Differentiation by task design

Bloom's Taxonomy and Task Design
Objectives
Participants will be able to:
- see how differentiation can be achieved by careful task design
- amend tasks that they presently set students, so as to achieve better differentiation
- explain and appreciate the importance of setting a mix of achievable (mastery) and stretching (developmental) tasks.

Introduction

Bloom's Taxonomy is a spectrum of task difficulty. It goes from easy tasks such as recalling knowledge to harder tasks such as evaluating an argument. It deals with cognitive learning*, but a similar approach can be used in other sorts of learning.

- 'Tasks' include **everything** you ask students to do: verbal question and answer, tasks set in the lesson; and full blown assignments or projects. It also includes tasks for work inside and outside the class.

- In order to differentiate there should be a <u>mix</u> of:

  - **Mastery Tasks** that can be mastered by all learners in a short period of time regardless of their prior learning. This allows weaker learners to succeed. Without this success they will probably give up.

  - **Developmental tasks** that stretch the more able, develop the skills required for academic success, and for the world of work. These tasks develop the skills required for progression to the next educational level. They also create deep learning, that is, real understanding.

- It is important to realise that the full spectrum of Bloom's Taxonomy should <u>appear at every academic level</u>. Entry level students need simple developmental tasks such as 'which of these is best' or 'plan how you are going to...' Similarly, level 4 students need mastery tasks such as to recall the key points in a lesson.

*Other domains of learning are psychomotor learning (practical skills such as serving at tennis) and affective learning (learning attitudes beliefs values etc).

Mastery and Developmental Tasks
A mix of developmental and mastery tasks ensures that weak students achieve some success while the able are stretched.

Mastery tasks
E.g. *Recognise and name the main constituents of a simple cell.*
Copy and label a diagram of a hydroelectric power station
Find the cost of sending a fax in this country and abroad.
Express one figure as a percentage of another using (A/B) x 100

'Mastery' tasks have the following characteristics:
- they are easy, typically involving only knowledge and comprehension
- they are not dependent on prior learning
- They can be attained in a short time, perhaps minutes.
- 100% of the students should be able to get them 100% right!

Because they are time rather than ability dependent mastery tasks allow weaker students can enjoy the success, reinforcement, self belief and motivation which makes learning possible.

Developmental tasks
E.g. *Write a clear, scientifically argued laboratory report ......*
Evaluate the importance of full to high employment in western societies.......
How did the early life of Harold Macmillan influence his political thinking?
Survey leisure time opportunities in Your nearestCity, and report on your findings

Developmental tasks have the following characteristics.:
- they are more difficult
- they are highly dependent of prior learning
- Students can't get 100%. Development is slow and requires considerable effort.
- they involve higher order skills such as evaluation, synthesis, etc.

The importance of developmental objectives lies in their ability to maximise individual development and to stretch the more able. Continuous development rather than complete mastery is expected.

Using Mastery and Developmental Tasks in Practice.
Difficult Developmental tasks can be broken down into introductory mastery tasks, followed by a simpler developmental task. The mastery tasks should prepare the student for the developmental task. In this way Bloom's Taxonomy is used as a ladder allowing all students to climb to success.

Take for example
"Survey leisure time opportunities in your nearest city, and report on your findings"

This is a developmental task, but could be broken down into a ladder of tasks such as:
a. List ten or more leisure time activities which are available in your nearest city
b. Find sources of information on other leisure time activities such as local papers and Tourist Information Offices
c. Make a fuller list of leisure opportunities in your city.
d. Group these opportunities into general categories such as sport, music, theatre etc. You will need to make up some new general categories.
e. Group the opportunities by the age of those most likely to be interested in them
f. Group your activities by geographical area, and by cost.
g. Think of some other useful ways of grouping the activities.

Bloom's Taxonomy and Task Design

Hard

Evaluation (judge, critically appraise)
- strengths and weaknesses
- advantages and disadvantages
- give arguments for and against
- fitness for purpose
- value for money & value for effort
- compare and contrast
- consider evidence, bias etc

⇧

Synthesis (create, design, invent)
- solve a problem
- write an essay, report, criticism ...
- design a leaflet, poster, presentation etc.
- give constructive suggestions for improvement in a given situation
- design a policy or strategy or device
- do a survey (eg with a questionnaire etc.)

⇧

Analysis (consider the parts separately)
- analyse a situation, experiment, case study etc and describe what is happening.
- classify   · categorise
- compare   · deduce
- give reasons,
- give causes and effects

⇧

Application (Doing after being shown how)
- apply   · calculate
- use   · punctuate

⇧

Comprehension
- explain   · classify
- interpret   · reorganise

⇧

Knowledge
- state   · define
- recall   · describe

Easy

A mix of mastery and developmental tasks is required

Mastery so that weaker students can succeed

Developmental to stretch the more able, and to ensure deep understanding for all students

Set a mix of these tasks for Q&A; lesson tasks; worksheets; assignments; etc

Developmental Tasks
E.g.
Evaluate the importance of full to high employment.
Report on the leisure time opportunities in Worcester City.
Characteristics:
- they are difficult
- they are highly dependent on prior learning
- development is slow and requires considerable effort
- they create transferable learning of important thinking skills
- they are more interesting, even to weak students
- they are vocationally and academically relevant
- they create deep learning

Mastery Tasks
E.g. Recognise and name the main constituents of a cell.
Copy and label a diagram of a power station
Characteristics:
- They are easy. 100% of students can get them 100% right!
- they are not dependent on prior learning
- They can be attained in a short time, perhaps minutes

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h. Use the above to help you plan a report on leisure activities in Worcester. Your plan could either be a mind-map, or an ordered set of headings.

i. Write a report on your survey of leisure time opportunities in your nearest city.

j. Proof read your report before handing it in.

An essay such as "How can learning theory inform the teaching of mathematics" or "In what way did Charles 1 prepare the way for Cromwell?" can be turned into a ladder of tasks, with mastery tasks being chosen to lead the way to the writing of the essay. Such assignments can allow students without effective essay writing skills to succeed.

Surface and Deep Learning

Objective
To show that low quality surface learning often results from the exclusive use of tasks at the very bottom of Bloom's Taxonomy.

Task 1 The dangers of surface learning
- Participants are told they are to be given a test.
- The facilitator presents the 'Jabberwocky' OHT and reveals only the verse and the first three questions.
- Participants are told the verse is a nonsense poem and they are given about four minutes to complete the first three questions, working in pairs.
- The facilitator tells the participants that they can mark their own answers
- The facilitator asks participants for answers to questions one at a time and confirms the answers:
    1. *What were the slithy toves doing in the wabe?* – gyring and gimbling

    2. *How would you describe the state of the borogroves?* – mimsey or all mimsey

    3. *What can you say about the mome raths?* – they outgrabe.

- The facilitator asks how the class has done, and congratulates the class, and his own teaching, on such good results.
- The facilitator reveals question 4, and gets the answer 'no'. The students need an understanding of grammar only, not of the subject matter.
- Questions 5 and 6 are revealed and read out one by one, and the class asked to answer them.
- The participants are asked why they can't answer these questions.
- The facilitator asks the participants to place the questions 1,2,3,5,and 6, on Bloom's Taxonomy. This reveals that 1, 2, and 3 are all 'knowledge' and questions 5, and 6 are evaluation.
- Conclusion: Staying at the bottom of Bloom's Taxonomy can lead to surface learning, that is learning without understanding.
- As an example of surface learning the facilitator can show the 'gardener' question OHT and discuss gapped handout worksheets etc.

Conclusion – This needs to be stressed to ensure full understanding:
- Knowledge tasks are fine as a start, but if we stay at the knowledge level, surface learning may result. Knowledge tasks may be necessary, but they are never sufficient. We must avoid 'rote learning' of facts and procedures.
- Deep learning in contrast to surface learning requires higher order tasks than knowledge. The higher the task the more likely deep learning will result.

The Jabberwocky Problem

'Twas brillig, and the slithy toves
Did gyre and gimble in the wabe;
All mimsy were the borogroves,
And the mome raths outgrabe.

1. What were the slithy toves doing in the wabe?

2. How would you describe the state of the borogroves?

3. What can you say about the mome raths?

Please leave these questions till later:

4. Does the student need to understand material in order to answer low level questions directly related to the texts you give them?!

5. Were the borogroves right to feel mimsey?

6. How effective was the mome raths strategy?

Note questions 1-3 were at the bottom of Bloom's Taxonomy, 5&6 were at the top. This shows that tasks at the very bottom of Bloom can just create 'surface learning' without understanding.

Surface and deep learning

80% of 12 year olds can correctly divide 225 by 15. But only 40% can solve the problem:

if a gardener has 225 bulbs to place equally in 15 flower beds, how many would be in each bed?

Most of the failing pupils did not know which mathematical operation to use.

Task: Help for Parkinson

Michael Parkinson is about to interview David Beckham and has prepared a list of questions. But he needs help. Please....

a) Place each question on Bloom's Taxonomy. That is, decide whether it is at the level of knowledge, comprehension, application etc by placing a 'k' 'c' 'app' 'an' in the column provided.

b) Decide on the five most interesting questions

c) What do you notice about the level of the most interesting questions?

The Application of Bloom's Taxonomy to Differentiated Activities in GCSE Economics

The following shows a series of lessons 'before' and 'after' being differentiated. The outcome, an essay, is the same in each case. However, in the second case Bloom's Taxonomy has been used as a 'ladder' to assist and prepare students with the essay. High order tasks have been used in the lesson, to develop and check learning so that deep learning takes place, and so that misconceptions can be corrected before the essay is written.

Undifferentiated lessons and task:
Students were given five lectures on the topic of unemployment, where students took notes from the board, and answered factual questions to check their understanding. The students then conduct further research in the library, and were asked to write the essay below:

"Outline the trend in UK unemployment from 1991-2001. Explain the various causes of unemployment and describe the approaches governments may use to deal with each type"

Differentiated lessons and tasks
Below is an outline of a differentiated approach for the same series of lessons on unemployment – types and cures. It would take approximately 5 hours depending on work to date and background knowledge. The aim is to promote both deeper and more accessible learning in the topic. The lesson culminates in the students producing the same essay described in the undifferentiated lessons.

Level of student activity on Bloom's Taxonomy	Student Learning	Brief description of activity	Possible resources
	Unemployment as a measurable statistic. Source handling and data selection. Trend identification.	Students look through a range of provided sources (pictorial, tabular, graphical, text) which contain the unemployment rates for 1991-2001. They complete a table showing the rates over the period and write a statement as to the trend.	Unemployment rate sources – real and manufactured. Table framework.
	Various "types" of unemployment established based on differing circumstances and events. Linguistic skills developed around providing explanations and creating definitions	Matching cards exercise (unemployment "type" with sample causal situations or "examples". Activity completed in pairs. "Collaborative talk" approach employed with students explaining to each other their understanding of the matches selected. Particular focus on words used in the examples to secure initial definitions of each type.	Matching cards

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Parkinson Questions	Which level on Bloom's Taxonomy?	Tick the five most interesting questions
• How old were you when you signed for Manchester United		
• How many goals have you scored for Manchester United this season		
• How many caps have you got for England?		
• What was your wife's last single called?		
• Where was Brooklyn conceived?		
• Could you explain the off-side rule?		
• What steps do you go through to take a free kick?		
• How do you go about taking a corner?		
• What do you have written on the front of your boots?		
• What would cause you to leave Manchester United?		
• Give reasons why you are such a good midfielder.		
• What is your favourite football moment?		
• What were the main reasons for England's defeat by Brazil?		
• George Best is your favourite footballer, what were his strengths and weaknesses as a footballer.		
• What is the difference between how Manchester United is coached and how England is coached ?		
• If you were managing United, how would you run the team?		
• What are the characteristics of a great manager?		
• What makes a great coach?		
• How would you improve the quality of England's game		
• How can Manchester United improve as a team?		
• What star sign were you born under?		
• What's your favourite colour?		
• What's your favourite food?		
• What do you and Posh argue about?		
• Could you explain why you re-signed for Manchester United instead of going to an Italian team		

WRITING FRAME

Essay Title: "Outline the trend in UK unemployment from 1991-2001. Explain the various causes of unemployment and describe the approaches governments may use to deal with each type"

Possible sentence/paragraph starts	Essay guidance	Possible key terms
Unemployment can generally be defined as	Explain what unemployment is	• Workforce • Labour
From 1990 to 2001 UK unemployment has gone from ...... to	Describe the 1991-2001 figures and changes with highs/lows and trend	• Sources • Trend • Rate • Percentage • Increase/Decrease • High/low point
There are five main types or causes of unemployment. First there is ...... An example of this is	Go through each type explaining how it happens with examples	• Technical • Structural • Cyclical (demand) • Frictional • Seasonal
The government can take steps to reduce each type of unemployment for ...... they can .... The problem with this method of curing unemployment is that	Go through the government steps saying how they work. Describe any disadvantages with each step.	• Retraining • Taxes • Government spending • Grants • Sunrise industries • Sunset industries • Infrastructure • Interest rates • Investment • Inflation

Conclusion – Give a summary of your findings referring back to the essay title.

Application of features of examples to create own samples. Problem solving to address each unemployment type.	Individual students in each pair devises own example on blank card of each type for other to match. Further collaborative talk to explain example and matching decisions. Pairs then consider one example of each type and produce list of ways of preventing the type of unemployment from happening or getting the people in the example back to work. List produced for each type.	Blank matching cards.
Theoretical explanation of cures for unemployment. Design skills for poster display. Representing ideas.	Students use textbook to find summaries of solutions to each type to compare with own. Pairs prepare poster demonstrating/describing types of unemployment with possible solutions/cures.	Display resources. Standard textbook.
Essay construction. Evaluation of knowledge gathered on unemployment.	Class discussion of wall displays focusing on advantages and disadvantages of methods available to reduce each type of unemployment. Table completed by students to ensure notes. Students complete essay in Option A using writing frame for guidance (see attached)	Wall displays. Writing frame (see attached).

TASK Comparing differentiated and undifferentiated teaching strategies

Stage 1

In pairs consider the undifferentiated *'lecture - research - essay'* approach, and compare it with the differentiated approach.

- Which parts of Bloom's Taxonomy are used in the differentiated activities? Please note them in the first column left blank for this purpose.
- What parts of Bloom's Taxonomy would be used in the undifferentiated approach?
- Which aspects of the two approaches lend themselves to deeper learning, wider learning styles and accessibility?
- What is the purpose of the writing frame and how does it help a weak GCSE student?

Stage 2

Identify a topic in your area of teaching. Produce a similar breakdown applying the stages of Bloom's taxonomy to the graduated activities.

'Answers' to the first task on the Economics lesson:

Blooms taxonomy context	Student Learning	Brief description of activity	Possible resources
Knowledge based – mastery tasks available to all with source range to reflect variety of learning styles.	Unemployment as a measurable statistic. Source handling and data selection. Trend identification.	Students look through a range of provided sources (pictoral, tabular, graphical, text) which contain the unemployment rates for 1991-2001. They complete a table showing the rates over the period and write a statement as to the trend.	Unemployment rate sources – real and manufactured. Table framework.
Comprehension based via classification with application introduced	Various "types" of unemployment established based on differing circumstances and events. Linguistic skills developed around providing explanations and creating definitions	Matching cards exercise (unemployment "type" with sample causal situations or "examples". Activity completed in pairs. "Collaborative talk" approach employed with students explaining to each other their understanding of the matches selected. Particular focus on words used in the examples to secure initial definitions of each type.	Matching cards
Application and analysis based	Application of features of examples to create own samples. Problem solving to address each unemployment type.	Individual students in each pair devises own example on blank card of each type for other to match. Further collaborative talk to explain example and matching decisions. Pairs then consider one example of each type and produce list of ways of preventing the type of unemployment from happening or getting the people in the example back to work. List produced for each type.	Blank matching cards.
Synthesis based	Theoretical explanation of cures	Students use textbook to find summaries of	Display resources.

Task 2. Making use of Bloom's Taxonomy in your teaching teams

Stage 1. Does your team differentiate with task design?

a) Get together in your teaching team with at least some of the tasks you set students, for example your:

- Worksheets
- Handouts
- Assignments
- Essay titles
- Tasks to be completed in lessons, for example questions for students to answer in small groups
- Example questions you might ask in verbal question and answer while you teach a given topic
- Etc

It might help if you have lesson plans, schemes of work, assignments etc to refer to

As a team discuss the extent to which your team:

- **mixes mastery and developmental tasks.** Consider each type of task resource or method you use separately, e.g. question and answer; worksheets; assignments etc

- **breaks difficult tasks down into a ladder of tasks.** This can be helpful, at least for the weaker students. (For example help-sheets can be provided for students that need them for some tasks)

Stage 2 Improving the tasks your team sets

Decide as a team what works needs doing on your resources, tasks, etc. You could write an action plan.
Parcel out the work to members of the team
Decide on a monitoring process to ensure the work gets done on time, and that team members can support each other.

(creative action)	for unemployment. Design skills for poster display. Representing ideas.	solutions to each type to compare with own. Pairs prepare poster demonstrating/describing types of unemployment with possible solutions/cures.	Standard textbook.
Evaluation	Essay construction. Evaluation of knowledge gathered on unemployment.	Class discussion of wall displays focusing on advantages and disadvantages of methods available to reduce each type of unemployment. Table completed by students to ensure notes. Students complete essay in Option A using writing frame for guidance (see attached)	Wall displays. Writing frame (see attached).