Teaching gifted students : A differentiation framework for the classroom

John Munro

Session 4

Differentiating the curriculum

Application of the framework to topics in the Australian Curriculum

Our pathway

Differentiating in gifted education provision

Framework for differentiating at each frame at each phase of learning

Apply to stimulate students' existing knowledge

How to differentiate Phase 2 teaching

How to differentiate Phase 3 teaching

Differentiation during Phase 3 teaching: curriculum

Students work through more complex tasks that involve them showing their gifted learning ability.

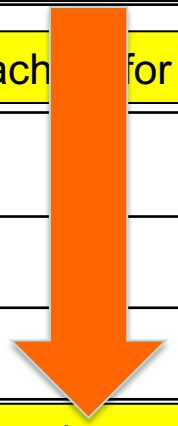
To plan more complex tasks that could match a gifted understanding of a topic in the curriculum:

- use the regular->pattern-> big ideas rubric to plan higher level conceptual understanding.
- take account of how the gifted students think in the subject or domain.
- plan a knowledge pathway for the topic

	Depth of investigation	Level of inference
regular	Literal understanding of the topic	
pattern	Identify a pattern across details	
	Trend : link pattern with factors that may influence it	
big ideas	Rules – formulate the trend as a rule	
	Link values, attitudes with the rules	
	Understanding big ideas	

Regular student's understanding

Direction of teach for gifted



Big ideas understanding

Some examples of higher levels of understanding

Curriculum content

Describe photosynthesis and the ingredients of the reaction: water + carbon dioxide + light → glucose + oxygen.

Describe the structure of leaves and the functions that occur.

They comprehend the process for particular leaves.

higher levels of understanding

Combine the inferred patterns and trends into a patterned understanding.

Synthesize the patterns and trends into an intuitive theory with big ideas.

Link photosynthesis with

- the temperature of the leaf, the climate in which the tree is growing.
- features of a leaf such as its size, its shape, the number of chloroplasts and the intensity and colour of the light, the time for which it impacts the leaf

Theories about photosynthesis

- as critical for plant life and survival in C21st
- linked with cell structure
- linked with climate change
- in aquatic as well as terrestrial plants
- in bacteria, how green sea slug photosynthesizes, the symbiotic relationship between plants/algae and other organism

Some examples of higher levels of understanding

Curriculum content

Identify how writers use language and text structure in narrative A to achieve humorous purposes and goals.

higher levels of understanding

Combine the inferred patterns and trends into a patterned understanding.

Synthesize the patterns and trends into an intuitive theory with big ideas.

Different humour in different narratives
Different purposes and goals in A with how it is done in narratives B, C.
Look for patterns in how writers use language and text structure to achieve it

Theories about humour in different texts:

Link humorous purposes and goals in narratives B, C … with its use in other genres (persuasive text, poetry, …..) and generate theory about how and why writers use language and text structure to achieve it

Examples of higher level interpretations that HA students could form

During this phase students learn more about the topic by practising and applying the new ideas. HA students work through more complex problems or enquiry project. They explore, analyze and evaluate their intuitive theory.

	Differentiate a topic in Grade 5 History	Differentiate a topic in Grade 5 English	
lar	How people lived at Lake Mungo 40,000 years ago.	Identify how writers use language and text structure to	Regular students are taught to use renaming to solve tasks such as

Note how the three levels differ for each topic. When you can see the difference, you will be more able to differentiate up topics in the curricula you teach.

Pattern	Link life at Lake Mungo 40,000 years ago with the food that was available and what these tell about the environment there 40,000 years ago? How do historians and archeologists use existing evidence to 'put together a knowledge of the past.	Link humorous purposes and goals in A with how it is done in narratives B, C … and generate a theory about how writers use language and text structure to achieve it	Pattern learners link this with subtracting in base 9 or 11 for example 74232_{nine} $\underline{-38743}_{nine}$
Big ideas	Link life at Lake Mungo at various times in history and link with changes in the food eaten and the tools used and the environment. Compare life at Lake Mungo 40,000 years ago with life there 20,000 years ago. How did the food eaten and the tools used changes. How are climate and history linked?	Link humorous purposes and goals in A with how it is done in narratives B, C …and other genres and generate theories about how writers use language and text structure to achieve it	Interpret place value as an arbitrary grouping of numbers that influences the domain of numbers in which it used. Check this for different bases in multiplication, addition,

How to work the higher levels of understanding

Steps in differentiating up a topic:

The examples of higher levels of understanding for the two topics were worked out using the following steps :

- Specify explicitly the knowledge /understanding regular students will learn.
- Select the main concepts in this specification.
- Imagine or infer how each of these concepts might change, that is, imagine each concept in a pattern.
- Combine the inferred patterns and trends into a patterned understanding.
- Synthesize the patterns and trends into an intuitive theory with big ideas.

How well you can differentiate topics in the curriculum depends on how clearly you understand what you want the regular students to learn and know from your teaching and how well you can understand and select the key concepts in what you are teaching.

Specify explicitly the knowledge /understanding regular students will learn.	Identify how writers use language and text structure in narrative A to achieve humorous purposes and goals.	Describe the structure of leaves and the functions that occur. describe photosynthesis and the ingredients of the reaction $6H_2O + 6CO_2 + \text{light} \rightarrow C_6H_{12}O_6 + 6O_2$. They comprehend the process for particular leaves.
Select the main concepts in this specification.	• language and text structure • narrative A • humorous purposes and goals.	• structure of leaves • photosynthesis • the ingredients (H_2O, CO_2, light).
Imagine or infer how each of these concepts might change, that is, imagine each concept in a pattern.	• Different types of language structure and text structures • Different narratives • Different types of humour • Different purposes and goals	• Different structure of leaves; different shapes, sizes, thicknesses • Differences in photosynthesis; more /less efficient, faster/slower • Differences in the ingredients, for example, more or less light, hotter/colder condition

How to work the higher levels of understanding

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	Humorous text	Photosynthesis
Combine the inferred patterns and trends into a patterned understanding.	Different humour in different narratives Different purposes of humour in different narratives	Link photosynthesis with • the temperature of the leaf, the climate in which the tree is growing. • features of a leaf such as its size, its shape, the number of chloroplasts and the intensity and colour of the light, the time for which it impacts the leaf
Synthesize the patterns and trends into an intuitive theory with big ideas.	Theories about humour in different texts	Theories about photosynthesis • as critical for plant life and survival • linked with cell structure • linked with climate change • in aquatic as well as terrestrial plants • in bacteria, how green sea slug photosynthesizes, the symbiotic relationship between plants/algae and other organism

Plan the challenges/problems students will use to show their higher level of understanding.

Plan probe challenges or problems that guide the HA students to apply, use and contextualize their advanced understanding in individual and collaborative problem solving. One type of problem is the scenario problem. These problems ask students to use what they are learning about the topic to solve complex problems that are relevant to it. These problems:

- are ill-defined, may need to be clarified and lack a single solution path.
- are in "real-world" settings.
- may interact with other issues in the context.
- need information to solve them that may not be obvious or readily available.

	Differentiate a topic in Year 8 science : digestive system	Differentiate a topic in Grade 7 English
Regular	how is the release of acid into the stomach for digestion controlled ?	How did the writer of narrative A use language and text structure amuse us and to make us laugh?
Pattern	How would today's digestive system be different from that in humans 1000 years ago.	What types of humour are used in narrative A. How did the writer use language and text structure to make us laugh? How are different language structures used to communicate the different types of humor? Did writers do similar things in other narratives you've read?
Big ideas	How could digestive processes be managed to reduce the problem of obesity ?	How do different genres of writing such as a narrative, a poem, a jingle, an advertisement use language and text structure to achieve different types of humor? What is the best genre for communicating sarcasm, 'dry humor' and 'witty humor'?

Link a challenge question /problem with each level of gifted understanding

Curriculum content

Regular students learn specific topic about how and why life changed in the past, and identify aspects of the past that remained the same. They describe the experiences of an individual or group over time. They recognize the signifi[illegible]ce of events in bringing about change.

Patterned understanding: extend ideas in I direction

Link life at Lake Mungo 40,000 years ago with the food that was available and what these tell about the environment

Patterned understanding

Wh[illegible]
at L[illegible]o
hist[illegible]
evi[illegible]e
pas[illegible]

Problem /challenge : What does the study of life at Lake Mungo 40,000 years ago tell us about how to study our past. Where else in Australia might we look for evidence of earlier cultures ?

Big idea understanding: extend ideas in 2 or more directions and synthesize

Link life at Lake Mungo at various times in history and link with changes in the food eaten and the tools used and the environment

Big picture understanding

Compare life at Lake Mungo 40,000 years ago

Problem /challenge : What does the comparison of life at Lake Mungo tell us about how to study our past and about how cultures develop ? What can we infer the cultures at Lake Mungo knew ?

Link a challenge question /problem with each level of gifted understanding

Curriculum content

Regular students learn specific topic in science, eg., digestive system

Extend ideas in I direction

Link the digestive system in humans with other topics within the domain of digestion and other individual systems in the human body or other single aspects of living

Patterned understanding

How is digestion managed by nervous sy… d in … n oth…

Problem /challenge : how are health problems caused by the release of enzymes in the stomach ? How would this be managed for C 21 diets ?

Extend ideas in 2 or more direction

Link with trends across disciplines, for example, history : Predict digestive system variations in different animals

Big picture understanding

Link the digestive system in humans with other …

Problem /challenge : how would today's digestive system be different from that in humans 1000 years ago ? How will our digestive system need to adapt to predicted changes in diet over the next 100 years ?

Link a challenge question /problem with each level of gifted understanding

Curriculum content

Regular students learn specific topic in maths, eg., Pythagoras, $c^2 = a^2 + b^2$

Extend ideas in I direction

Link with another trend eg.,

- more than one right angled triangle, more that two squared terms
- use in building, architecture, civil engineering

Patterned understanding

Problem /challenge : how can Pythagoras be used to identify the properties of more complex shapes?

High ach… ^{2} + b^2 in rig… sets of t… rld problems, would Pythagoras hold on a curved /wavy/ 3D surface, explore $d^2 = a^2 + b^2 + c^2$

Extend ideas in 2 or more direction

Link with more general trends for example, in both algebra and geometry

Big picture understanding

Gifte… uplet relati… uares, the su… ld look…

Problem /challenge : can you find numbers that satisfy $d^2 = a^2 + b^{2+} b^2$ or What would $c^3 = a^3 + b^3$ look like spatially ?

Your turn 10

A key issue in Phase 3 differentiation is providing the opportunity for gifted students to consolidate, apply and extend their advanced understanding of a topic in a range of ways.

A challenge teachers frequently face is how to create higher levels of understanding of a topic that could interest and challenge gifted students. How could you apply the procedures discussed here to topics you will teach in the next few months. Examine the following:

Padlet 7 Activity - https://padlet.com/markeoliver/xqorzowd787psja4

- How could you frame up or create more intellectually complex versions of topics you will teach?
- How will you engage nonverbally and practically gifted students in pursuing this higher level understanding?
- How will you engage twice exceptional students in the consolidation process?
- What resources could assist you to frame up these higher levels of understanding?
- How could you link these higher levels of understanding with the curriculum?

Plan the knowledge pathway and probe questions for each level of complexity about a topic

When you've specified the higher levels of understanding for a topic, develop a 'knowledge pathway' plan the questions/ challenges that will guide and direct students to form each level of understanding and the learning activities and the information they will use to assist them to do this for each step in the sequence.
Some HA students will need to have their project broken into smaller modules or steps with an outcome at the end of each.

	Humorous text	maths
Regular understand-ing	Are taught to identify how writers use language and text structure in narratives to achieve humorous purposes and goals in texts they read explicitly.	solve tasks such as 74232 by renaming -38743
Identify patterns in the ideas	Link multiple types of humor in narratives: Infer multiple types of humor in narratives for example, 'laugh at life', 'slapstick', sarcasm', 'self deprecating' purposes and goals and how	subtract in base 9 or 11 : 74232_{nine} 74232_{eleven} -38743_{nine} -38743_{eleven}
	humour that works ?	
Identify generalities, rules	Infer how different genres of writing (narrative, poem, jingle, an advertisement) use different types of language to achieve different types of humor, for example, 'laugh at life', 'slapstick', sarcasm', 'self deprecating' purposes and goals.	What is the rule for using place value. How does the value of the digit affect which problems will give you the same outcome?
Identify / infer big ideas	Humour in a written text can be used to stimulate a range of feelings in readers, including sadness, scorn, amusement and happiness, for example, black humour and irony.	Place value is an arbitrary grouping. What is place value system in Roman numeral arithmetic. How do the bases affect multiplication and fractions?

The HA students can work through a project that allows them to investigate their intuitive theory about the teaching. Relevant teaching information includes on-line data sources, flipped learning opportunities, mentors, personal study/research. Key differentiated teaching considerations:

- negotiate the learning pathway early with the student and prepare with them a written 'contract' that specifies what they will achieve at the end of each step.
- ensure the student consolidates and monitors regularly what they have learnt.
- encourage the student to link emotions with the ideas being learnt
- support them to use their metacognition and intrinsic motivation to guide their activity.

Teaching at consolidation: Plan the probe questions to guide to each level of complexity

Plan probe questions to guide students to develop a more in depth knowledge of Egypt to examine further detail of Egyptian culture

Challenge for learning	How does hieroglyphics differ from contemporary written languages as a ... the people who used it?
Literal understanding ... topic	...osetta stone. Describe the characters of Egyptian writing. Explain the origin of each.
Identify a pattern across details	What patterns are in symbols on Narmer's Palette and the Rosetta stone ? What was the purpose of each for communication? How is Narmer's Palette ...ke
Trend : link pattern with factors that may influence it	Wh... ...evelop in this way?
Rules – formulate the trend a... a rule	Did rules apply to hieroglyphics or were they set as a result of the ...evelopment and use of an artistic code of writing?
Link values, attitudes with the rules	In what ways were written messages used for the public good and to foster ...s.
Understanding big ide...	... help cultures to develop, for example, its technology and industrial base

Novice understanding

Direction of teaching for gifted

Expert understanding

Planning the probe questions to guide to each level of complexity

These questions guide students develop a more in depth knowledge of a topic

	Frame up complex questions about the topic. Ask students to
Know topic literally	• identify ideas and links between them in the teaching information. • think in ways cued or scaffolded explicitly by the teaching.
Infer patterns in the ideas	• infer other specific ideas not included in the topic, generalize and summarize the key ideas. Identify what they share across a range of examples. *Look at what* • infer patterns or more general ideas that contain the ideas; imagine key aspects of the idea art of a pattern and infer, predict or decontextualize understanding across contexts, elaborate, exte d abstract the pattern to form new concepts or relationships. • link the conceptual, episodic and procedural aspects of a visualize the ideas changing and describe the new ideas. • question, speculate about the patterns, generate possibilities; *How did the patterns effect / c bute to . ?*
Infer trends	• link two or more patterns into a possible causal or consequential trend. *How / why did the affect/change the direction of the pattern ?*
Generate possibilities	• explore, analyze, reflect on aspects of the new ideas from multiple perspectives, make far tr r links and use analogies, look for possibilities and options: *What might happen if ..?* , look for po e moves and options: *"If this happens, then.., but because of .. I would….* • monitor, manage and use their knowledge efficiently and change direction or re-question what they know think about more of the aspects, elaborate and extend the ideas through questioning and link them more broadly with what you know . • think more broadly about an issue and see possibilities and options: *What might happen if ..? ;*

Regular student unders ding

Direction of teaching for gifted

Planning the probe questions to guide to each level of complexity

Identify generalities, rules	• infer and form rules or general propositions, generalize the ideas, make far transfer, identify their boundaries and use analogies. • synthesize new understanding, for example, use 'higher order' thinking strategies such as Bloom's levels of questioning. • re-organize and re-prioritize aspects of their knowledge such as the main and subord ideas at once, for example, *Make X the main idea instead of Y. How does the interpretation ge ?* • synthesize the inferred patterns into big ideas by abstracting or generalizing to form , formulate and understand rules and principles
Identify / infer ethical issues	• link moral / ethical issues with the rules or general propositions : *What / how/why sh d/might …..?*
Identify / infer big ideas	• infer how the 'big ideas' could be used to solve problems and n how they will use their new knowledge in creative, novel ways, use creative imagery thinking and analogy to generate creative knowledge and think in open-ended creative o ways, use in problem solving • use 'big ideas' in topic fluently and automatically to solve problems and make decisions, *"If this happens, then.., but because of .. I would….* • infer and investigate broader possibilities and options: *What might you do if ….. Why wouldn't you …. ?* , ask *"What if…"* and *Where could you use this ?* types of questions.

Expert understanding

Plan the challenges/problems students will use to show their higher level of understanding.

If you use the scenario problem solving as a learning format, you can ask students to organize their developing understanding using this framework .

The student's solution will identify	Cue questions that will be used to guide each student's response
the main problem?	Write down what you think the problem is in your own words
a solution?	What would the situation look like after the problem has been solved? What would you hope to achieve?
the actions needed to solve the problem ?	What do you think you would need to do to solve the problem? List as many things as you can think of.
the information/assistance they need to solve the problem and the questions they could ask ?	To do these things what do you need to know? Say these as questions you want answers to.
obstacles and difficulties in implementing their solution ?	What difficulties do you think you would face? List as many as you can.
ways of overcoming them ?	What could you do you to overcome these difficulties?
the people likely to be affected by your problem solving activity ?	You have solved the problem. Which groups of people may be affected by this? Some people may be affected in a good way and others in a bad way.
how the solution would affect the community ?	What effect do you think your actions would have on the local community?
how to monitor the effectiveness of the solution ?	What could you do to help you see if your solution was working?

How to scaffold teaching across a general context

Sequence for removing scaffolding in gifted learning and move to self management and direction of learning activity. Example : living in ancient cultures.

For one culture in each aspect, provide a learning pathway that guides the students' thinking appropriately.

For a second culture, provide the gifted students with a guiding question pathway

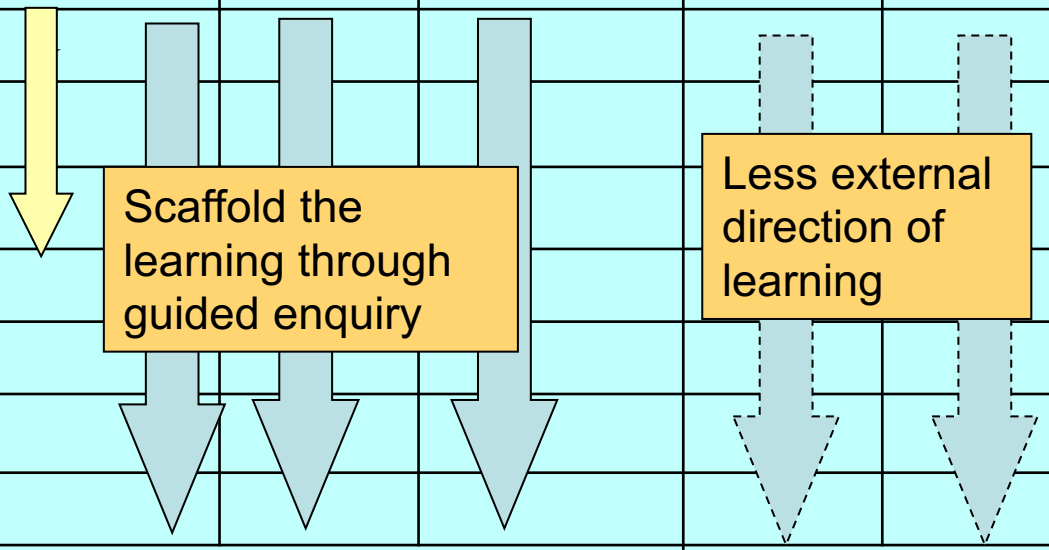
Students draw out similarities and differences and infer their causes. They infer / predict for other cultures.

They investigate their predictions in a third culture. They design their own research for communication in Athens, Japan or China. Their output is assessed in terms of the knowledge generated, the transfer of research skills and the capacity to make links between cultures.

Students draw out their findings re the knowledge that underpinned ancient cultures and the implications of this knowledge for our culture.

Integrating the aspects: History example

	Egypt			Rome	
	communic	technol	religion	commun	technol
Paradox					
Literal understanding of key ideas					
Identify patterns in the ideas					
Identify / infer possible trends					
Generate possibilities, unknown ideas					
Identify the generalities, rules about topic					
Identify / infer ethical issues re topic					
Consolidate, integrate for one culture, predict	synthesize re question : What was known in ancient Egypt?			What was known in ancient Rome ?	
Review how they learnt about the topic	What are key questions I asked re Egypt ? What ways of thinking helped me ? Develop self direction.			What key questions /ways of thinking helped re Rome ?	
Identify / infer big ideas + predict future.				What was known to both cultures?	
Link big ideas with broader knowledge					



Developing learning activities for consolidation

Plan the questions/challenges you can use to guide students to for
the information they could use to assist them to do this.

Key probe questions to guide the learning pathway

Decide how you will link the differentiated content with regular teaching. How will gifted students access/use the regular teaching ? (for example, jigsaw, accelerated progress)

You could use popular models for curriculum differentiation (
Tomlinson, Renzulli, Braggett, Kaplan) to assist with this.

Regular coaching of learning, individual and small groups

A focus here is using open-ended problem – based learning. The chall
thinking or each 'level' and 'type' of gifted understanding will be fra
information sources /mentor opportunities to inform learning for eac
collated and organised.

Diffuse problem to apply new knowledge

The challenges and stimulus information could be planne
in a domain (institutions such as CSIRO, university) and the outcomes of mapped into the learning activities.

Information sources that are accessible, subject associations, mentors

The gifted students share their knowledge with their classroom pe

Regular consolidation and monitoring of what has been learnt

Your turn 11

Teachers sometimes find teaching at Phase 3 differentiation a challenge because the content that the students work on is not within the teacher's expertise. In this section we examined identifying the sequence of questions that students can ask to progress to their 'big idea' understanding.

Mentimeter Slide 16 (Open-ended)

What steps do you think a classroom teacher can take to plan and implement the teaching at this phase?

Managing the differentiated learning at consolidation

Develop **formative procedures for monitoring talent development** by gifted learners by applying the differentiation framework to the topic and describe the knowledge and understanding in terms of national science curriculum outcomes.

Plan and clarify **your role as a learning coach** for gifted and talented students in the domain; this includes identifying key ways in which these teachers will actively scaffold and guide gifted and talented learning activity. How will you

- prepare the gifted students to manage and direct their learning pathways ?
- self monitor and direct their learning ?

Guide the students **to share their new knowledge** with peers and the broader community (they learn the skills needed to collate and communicate the outcomes of their learning).

Value of using the Australian curriculum to describe gifted and talented learning

When classroom teachers use the Australian curriculum to differentiate the teaching and curriculum for gifted and talented students, they can

- 'see' gifted students' knowledge and understanding more easily because they are familiar with the 'measuring stick' It assists them in identifying gifted underachievers
- 'see' how gifted students learn and think more easily; they know what to look for.
- describe gifted students' learning outcomes more easily; they can link them with the 'regular' knowledge pathways .
- easily link the the gifted students' knowledge with those of their peers; they can have the gifted learners share their understanding and new knowledge with those of the class.
- plan gifted learning activities and units; they will be teaching the content anyway .
- Talk more easily with colleagues, collaborate to understand gifted learning and plan together to modify their teaching; this approach gives teachers a common language for talking about gifted learning,
- Identify more cognitively complex knowledge and understanding. It is easier for teachers to see how gifted students might understand and think if the broad topic areas are part of their regular teaching
- generate and challenges and enquiry to stimulate students' knowledge; the teachers need take account of only one topic at a time.

Why my obsession with seeing gifted students' knowledge ?

A matter of equity

Only when we bother to see accurately what these students know and understand can we value their knowledge

Go on a journey through what they know about a topic vs "You are in the top 1 %".

Interact with what they know about a topic, ask questions.

This helps students see what they know about a topic and to use it.

We need tools for seeing what they know, the edges or frontiers of their knowledge at any time

Your turn 12

Reflection prompt

The focus of today's workshop has been on making gifted learning and talent development explicit in the regular classroom and to optimize the likelihood that the understanding of gifted students at any time will be recognised, valued and respected in the classroom.

Padlet 8 Activity - https://padlet.com/markeoliver/kegc2vp9fd5auhmq

- How important is it that it be made explicit and visible?
- Identify ways in which the workshop has added to your knowledge of how to cater for gifted learning and talent development in the regular classroom.
- How will your provision for these students be different in the future?

Q & A

Thank you for travelling this journey with me today.

My very best wishes with your important work in this area in the future