

From shed to head: A conceptual toolkit for social sciences

Nigel Parsons

Politics Programme
Massey University

Scott Symonds

Centre for Teaching & Learning
Massey University

The conceptual toolkit is a heuristic device for teaching and learning key concepts and is grounded in Cognitive Load Theory (CLT). It focuses attention by stripping away extraneous material, encouraging a focus on the germane. This project brings the toolkit into virtual existence as a digitally animated interactive resource in the form of an extended metaphor. Key disciplinary concepts are represented as a 'tools' that can gain traction on data like a spanner on a bolt. Tools are acquired by learners and organized in a 'tool shed' ready for use. The tool shed allows students to organize concepts into memorable clusters; tools are organized on shelves akin to cognitive schemata in long-term memory. Subsequently learners may select tools appropriate to a specific 'job' and, extending the metaphor, these are placed into a traditional steel cantilever toolbox ready for use. Exercises then scaffold application and analysis, facilitating higher level thinking; tools are 'picked up' by working memory for application to tasks such as case study or comparison. Reflection on the suitability of tools selected allows for deeper synthesis and understanding.

Keywords: Conceptual toolkit, cognitive load, cognitive schemata, long-term memory, working memory

The metaphor of the toolkit

The 'toolkit' is an established pedagogical metaphor, with examples extending from philosophy (Baggini 2002) and ethics (Cooper 2008), to biology (Janssen 2008) proteins (Price 2009), conceptual modeling (Wieringa 2003) and urban infrastructure (NIWA 2012). The metaphor has also been extended to political thought (Roberts 2004); similarly, Heywood (2000, 2007), places an emphasis on concepts. This project extends the metaphor in a manner consistent with the lessons of CLT.

CLT and the toolkit

Mayer and Moreno propose multiple solutions to cognitive overload including "pretraining in names and characteristics of components" in a "mental model".

The tool shed: Reducing cognitive load

Stage one of engagement with the toolkit corresponds to "pretraining". This is done through acquisition and organization of tools for the shed; stocking the shed allows students to build "component models (i.e., representations of how each component works)." The shed stage requires "active processing" and encourages "meaningful learning", with students "mentally organizing the presented material into a coherent structure, and integrating the presented material with existing knowledge." Shelves in the shed are akin to cognitive schemata in long-term memory.

The toolbox: Encouraging higher level thinking

Stage two requires students to choose a small number of tools for a box appropriate to a particular job; selection and application to empirical material then facilitate construction of a "causal model (i.e., a representation of how a change in one part of the system causes change in another part, etc.). Beneficial outcomes include "better transfer" because "students know names and behaviors of system components" (Mayer and Moreno 2003). Tools picked up by working memory bring conceptual clarity to a case study or comparison.

The conceptual toolkit in Politics and Middle East studies

The toolkit reflects a teaching ethos and political commitment: that higher level thinking develops as concepts expedite analysis, analysis reveals patterns, and patterns render the complex comprehensible; and that education can empower individuals to analyse and so to read, listen or watch politics on a deeper level for themselves. The toolkit is intended to support learning within and beyond a tertiary environment.

One sample concept in Politics is legitimacy, a quality that “confers on a command an authoritative or binding character, thus transforming power into authority” (Heywood 2007: 219). For Weber, authority takes three forms: traditional, charismatic, and legal-rational (through mechanisms such as free and fair elections). Upheaval in the Arab world appears confusing. But the concept of legitimacy brings clarity, revealing deficits in the authority of Arab governments across the region and patterns in dynamic regional politics.

The toolkit is intended to have generic applicability; opening up the cognitive process to social science students in general could be done in tandem with the development of discipline specific learning skills. The capacity for ready customization is an integral feature of the resource: the ‘shed’ provides organization and storage space within which students can build a “component model” of concepts from Sociology, Social Anthropology or Human Geography as readily as Politics; the selection and application of concepts via a job-specific ‘box’ facilitates construction of a “causal model” with equally generic pedagogical value.

Development of a prototype of the toolkit is underway; a trial is planned with first year Politics students at Massey University during semester one 2013. The trial will be followed up with student evaluation using a tailored questionnaire via the Massey Online Survey Tool (MOST), plus peer review by social science colleagues from the GASP group within Massey University (Geography, Anthropology, Sociology and Politics). Feedback will inform further development of a stand-alone version that will be made publically available under a creative commons licence.

References

- Baggini, J. & Fosl, P. (2002). *The philosopher's toolkit: A compendium of philosophical concepts and methods*. John Wiley & Sons.
- Boserup (2012). The Arab Spring: New directions in teaching and researching the Middle East. *British Society for Middle Eastern Studies* annual conference. London.
- Cooper, B., Leung, P., Dellaportas, S., Jackling, B. & Wong, G. (2008). Ethics education for accounting students - a toolkit approach. *Accounting Education: An International Journal* 17(4), 405-430.
- Dehne, F. & Wieringa, R. (2003), *Toolkit for conceptual modelling (TCM)*. <http://wwwhome.cs.utwente.nl/~tcm/> [viewed 9 August 2012]
- de Jong, T. (2010). Cognitive load theory, educational research, and instructional design: some food for thought. *Instructional Science* 38, 105-134.
- Herrod, J. (2000). *Cognitive overload*. <http://www.jchconsulting.com/fall2000/index.htm> [viewed 9 August 2012].
- Heywood, A. (2007). *Politics (3rd ed.)*. Palgrave Macmillan.
- _____ (2000). *Key concepts in politics*. Palgrave Macmillan.
- Janssen, F. & de Hullu, E. (2008). A toolkit for stimulating productive thinking. *Journal of Biological Education*, 43(1), 21-26.
- Jin, S.-H. & Boling, E. (2010). Instructional designer's intentions and learners' perceptions of the instructional visuals in an e-learning context. *Journal of Visual Literacy*, 29(2), 143-166.
- Mayer, R. & Moreno, R. (2003). Nine ways to reduce cognitive load in multimedia learning. *Educational Psychologist* 38(1), 43-52.
- NIWA, MWH, GNS and BRANZ. (2012). *Impacts of climate change on urban infrastructure and the built environment: Toolbox handbook*. <http://www.niwa.co.nz/climate/urban-impacts-toolbox> [viewed 9 August 2012]
- Paas, F., Renkl, A. & Sweller, J. (2003). Cognitive load theory and instructional design: Recent developments. *Educational Psychologist* 38(1), 1-4.
- Price, N. & Nairn, J. (2009). Conceptual toolkit: the molecular principles for understanding proteins. In *Exploring proteins: a student's guide to experimental skills and methods*. Oxford University Press. http://www.oup.com/uk/orc/bin/9780199205707/price_ch01.pdf [viewed 9 August 2012]
- Roberts, P. & Sutch, P. (2004). *An introduction to political thought: A conceptual toolkit*. Edinburgh University Press.

Stewart, T. (2011). *Tips for designing better lessons by taking into account Cognitive Load Theory*. Massey University.
van Merriënboer, J. & Sweller, J. (2010). Cognitive load theory in health professional education: design principles and strategies. *Medical Education* 44(1), 85-93.

Author contact details:

Nigel Parsons, n.parsons@massey.ac.nz

Please cite as: Parsons, N., & Symonds, S. (2012). From shed to head: A conceptual toolkit for social sciences. In M. Brown, M. Hartnett & T. Stewart (Eds.), *Future challenges, sustainable futures*. Proceedings ascilite Wellington 2012. (pp.740-742).

Copyright © 2012 Nigel Parsons and Scott Symonds.

The author(s) assign to the ascilite and educational non-profit institutions, a non-exclusive licence to use this document for personal use and in courses of instruction, provided that the article is used in full and this copyright statement is reproduced. The author(s) also grant a non-exclusive licence to ascilite to publish this document on the ascilite website and in other formats for the Proceedings ascilite 2012. Any other use is prohibited without the express permission of the author(s).