Rich Task Blueprint

This blueprint is designed for use in the lower years but might well be suitable for students in any year. Its suitability for particular groups of students depends on such things as choice of the form of collection, choice of incitement, and the depth, breadth and sophistication required in the demonstrations.

I DIDN'T EXPECT THAT!

(Science and maths for a rainy day)

A small group **of students (or even an *individual*), choose, and become authorities on, one or more challenging/complex mathematical or scientific "incitements" — worthwhile observations/results/concepts/experiments that should surprise, mystify, engage, or produce "cognitive dissonance" in, other people. Students demonstrate their expertise in one chosen incitement, and design and construct a self-contained physical product and/or text for others to experience, and to learn something from, this incitement. Together, a number of small groups construct one or more polished, "portable" collections of the stand-alone experiences in science and/or mathematics they have created and make arrangements so that collections are held and available in some way to others (and possibly themselves).**

Students search out, engross themselves in, and learn something from, a few different sorts of incitement; e.g. they do the experiment, solve the problem or puzzle, search for explanations.

EXAMPLES OF INCITEMENTS

Bouncing balls; bubbles; properties of "Newton's balls"; effects of gravity on objects dropped or thrown; floating and sinking; unusual animal behaviours; colour mixing; published mathematical puzzles; the triangle inequality; natural indicators or remedies; kitchen chemistry; logic puzzles; Euler's theorem; graphs and networks; a known counter-intuitive scientific claim (e.g. that hot water freezes faster than cold); a commonly held scientific myth or belief; map colouring theorems; snowflake curves; pinhole cameras, or "Why am I upside down in a spoon?"; identity matching e.g. fingerprinting; average speed is not the average of the speeds; casting out 9s; making classification keys; optical illusions; electrical projects; Pascal or Fibonacci numbers; slimes and polymers; burning tea bags; Golden section; bird's eye views; Sudoko puzzles (Latin squares) or magic squares; binary numbers; tessellations; flexagons; sum of 1, 2, …, *n*; the infinite or infinitesimal.; unexpected probabilities; (irrational) square roots

Students select the incitement on which they will base their efforts in the Rich Task designed by your school.

KEY QUESTIONS
(so the various demands of the school's Rich Task can be fulfilled well)

- Will I be up to becoming an authority on this incitement?
- Can I see a way to demonstrate my expert knowledge about this incitement?
- Can I see a way, suited to the collection, of designing and constructing the content of a self-contained physical display or text based on this incitement?

The task components on this page do not need to be done in any particular order; they could even occur concurrently.

Students demonstrate however they like — "no holds barred" — that they are authorities on their chosen incitement i.e. "they know what they are talking about". Ideally, students can also show themselves working mathematically/scientifically.

EXAMPLES OF DEMONSTRATIONS OF AUTHORITY

Any (combination of) such things as

- outline the history/ context of the incitement
- demonstrate an experiment and explain the results
- set up a problem and explain the difficulties to be overcome
- show alternative solutions, or extend a result
- reflect on how their explanations/theories have developed
- exhibit "hands-on" displays
- provide assistance to others engaging in the incitement.
- respond to a grilling by an audience.

Students design and construct the content of a self-contained physical display or text, based on their chosen incitement.

KEY QUESTIONS

- How will the incitement be presented to surprise, mystify, engage, or produce "cognitive dissonance"?
- Will, and how can, the audience have opportunities to conjecture, explain, "trial and test" etc?
- What is the audience meant to learn (e.g. that a certain thing happens, why it happens, competing explanations, the implications)? How will they learn it?
- Will the audience be given an opportunity to: provide feedback; provide and/or test their own explanations; raise questions or suggest possible extensions that arise, etc.

The *form* of the collection is chosen, with the following considerations taken into account:

- **groups of students must be able to create self-contained physical products and/or texts in that form**
- **the intended use of the collection**
- **the need for the entire collection to be portable — "able to be taken as cabin baggage" — and to be retained conveniently**
- **the implications of the choice of repertoires that will be taught**
- **the possibility of multiple-form collections**
- **resourcing and other implementation issues.**

KEY QUESTIONS

- Is the collection designed for a particular audience to experience every incitement or will only some of the provocations suit some readers?
- If so, how will the audience know which incitements to experience?
- How will the collection be organized, sequenced, indexed etc?
- How will the collection, or copies of it, be produced and made available?
- Are there copyright considerations?

Come up with a set of specifications guiding how the self-contained physical products and/or texts are to appear in the collection. These specifications will depend on the nature of the collection, but could cover such things as mediums, paper size, layout, illustrations, typefaces, structures and sequences, and colours.

EXAMPLES OF POSSIBLE COLLECTIONS, OR PARTS OF THEM

- classroom frieze made up of individual small posters
- video or PowerPoint presentation of demonstrations
- book of simple science experiments
- board game with explanatory cards
- book of questions and answers
- programmed learning course
- workbook or puzzle book
- pages on a website
- tablemats
- kit

Does the application of common formats etc, and the polishing, take place during creation of the self-contained physical product and/or text, during creation of the collection, or a bit of both?

Together, a number of small groups construct a polished, portable collection of the stand-alone experiences they have created and make arrangements so that this collection is held and made available in some way to others (and possibly to themselves).

I Didn't Expect That!
Standards, referents, repertoires

The following standards, New Basics referents and targeted repertoires of practice apply to any valid implementation of this Blueprint. A school may supplement the New Basics referents with other sets of valued practices and/or learnings (e.g. QCAR Essential Learnings). Additional standards, New Basics referents and targeted repertoires of practice may come into play in a particular implementation by a particular school; if so, they are to be recorded in the task documentation.

Standards

Desirable features indicate what high-quality performance in the task will look like. *Acceptable performance* represents full task completion, at an acceptable level. (See the Grading Master.)

Desirable features

Expert knowledge: Extensive conceptual and/or technical mathematical/scientific knowledge of

- what is behind a challenging/complex, chosen incitement, and
- the ways that people tend to respond to this incitement, and why

Engaging text: (Composition of) A self-contained and engaging physical product and/or text that invites an external audience to experience the incitement with interest or enjoyment, and to gain something worthwhile mathematically or scientifically from it in the process

Delivery to specifications:

- (Group/individual) Transformation/refinement of self-contained physical product and/or text according to detailed specifications, so that the transformed text is polished and in harmony with the rest of the collection, yet makes a distinctive contribution to the collection
- (Number of small groups/individuals) Presentation of a coherent, polished and portable collection that is held and available to others

Acceptable performance

Expert knowledge: Understanding of what a chosen non-trivial incitement is basically about

Engaging text: Self-contained and engaging physical product and/or text that invites an external audience to do something mathematical or scientific with interest or enjoyment

Delivery to specifications:

- (Group/individual) Some of the specifications are evident
- (Number of small groups/individuals) A collection with some coherence

New Basics referents

"…groups of core, essential sets of practices that young Queenslanders need to survive and flourish in new economic, social and cultural conditions. As a set, they are not meant to be exhaustive, nor could they be. They are limited selections from an infinite set of possibilities. Teachers and schools will include other knowledges—local, traditional, multicultural, and alternative." (New Basics Technical Paper)

Life Pathways and Social Futures
Who am I and where am I going?

- Collaborating with peers and others
- Developing initiative and enterprise

Environments and Technologies
How do I describe, analyse and shape the world around me?

- Developing a scientific knowledge of the world

Multiliteracies and Communications Media
How do I make sense of and communicate with the world?

- Blending traditional and new communications media

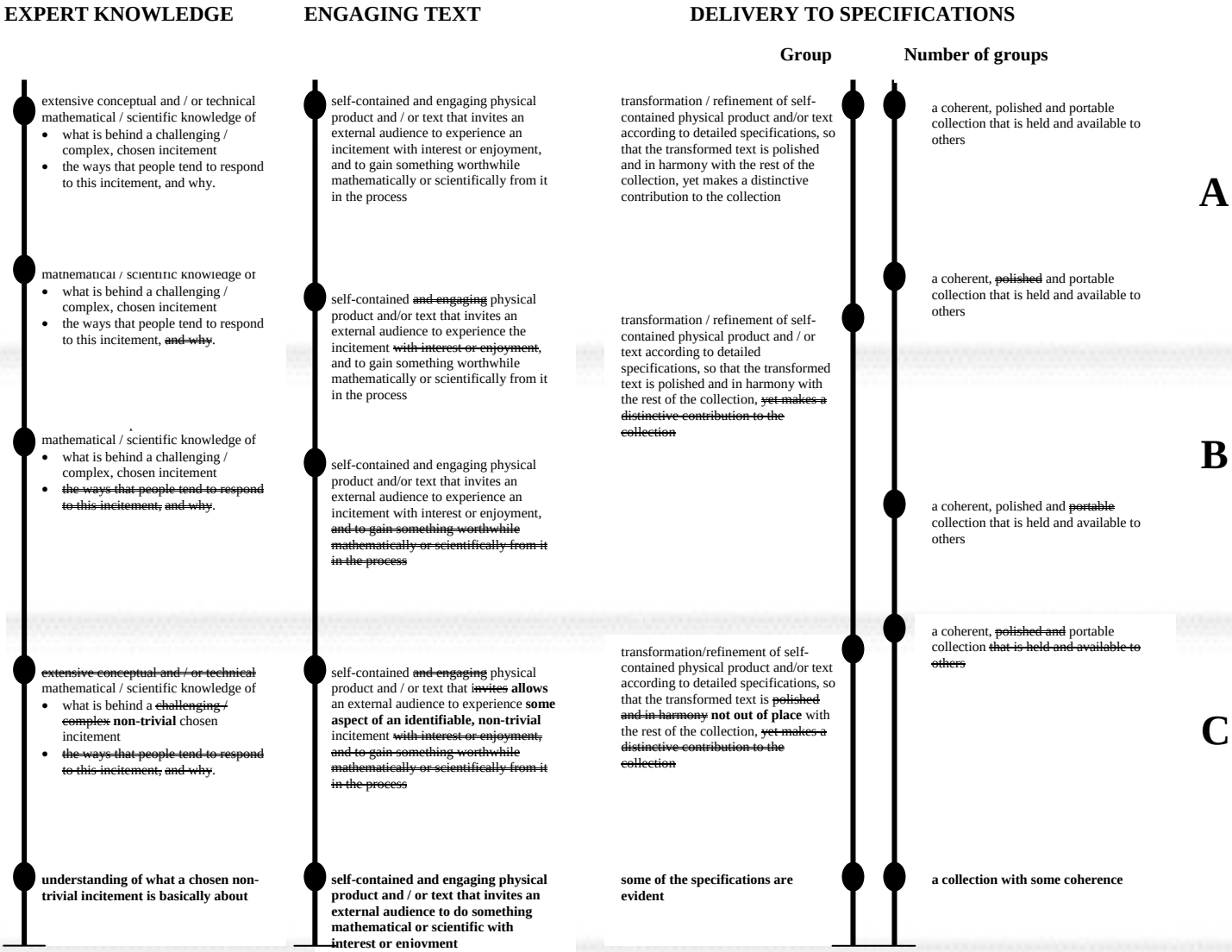
Targeted repertoires of practice

The cognitive and cultural, linguistic and social skills needed to be acquired developmentally in order to complete the Rich Task.

- Choosing the form of a product/text to fulfil a particular purpose
- Compiling related individual works
- Creating product/text specifications
- Developing and acknowledging expertise
- Engaging, and gaining the confidence and respect of, an audience
- Facilitating the sharing of resources
- Knowing about, and taking into account, copyright laws
- Observing and taking on board audience reactions
- Polishing a product/text to publishable standard
- Working scientifically (mathematically), including
  - conjecturing and providing scientific explanations, and seeing how they stack up against existing facts and theories
  - experimenting with ideas
  - exploring and extending concepts

I Didn't Expect That!

Draft Grading Master



Notes

1. It is vital that, as usual, assessment in each pole be carried out across the entire collection of students' demonstrations.
2. A school can include a supplementary assessment pole of its own design when it is believed that the existing poles do not sufficiently cover the range of what students in that school have learnt specifically as a result of engagement in this task.
3. Words that are ~~struckthrough~~ apply to a higher referent, but not the current one; words in **bold** do not appear in higher referents.