Proposed Project: Developing students' skills in problem finding for the Google era – the Library contribution

Wendy Haszler, RMIT University Library
November 2013

RMIT
UNIVERSITY

Developing students' skills in problem finding for the Google era

Proposed Project

❖ Proposed project – application submitted for OLT funding, to run 2015-2016

❖ Being led by an engineering academic at RMIT who is interested in teaching creativity in education

❖ Collaborative   with academics at LaTU, UNSW & UNE

with librarian at RMIT University (so far!)

❖ Aim to produce a handbook of successful strategies

What is the proposed project about?

❖ 'This project will provide a means by which students can creatively tackle open-ended and ill-defined problems in this 'Google era'.

❖ The focus is on the disciplines of Science, Engineering, Health and Business, but I am interested to discuss this more widely too.

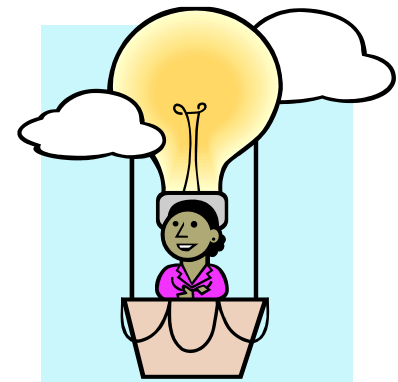# Developing students' skills in problem finding for the Google era

What is Problem Finding?

'Problem finding' is a stage of the problem solving process that is closely related to critical thinking and is usually defined as 'the process by which alternative views or definitions of a problem are generated and selected for further consideration in arriving at a formulation of a problem' (Fontenot 1993).
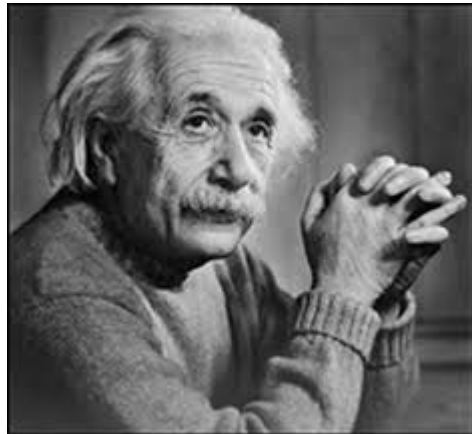
Problem finding is often referred to as

- problem discovery
- problem identification
- problem analysis
- problem shaping
- problem framing
- problem definition
- problem construction

This involves the application of **creativity**

Developing students' skills in problem finding for the Google era

"The formulation of a problem is often more essential than its solution, which may be merely a matter of mathematical or experimental skill. To raise new questions, new possibilities, to regard old questions from a new angle, requires creative imagination and marks real advance in science".

Albert Einstein, The Evolution of physics, Cambridge, Cambridge University Press,1938, p. 92.

Developing students' skills in problem finding for the Google era – Library perspective

❖ How do librarians facilitate the development of problem finding and problem solving skills in students who need to search for information across a range of resources and tools, from Google to highly structured library databases?

❖ How do librarians teach students to "translate" an assignment or research topic into a search strategy?

❖ For example:

- Do you teach students to find synonyms and other keywords to describe their topic?

- Do you do this for students at all levels?

- Do you teach students to think about hierarchies of subjects,

- Do you discuss how library database algorithms differ from the Google algorithm?

- Do you teach students how to evaluate their results?

- Do you teach students how to save their references?

Developing students' skills in problem finding for the Google era – Library perspective

❖ How does this topic fit with the
- Australian and New Zealand Information Literacy (ANZIL) Framework
- Research Skill Development Framework? (J. Willison at Univ of Adelaide)

❖ Are librarians structuring sequences of classes to develop the Levels of Student Autonomy… and which facets of enquiry they focus on…

❖ Interested to know if any of us have the concept of fostering **creativity** when planning lessons?

❖ What are your thoughts?

❖ Wendy.haszler@rmit.edu.au

Research Skill Development Framework

A conceptual framework for the explicit, coherent, incremental and spiralling development of students' research skills

www.rsd.edu.au

Extent of Students' Autonomy

What characterises the difference between 'search' and 'research'? More searching and more data generation is just a 'biggasearch'! Research is when students…

		Level 1 (Prescribed Research) — Highly structured directions and modelling from educator prompt student research	Level 2 (Bounded Research) — Boundaries set by and limited directions from educator channel student research	Level 3 (Scaffolded Research) — Scaffolds placed by educator shape student independent research	Level 4 (Student-initiated Research) — Students initiate the research and this is guided by the educator	Level 5 (Open Research) — Students research within self-determined guidelines that are in accord with discipline or context.
a. Embark & Clarify Respond to or initiate research and clarify or determine what knowledge is required, heeding ethical/cultural and social/team considerations.	Curious	Respond to questions/tasks arising explicitly from a closed inquiry. Use a provided structured approach to clarify questions, terms, requirements and expectations.	Respond to questions/tasks required by and implicit in a closed inquiry. Choose from several provided structures to clarify questions, terms, requirements and expectations.	Respond to questions/tasks generated from a closed inquiry. Choose from a range of provided structures or approaches to clarify questions, terms, requirements and expectations.	*Generate questions/aims/ hypotheses framed within structured guidelines*.	*Generate questions/aims/ hypotheses based on experience, expertise and literature*.
b. Find & Generate Find and generate needed information/data using appropriate methodology.	Determined	Collect and record required information or data using a prescribed methodology from a prescribed source in which the information/data is clearly evident.	Collect and record required information/data using a prescribed methodology from prescribed source/s in which the information/data is not clearly evident.	Collect and record required information/data from self-selected sources using one of several prescribed methodologies.	Collect and record self-determined information/ data from self-selected sources, choosing an appropriate methodology based on structured guidelines.	Collect and record self-determined information/data from self-selected sources, choosing or devising an appropriate methodology with self-structured guidelines.
c. Evaluate & Reflect Determine and critique the degree of credibility of selected sources and of data generated, and reflect on the research processes used.	Discerning	Evaluate information/data and reflects on inquiry process using simple prescribed criteria.	Evaluate information/data and reflect on the inquiry process using given criteria.	Evaluate information/data and inquiry process using criteria related to the aims of the inquiry. Reflect insightfully to improve own processes used.	Evaluate information/data and the inquiry process comprehensively using self-determined criteria developed within structured guidelines. Reflect insightfully to refine others' processes.	Evaluate information/data and inquiry process rigorously using self-generated criteria based on experience, expertise and the literature. Reflect insightfully to renew others' processes.
d. Organise & Manage Organise information and data to reveal patterns and themes, and manage teams and research processes.	Harmonising	Organise information/data using prescribed structure. Manage linear process provided.	Organise information/data using a choice of given structures. Manage a process which has alternative pathways.	Organise information/data using recommended structures. Manage self-determined processes with multiple possible pathways.	Organise information/data using student-determined structures, and manage the processes, within the parameters set by the guidelines.	Organise information/data using student-determined structures and management of processes.
e. Analyse & Synthesise Analyse information/data critically and synthesise new knowledge to produce coherent individual/team understandings.	Creative	Analyse and synthesise information/data to reproduce existing knowledge in prescribed formats. *Ask emergent questions of clarification/curiosity*.	Analyse and synthesise information/data to reorganize existing knowledge in standard formats. *Ask relevant, researchable questions emerging from the research*.	Analyse and synthesise information/data to construct emergent knowledge. *Ask rigorous, researchable questions based on new understandings*.	Analyse and create information/data to fill knowledge gaps stated by others.	Analyse and create information/data to fill student-identified gaps or extend knowledge.
f. Communicate and Apply Write, present and perform the processes, understandings and applications of the research, and respond to feedback, accounting for ethical, social and cultural (ESC) issues.	Constructive	Use mainly lay language and prescribed genre to demonstrate understanding for lecturer/ teacher as audience. Apply to a similar context the knowledge developed. Follow prompts on ESC issues.	Use some discipline-specific language and prescribed genre to demonstrate understanding from a stated perspective and for a specified audience. Apply to different contexts the knowledge developed. Specify ESC issues.	Use discipline-specific language and genres to demonstrate scholarly understanding for a specified audience. Apply the knowledge developed to diverse contexts. Specify ESC issues in initiating, conducting and communicating.	Use discipline-specific language and genres to address gaps of a self-selected audience. Apply innovatively the knowledge developed to a different context. Probe and specify ESC issues in each relevant context.	Use appropriate language and genre to extend the knowledge of a range of audiences. Apply innovatively the knowledge developed to multiple contexts. Probe and specify ESC issues that emerge broadly.

(Left margin: Facet of Research)

… spiral through the facets, adding degrees of rigour and discernment as they dig and delve.

Research Skill Development (RSD), a conceptual framework for Primary school to PhD, developed by John Willison and Kerry O'Regan ®, October, 2006/November, 2012. Facets based on: ANZIIL (2004) Standards & Bloom's et al (1956) Taxonomy.
* Framing researchable questions often requires a high degree of guidance and modelling for students and, initially, may need to be scaffolded as an outcome of the researching process (Facet E, Levels 1-3). After development, more students are able to initiate research (Facet A, Levels 4 & 5)*. The perpendicular font reflects the drivers and emotions of research. Framework, resources, learning modules and references available at http://www.rsd.edu.au. For info: john.willison@adelaide.edu.au