



Problem based learning

A DIFFERENT APPROACH TO
UNDERGRADUATE TEACHING

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What it is



- ▶ Students learn through team-work and self study
- ▶ Learning is student-centred and self-directed
- ▶ Students are divided into groups of up to 10
- ▶ A member of staff acts as facilitator
- ▶ Each student is given a 'problem' to consider and address over the following week
- ▶ Each problem links with a lecture given in the morning prior to the PBL session

Types of problems



- ▶ Experimental data
- ▶ Photograph
- ▶ A film extract
- ▶ Newspaper article
- ▶ Scientific article
- ▶ Real or simulated forensic case

Stephen Lawrence murder: Dobson and Norris found guilty

Verdicts | Timeline | Evidence | Road to justice | Profile | Reaction

The Stephen Lawrence murder trial boiled down to three things; blood, fibres and hair. These tiny fragments of new evidence emerged in 2007 as scientists conducted a massive "cold case review". They re-examined clothing taken from the two defendants, Gary Dobson and David Norris, starting a process that eventually led to a guilty verdict for both men. The prosecution had argued that these microscopic clues linked the defendants to the murder. But Tim Roberts QC, for Gary Dobson told the court: "The actual evidence upon which this charge is brought, the fibres and fragments, would not fill a teaspoon."

Gary Dobson | David Norris



Blood stain on the bomber jacket



The blood stain dried into the weave of the bomber jacket's collar was the most significant finding of the case review in 2007. The jury was told that there was less than a billion-to-one-chance that the DNA was not that of Stephen Lawrence.

Principles behind PBL



- ▶ Reactivates old knowledge
- ▶ Integrates subject areas
- ▶ Motivates students (fosters curiosity – gives ownership)
- ▶ Encourages active learning
- ▶ Encourages thinking, rather than learning by rote
- ▶ Areas in the lecture can be revisited at deeper / higher levels of complexity and understanding
- ▶ Encourages students to form and reject hypotheses
- ▶ Helps to develop skills in communication, group work and leadership

Old Friends



- ▶ Geoff and Trevor live in Southfields and have been neighbours for over 20 years. They regularly chat about work, cricket and family life over the garden fence. Both men are in their late 60s. Geoff is a retired carpenter and was born and raised in the area. Trevor came to Britain from Jamaica in the 1950s and retired from his job as a clerk in the civil service three years ago. They now spend much of their time discussing their various health problems. Today they are discussing a friend who has recently had a stroke.
- ▶ Trevor's wife wants him to go to the GP for a check-up as he's had headaches recently and she's worried about his blood pressure, but he doesn't trust doctors and refuses to go. He says he's getting on a bit and there's nothing you can do to stop ageing.
- ▶ Geoff's happy with his GP who's always listened to his problems, though he can't see the point of his advice to change his lifestyle to include more exercise, improve his diet and stop smoking at this stage in his life, much to his wife's consternation.

7 step process



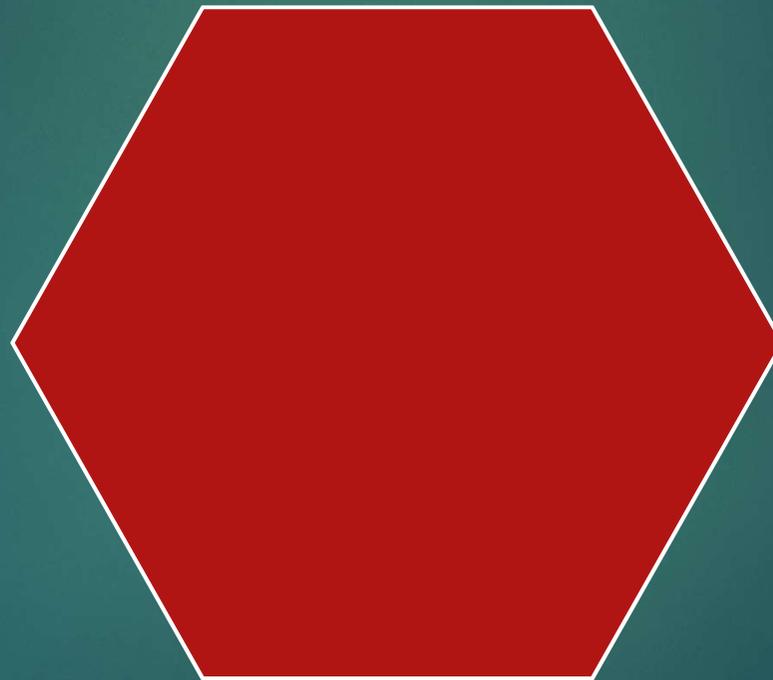
First session

- ▶ Step 1 – Clarify terms that are not understood
- ▶ Step 2 – Decide what the central issue is that they want to focus on
- ▶ Step 3 – Brainstorm interesting areas that might be followed up – the group members can offer anything but it will be up to the group to decide whether it is worth following up during the week

Terms – step 1

- ▶ Stroke
 - ▶ Brain attack
 - ▶ Different types
 - ▶ Ischaemic – cutting off blood supply to the brain
 - ▶ Haemorrhagic – bleeding in or around the brain

Central issue – step 2



Central issue – step 2



Brainstorm – step 3



- ▶ Retired
- ▶ Diseases – stroke – high blood pressure – what else?
- ▶ Ethnicity
- ▶ Occupation
- ▶ Attitudes – trust – is that different in males?
- ▶ Communication
- ▶ Life-style advice – what is the evidence?

7 step process



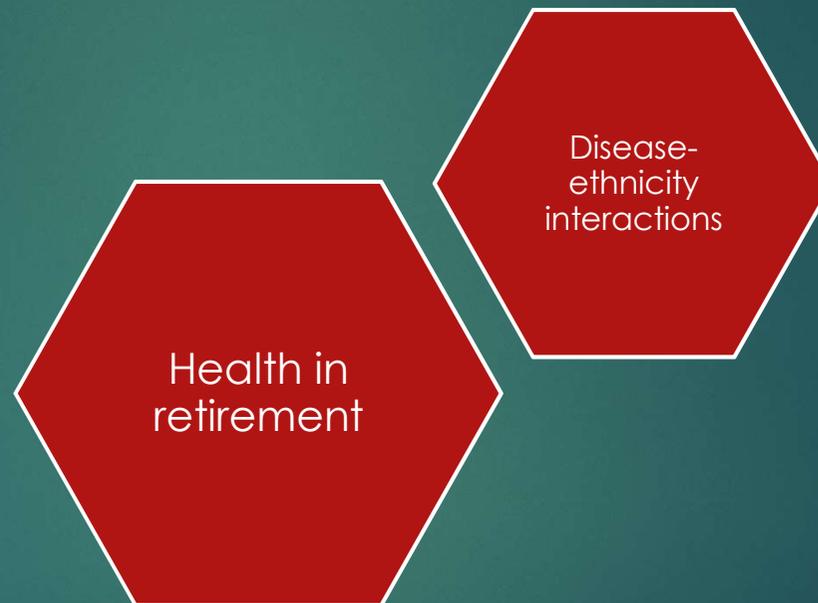
First session

- ▶ Step 4 – Explore and organise solutions amongst group – you might have an expert amongst the students who can already offer information that will either mean you don't need to do any more, or it may raise more questions
- ▶ Step 5 – Formulate group learning objectives – generally 6 or 7, ideally presented as a clear question or task that can be answered succinctly. For example:

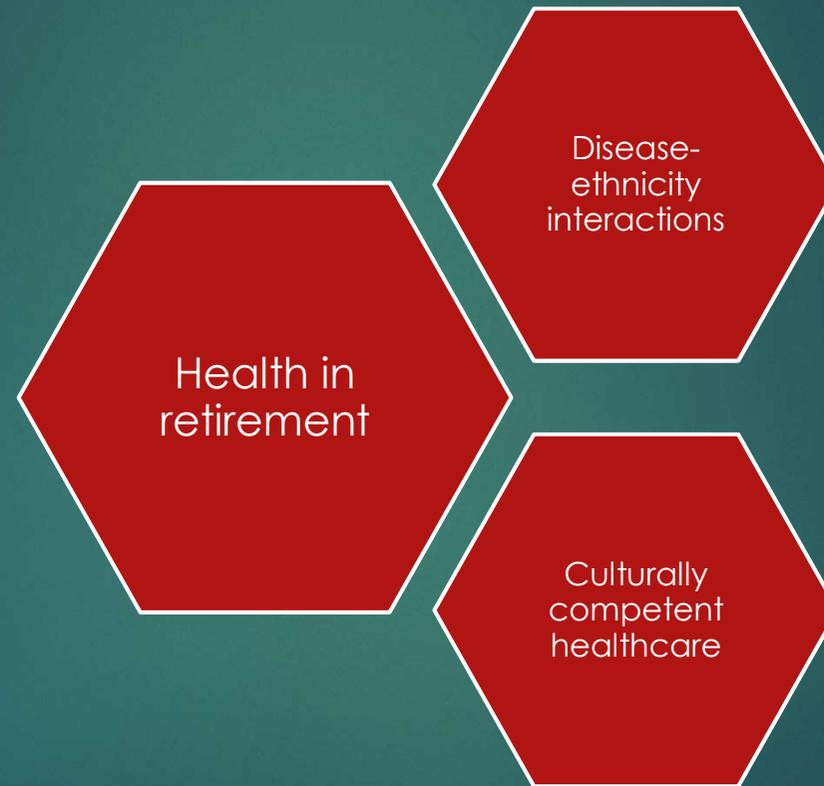
NOT – how does a scientist conduct a forensic examination?, which might require a text book,

RATHER – describe the processes involved in conducting a biological search.

Organise solutions – step 4



Organise solutions – step 4



Organise solutions – step 4



Organise solutions – step 4



Organise solutions – step 4



Organise solutions – step 4



Learning objectives – step 5

- ▶ Review the relationship between ethnicity and diseases of middle age – coronary heart disease, cardiovascular disease, Type 2 diabetes
- ▶ Describe the ways in which age and gender affect the individual's use of the health service
- ▶ Consider the implications of the men's occupational backgrounds on their health
- ▶ Consider the psychosocial factors involved in response to symptoms and decision to seek treatment
- ▶ Identify the key components of culturally competent healthcare and discuss appropriate lifestyle advice for Geoff and Trevor in relation to research evidence and health policy

7 step process



During the week and second session

- ▶ Step 6 – Research independently during the week
- ▶ Step 7 – Reconvene and discuss objectives – sources – explanations – this should not be done by reading notes although students may wish to have notes with them and be encouraged to make more notes as part of the discussion
- ▶ Begin the new problem

Features of group work

- ▶ Everyone has a role:
 - ▶ Scribe – to record ideas
 - ▶ Chair – to run the session and keep everyone to time
 - ▶ Group member – to participate
 - ▶ Facilitator - to overview the process
- ▶ For each PBL scenario students elect their own Scribe and Chair
 - ▶ These positions will rotate around the group for the module

Role of Scribe



- ▶ To record points raised by the group during discussion in steps 1-5
- ▶ To help the group to order or link their points
- ▶ To participate as far as possible in the group discussion

Role of Chair



- ▶ To lead the group through the 7 steps
- ▶ To encourage participation of all members of the group
- ▶ To maintain good group dynamics
- ▶ To keep the group to time
- ▶ To ensure the group adheres to the task in hand
 - ▶ Ensures that the steps are not hurried
- ▶ To check the scribe accurately records the points raised in the discussion

Role of group members



- ▶ To follow the 7 steps in sequence
- ▶ To actively participate in discussions
- ▶ To listen actively to each others' contributions
- ▶ To ask 'open' questions
- ▶ To independently research all the learning objectives
- ▶ To share information with each other

Role of facilitator

- ▶ To advise group on what is not relevant
- ▶ To act as a go-between
 - ▶ Prompting chairs and scribes who are finding it difficult
- ▶ To identify students with particular problems that may need addressing outside the group
- ▶ To intervene where groups are demonstrating non-functional behaviour
 - ▶ Fooling around
 - ▶ Having private conversations
 - ▶ Undermining other students
- ▶ The facilitator is not expected to be an expert in the field. Questions from students should be turned into tasks to be researched

What learning happens in PBL?

- ▶ Students acquire and process knowledge actively
- ▶ PBL gives vitality to the lecture material and supports students in understanding what they find difficult
- ▶ Students learn to work systematically, become good at explaining, listening and negotiating
- ▶ They feel they are expected by their group to do the work
- ▶ They develop inter-personal skills and learn how to chair meetings

Limitations of PBL



- ▶ Loss of students being enthused by expert
 - ▶ But they will have had that in the lead-in lecture
- ▶ Loss of 'buzz' for the teacher in imparting knowledge as a facilitator
 - ▶ It is important for the facilitator to understand they have other opportunities and students may get things wrong in the first session, only to understand that once they have done their own study
 - ▶ If there is a clear misunderstanding that the facilitator is aware of then you may wish to suggest they look into something carefully, without revealing what the problem is – or set them a new objective at the end of the second session if they still haven't got it
- ▶ Time and resourcing issues – space is important – time is set
- ▶ Facilitator competence important for success

Advantages of PBL for students

- ▶ Direct their own learning
- ▶ Learn at their own pace
- ▶ Learn in context
- ▶ Are motivated and enjoy their learning
- ▶ Integrate their knowledge
- ▶ Learn 'how to learn'
- ▶ Each student writes up two PBLs that are assessed and can become an expert resource for revision for the group
- ▶ Students perform at a high level in the module

What else?

- ▶ Take a register – I will email you a spreadsheet for your group
 - ▶ Please email me
- ▶ Encourage the group to organise their own chat group
- ▶ Take a set of white board markers for the group to use (available from AV)
- ▶ Recruit volunteers for chair and scribe
- ▶ Make it the responsibility of the chair to communicate with absent members
- ▶ Make it the responsibility of the scribe to record the learning outcomes and clean the board
- ▶ First mark you group's PBL write-ups – at end of session 1 or session 2

Write-up

- ▶ 1500 – 2000 words
- ▶ Assessment in terms of:
 - ▶ Content – learning objectives stated and covered – appropriate balance – word count
 - ▶ Clarity – presentation – formatting – tables – figures
 - ▶ Reasoning, explanation and comprehension to a lay audience – interesting and engaging?
 - ▶ References – range – Harvard or Vancouver
- ▶ Marking criteria worksheet – also available for students

Questions?