to fit in a particular context of enquiry.

“

Shared knowledge is an important starting point for learning.

”

The difficulty that confronts us as teachers is that things that we take for granted because we know them so well may **not** be shared by the learners whom we teach. For example, we know that Lucas Radebe is a defender, but we may not realise that people who don't know the game of soccer will not know the difference between strikers and defenders! To them, all soccer players are the same.

Shared knowledge (like the understanding of the game of soccer that even the least knowledgeable amongst us may possess) is an important starting point for learning. If it isn't recognized by either teachers or learners, then learners may feel that they are ignorant and incapable of learning and teachers may feel helpless, frustrated, and unable to get through to learners.

The problem in teaching new knowledge is precisely that it is not shared. This presents the central problem of learning-teaching:

- How do we find out whether the knowledge that is required for a learning task is shared by participants?
- How can those who know (often the teacher) share that knowledge with others who don't know?
- How is it possible for those who do not know something, to come to know it?

STOP. THINK.

Before you continue, stop and think about these questions. They are the kinds of questions that seem so natural to us as teachers that we don't think they are important! You might want to make brief notes about your thinking in your workbook. We shall return to these questions later.



Take some time to reflect on the issue being raised here.

Learning what we don't know

Sharing knowledge may not sound like a very complicated problem. Surely, you may think, if people do not know about soccer, they could simply ask someone who does know to *tell them* about it! After all this is how we were taught.

STOP. THINK.

Let's think about it a bit more carefully. In fact, let's do a little experiment. Without looking at the text, recall as many facts as possible about the game of soccer that we have mentioned in this section so far.

How do we remember things?

If you already knew many things about soccer before you started reading this text, you probably had no difficulty recalling the information. Even if you didn't know every one of the specific facts mentioned beforehand, you would quickly have taken in any new fact by adding or linking it to your previous knowledge of soccer. This points to an important idea in good learning:



Take some time to reflect on the issue being raised here.

We learn more by building on what we already know. Knowing is about making relationships by adding to our existing networks of knowledge.



If, however, you knew very little about soccer before reading this module you probably found that you 'failed the test'. Maybe you didn't even bother to try, thinking, 'Why should I try? I am not trying to learn about soccer, it is of no interest to me and will not help me in any way.' Ironically your *resistance* to learning would have identified another important problem with *any* learning:

Learners must experience a need to know about something and see the value of knowing it before they can begin learning.



This quote is from E. Z. Rothkopf, 'The concept of mathemagenic activities', *Review of Educational Research*, 40 (1970), 325–336.

The old saying, 'you can lead a horse to water but you can't make it drink' is powerfully accurate in any learning-teaching situation. Rothkopf puts it like this:

'You can lead a horse to water but the only water that gets into his stomach is what he drinks. ... The proposition is simple. In most (teaching) situations, what is learnt depends largely on the activities of the student.'

The importance of motivation

Perhaps if you were told that knowing these facts about soccer would be important for the course examination, you would now go back and memorize them. You would now have a **motivation** – however controversial – to learn.

But coming to know something requires more than:

- already knowing something about the topic;
- having a motivation to learn more.

Think about this: having learnt these facts, do you think you would feel that you know all about soccer? Probably not. Although you may be able to reproduce these facts under examination conditions and in conversation amongst people who really know a lot about soccer, you might still feel foolish and perhaps bored, uncertain of where and how to insert these facts into the conversation, and unable to demonstrate that you know about soccer. In other words, you wouldn't really be able to **use** your knowledge competently.

Participating fully in **conversations** about the game would require that you have a wide-ranging and deep knowledge about the world of soccer. And of course to play the game, requires a whole array of different skills.

How can we develop understandings that are deep and allow us to enter conversations knowledgeably?



Spend about 40 minutes on this activity. Think carefully about the analogies used. Try and link them to your own experiences, and to what you have already learnt in this module. The quote is from R. Harré, in D. Clarke and N. de Carlo, *Motives and Mechanisms: An Introduction to the Psychology of Action* (London, Methuen, 1985), pp. 71–72.

ACTIVITY 4

- 1 Read the quotation about learning below and then answer the questions that follow it.

'The difference between traditional and personal psychology can be illustrated by their respective (understandings) of education. According to the traditional (understandings), a teacher possesses a large stock of knowledge, while a student has only a small amount of knowledge. Education consists of the teacher passing knowledge from him/herself into his/her student. A traditional examination is an attempt to discover how much each individual has acquired.

In our theory of education, however, the process is quite differently conceived. There is a general conversation which takes place in institutions like the universities, and to which the academic staff contribute. It is from this conversation that students extract what they can.

Education, according to personal psychology, is like breathing in the surrounding air; it is not like being pumped up like the tyre of a bicycle.'

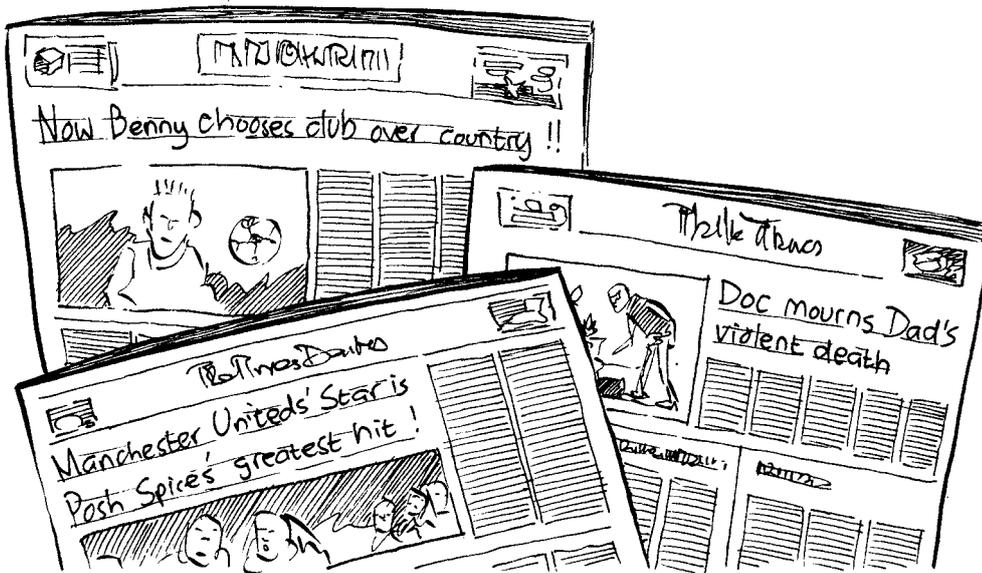
- a The writer argues that education is like participation in a conversation. What does he mean? What kinds of things do we learn in conversations that are often not learnt in classroom instruction?
 - b What does the writer mean by the analogy 'education ... is like breathing in the surrounding air, it is not like being pumped up like the tyre of a bicycle'? What does this suggest about 'traditional' views of the learning process?
- 2 Think of your own experience of learning at home, in classrooms, and in the environment of colleges and universities. How is learning different in these places? Can you think of any examples that could justify Harré's views?

Learning by 'breathing the air'

Becoming familiar with the conversational world of soccer would entail coming to know all kinds of *unanticipated* facts which *initially appear irrelevant*.

For example, each of the famous players mentioned earlier has a unique character and is well known for his style of playing and impressive goals scored or saved in particular games. Each of them is also linked to a particular club. There are also other facts associated with these players that are not about soccer but are nonetheless well known by people interested in the world of soccer. For instance:

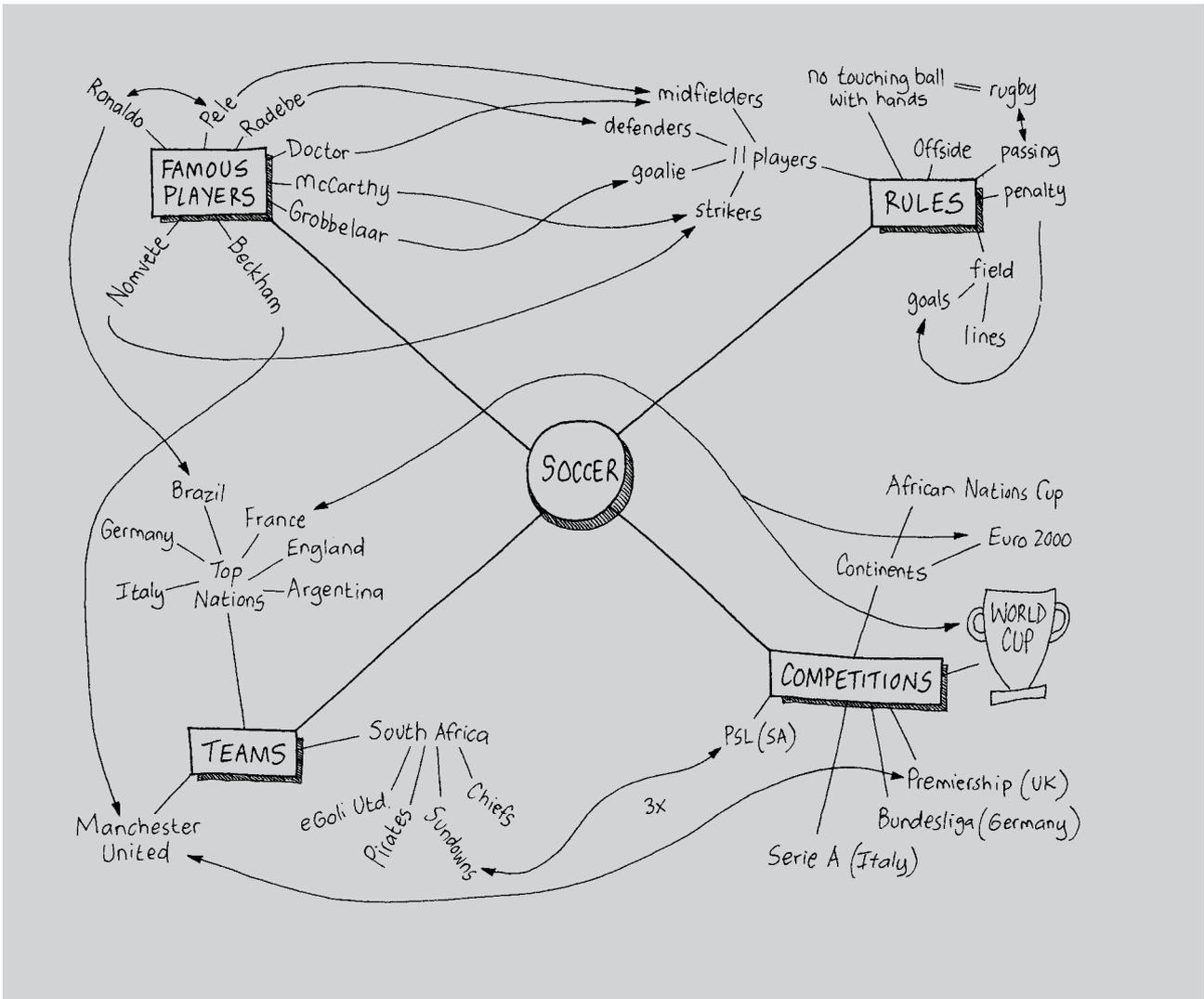
- Do you know which of the players is married to a famous pop star? Who is she?
- Do you know whose father was killed in a violent robbery?
- Do you know which player refused to play for his country at one time because he wanted to put his club first?



You may again be thinking, 'But what is the point of all of this talk about soccer?' Well, we are using it to make the following points about the nature of learning; about moving from the known to the unknown:

- First, something that we already know that *may not appear to be relevant* to a new field of knowledge, may indeed connect us to this new, unknown world. So, for instance, although we may not be interested in soccer we might be interested in pop music and come to know about David Beckham as the soccer player married to Posh Spice.
- Second, a missing fact in our previous knowledge may make it difficult to understand new information. We won't understand 'Ronaldo is the new Pele' unless we know that at one time Pele was considered to be the greatest player in the world. When we learn this we understand that the sentence is saying that Ronaldo must be a very good soccer player too.
- Third, sometimes previous knowledge isn't helpful. In fact, it may hinder the development of new and different understandings. For example, in another game – rugby – one isn't allowed to pass the ball forward. In soccer this is permissible. People familiar with the rules of rugby might therefore be puzzled about why the referee allows play to continue in a situation where it appears a rule has been broken.

We can now begin to see that good learning – which leads to the kind of knowing required to indulge in conversations – is a complex web of connections between our previous knowledge (the known) and new knowledge (the unknown). It is like a network of interconnected information that continually develops, grows, and changes shape.



Harré suggests that this kind of learning develops through the **act** of being within a conversation, **listening** to this conversation, and **watching** how people **talk** and **behave** as they converse. Maybe this is what he means when he says that education is like 'breathing the air'? Rather than being fed knowledge, we learn by engaging in it, observing it, and practising it. What do you think?

Learning about Durban

We now want you to engage in a bit of action to illustrate a number of the points we have made about learning in this section so far. This time, we want you to think about what it means to know a city. The city in this case, is Durban. Work through this example and see if you can identify how **this** analogy works to illustrate the same points about learning as those identified in the story about soccer. This example also introduces some new ideas. If possible, use the example to try to 'teach' a colleague what you have learnt about learning.



Spend about an hour on this activity. The appendices with all the information required for this activity are at the back of this Learning Guide (see pages 213–225).

ACTIVITY 5

- 1 Use Appendix A to answer the following questions about the city of Durban. Write your answers in your workbook.
 - a Where is Durban?
 - b Write down as many facts about the history of the city that you can find in the material provided.
 - c Describe the population of Durban.

- d Describe the political profile of Durban.
 - e What interesting things are there to do and see in Durban?
- 2 When you have answered the questions, try to connect the facts you have unearthed by drawing a mindmap (similar to the one on page 32 on soccer) of the new knowledge you have acquired about Durban.
- 3 Now think about what this activity has taught you about how people move from the known to the unknown. For instance:
- a How would we come to know a place like Durban if we had never been there before?
 - b How would our knowledge of other cities (and particularly of the place where we ourselves live) help us or hinder us in coming to know the city of Durban?
 - c How would we communicate our knowledge of our home town (or a place that we know very well) to someone who doesn't know it at all?

What did we learn from this activity?

Which of the facts about Durban did you consider to be important? Which facts do you think are *essential* to *knowing* Durban?

Put yourself in a learner's position. Think about what you would want to know about a city and why. Discard the kind of knowing that is associated with recalling information for an exam. Instead, think about what facts would be useful to a person living in the city or visiting it as a holiday-maker.

Would the facts that you have identified above help you to know:

- Where to buy cheap, fresh vegetables?
- Which are safe and unsafe places to go?
- Where there are interesting places to listen to music?
- Whether to go there on holiday?
- How to look for work there and whether it would be wise to move to the city to live there?
- Which school to send your children to?
- How to get from A to B, from the market taxi-rank to the beachfront for instance, or from the airport to Umlazi?

It is interesting that official documents about the city don't help us very much at all with developing this sort of knowledge about a place. But the people who live there certainly have opinions about these things and talking to them and living among them would enable us to find out this kind of information about the city. To simulate this experience, we interviewed some Durbanites. Their stories about their home town are included in Appendix B.

STOP. THINK.

Turn to Appendix B and read what these Durban residents have to say. Do their personal experiences give you greater insight into the aspects of the city listed above? Do you notice that the kinds of writing supplied aren't just factual? Instead, they create a kind of *conversation* about the city, about the experience of *living* in the city.

These *different kinds of knowledge* about Durban raise important questions about how we may go about learning new, previously unknown things about the city:

- Which sources of information (for example, the tourist bureau's brochure, daily newspapers, people who live there) would we trust in trying to learn about these aspects of the city of Durban?
- Would everyone's knowledge of the city be of the same kind?
- Would this make some knowledge of Durban right or wrong?
- How would we check or evaluate our own and others' understandings of Durban?



Take some time to reflect on the issue being raised here.

What have we learnt about learning new things?

Think about what the soccer and Durban examples show us about the processes involved in learning *anything new*. What general conclusions can we draw that may apply not just to these examples, but to all processes of knowing and learning to know new things?

If we assume that knowledge is a system of interrelated facts, we can see how the task of constructing a mindmap or a network can help us to *represent* what we think *relationally*. By drawing a mindmap we can capture the ideas *and* the relationships between them.



If knowledge is a web of connections, then knowing the relationship between facts is as important as knowing the facts themselves.

This is an important point to remember for your own learning in this course. Simply collecting and repeating facts does not yet count as knowledge. An important part of knowing is the ability to connect facts into a complex network of ideas. This means that you must learn to *identify and explain the relationships* between facts or ideas.

The activities in this section have shown you that the notion of a 'network of knowledge' is a useful way of explaining *why* we often discover that we know more than we thought. (Although, as we suggested earlier, we often need something to make us realize that we do in fact know these things). It also helps us to understand why it is easier to learn new facts about familiar topics than it is to learn new facts about completely unfamiliar topics. You will also have discovered that because knowledge is a network of connections, knowing the relationships between facts is as important as knowing the facts themselves.

However, as we said earlier, there is a level at which knowing something involves more than a network of information or facts. Even those who may be able to talk quite competently about the game of soccer or about Durban, and can link into a wide range of facts in the network of knowledge about either, may not necessarily be able to actually play soccer or have been to Durban themselves!

Coming to know something may also involve learning to *do* things, through repeated activity and disciplined practice or perhaps just through lived experience.



Take some time to reflect on the issue being raised here.

STOP. THINK.

At this point you may want to do a quick review of what you have learnt:

- Page back to the introduction of this section (page 23). Check the description of what it was to cover. How much of this have you learnt?
- Check the half-truths on page 24. Has your opinion of any of them changed?
- Turn to page 68. Read the first two key points. Do you recognize that you have learnt these things?

Learning by guessing

2.3

Our account of learning thus far suggests that the process of learning is both easier and more difficult than we might have thought! It is easier, because all people actively think about their worlds and all learners have some knowledge that can be used in the learning-teaching situation. It is harder, because coming to know about something entails far more than acquiring and memorizing facts and therefore we can't teach learners by simply telling them things. We now move on to suggest three possible strategies to move from the known to the unknown:

- **Guessing:** learning by taking risks and making mistakes (Section 2.3).
- **Questioning:** listening to learner questions and asking good questions (Section 2.4).
- **Imagining:** using metaphors and analogies to constitute the unknown (Section 2.5).



Week 4 begins.

How our fear of the new limits our learning

Learning is always about coming to know something **new**. This could mean finding out new information, thinking in a new way, or doing something you have never done before.

This is most obvious in school where, for example, we learn new things like how to do quadratic equations, draw contour maps, and analyse poems. However, **living effectively and independently** in the world **also** involves a process of learning **new** things. We learn how to operate a new appliance, to ride a bicycle, to bake a particular kind of cake, to care for a new-born baby, or to settle an argument between members of a household.

This quality of **newness** or **strangeness** may generate feelings of curiosity and excitement, but it may also create a sense of fear about the difficulties and hard work entailed in learning.

As teachers, it is easy to forget that the things we now understand – that are easy – were once strange and unfamiliar to us. As we 'forget' that we know things that we have known for a long time, it becomes very hard to remember that learning them involved taking risks or making mistakes. Bruner suggests that most of what we know feels rather more like a well-known story than a list of distinct facts and procedures:

*'We live in a sea of stories, and like fish who [according to the proverb] will be the last to discover water, we have our own difficulties grasping what it is like to swim in stories. It is not that we lack competence [in doing this]. Far from it. We are, if anything, too expert. Our problem, rather, is achieving **consciousness of what we so easily do automatically** [...]'*

This quote is from J. Bruner, *The Culture of Education* (Cambridge, Harvard University Press, 1996), p. 147.

In other words, it is difficult to place ourselves in our learners' shoes. We can't imagine the problems they may have with something that is completely familiar to us. Because we have mastered the equations or the maps etc., we no longer have to take risks when working with them. So it becomes hard to imagine the feelings of helplessness or fear some learners experience when they are faced with what seem to us to be simple tasks.

But if we don't begin to understand these feelings – which are very powerful and can disrupt learning – we limit our abilities as teachers. Let's begin to understand these fears by reading through three excerpts describing fear in learning situations.



Spend about an hour on this activity. You might want to talk to other teachers about the fears mentioned in these excerpts. Make notes in your workbook. Experience 1 is from a famous novel called *Weep Not, Child*, by Kenyan author, Ngugi wa Thiong'o (published by Heinemann, London in 1964). Experience 2 is from a novel called *I Know Why the Caged Bird Sings*, written by American author, Maya Angelou (published by Virago Press, London in 1984). The 'Uncle Willie' referred to is a teacher. Experience 3 was written by University of the Witwatersrand student, Mandla Maseko.

ACTIVITY 6

1 Read the cartoon below and the extracts on page 35. They tell us about the experiences of people who remember feeling anxious in a learning situation. Try to find out why they felt uncertain, even afraid. Then answer the questions that follow the extracts.

Experience 1: Njoroge

It was in Standard IV that they began to learn English. Lucia, Mwhiki's sister, taught them. They all sat expectantly at their desks with eyes on the board. A knowledge of English was the criterion of a man's learning.

What's your name? Njoroge.

Njoroge, stand up.

He stood up. Learning English was all right but not when he stood up for all eyes to watch and maybe make faces at him.

What are you doing?

You are standing up.

What are YOU doing?

You are standing up.

No! No! ...

Njoroge was very confused. Hands were raised up all around him. He felt very foolish so that in the end he gave up the very attempt to answer.

Experience 2: Maya

'Uncle Willie used to sit like a giant black Z (he had been crippled as a child), and hear us testify to the Lafayette County Training School's abilities. His face pulled down on the left side, as if a pulley had been attached to his lower teeth, and his left hand was only a mite bigger than Bailey's. On the second mistake or on the third hesitation his big overgrown right hand would catch one of us behind the collar, and in the same moment would thrust the culprit toward the dull red heater, which throbbed like a toothache. We were never burned, although once I might have been when I was so terrified I tried to jump onto the stove to remove the possibility of it remaining a threat. Like most children, I thought if I could face the worst danger voluntarily, and triumph, I would forever have power over it. But in my case the effort was in vain. Uncle Willie held tight to my dress and I only got close enough to smell the clean dry scent of hot iron. We learnt the times tables without understanding their grand principle, simply because we had the capacity and no alternative.'

Experience 3: Mandla

'In 1996, I received a letter that changed my life. It was an acceptance letter from Wits University. I could hardly believe it! For the next few days I was so excited I could hardly sleep. I had attended a rural school but had always dreamt of studying at an institution like Wits. My dream had come true!

However, being accepted was just the first hurdle. As I began my studies I sometimes almost wished I hadn't been accepted. For starters, it was the first time in my life I'd shared a learning area with students of other races, most of whom spoke English fluently. The new environment demanded that I speak English too. Yet I struggled to construct a sentence for the first few months! And asking a question in a lecture was nerve-racking and embarrassing because other students – schooled at multiracial or Model C schools – made fun of me as I stuttered and mumbled in English. A second problem was the library's computerized catalogue: it looked so sophisticated that I thought I'd never be able to use it. I became extremely nervous and worried that I would not be able to get a degree and that my family and community would be disappointed.

However, my success in getting in, and my desire to make my family proud, made me determined. Although I was still nervous about asking questions in class, I realized that doing so helped me learn. Similarly, once I plucked up the courage to ask a librarian for help, the computer system in the library proved quite easy and a real help in finding information for essays and assignments.

Perhaps I would have been less anxious in a more comfortable environment where I wasn't pushed to use English constantly and where the library was smaller and less imposing. But my excitement about being at Wits was all about the wonderful learning opportunity that it represented and so the anxiety spurred me on to make sure that I achieved. And so I did, graduating three years later, a fully-fledged member of the university community.'

2 Now answer these questions:

- a What makes the learners feel anxious in each experience?
- b Compare the three stories. What is similar in the learners' experiences? What is different about their individual experiences?
- c Imagine that you were able to change the conditions of learning for these three learners. What would you do for each one?
- d Is it possible to remove all the things that made the learners feel anxious?
- e Is there any sense in which anxiety may benefit the learning process?
- f Can you make a general statement about fear and learning?

The fear of making mistakes

In each of the three experiences, learners report feelings of anxiety:

- in Experience 2 the fear is linked to harsh punishment;
- in the other two situations there is no such threat. In these instances, *the anxiety*

associated with learning is due to a fear of failure or embarrassment.

Of course, in some situations, making a mistake may have life-threatening consequences, for example, failing to stop at a red robot, putting one's fingers in an electric socket, or misjudging the intentions of a stranger. Because of this we tell our children, 'Look left, look right, look left again'; 'Don't touch'; 'Don't talk to strangers'. We try to ensure that they will **avoid** these dangerous mistakes, because we want them to survive!

However, most mistakes are not of this kind. When we fail to understand a concept, draw a graph incorrectly, or forget the steps in a dance sequence, our lives are not at risk. Yet many of us are terrified of making mistakes. We treat the possibility of error in these and other contexts of learning in the same serious way.

It seems that avoiding mistakes is the most important goal in learning. We believe we are always learning to do something 'right'. Teachers often have similar attitudes to mistakes. They may interpret learners' mistakes as a failure in their teaching or as an indication that learners are lazy or have not done the necessary work.

Either way, mistakes often make teachers angry or frustrated. Here is another extract from *Weep Not, Child*, Ngugi wa Thiong'o's novel. It provides us with a good example of how easily teachers can be **angered** by mistakes.

The story is set in colonial Kenya. In the extract, Lucia, the English teacher, has to witness how her class makes mistakes in front of an English-speaking visitor. This provokes very strong feelings in her.

“

Anxiety associated with learning is often due to a fear of failure or embarrassment.

”

The visitor

'One day a European woman came to the school. As she was expected, the school had been cleaned up and put in good order. The children had been told and shown how to behave. ... When she entered, the whole class stood up at attention. Some had already opened their mouths to answer the expected greeting.

"Good afternoon, children."

"Good morning, Sir."

Lucia felt like crying. Had she not taught them the correct thing over and over again? She had been let down.

The visitor was explaining that, since it was after lunch, after twelve o'clock, they should talk of "afternoon", and since she was a woman, they should call her "Madam".

"All right?"

"Yes Sir!"

"Madam!" shouted Lucia almost hysterically. She could have killed someone.

"Yes Madam."

"Good afternoon."

"Good afternoon, Madam." But some still clung to "Sir". It had come to be part of their way of greeting. Even when one pupil greeted another, "Sir" accompanied the answer.

When the European went away, the children regretted the incident. Lucia beat them to cool her rage and shame. In the future they were to know the difference between "a morning" and "an afternoon", and between "a Sir" and "a Madam".

STOP. THINK.

Do you notice how strongly Lucia's fear is driven by her ego? She is terrified of being embarrassed by the learners. She is frightened she will be regarded as a failure. Have you experienced such feelings? Can you suggest better ways of responding to mistakes that learners make? How could these mistakes be used to support learning that will lead to understanding?



Take some time to reflect on the issue being raised here.

Making mistakes: the secret of successful learning?

The philosopher Dennett makes the strong and unusual claim that attempting to avoid mistakes is counterproductive to the learning process. He argues that 'there are times when making mistakes is the secret of success'. What do you think about this assertion? Surely success is measured by the *lack* of mistakes? Let's read and see why Dennett says this.

ACTIVITY 7

- 1 Turn to Reading 11. Read the *first paragraph only* of 'How to make mistakes' by Dennett. Then answer the following questions.
 - a What is Dennett saying that is different from the way you have thought about taking risks in learning new things?
 - b Is Dennett suggesting that every mistake will necessarily be of value for learning?
 - What kinds of mistakes would be counterproductive?
 - What kind of response to mistakes does Dennett propose as useful for learning?



Spend about an hour on this activity.

You will notice that all these questions can be answered, briefly, by reading just the first paragraph of the article. Dennett presents the *core of his argument* in the first paragraph. In the rest of the article he establishes the *reasons and evidence* for his position.

Many academic articles take this form and you can therefore usually use the first paragraph to get a general *sense* of what an article is about. It often helps to stop after reading the first paragraph and to try to establish this general sense for yourself. Orientating your mind in this way, getting in tune with the author, helps you to organize and structure the rest of what you read in relation to this general idea.

- 2 Now read the whole article by Dennett before answering the next set of questions.
 - a Read Dennett's description of how to learn long division and note what he says about the value of guessing. Can you remember an example from your own experience where guessing was a valuable tool for learning?
 - b What, according to Dennett, is the significance of making mistakes in public?

A note about good reading and learning

Our questions focus your reading on important parts of the text. Although Dennett, for instance, discusses the role of 'mistakes' in evolution and artificial intelligence, you have not been asked any direct questions about these sections of the text. This is because a full understanding of these parts of his argument require *other knowledge* that you may not have.

But it is possible to follow Dennett's central argument about guessing and making mistakes without grasping these details. Part of becoming a good reader involves learning which parts of a text to focus on and which can be left for another reading

or another context of learning. Identifying the central argument clearly as we did in the last activity is one reading strategy. You also need to become comfortable with skipping or moving quickly through parts of an article without worrying if all of it makes complete and immediate sense to you.

However, imagine if we told those of you who have no idea what 'artificial intelligence' is that it is:

- '1. *A label for a relatively new interdisciplinary field combining research and theory from cognitive psychology and computer sciences, which is focused on the development of artificial systems that display human-like thinking or "intelligence".*
2. *Any manufactured intelligence, i.e. the goal of the field of study in 1. The work in AI [artificial intelligence] should be, although it often is not, distinguished from work in computer simulation, in which the intelligence is in the programmer of the computer and not the machine itself.'*

This is from A. S. Reber, *The Penguin Dictionary of Psychology* (Harmondsworth, Penguin, 1995).

Once you have understood this definition, reread the sections in Dennett that deal with artificial intelligence. You will probably understand the references in the Dennett article that much better now. As we have said before, one way of expanding your existing network of knowledge about any subject is, of course, to read further on the subject. Then build the new links ...

Why is it important to take risks and make mistakes?

Dennett suggests that the key to learning lies in a willingness to guess and take risks even when these risks lead to mistakes. He goes further to suggest that mistakes may be **more productive** for learning than **correct guesses**.

He accepts that there are times when mistakes are dangerous and should be avoided, but goes on to argue that we are more afraid of mistakes than we need to be. In school learning guessing is nerve-racking and many learners prefer to remain silent and inactive rather than risk a mistake. But because classrooms are places where we learn new things, school tasks often put us in a situation where, as Dennett puts it:

'the only way to come up with the answer is to take some creative leaps in the dark and be informed by the results.'

Mistakes can be productive if we make **educated** guesses. These are guesses that build on what we already know. Once made, we need to look carefully at the results to establish whether they are correct or not. Dennett argues that:

'we don't usually have to risk life and limb in order to learn from our mistakes, but we do have to keep track and actually attend to them.'

If we do not take our mistakes seriously and 'attend to them' – look carefully at what went wrong and why – we limit our opportunities for learning. Think back to Uncle Willie's children (see page 38). They recited the times-tables without risking mistakes because they were afraid of the punishment they would get for 'being wrong'. However, because they avoided mistakes, they avoided opportunities for true understanding. In the end they 'learnt the times-tables without understanding their grand principle'.

Most of us may be willing to contemplate the idea that we can learn from our mistakes as Dennett suggests. By reflecting on the unexpected results or negative consequences of our actions, we may come to a new understanding of what happened and why. However, most of us find it very difficult to attend to our mistakes **in public**. We prefer to see 'learning from our mistakes' as a private, individual experience to be hidden from others to whom we pretend that we know much more than

we do. The following poem by Laing illustrates this attitude rather well.

*There is something I don't know
that I am supposed to know.
I don't know what it is I don't know,
and yet I am supposed to know,
and I feel I look stupid
if I seem both not to know it
and not to know what it is I don't know.
Therefore I pretend I know it.
This is nerve-racking
since I don't know what I must pretend to know.
Therefore I pretend to know everything.*

*I feel you know what I am supposed to know
but you can't tell me what it is
because you don't know that I don't know what it is.*

*You may know what I don't know, but not
that I don't know it,
and I can't tell you.
So you will have to tell me everything.*

This poem is from R. D. Laing, *Knots* (Random House, 1972).

Becoming conscious of our mistakes

The all-too-familiar experience captured in Laing's poem highlights a crucial problem in the process of learning from mistakes: ***we often do not realize we have made a mistake until others tell us so.***

Sometimes our actions may themselves produce negative results that enable us to learn directly and independently from our mistakes. We can then learn lessons and draw conclusions from the consequences of our actions that will allow us to do things differently the next time around. As Dennett says:

'We can actually think the thought, reflecting on what we have just done. And when we reflect, we confront directly the problem that must be solved by any mistake maker: What, exactly is that? What was it about what I just did that got me into all this trouble? The trick is to take advantage of the particular details of the mess you've made, so that your next attempt will be informed by it, and not just be another blind stab in the dark. In which direction should the next attempt be launched, given that this attempt failed?'

Our capacity to ***learn reflexively*** is a remarkable human characteristic. This means that each new guess or creative leap in the dark, is seldom completely random or undirected. We may ***feel*** as if we know nothing about a particular topic (such as soccer, mathematics, or jazz) or about how to perform a particular task (play a piano, drive a car, write a poem, make a table). However, our guesses about these things are never completely uninformed. Rather, they always draw on our previous experiences, and on a lifetime of reflecting on our actions and drawing conclusions. This uniquely human intelligence is what helps people to deal with the uncertain future. We use our past experiences and knowledge to guess about the future and anticipate likely outcomes of our actions. We can assume that this process of anticipating, guessing, and moving ahead of what is already known occurs in all learners regardless of who they are and what they are trying to learn.

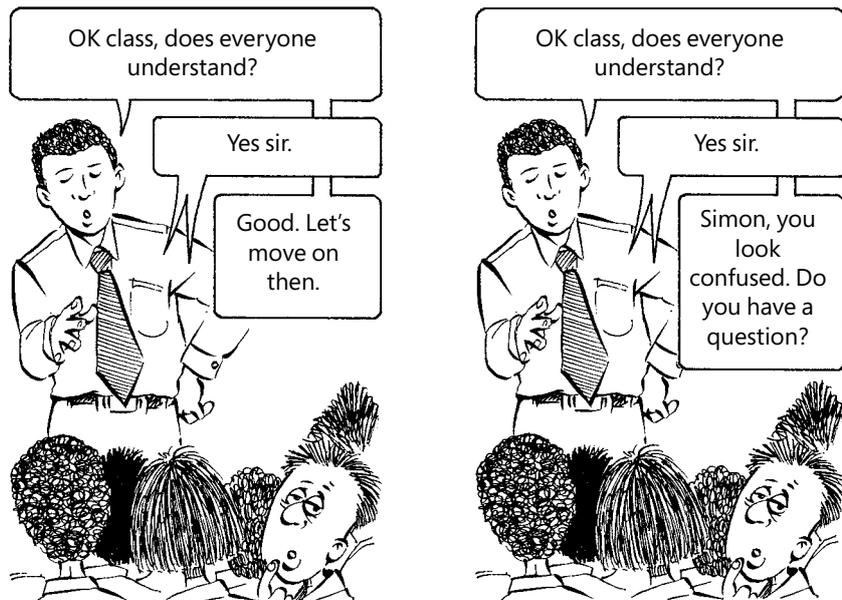
Using others to point out our mistakes

However, sometimes our learning actions may not produce an immediately obvious negative consequence that tells us of our mistake, or may produce a consequence that we cannot interpret or learn from. Often the best feedback about our mistakes

comes in conversation with other people, who help us to see our actions in a new light.

So, while reflection alone may have limited value, reflection *with feedback* offers powerful possibilities for changing and developing our understanding. The response of teachers to mistakes should therefore be to enhance the possibilities for learning from mistakes by providing *feedback* that will change understanding and allow for the integration of new knowledge. Equally, teachers should create situations where they can receive feedback on their teaching by, for instance, asking other teachers to sit in on their classes.

Learner responses are a form of feedback. But, like the teacher on the right in this cartoon, teachers should not simply accept a chorused 'yes' response from learners. Always observe learners and probe for possible difficulties.



“

When we regard mistakes as the cornerstone of learning, we suddenly have to rethink a lot of common-sense ideas about teaching and learning.

”

When we regard mistakes as the cornerstone of learning, we suddenly have to rethink a lot of common-sense ideas about teaching and learning:

- Are teachers like Uncle Willie or Lucia not blocking learning because they punish children who make mistakes?
- Shouldn't children like Njoroge, who make useful mistakes, be rewarded for their active engagement in the process of learning, rather than punished for being wrong?

Simply by rethinking the experiences of these learners we can see how challenging Dennett's ideas about risk-taking and mistakes really are to teachers and to schools.

Yet, when we think of our own experience of learning, his ideas make perfect sense. For example, quite often, when we think back to the beginning of a new course, the things that worried us when we first started learning (and the mistakes that we were afraid of making) seem trivial in hindsight. Looking back, it seems that we were foolish not to see this at the time. As we attend to our mistakes, we learn, and as we learn, we reach a new sense of balance and certainty that allows us to assert, 'I know about that!'

Learning is an experience of taking risks, making mistakes, and changing our understanding as we move from the known to the unknown. This is why we ask you to answer the half-truth activities *before* we deal with these issues, and why we ask you to *relook* at them afterwards.



Spend about 40 minutes on this activity. Do it on your own at first and then share your ideas with other learners.

ACTIVITY 8

- 1 Take out your notes from the half-truth activity on page 24 at the beginning of this section and read them again.
 - a Has our discussion about the importance of taking risks and making

- mistakes changed your ideas about learning?
- b** How would you now describe the path from the known to the unknown?
- 2** Do you remember the learning experience of Njoroge in Activity 6? He is made to feel foolish because he makes a mistake and therefore gives up his attempts to answer the teacher's questions. Look at the transcript again (page 34).
- a** What errors did Njoroge make?
- b** What do they tell you about Njoroge's understanding of pronouns?
- c** Explain why you think Njoroge is making these mistakes.
- d** How would you correct Njoroge's mistakes?

Assimilation and accommodation in learning

The process of learning through guessing (and inevitably making mistakes) can be compared to the experience of walking a tightrope. The tightrope walker takes enormous risks. What makes it possible for him to do so?



- First, the tightrope walker makes *his own progress* across the high wire. He is in control of when and how to take the next step. Learners also need to have some sense of control over when it's a good time to guess or take risks, and how to do so.
- Second, with each step, the tightrope walker *adjusts* his weight and *finds a new sense of balance*. Learners also need to find *equilibrium*. In their case it is a balance between their previous knowledge (the known and familiar) and the new things they are learning (the unknown and unfamiliar).
- Last, but by no means least, the tightrope walker can take risks because of the *safety net* below! He knows that even if he falls the consequences will not be fatal. The same applies to learning. Learners also need safety nets in the classroom. They must be encouraged to take the risks associated with guessing in learning. The safety net is teacher reassurance that mistakes will not have serious negative and irreversible consequences.

There is another reason why the safety net is important for learning. Even when guessing takes place in the best possible way, giving the learner control and providing support, there is no guarantee of immediate, complete, faultless understanding. New understandings may include new errors and new possibilities for mistakes. So learning is a continuous process of seeking a state of mental balance, integrating new knowledge with what we already know, and adjusting our previous understandings in the light of new knowledge.

The comparison between the tightrope walker and learning is a useful way of introducing the ideas of Piaget.

What can we learn from Piaget?

Jean Piaget (1896–1980) developed a theory of knowledge and of the cognitive processes whereby people come to know the world. It is one of the most important psychological theories of the twentieth century.

The importance of action

From Piaget's perspective, all knowledge is constructed through our **action** in the world. He argued that we can only know about things if we **act on them**. Very small babies, for instance, get to know the world around them by touching and tasting things (although exasperated mothers try and curb this guessing and acting behaviour). As children get older, they literally get to know their world by **moving about in it**: learning to crawl, then walk, and bumping into things. Through these actions babies learn what's hard and what's soft, what's heavy, what's painful, and what's not.

Piaget argues that **action** continues to be very important for all thinking throughout our lives, although its nature changes. Older children and adults also use physical actions – similar to those of the small child – to learn about the world. But the action increasingly happens in the **mental** realm; the act of thinking. This is how Piaget explained this point:

'Logical relationships are, first and above all, operational structures. Although their most advanced forms are certainly expressed by language, their origins are found in the co-ordination of (a person's) own actions. Even at the sensory-motor, pre-verbal level, a child is involved in activities that include uniting, ordering, introducing correspondences etc. These activities are the source of operations and logico-mathematical structures.'

Equilibrium: accommodation plus assimilation

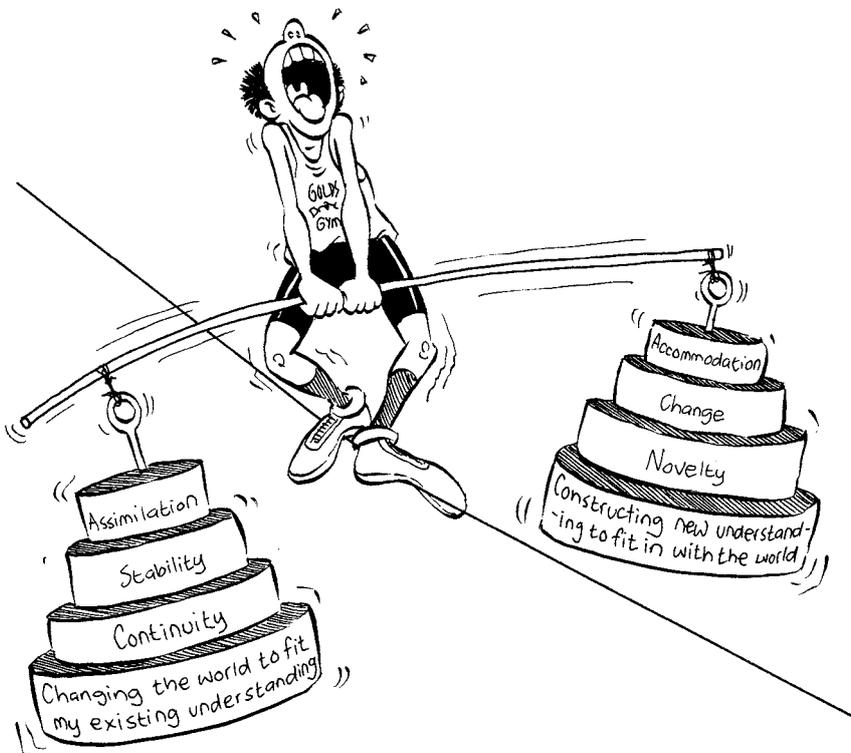
Piaget first suggested that the development of knowledge occurs through the process by which we seek a state of **equilibrium**, or balance, between our previous knowledge and new things we encounter in the world. Like a tightrope walker adjusts his or her physical balance, we all **mentally adjust and readjust our thinking** in response to new objects and events. Piaget identified two mental processes that enable us to perform this balancing act: **assimilation** and **accommodation**. He argued:



*'Knowledge is not determined strictly by the knower, or by the objects known, but by the exchanges or interactions between the knower **and** the objects (between organism and the environment). The fundamental relation is not one of simple association but of **assimilation and accommodation**. The knower assimilates objects to the structures of his actions (or of his operations), and at the same time he accommodates these structures (by differentiating them) to the unforeseen aspects of the reality which he encounters.'*

The process of coming to know things is not, in Piaget's words, 'having a static mental copy of the object'. We become knowledgeable by 'effecting transformations' on what we are trying to understand and, by so doing, 'reaching some understanding of the mechanisms of these transformations'.

Piaget is an important educational theorist. Many of the ideas in this module have been inspired by him. Let's spend a little more time understanding his ideas and what their importance is to teaching.



ACTIVITY 9

- 1 Turn to Reading 3 and study Piaget's article entitled 'Development and learning'. Pay special attention to his notion of *equilibration* to extend what you have learnt thus far.
- 2 Answer the following questions when you have finished:
 - a According to Piaget, how does knowledge come from equilibration?
 - b Define in your own words the terms 'assimilation' and 'accommodation'. Illustrate your definitions with examples from your teaching.
 - c Look at the labelled drawing of the tightrope walker above. Think about the way in which assimilation and accommodation are represented. Then answer these questions:
 - Why is assimilation linked to stability and continuity?
 - Why is accommodation linked to novelty and change?

This quotation and the one on page 45 are taken from J. Piaget, 'A theory of development' in *International Encyclopaedia of the Social Sciences* (New York, McMillan, 1968), pp. 140–141.



You should spend at least an hour on this activity. Read Piaget carefully. Use the good reading ideas we have suggested. And read the article more than once. Try and link these ideas back to what we have already learnt, and to your work as a teacher.

What have we learnt about guessing and learning?

Consider this story of a young child learning about snakes and lizards.



Take some time to reflect on the issue being raised here.

STOP. THINK.

Can you guess how Dennett and Piaget would explain this child's learning? Spend a moment thinking. Then make some guesses!

We think Dennett would say something like this:

- When the child sees the snake (picture 2), she makes a guess based on her previous experience of seeing and knowing a lizard (picture 1).
- In doing this, she makes a mistake (picture 2).
- The mistake presents her with an opportunity for learning (picture 3) and so she corrects herself with the help of outside feedback (picture 4).
- In the end she has learnt something new.

We think Piaget would explain the same process in the following way:

- As the child sees the snake she focuses on what is familiar, and 'assimilates' her perception of the snake into her 'schema' of a lizard (pictures 1 and 2).
- But then she notices the differences between what she knows about lizards and the actual snake in the picture. By noticing the differences, she begins to feel unsure and experiences a state of 'disequilibrium' (picture 3).
- With the help of feedback from the environment – maybe a teacher, but based initially on her action of looking at the snake and noticing the absence of legs –

she develops a new understanding (a new 'schema') of what a snake is (picture 4).

- This enables her to 'accommodate' the differences.

Without assimilating (using her previous knowledge to make sense of what she sees), the child would be unable to understand the world. However, without accommodating the new and different information that she encounters, her knowledge would remain static and unchanging. Both aspects of her thinking enable her to achieve new and more complex states of mental equilibrium.

STOP. THINK.

Read through these explanations again. Do you notice any similarities between these and the process of learning that Socrates took his learner through (Section One)? Do you remember the disequilibrium felt by the boy in that process?

Piaget's theory offers a formal explanation of the ideas that we have already explored in the first part of this section (in the examples of learning about soccer and the city of Durban). He offers us a way to answer our central question, '*How does the unknown become known?*'

We do so through a process of equilibration. This involves:

- connecting new information to what we already know (assimilation);
- noticing, through our action (which includes thinking about what we are doing or looking at), that our understanding doesn't quite explain things (disequilibrium/conflict);
- filling in missing gaps in our knowledge by identifying other facts that will help us interpret new information;
- recognizing novel and contradictory aspects of new knowledge that our previous understandings cannot account for, and accommodating these into our new and more advanced understanding.

ACTIVITY 10

- 1 Listen to Part 2 of the audiotape. You will first hear Ronny Miller (whom you met in Part 1), then some music, and then the author of this section, Jill Bradbury. Miller and Bradbury discuss many of the ideas raised in this section so far. In particular, listen to how they explain the idea of *action* and *experience* in learning.
- 2 Answer these questions when you have finished listening:
 - a How is their understanding of action and experience (which they call 'spontaneous discovery learning') different from what is commonly practised in schools?
 - b What kinds of skills do teachers need to construct the kind of active learning environment they suggest?
- 3 Before you continue we'd like you to do a quick recap of what you have learnt so far. Page back to the introduction to this section. Read through the half-truths again. Have you changed any of your opinions yet?
- 4 Choose one idea about learning that you have learnt (and which is new to you). Think of how you'd use this to improve your teaching. Explain your idea to another teacher and ask for feedback.



Take some time to reflect on the issue being raised here.



Spend about an hour on this activity. The audiotape runs for about 9 minutes. Listen carefully and take notes as you listen. The activity is designed to help you consolidate and apply many of the ideas you have learnt so far. If you are feeling uncertain about these ideas, relisten to the Introduction and Part 1 of your tape, and reread Sections One and Two before continuing.

Learning by questioning

2.4

What function do questions play in learning?

Questioning is a critical part of both teaching and learning, second only to explanation in its use by teachers in classroom teaching. Unfortunately, however, questioning is too often used in a very limited way. Questions are usually:

- asked by teachers and answered by learners;
- used to test knowledge recall.

So, while questioning is a valuable and very important *teaching* tool, it is under-used.

Rather than simply assessing the *product* of learning, questions can and should be used to drive the *process* of learning.



Questioning can be used to *predispose* learners to learn. By asking intriguing questions we can make learners more receptive to teaching.

Teachers can deepen and widen learners' criticality and thinking by using a wide *variety* of question types.

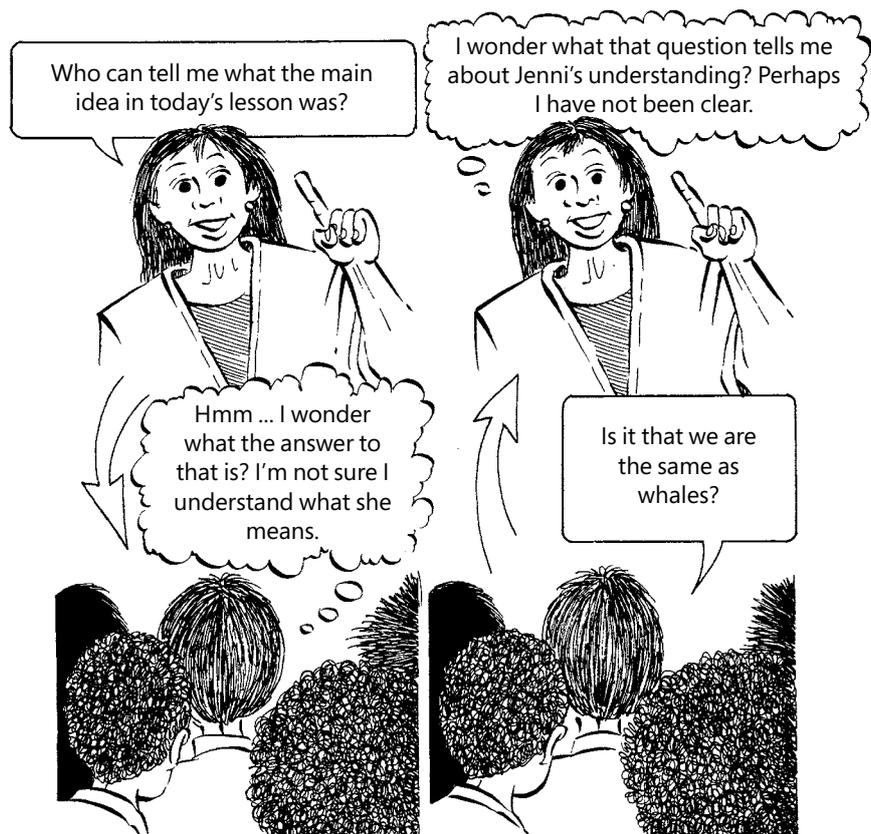
Listening to *learner questions* can provide teachers with important tools to guide their teaching.

“
Although questioning is a valuable and very important teaching tool, it is under-used.
”

The roles of teacher-as-questioner and learner-as-answerer are sometimes reversed. Teachers are often expected to possess an encyclopaedic knowledge because learners frequently see the teacher as a person who will have answers to every question. In turn, many teachers believe that their role is to provide the information that learners seek.

Playing this role has two key weaknesses:

- First, while teachers should know more than their students, it is impossible for teachers to know the answer to every question. This isn't because they are inadequately trained or haven't studied enough (although sometimes this is the reason). It is simply due to the fact that *networks* of knowledge present us with a variety of possible linkages (and thus answers) to questions. As we suggested earlier, the more we know the more we know we don't know!
- Second, not all kinds of questions *can* be answered by simply providing a specific piece of information. Sometimes the relationships between facts are very complex. It is therefore impossible for teachers to answer some questions by simply stating facts. By trying to do so teachers curtail learner motivation to enquire further. Do you remember Socrates' student? He became complacent because he thought he knew. Providing answers rather than provoking questions can close down learning!



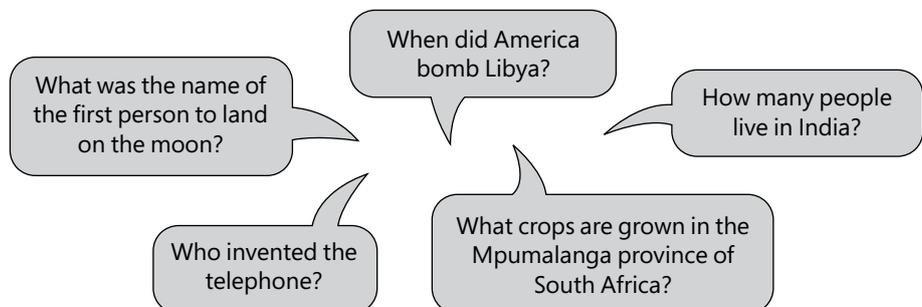
The feedback loop in questioning.

Different kinds of questions

Not all questions are equally valuable for learning and not all questions demand the same kind of answers. Learning to ask the right sort of question is an important teaching skill! Let's begin by investigating different kinds of questions and the ways in which they lead us to explore new knowledge

Factual questions

We often think of a question as representing a gap or hole in a learner's knowledge that must be filled or plugged by the teacher. Some questions are indeed like this. Let's take the following examples of **factual questions** as the starting point for our investigation of how learning happens through questioning:



These questions have correct, factual answers about which there can be little debate. Even if you don't know the answer to a factual question, there is no need to worry. These are the sort of questions to which we can find answers by looking in an encyclopaedia or other reference source. Factual questions will direct learners in the process of gathering information but the answers provide little more than a **starting**

point for developing understanding or new ways of thinking about aspects of the world.

There are questions that are not so straightforward. These questions challenge learners to *construct new knowledge*. What happens when we change factual questions to focus on the *same information* in *different ways*?

Relational questions

Unlike factual questions that focus on isolated facts, *relational questions* make us think about the relationship between facts and in this way, encourage learners to extend the way they think. Relational questions are more open-ended than factual questions and can be answered in several different ways. Strohm Kitchener calls these kinds of questions 'ill-structured problems' for which there is no 'single, unequivocal solution which can be effectively determined at the present moment by employing a particular decision making procedure'.

Compare the examples of factual and relational question forms in the following table:

Factual question form (and answers)	Relational question form
What was the name of the first person to land on the moon? (Neil Armstrong)	Why was the first person to travel to the moon an American man rather than an African woman?
What crops are grown in the Mpumalanga province of South Africa? (Citrus fruit, bananas, timber, maize, sunflowers, cotton, potatoes, avocado pears, macadamia and pecan nuts)	How do these crops generate income for the province and what contribution do they make to the economy of South Africa as a whole?
When did America bomb Libya? (1986)	How did this bombing campaign affect international relations in subsequent years?
Who invented the telephone? (Alexander Bell)	How are telephones used in different parts of the world?
How many people live in India? (2 billion)	What access do people have to resources such as health and education in India?

We have not provided answers to the more complex relational questions above as there are several possible correct answers and many different ways to approach these questions. Do you notice, however, that without some factual information, it is impossible to answer these more complex questions or indeed, even to ask them? For example, if you did not know that the first person to land on the moon was an American man named Neil Armstrong, then it would not be possible to construct the relational question, 'Why was the first person to travel to the moon an American man rather than an African woman?'

Explanatory questions

Questions that probe the *meaning of particular aspects* of a situation and search for *explanations of why* they occur in a particular way, or what causes them to happen, are called *explanatory questions*. They focus on physical causes and/or human reasons for things and they can be raised in relation to each of our examples. You might have noticed that an explanatory question is a specific kind of relational question: it *explains and gives reasons*.

These ideas are from K. Strohm Kitchener, 'Cognition, metacognition and epistemic cognition' in *Human Development*, 26 (1983).

Compare the examples of factual and explanatory question forms in the following table:

Factual question form	Explanatory question form
What was the name of the first person to land on the moon?	What is gravity and how is it possible to overcome it and travel out of the orbit of the earth? (physical causes) Why did people travel to the moon? (human reason)
What crops are grown in the Mpumalanga province of South Africa?	What climatic conditions and other social or economic factors facilitate the growth of these crops for profit? (physical causes)
When did America bomb Libya?	Why did America bomb Libya and what were the consequences of this action? (human reason)
Who invented the telephone?	How is it possible to transmit sound through telephone wires? (physical causes)
How many people live in India?	Why are some areas more densely populated than others and what are the consequences of this population distribution? (physical causes and human reason)

Once again, note how explanatory questions require us to think about certain facts *in relation* to other facts. While relational questions explore a whole range of relationships within the web of knowledge, explanatory questions focus on a *particular kind of relationship*, enquiring into the possible physical causes or human reasons for why things happen the way they do.

Evaluative questions

Particularly with regard to the human reasons for things, we can extend our enquiry further by asking *evaluative questions* about whether things are good or right or fair, or whether we find them appealing, interesting, beautiful, inspiring, or saddening. Evaluative questions are likely to evoke the most debate in class because most of them don't have a right answer that can be proven. Instead, our answers will often be based on our beliefs and assessed not on whether they are true, but rather on how well they are argued and substantiated.

Compare the examples of factual and evaluative question forms in the following table:

Factual question form	Evaluative question form
What was the name of the first person to land on the moon?	Is the expenditure of state money on space travel justified?
What crops are grown in the Mpumalanga province of South Africa?	Is this the best use of the natural and human resources of the province?
When did America bomb Libya?	Did America have a right to bomb Libya?
Who invented the telephone?	What's the best looking, smallest cell-phone on the market?
How many people live in India?	Do people have equal access to health and education in India?

Using a range of questions in teaching

The kinds of questions that focus on the *relations* between facts, generate a search for *explanations*, or *evaluate* the state of affairs, require more complex processes of answering than simply 'filling the gap' as demanded by *factual* questions. They are questions that:

- can *extend* and *change our thinking*;
- help us to focus on *unfamiliar* aspects of what we already know;
- encourage us to *actively construct new links* between existing facts.

This makes them excellent teaching tools. Rather than limiting questions to those that have a right answer, and thus encouraging an atmosphere where learners don't risk making mistakes, and limiting opportunities for thinking and debate, these kinds of questions generate new thought and controversy. They 'predispose' learners toward thinking, risk-taking, and thus learning.

But let's get active again. We'd like you to practise designing these kinds of questions.

ACTIVITY 11

- 1 Take another look at the different kinds of questions (factual, relational, explanatory, and evaluative) we have used as examples in this subsection. Using the *same question topics* we'd like you to add one or two of your own examples for each kind of question. You could, for instance, add a *factual* question like 'How old was Neil Armstrong when he walked on the moon?' to the question about the first person on the moon. Or a *relational* question like 'In what way did the first man on the moon make history?'
- 2 Next, we'd like you to think up examples of each kind of question but using new 'topics'. For example, 'When was Nelson Mandela inaugurated as South Africa's president?' (a factual question in History or Human and Social Studies), or 'Should South Africa use nuclear energy as it's main source of electrical power?' (an *evaluative* question).
- 3 Finally, design a short, fifteen-minute lesson teaching a concept or idea in an area with which you are familiar using *only questions*. We'd like you to use a range of questions so that you evoke different kinds of learning. (Read the subsection on questioning again to see why we use questions.) You will also need to imagine how learners will respond to each question you ask and build on this. Maybe use a table similar to the one below:



Spend about an hour on this activity. You may want to 'practise' using these questions with a group of fellow teachers.

Topic and stage	Teacher's question	Likely learner answer
Introduction (evoke interest).	(Give learners a newspaper article with sensationalist report on matric pass rate.)	
	What % of matriculants at X passed in 2000? (<i>factual question</i>)	Simple question ... some might have difficulty working out percentages but should get right answer (40%).
	Do you think 40% is a good pass rate? (<i>evaluative question</i>)	Most will say no, some might say yes ... mixed response.
	Yes, it is difficult to answer that. Maybe we should explore <i>why</i> the school has this kind of pass rate.	Mixed response ... too few resources ... qualification of teachers ... attitude of learners etc.

Topic and stage	Teacher's question	Likely learner answer
	Can you think of, or work out, possible reasons for the 40% pass rate? (<i>explanatory question</i>)	
	↓	
	OK ... you say resources and qualifications are the problem. But here is another school two kilometres from X. It has a pass rate of 95%. Why the difference? (<i>explanatory question</i>) etc.	etc.

Learning to ask the right kinds of questions to solve different kinds of problems is an important part of learning. By *modelling* a thoughtful and questioning attitude in class – teaching through questioning is one way of doing this – we provide learners with the opportunity to learn by '*breathing a questioning air*'. We give them an experience of how they can use questions to find out more about the world.

As teachers, we need to become aware of the kinds of relationships that different questions explore. Remember, all questions rest on some kind of original fact (rendered through a question, perhaps, but maybe based on a newspaper article). By using an array of *explanatory* and *evaluative* questions, however, one pushes learners into seeing the original fact – their original *known* – in new and unknown ways. By questioning skilfully we help learners develop networks of knowledge because we teach them how to make relationships, or see relationships, between discrete facts.

“

Learner questions provide opportunities for teachers to investigate how individual students think and what their learning needs are.

”

Listening to learners' questions

As important as choosing the right question to ask, is the ability to *listen to and interpret* the answers that students provide and the questions they ask.

Dillon (who said that questions 'predispose' us toward learning) argues that a question not only asks for information, it also *gives* us information about the questioner:

'When a student asks a question, he exhibits his present and future complex of knowledge, his dispositions of character, and the dynamics of his relations to the world, insofar as these pertain to the matter in question.'

Questions (and, often, answers) offer a strong indication of a student's readiness to learn and reveal things to us about our learners, such as:

- who they are (their values and attitudes etc.);
- what they already know and understand (or perhaps misunderstand);
- their orientation towards new learning (how they learn, how keen they are to learn etc.).

As teachers we need to resist using learner questions merely as opportunities to display what we know by providing answers. We should rather learn to use the questions of our learners as opportunities to investigate how individual students think and what their learning needs are. How do we do this? Your next activity, in which you read Dillon, may give you some ideas.

ACTIVITY 12

- 1 Turn to Reading 12, 'Student questions and individual learning' by Dillon. Start by scanning the whole article and reading the headings of each section. This will give you an idea of what the article is about.
- 2 Focus on Dillon's ideas about how questions reveal learners' 'pre-understanding'. Then answer the following questions:
 - a What do the following questions tell us about what the questioner *already knows*:
 - Do you think that dagga should be legalized?
 - Would you help me with this problem, I am very confused?
 - Why are you being so difficult?
 - Don't you think this picture of a river is beautiful?
 - b Look at each of the questions above again. What do they tell us about the questioner's *'dispositions'* (the kind of person she is, her attitudes towards the issue about which she is asking and towards the person whom she is asking)?
- 3 Now reread the first three paragraphs of the section in which Dillon deals with 'the question sentence'. He argues here that a question may reveal a misunderstanding that needs correcting before any kind of answering can make sense. We can refer to the understanding implicit in a question as a kind of 'preunderstanding'. It is the understanding that exists prior to the question and on the basis of which the question is formed.
 - a Reread the question about the man who beats his wife and explain why this question cannot and should not be answered.
- 4 Finally, read the section called 'The questioning act'. As you read, make a note of the positive and negative feelings that the act of questioning provokes.
 - a Using your notes, how would you explain the observation that many learners do not like to ask questions in class? How would you encourage questioning in the classroom?



This is a reading activity and should take you no less than an hour to complete. Use the good reading tips we have already taught you. If you'd like to discuss the ideas in this reading, do so only after you have answered the questions and thought carefully about the ideas.

What can we learn from Dillon?

Questions seem to *demand answers* and we often think that the *quicker and more certain* the answer, the better it is.

However, Dillon says that 'to begin by answering the question may be a pedagogical blunder'. He suggests that, instead, we should treat a question like a *doorway* that opens into a new room. Rather than simply closing the door as soon as it is opened (by answering a question the moment it is asked), we should pay attention to the question itself. This will allow us to enter into the space that it creates for dialogue and discussion.

For example, when learners ask questions that cannot be answered easily, we can use them to trigger discussions that will focus the whole group's learning in new ways. Our teaching response to the questions of our students may very often take the form of yet more questions rather than answers.

You will have noticed that some questions reveal more about what a person knows than others. Some questions tell us very little about the disposition (personality or attitudes) of the questioner, whereas other questions reveal a lot. However, all questions reveal *something* about the questioner – about what they know and about who they are. For these reasons we should pay attention to the question rather than just rushing to answer it. We need to pay attention to the partly-disguised clues or hints in questions by 'reading' and interpreting their meanings more carefully. By doing this we will be able to respond to learners in more effective ways.

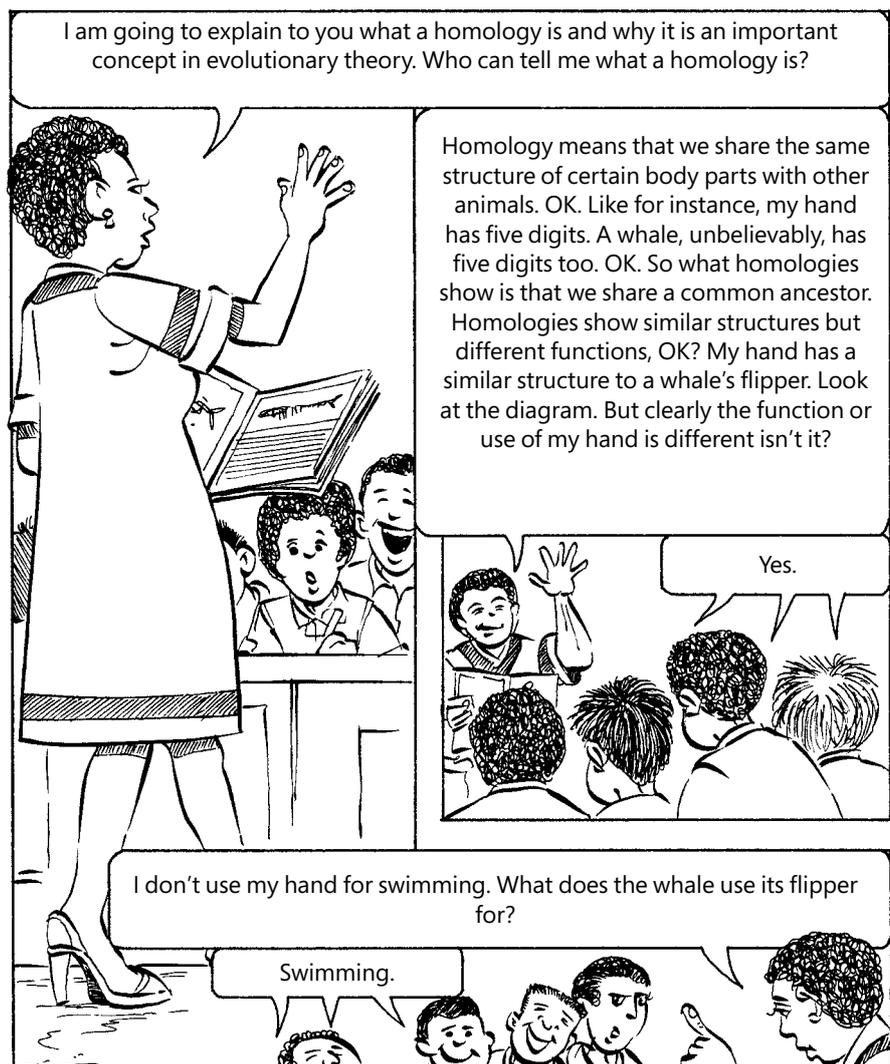
Remember though that questions alone do not necessarily lead to learning. Also, if we ask the wrong kinds of questions, we may block rather than facilitate learning. The following activity will illustrate this point.

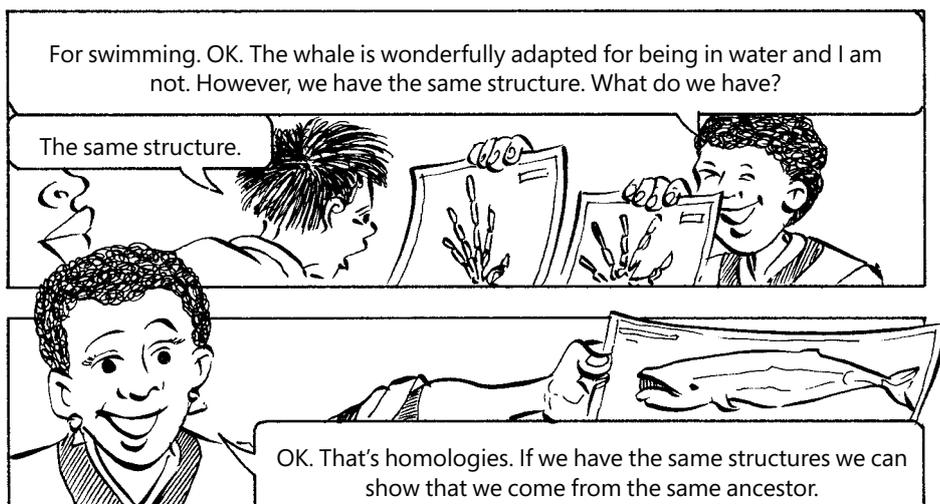


Spend about 30 minutes on this activity. When you have finished, relisten to Part 2 of your tape. Do Miller and Bradbury's ideas about questioning provide you with any new ways of thinking about this activity?

ACTIVITY 13

- 1 Read the exchange below between a teacher and a group of learners. The teacher is using a question- and-answer method to introduce the learners to a new idea (in this case the notion of 'homology').
- 2 As you follow the lesson, pay particular attention to the questions the teacher asks. Consider:
 - a Which questions block learning and which encourage learning? Explain your answer.
 - b How would you judge the quality of the questions asked? Your comment on the *quality* of the questions should make use of the ideas we have discussed so far. For example:
 - What kinds of questions are being asked?
 - Are they factual, relational, explanatory, or evaluative?
 - What knowledge do these questions presuppose?
 - What do the questions tell you about the disposition of the teacher?
- 3 Compare the kinds of questions in this activity with those you devised for your lesson in Activity 11. On reflection, do you think that some of your questions may block learning? Why?





What can we learn from this activity?

This teacher uses a lot of questions in a fairly short space of time. One might think about this, 'Good, she knows that questions are part of good teaching!'

The problem is that her questions don't lead students into the unknown. They also don't provoke learning. Notice that she gets two kinds of responses to her questions:

- Her first question is met with **complete silence**. Why? Because the students can't possibly answer it! If they could answer it and knew what 'homologies' were, the lesson would be unnecessary. They know that this is not a 'real' question and so don't respond. It serves right at the outset to establish the students' ignorance and the teacher's knowledge.
- Her other questions are answered enthusiastically. Why the difference in response? And does this signal a better use of questions? Learners answer these questions because they are safe questions. They are safe for the teacher because she knows learners can answer them and so she feels affirmed. They are safe for the learners because they know exactly what the teacher wants to hear. The problem is that these questions are not really questions that promote learning; they only serve to prompt the students to **repeat** the teacher's story. It isn't possible for us to tell from their answers whether the learners have understood the concept of homologies or why it is important for evolutionary theory.

If the teacher asked her first question again at the end of the lesson, do you think the students would now be able to answer it?

We don't think so!

STOP. THINK.

We have come to the end of this subsection. Before you rush off, or move on to the next subsection, stop and think.

- Try and organize what you have learnt so far. Make links, and think of practical applications.
- Check whether you have understood the ideas well enough to use them in your teaching and learning. See if you can talk about them by talking to other teacher-learners.
- Can you link the ideas together into a network of knowledge about learning?
- Refer back to the half-truths (page 24). Have you changed, or added to, any of your earlier ideas?



Take some time to reflect on the issue being raised here.

This is what we think we have covered so far

We began our discussion on asking and answering questions by wondering how questions can help learners to bridge the gap between the known and the unknown. We then showed how different kinds of questions bridge this gap in different ways.

Although our common sense tells us that good answers are more important for learning than good questions, Dillon's article challenges us to turn this thinking on its head. The reading showed that questions can be more important than answers because they:

- allow us to construct new relationships between facts;
- reveal a lot of useful information about the learner.

What happens *before* the answer (be it a question, a guess, or a mistake) is what really counts when we chart the path from the known to the unknown.

Learning by imagining

2.5

The power of our imagination

A remarkable feature of human thinking is our capacity to *imagine* things. We can create pictures in our minds about things we have never seen or events that we have never personally experienced. We can compose stories that take place in other worlds, or in our world but which have characters that don't exist (who are invented by the author). The ability to imagine is one of the characteristics that distinguish human beings from other living creatures.

Yet although imagination is often spoken of as an important part of teaching and learning, it is seldom used to its full potential. How can we use it to assist learners to move from the familiar known, to the unknown?

The unknown can be imagined or created in the *mind's eye* if we, as teachers, create the opportunity for learners to do this. Imagining is, if you think about it, a kind of *guessing*. We guess, or imagine, what might happen if we do something (or don't do it). We guess about things that we don't yet know and in so doing we create possibilities for exploration and testing.

However, the imagined world is seldom (if ever) created out of nothing. We draw on what we already know to imagine what is possible. We create a path between the known and the unknown. The closer the imagined possibility is to what we have previously experienced and already know, the *easier* it is to learn. The further away from our own experience we travel, the more room there is for 'error' in our imagined reality and the greater the possibility for surprise.

The power of imagination lies primarily in that it allows us to *loosen our mental grip* on familiar things. By doing this we are able to think of new worlds that would not be possible if we held tightly to the familiar. By opening up these new worlds, we can also begin to change our understandings.

Rather than tell you how to use imagination as a teaching tool, we'd like you to try the following activity. Through action you will experience *both*:

- the *power* of imagination and surprise;
- how our 'familiar' *shapes* and *constrains* our ability to imagine.

ACTIVITY 14

- 1 *Imagine* the people, objects, or events described below. In each case jot down a few words that describe what you imagine or, if you prefer, make a simple sketch.
 - a A woman who testified about the murder of her father at the Truth and Reconciliation Commission.
 - b A vast crowd of people.
 - c A man jumping off a high bridge.
 - d A child swimming in a large pool.
 - e A powerful, democratic leader.
 - f Landing on the moon.
- 2 Now look at the photographs in Appendix C on page 223. Compare the images with those that you imagined. Were there things about these images that surprised you?



Week 6 begins.



Do this activity quickly. Spend no more than 15 minutes on it.

These extracts are taken from an article by J. Turner published in the Mail & Guardian on 2 September 1997.

How does our imagination work?

Did you imagine the woman who testified at the TRC as a black woman or a white woman? Given that most victims of apartheid were black, most readers probably imagined a black woman, possibly an older woman in a great deal of distress. (We would also have 'learnt' this from seeing clips from TRC hearings on television.)

Given that the photograph is of a young, white woman can you imagine who she is and what story she told? Maybe you said she had been bombed by ANC guerrillas? Maybe you thought she was asking for compensation from the ANC? Read this excerpt from a newspaper. It tells you who the woman is.

Will somebody please just tell me who killed my father?

Activist Rick Turner was gunned down at his door in 1978, one of the early victims of apartheid hit squads. For years his daughter, Jann Turner, has been trying to find the killer. This is the moving story of her search ...

'I began searching for my father's killer in 1989. I was living in New York City at the time. I read in the paper that an investigative journalist called Jacques Pauw had blown the lid on a place called Vlakplaas, South Africa's death squad HQ. Horror unfolded in the forms of Almond Nofomela and Dirk Coetzee and for the first time I pictured my father's murderer as a person, rather than a state or a system. [...]

No one has applied for amnesty for the murder of Dr Rick Turner. Over the years there have been a series of leads, flutterings of hope when it seemed we might discover who killed him and why, but we've always ended up with the fantasies of cranks or hitting the wall of silence surrounding Boss (the Bureau of State Security) and the security police. This week I slammed into the very last cul de sac. I am tired of it, tired of returning to the horror of the night my dad was killed, tired of pushing and pushing to get to the ever elusive truth about who killed him and why, tired of doing this alone. There is a chance – because the cut off-date for receipt of applications is an ever-receding one – that someone will confess. But it's unlikely. [...]

The Truth and Reconciliation Commission offered the first and last hope that my father's assassination would be officially investigated. It was a real chance to break through the wall of silence surrounding Boss and the security police.

This week sources within the commission told me that their investigations have revealed a high-level cover up. But that is all. It seems they've been thorough in checking out the police, but have they requested Boss and security police files? Have they subpoenaed everyone I listed in my submission, everyone with something to tell us about my father's murder? If not, why not?

Alex Borraine, acting chair of the commission, re-emphasized to me this week that "the time we would like to devote to individual incidents just isn't available, there are so many others to do". It's awful, but I do understand. Truth commissioner Richard Lyster also pointed out to me that "in Natal there are 12 investigators and 4 600 cases". Perhaps the commission's investigation unit was doomed from the start. Perhaps it would have been more apt to have named it the Verification and Research Unit.

And yet – through the search for my father's killer, culminating in the truth commission, I have found healing. Whatever I was looking for, I have found part of it.

The emotional closure began in

1993. I had been filming in the house at Dalton Avenue. It was late at night, the crew wrapped and piled outside into the car. They left me alone to close the place up. It's very hard to articulate what happened next, because what I felt was so intense that I seemed to see it and hear it as well. As I walked around the house locking up, I felt the house leaving me. Each room; his bedroom, the bathroom, the kitchen – the rooms and I said our farewells to one another.

Finally I stood on the place where my father died. I felt him leave the place on the floor, I saw him rise up from there and leave that dying-place. I had this vision – I don't know what else to describe it as. It was a vision of me and him in a place like a wind tunnel, but the wind was pulling us in different directions. We were literally flying, but we were holding onto each other by our fingertips and the effort of holding on was enormous, the strain was unbearable. Then suddenly Dad and I let go of each other. We just flew away from each other, ripped apart by the opposing forces in the tunnel. The relief was intense. I felt peace flooding through me. It rose up from the floor, through my feet and into my body. When I walked out of that house, down the steps to the van, it was in the present that I did so, it was now. My father didn't live there any more. I had broken past the barrier of that terrible night of his murder, past him dying and beyond to him alive. I had

to walk through a wall of grief to get there, but since then I have felt him alive in me, present to me in a way he was not before. [...]

The emotional closure was completed in October last year. My sister and mother and stepmother flew out from Britain to testify with me before the Human Rights Violations Committee of the truth commission. Before testifying we spent a week travelling around South Africa, visiting my grandmother and gathering with friends of my father's to remember and to celebrate him. At Natal University we opened the Rick Turner Memorial Building and met students and teachers in whom my father and his work are very much alive.

The wakes and memorials culminated at the hearing in Durban. Going over all that old ground was harder and more painful than I expected, but after testifying I felt lighter. I felt somehow unburdened. To be heard out by officials of Nelson Mandela's government, to have our loss so publicly acknowledged – it was terribly important. [...]

It is very, very hard for me to accept that I may never know who killed him and why. It is very hard to accept that the truth will remain obscured. Somebody shot down this man who spoke gently of reason and freedom, who swore violently at the failures of his DIY projects, loved bad English cooking and Elvis and

Hegel. A man who was thinking about going for a walk on the beach tomorrow with his daughters, if only the rain would let up. What do you think went through his mind in those 20 long minutes after the bullet ripped through him? Those 20 minutes before he died? How much fear? How much regret? How much love? How much forgetting? How much forgiveness?

The truth is I'm depressed by this process. I wish that anger would spur me to action, but I know further action is pointless. I just feel dull and low. The truth is I feel I have failed him. There are people out there who do know the truth. Will someone please just tell me?'

Were you surprised? Maybe. Maybe not. The fact that many of us imagined that this photograph would have been about a black woman tells us a lot about our ability to imagine but also about how our imagination is constrained by our 'known'. Our imagination is strongly coloured by our experience, our reality.

The second image is quite surprising, perhaps even shocking. While it *is* an image of a large crowd, our guess is that none of you imagined the crowd to be a sea of bridal couples! It is far more likely that you would have imagined a rally of some kind, or a church congregation.

Did you imagine the man jumping off a bridge to be suicidal, thus evoking feelings of sadness? Were you surprised by the contrast: the delight of a young bungee-jumper as he leaps daringly from a bridge?

Even the ordinary experiences that are part of everyday life, such as swimming in a pool, may be imagined in a range of different ways. These imaginings are strongly shaped by your experiences and previous knowledge of these things: different people will call to mind different sorts of swimming pool, or will have a different experience of swimming 'triggered'.

The other photographs were probably not very surprising to you at all. Even if your own personal images differed from these, they are so famous that they would have been instantly recognizable to you. Some people and events are popularized by contemporary culture, recognized by millions, and represent memories of the past and hopes for the future that transcend cultural and other boundaries.

Our imaginations are amazingly powerful, creating people, places, and events seemingly out of thin air! You remained seated and reading and even though you didn't change your activity, your imagination created new worlds.

This is where the power of imagination for learning can be found. Learners can be enticed down the path from the known to the unknown by the use of images that draw on what they already know, but which simultaneously introduce new and often surprising possibilities. By drawing on learner imaginations of the TRC (and having a good idea of the likely imaginings they will come up with) and then presenting them with a very different imagination (an actual photograph), one creates a disequilibrium in the learners' heads. This state, you may remember, jolts learners out of their complacency and forces them to look for explanations. Why did I assume these things? What does it tell me about my thinking? etc.

“
*Our imaginations are
strongly influenced by
our experiences.*
”

Using metaphors to evoke imagination

Metaphors and analogies can also be used to evoke learners' imaginations. These are generally powerful word images that force an association with something else. For example, we said earlier that 'Ronaldo is the new Pele'. We associated Ronaldo with Pele, who many people regard as the best footballer ever.

South African soccer fans do this regularly. Someone who is a very poor soccer player is called an 'uyinkomo' (in Zulu) or 'ke kgomo' (in Sotho). Yes, a 'cow!' What image does this analogy conjure in your head? A big, clumsy animal that walks around grazing grass and periodically stamping the ground and kicking up the turf? This is exactly what the users of this metaphor want you to imagine. It refers to soccer players who spend their time wandering aimlessly around a soccer field and who miss the ball when it does come their way, kicking the ground instead!

Many South African soccer players have metaphorical nicknames. A 1970s Chiefs goalkeeper was called 'Banks' Setlhodi. The association may have been with the English goalkeeper, Gordon Banks, who was regarded at that time as the best in the world. But a friend told us that it had another association: supporters knew that Setlhodi would invariably save kicks from strikers of opposing teams. His hands were as safe as a bank. This example demonstrates vividly how a metaphor (in this case a nickname) can help us to imagine the unknown (in this case the attributes of a player we may never have heard of).



Take some time to reflect on the issue being raised here.

STOP. THINK.

What associations do these other nicknames conjure up?

- 'Spiderman' Baloyi (the current Chiefs goalkeeper).
- 'Yster' Khomane (a Pirates defender from the past).
- 'Computer' Lamula (a former Chiefs mid-field player).
- 'Telephone Exchange' Molatedi (another Chiefs mid-fielder).

What did we think?

Did you notice how the metaphors used allow even those of us who have never heard of these people to imagine something about their skills? In other words, the metaphor of a 'telephone exchange' allows the *unknown* – the kind of player Molatedi was – to become part of our *known* (because we understand something of what a telephone exchange does). Molatedi was a player in the late 1980s and early 1990s. He was nicknamed 'telephone exchange' because of his ball distribution skills and accurate passes. The ball was always passed to him in the centre of the park and he would make sure that it was distributed to Chiefs players all over the ground.

By thinking of a new, unknown thing as 'like' something already known, we can imagine the thing we don't yet know. The connections created between the known and the unknown, and the simultaneous sense of confidence and uncertainty that learners feel, make this process of imagination very productive for learning. Can you see how metaphors or analogies are like photographs or pictures? To learn more about how and why you should use these ideas in classrooms we'd like you to do some reading.



Spend about 30 minutes on this activity. Do the reading and then share your ideas with other teachers. See if you can think of metaphors you can use in class to assist learners to understand something they know nothing about.

ACTIVITY 15

- 1 Turn to Reading 10, 'Learning to think metaphorically' by Joyce *et al.*
- 2 Before you start reading, look through the article and note the headings. You will see that it is a text written to assist teachers who would like to encourage metaphorical thinking in class. Consider:
 - a How has the use of metaphors and analogies helped learners to think about poems in a new way?
 - b Can you link Joyce *et al.*'s suggestions about the use of metaphorical thinking in the classroom to Dennett's arguments about risk-taking?

What did we learn from Joyce et al.?

Aha! So, after all of that we find that metaphors don't always work. Sometimes they may even block learning!

This should not surprise you. Although photographs or images are a powerful means of evoking imagination, they can also fail dismally if:

- learners are too familiar with the photograph (they stay in their known);
- the photograph contains images of something utterly unfamiliar (learners are unable to use their known to access the unknown, because there is no known in the photograph).

The trick in developing metaphors for learning and teaching lies in creating the **correct balance** between the known and unknown components. If we assume that something is familiar and known to our learners when it is not, the metaphor will fail to provide an access route into the new information that we want them to learn. On the other hand, if the image or metaphor is too familiar, learners may latch onto this and be unable to 'see' what's new.

Let's examine these problems in more detail.

An analogy cannot work unless something about it is familiar. For example, earlier in this section we likened the process of learning to the progress of a tightrope walker across a high wire. If you did not know what a tightrope walker is, the analogy would not have helped you to understand how important **equilibrium** is for learning. The picture we included to 'explain' the analogy might have assisted you to understand the association, but if you were unfamiliar with the analogy and the image, it is likely that you skipped that bit of the module. The potential explanatory power of the association would have been lost entirely. Even worse, the metaphorical explanation may have confused you rather than helped you to imagine the more abstract processes of mental equilibration.

An important part of teaching therefore involves **listening** to your learners so that you can enter and use their **familiar** worlds to make connections to the new ideas that must be taught. Are you familiar with the television programmes your students watch? Do they have favourite music groups? Who are their role models and why do they admire these people? What about the family circumstances of your learners? We need to be aware of the distances that may exist between us as teachers and our learners. In the end, it is our responsibility to **build bridges** that help to close these distances.

Being aware of our learners' worlds and the things they value doesn't mean that we must necessarily agree with them. Adolescents in particular are highly sensitive to, and even resentful of, insincere attempts to identify with their worlds. However, our knowledge of what is familiar to them will enable us to use what they know to introduce them to ideas that they don't yet know. In short, we cannot just assume that things are familiar to students. We have to **work** at creating a **shared world of meaning and experience**.

ACTIVITY 16

1 'Education is like banking.'

What does this statement bring to mind? Think about what pictures it evokes in your head.

2 Now read through the cartoon on page 62.

Comment on the way in which the analogy goes wrong in the learning situation depicted. How could the teacher overcome this problem?

Misreading metaphors

This cartoon demonstrates a rather unexpected problem with using analogies in class. New ideas may be blocked by:

- ambiguities of language (one learner thinks of a riverbank instead of a money bank);

“

The trick in developing metaphors for learning and teaching lies in creating the correct balance between the known and unknown components.

”

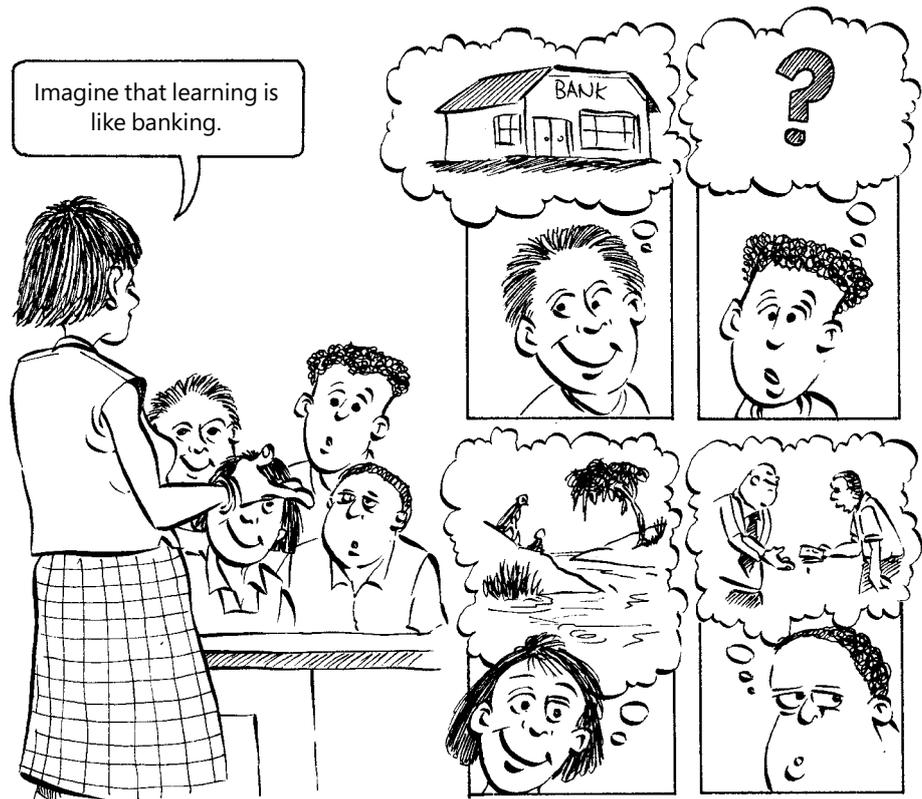


Spend about 30 minutes on this activity, which is a good one to do with other teachers. Listen to the different ways in which they interpret these misunderstandings.

- the learners knowing too much about the analogy.

Knowing too much might seem like a strange problem, especially because we have already seen that analogies cannot work when meaning is not shared. However, if analogies are too well known, the familiar content may overwhelm the imaginative process leaving no room for the new ideas to develop.

For example, the learner who imagines the teacher receiving money from a pupil,



may immediately link the analogy very concretely to his own context in which concerns with the costs of education and the possibilities for corruption are pre-eminent. In the end, his detailed knowledge blocks his understanding because he cannot see the *general* point the teacher is trying to make by using the analogy.

The cartoon also reminds us that we cannot simply assume that the worlds we imagine as teachers will be reproduced precisely in the minds of our learners. Sometimes what sits in our learners' heads may prevent them from thinking of the new things we try to teach them.

The Joyce reading contained an example which illustrated a different problem. Learners *knew* that a poem is not like a giraffe, but when they *had* to find similarities between the two, they made surprising connections and as a result they came to think about both giraffes and poems in a *new* and interesting way. This underlines an important point: new ideas may be continuous with our previous knowledge and build on it, or they may be entirely different from our previous understandings and even contradict what we already know. In both cases they assist us in learning.

We must remember that although analogies or metaphors play on *some element of similarity* between two things, they need not be alike in every respect. In fact in some cases, the differences between things may be misleading at first (there are lots of things about giraffes that are very different to poems, and banking can be quite different to education). Part of the teacher's task is to carefully elaborate *how* the familiar can be used to imagine the new. In order to avoid confusion, teachers might also need to point out the limits of the comparisons they are making.

In other words, as teachers we must use analogies to create a *world of shared understanding*. Despite the difficulties associated with the use of analogies and metaphors, they remain exciting tools for challenging what we already know and for suggesting new possibilities. By using symbolic representation, language, and images we can create pathways into the unknown.

Can you see that this idea of a pathway into the unknown is itself a metaphor, repeated throughout this section? We have also constantly referred to worlds of meaning that have to be shared (another metaphor).

Before you move on to the next subsection, try the following activity. It will help you to sum up what you have learnt about using the known to imagine the unknown.

ACTIVITY 17

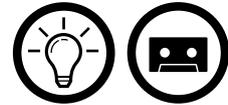
- 1 A number of metaphors or analogies have been used in this section to create the possibilities for you to learn new things and to help you think about the process of learning in new ways. Read through the whole section again and list as many metaphors or analogies as you can. (There are *lots* – far more than ten!)
- 2 Which of these analogies work or do not work for you? Give reasons for your answers. Here are a few metaphorical questions to get you thinking:
 - How is learning like forgetting?
 - How is learning like knowing?
 - How is learning like eating?
 - How is learning like a giraffe?

STOP. LISTEN. THINK.

At this point you might want to relisten to Part 2 of your audiotape. Refer back to the notes you made when you listened to it previously (page 45). Have any of your understandings changed or deepened? Why?



Spend about an hour on this activity. Ideally, do it alone at first. Then get a group of teachers (who have all also done this activity on their own) to share their ideas.



Take some time to reflect on the issue being raised here.

2.6

Learning and OBE

What did Curriculum 2005 say about learner-centred education?

Early on in the implementation of the new OBE curriculum in South African schools, the Department of Education called on teachers to develop 'a new way of looking at learners'.

Learners were not to be seen as empty vessels, as clever or stupid, or as being in competition with each other. Rather, every learner was to be considered unique and able to succeed in school. A more recent education policy discussion document has confirmed this principle. South African learners, it suggests, must be 'viewed as thinkers with emerging theories about the world' and 'not viewed as blank slates onto which information is etched by the teacher'.

The general idea is that what is learnt at school needs to be determined by, and **relevant** to, the needs and interests of learners, and not by a rigid syllabus. Teachers should 'seek the learners' points of view in order to understand learners' present conceptions for use in subsequent lessons'. This principle of **learner-centredness**, and the related idea of **relevance** to the learner, has led to an important debate in school classrooms:

The one side of the debate

Some teachers argue that **learners** must suggest the topics they want to learn. In other words, the syllabus should be constructed on the basis of learner interests. This is justified by the argument that learners bring with them rich, unique, personal experiences and knowledge and that out of this, topics relevant to them can be generated collectively. The proponents of this view argue that when learners don't know all the details of a topic, they will learn these details by exposure to the **collective** knowledge of their **peers** and to selected learning materials. Through this process, all learners will **discover**, or construct, new knowledge for themselves.

The other side of the debate

Other teachers argue that the relevance of any topic for the learners cannot be determined in advance, before the learning process begins. In other words, learners don't arrive at the classroom door knowing about what they need to learn. It is very likely that they aren't interested in, and so won't choose to learn about, adjectives and adverbs, the laws of motion, the international date line, or historical conflicts in the Eastern Cape. These teachers suggest, though, that it is **vital** that learners learn about things that aren't initially regarded by them as interesting or relevant. This argument holds that the initial lack of interest by learners can be overcome in the **process of learning**. As learners learn, they will begin to see the relevance of concepts or analytic processes that they did not anticipate before.

STOP. THINK.

Does this debate ring any bells? Does the second argument remind you of the learning paradox in any way? You might want to reread Section 1.4. Much of Section Two also talks about how to get someone who *doesn't know* to *know that they don't know*. Given what you have learnt so far, which side of the debate would you vote for?

These quotations are from Media in Education Trust for the National Department of Education (poster 5c), *Curriculum 2005 Orientation Programme* (1997), and Department of Education, *Curriculum 2005: Towards a Theoretical Framework* (Pretoria, 2000).



Take some time to reflect on the issue being raised here.

How has Section Two addressed this OBE debate?

In Section Two we have focused on the individual learner and on his or her *spontaneous, natural ability* to learn new things. We explored how different learners learn and discussed the different pathways along which they move in order to get from the known to the unknown:

- through guessing and making mistakes;
- by asking questions;
- by imagining new possibilities.

Piaget's theory of *equilibration* helped us to understand that these *acts* by learners are the ways in which they construct new knowledge for themselves. In this sense, learners *do* generate their own learning.

However, Piaget also warned us that the learning process is a *balancing act* between the known and the unknown. His twin notions of *assimilation* and *accommodation* help us to understand that it is *both* the learners' existing knowledge *and* the nature of the learning task, in *interaction with one another*, that challenge the learners and allow them to learn.

The teaching challenge is, therefore, to maintain a *relationship* between the known and the unknown. School learning *isn't* something that learners construct for themselves in splendid isolation. The different disciplines of knowledge, and the history of ideas that has developed over time, challenge and enlarge individual experience. They open up new worlds of knowledge for the learner. Importantly, teachers, other learners, and books all provide new opportunities for learning in that they mediate the different ways in which different kinds of specialists (mathematicians, historians, psychologists etc.) think, reason, and argue.

If we understand learning as a balancing act – as a process which requires *both* learner action and imagination *and* learners who are willing and able to discipline themselves by learning existing knowledge – then the current debate in OBE doesn't help us to think meaningfully about learning. The first position emphasizes only the *existing* knowledge of the learner; it over-balances on the side of learner action or what Piaget would call *assimilation*. The second position over-emphasizes the learning of accumulated school knowledge; it over-balances towards the *unknown* knowledge of the task, or the action of *accommodation*.

Our argument is that when learners construct their own knowledge, they must do both; they must assimilate and accommodate.

Nonetheless, *in a broad sense*, the OBE idea that learners construct their own learning is an important one. As the national Department of Education has put it in elaborating its conception of learner-centredness, OBE is about:

- *helping learners to internalize and reshape, or transform, new information (transformation occurs through the creation of new understandings that result from the emergence in action of new cognitive structures or ways of knowing);*
- *learner intellectual activity such as questioning, investigating, problem generating and problem solving (it's about constructing knowledge, not receiving it);*
- *understanding and applying, not repeating back;*
- *thinking and analysing, not accumulating and memorizing information;*
- *active, not passive learning.*

“
The constant challenge facing teachers is to maintain a relationship between the known and the unknown.
”

This quotation is from Department of Education, *Curriculum 2005: Towards a Theoretical Framework* (Pretoria, 2000).

2.7

Conclusion and key learning points



Take some time to reflect on the issue being raised here.

Reassessing the half-truths

STOP. THINK.

In order to conclude this section we'd like you to go back to the half-truths on page 24 and the notes that you made in response to them. Reconsider the statements in the light of what you have learnt in this section. Have you changed your opinions? How? Why? Note these changes in your workbook.

We will now provide you with our response to these half-truths and explain how we have explored them in Section Two. Use this as an example to guide your thinking about the half-truth statements at the beginning and end of each of the sections that follow.

Learning involves acquiring, retaining, and reproducing information

This statement is partly true. Learning does involve gathering new facts, whether these be about soccer, or a city like Durban, or about Piaget's theory of equilibration. Part of your task in studying this course on learning involves acquiring new facts, for example that assimilation is the process of understanding new information on the basis of what is already known. Or that accommodation is the process of changing previous knowledge in the light of new information.

However, in another important way, this statement is incorrect or at least incomplete. Learning involves *far more* than just acquiring isolated facts. Our discussion of the networks of knowledge (see pages 27–35) and of different kinds of questions (see pages 49–58) makes it clear that *developing connections between ideas* is as important as learning facts in the process of coming to know and understand new knowledge.

For example, to understand Piaget's theory fully, we need to understand the relationship between the processes of assimilation and accommodation. We also need to understand Piaget's theory in relation to other theories that you will encounter later in the course, like Vygotsky's theory of learning (see page 95 in Section Three).

As we become better at learning we should make fewer mistakes

This statement is true from a common-sense point of view. As we come to know more about something, we will make less errors and are likely to reproduce our knowledge in a more factually accurate way. We will also make fewer mistakes in the procedures that must be followed, whether these be the physical actions required for baking a cake or playing a good game of soccer, or the mental actions required for reading or writing a good essay.

However, in another important way this statement is very wrong. As we become better learners we become more willing to guess, to take risks, and therefore more likely to make mistakes! But, and this is important, we will know how to use our mistakes to learn new things. Our new mistakes will reveal new possibilities for knowledge and understanding. As Dennett (and others) have suggested:

'The more we know, the more we know that we don't know!'

For every question there is only one answer

You will now know that this statement is inaccurate. As we saw in this section, some kinds of questions have many different possible answers. Relational, explanatory, and evaluative questions can be answered in several different ways (see pages 51–52). Indeed, the tasks that you do in this course all require you to generate answers that are uniquely your own. There is no single, correct, model answer.

However, we also know that factual questions generally do only have one correct answer. If we ask who developed the theory of equilibration, the answer is Piaget and can be no other. It is also true that over time, and as we learn more about the world (or about learning), our previously 'correct' facts may change. Also, while some explanatory questions (for instance) may have the *possibility* of a number of answers, one answer may be far more convincing (and thus more acceptable) than other answers.

Teachers and learners need to learn to differentiate between different kinds of questions and the kinds of answers that they demand.

A good teacher will be able to answer all questions raised in the classroom

This statement is wrong. It is *impossible* for even the most knowledgeable teacher to know all there is to know about everything! An active class of enquiring children will pose problems and questions that cannot be anticipated. Dillon also suggests that answering a question immediately may stop or interrupt the learning process rather than encourage and provoke it.

Of course, teachers should prepare their lessons thoroughly and research the topics that they are going to work on with their classes. The teacher's own active engagement with trying to find answers serves as a model for learners. A question to which an answer cannot be given should be met with suggestions about how to find an answer.

The use of metaphors and analogies in teaching promotes understanding

This statement is true. Metaphors that link new ideas to that which is known and familiar help learners to enter the unknown (see pages 59–65).

However, sometimes metaphors may fail to promote understanding, and may even hinder it. This happens both when the knowledge that we assume to be familiar is not shared by learners, and when the metaphor is so strongly tied to the familiar, known world that learners are unable to ascertain in what way the new idea is different and unfamiliar (see Activity 16 on page 64). This means that although the use of metaphor and analogy is a useful strategy for teaching and learning, the elements of the known and unknown must be carefully balanced by the teacher.

Children are curious and active and therefore learn spontaneously

We strongly agree with this statement. Piaget's theory provides us with a model of human thought that is highly active. Teachers that recognize and enhance this naturally powerful capacity create classrooms that build the self-esteem of their learners and enable them to reach their full potential.

However, and this is important, some learning doesn't occur spontaneously and requires the intervention of a teacher or someone else to help us learn. Feedback from others can help learners to change their understandings and correct mistakes that they may otherwise be unaware of.

This view, and the important role of the teacher in the learning process it implies, is explored further in the rest of this module.

Key learning points

The aim of this section was to explore the question, '*How is it possible for those who do not know something to come to know it?*' Here is a summary of how we attempted to address it:

1. We suggested that the process of learning is both easier and more difficult than we think:
 - Easier, because all people actively think about their worlds and all learners have some knowledge that can be used in the learning-teaching situation.
 - Harder, because coming to know about something entails far more than acquiring and memorizing facts and therefore we can't teach learners by simply telling them things.
2. We found out that learning was a complex and contradictory process. For instance:
 - Even when we think we know nothing at all, we may in fact know quite a lot (but because it is so familiar, we 'forget' that we know it)!
 - Knowing some facts about a topic often makes it easier to acquire new knowledge.
 - But sometimes what we already know makes it more difficult to learn something (the new knowledge contradicts our current understanding).
3. We looked at three possible paths that could lead learners from the known to the unknown:
 - We challenged the assumption that mistakes are 'bad' and looked at how guessing and mistake-making can become the secret of learning success.
 - We looked at how questions and answers can guide learners towards a new understanding of their world. We identified different kinds of questions (factual, relational, explanatory, and evaluative) and realized that more complex and open-ended questions generated different kinds of learning. We also noted that questions tell us as much about what learners know as they do about what they don't know.
 - Finally, we explored the possibilities of using metaphors and analogies to imagine the unknown. In the process of doing that we discovered how learners could use the familiar to imagine the new.
4. Piaget offered a formal explanation of how we learn. He called it *equilibration* and it involves:
 - connecting or *assimilating* new information into what we already know;
 - feeling that what we have doesn't really fit, or answer, what we need to answer (this create a sense of *disequilibrium* which motivates us to search for new information);
 - filling in these missing gaps in our knowledge by identifying other facts that will help us interpret new information;
 - recognizing and accommodating novel and contradictory aspects of new knowledge that our previous understandings cannot account for.

“

The basic principle of active education methods ... may be expressed as follows: to understand is to discover, or reconstruct by discovery, and such conditions must be complied with if in the future individuals are to be formed who are capable of production and creativity and not simply repetition.

”

This quotation comes from J. Piaget, *To Understand is to Invent* (New York, Grossman, 1978), p. 20.