

Transformational Learning and Serious Game Design

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A joint university-industry, six country, 8.2 million euro European project on the development of a *serious game*¹ for the continuing education of project and innovation managers is incorporating both the threshold concept and the communities of practice frameworks into the *game*'s pedagogic underpinning (TARGET)². The *game* is situated in a virtual world environment where learners enact roles in stories and may also discuss amongst themselves their experiences of the executed stories. Addressing the social aspect of learning within a *serious game* has brought the threshold concept and the communities of practice frameworks jointly and sharply into a focus, highlighting the problematic relationship between the individual and a learning community with its still several unresolved issues.

The conventional approach in the continuing professional development of project managers is to concentrate on identifying competence gaps and on their rectification structuring the teaching around *knowledge management*, a mechanistic approach rooted in monist epistemology³. This leads to the dichotomy that many formally well-qualified individuals fail to function effectively, i.e. the transformation to 'thinking like a manager' does not occur. TARGET has chosen an alternative approach of *managing knowing*³; more dynamic and consistent with social constructivism which will, whilst retaining the obligatory emphasis on formal competences, bring to the fore through the *game* scenarios the ontological and epistemic shifts necessary for the individual's transformation.

Although there is an excellent body of work on the troublesome aspects of entering a virtual world learning environment^{4,5}, the incorporation of the threshold concept framework into an actual disciplinary core and design of the digital learning process has not previously been attempted. TARGET's migration of the framework into this new arena directly addresses the missing transformation.

The threshold concept framework contributes at several levels. Cousin's comments⁶ on the 'overcrowded curriculum' transfer neatly to the design of the *game*'s scenarios. Keeping these within a focussed manageable size is critical. The ability of a *game* to present several credible scenarios beyond those available in the real world is a major strength which is being formalised in terms of a third contemporary framework that also shares a common focus with the threshold framework; the variational theory of learning⁷. This virtual world allows learners to establish themselves within their community and also provides the opportunity for a learner to enhance their capacity for metalearning and critical reflection⁸.

Relevant threshold concepts are being identified by a major study involving courses within NTNU and the Norwegian School of Management and drawing on an extensive analysis of learner difficulties carried out over twelve years within the Siemens Austria. Two troublesome concepts identified within

a course in negotiation, the distinction between individuals' position and their interest when negotiating and best alternative to a negotiated agreement, are used to exemplify the above developments. The course is strongly case based and PBL oriented, hence facilitating the implementation of suggestions that PBL may be revitalised by virtual world applications⁵ and that problem focused learning may help learners grasp Threshold Concepts⁹.

1. de Freitas, S. (2008) *Serious Virtual Worlds: A scoping study* and (2006) *Learning in Immersive worlds: A review of game-based learning*, JISC,
<http://www.jisc.ac.uk/media/documents/publications/seriousvirtualworldsv1.pdf>
http://www.jisc.ac.uk/media/documents/programmes/elearninginnovation/gamingreport_v3.pdf
2. TARGET - http://cordis.europa.eu/fp7/ict/telearn-digicult/telearn-projects-target_en.html
3. Comas, J. and Sieber, S. (2001) *Connecting Knowledge Management and Experiential learning*, Global Co-Operation in the New Millennium, The 9th European Conference on Information Systems, Bled, Slovenia.
4. Bayne, S. (2008), *Uncanny spaces for higher education: teaching and learning in virtual worlds*, Alt-J, Research in Learning Technology, **16 (3)**, 197–205.
5. Savin-Baden, M. (2007) *Second Life PBL: Liminality, Liquidity and Lurking*, Keynote Speech, Reinventing Problem-based Learning Conference, Republic Polytechnic, Singapore 7–9th March
6. Cousin, G. (2008), *Threshold Concepts: Old Wine in New Bottles or New Forms of Transactional Inquiry?* in Threshold Concepts within the Disciplines, Land, R., Meyer, J.H.F. and Smith, J., (eds), Sense Publishers, Rotterdam, pp 261–272.
7. Meyer, J.H.F., Land, R. and Davies, P. (2008), *Threshold concepts and troublesome knowledge (4): Issues of variation and variability*, in: Land, R., Meyer, J.H.F. and Smith, J., (eds), Threshold Concepts within the Disciplines. Sense Publishers, Rotterdam, pp 59–74.
8. Meyer, J.H.F, Ward, S.C. and Latreille, P. (2009), *Threshold concepts and metalearning capacity*, International Review of Economics Education, **8 (1)**, 132–154.
9. Biz/ed (2009) Threshold Concepts: Problem-Focused Learning. A guide for teachers and lecturers, <http://www.bized.co.uk/educators/he/threshold/pflintro.htm>