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The Reading Game – encouraging learners to become *question-makers* rather than *question-takers* by getting feedback, making friends and having fun*.*

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Abstract: The **Reading Game** is a question and answer game designed to engage learners in the content of their coursework. The class of student participants creates a collective learning space where every action serves to introduce, build, or clarify concepts from the curriculum. The quality of the multiple-choice questions and the contents of the quizzes are determined by the participants who receive points for their efforts in both asking and answering questions. Participants can comment on and rate questions deemed outstanding by their peers, which directly impacts the contents of review quizzes. Participants progress to the next level of the game using their accumulated points onto asking **open questions** to the teachers and their cohort. Writing good questions is the winning strategy of the game. The key claim in the **Reading Game** is that creating questions is one of the fundamental cognitive elements that guide our conscious reasoning.
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Theoretical Background to the Reading Game

The key claim in the **Reading Game** is that creating questions is one of the fundamental cognitive elements that guide our conscious reasoning (Graesser et al., 2005). For example, in the game, the act of *asking* is recalling; *answering* is recognising; *quizzes* are reviewing; an *open question* is researching; *commenting* is collaboration and reflection; and *rating* is feedback (Walsh & Sattes, 2005; van Staalduinen & de Freitas, 2011). These explicit acts in the game form the architecture for *continuous formative assessment* and *meta-cognition* (Nicol & Macfarlane-Dick, 2006; McIntosh, 2010; Biggs, 1999) that are implicit in the **Reading Game**, by creating webs of coherent reasoning that are built around the difficult questions we ask and the iterative answers we give to these questions.

Further, explanatory reasoning is derived from distinctive classes of questions, such as "*why this and not that*", "*how to do this with that*", and "*what if then this else that*" and so on, that invite the construction of causal chains of explanation, aim-plan-do hierarchies, and logical arguments or mere justifications (Graesser & Black, 1985; Morgan & Saxton, 2006). These classes of questions can be mapped onto hierarchical learning taxonomies like *Bloom's Digital Taxonomy* (revised by Krathwohl, 2002) that allow a learner's progress toward understanding to be determined as well as the nature of the learner's reflective practice. (McIntosh, 2010).

This game utilises some psychological mechanisms (a *desire to win* and the *progression to mastery*) to underpin

our question asking and answering, supported by some empirical mechanisms (game thinking and game mechanics, such as: the *challenge achievement pleasure cycle* and *status building*), to contend that educational technology can be designed to facilitate question-lead coherent reasoning, to learn a field of knowledge and to discover its *threshold concepts (*Zichermann & Cunningham, 2011; Schell, 2008; Meyer & Land, 2003*)*.

This project will seek to address alleged student behaviour as passive receivers of course content and asking fewer questions with consequent higher dropout rates, that is reported in recent research (Anderson & Rainie, 2012; Michinov et al., 2011; Tapscott, 2009).

What is the Reading Game? Its Design, Scope, Pedagogy and Evaluation

To any course participant, the **Reading Game** is just that - a game about the content of a course. It leverages *game mechanics* to make the participants' interactions with the game, fun. *Game mechanics* are rule constructs and feedback loops to enable game play of non-game content (Schell, 2008). To the convenor of a course, however, it is much more. The **Reading Game** is a crowd-sourcing framework that enables a group of participants to collaboratively create a learning space in which every action serves to introduce, build, or clarify concepts from the course material by asking questions. The quality of the multiple-choice questions is up to the participants who receive points for their efforts in both asking and answering questions. Participants can also rate and comment on questions, allowing them to directly impact the contents of review quizzes, while activating a secondary reward called 'stars' for those participants whose questions are deemed outstanding by their peers. As the game progresses, participants are offered the opportunity to progress to the next level, which entails asking **Open Questions** by using their accumulated points. The teacher and their cohort of learners provide the answers to the Open Questions.

The unusual presentation of the questions, the points, the progress bar, the stars, the rating system and how questions are answered, are designed using *game thinking* (Zichermann & Cunningham, 2011) rather than a traditional pedagogical model. The aim of this game is to make learning fun and challenging at the same time while taking advantage of the widely reported enthusiasm students have shown for game play (Lenhart et al., 2008, Armitage, 2012) and in a way that complements existing educational tools by integration into Moodle and other learning management systems via LTI; while providing a unique educational experience within contemporary learning management systems.

The completed first stage of the project was to design and code the game as a Moodle module. The second stage is trialling it in two Faculty of Science units in 2013, *GEOS251: Minerals, Energy & the Environment* and *STAT273: Introduction to Probability*, to test the robustness of the code and the user interface. The third stage (in progress) is to go through a code review for acceptance into Moodle as a valid module by Netspot P/L for use in the wider Moodle community. The fourth stage (in progress) is to design a series of pedagogies to use with the **Reading Game** and deploy the analytics from the game to create new teaching opportunities and student engagement. Every learning and teaching technology needs a pedagogy and *vice versa*.

The fifth stage is to deploy it in all faculties at Macquarie University during 2014, with up to eight conveners using the **Reading Game** activity in their *iLearn* (Moodle) courses. For the *quantitative analysis* of the game play, course convenors will be looking at the analytics from the game behaviours (points, stars and comments) and how this correlates to students' performance in the formal assessments in the course. The association between the results of the assessment tasks (whose nature can vary between and within the courses) and the analytics from the game will be assessed with a generalised linear model regression. The regression will be adjusted for demographic covariates and will use data collected from all the students or only from the players of the game, when playing the game won't be a compulsory activity. All the analyses will be performed in R (R Core Team, 2012). Early results show positive and significant association between game behaviours and performance in the assessment tests. This will be measured and aggregated throughout the semester for the whole class.

An ethics application is being prepared so that students' questions and comments can be sighted in the *qualitative analysis* that will look at the types of questions being asked and the improvement or otherwise of individual student's question asking and participation levels measured against the objectives of a learning taxonomy. The investigation will also assess whether it deepens student understanding by a close reading of the course content, by the creation of quality questions that relate to the threshold concepts in the course as the class of participants progress to the next level of the game. At the **Open Question** level participants are well practised at constructing questions, the focus shifts to a deeper understanding of the content of the course. The game uses *crowd sourcing* for learning and enquiry into the course content, so potential breakthroughs in understanding by

one student can potentially transfer to others playing the game. The use of this game has implications for curriculum design, learning design for technology use and learning systems. Other evaluation methods will involve student feedback and surveys, unit convenor reflections and peer review of teaching.

What is the value or need for gamifying course content?

The gamification of education lines up with the cognitive processes associated with learning and teaching taxonomies; i.e. serious games if well targeted, pull students through the detailed information onto making higher order judgements (in a continuous gamification loop). If a game is well designed, then irrespective of the nature of the work (i.e. knowledge acquisition) required to play the game, it engages the player with the same cognitive stimulation (i.e. passion for winning or status) and the progression to mastery, by breaking the work down to achievable steps, so it ends up being a fun experience because it creates self-discovery (Schell, 2008; Zichermann & Cunningham, 2011).

The **Reading Game** is <u>not</u> just a quiz and it is <u>not</u> about literacy, it is about discovery and making you part of the knowledge experience by learning how to formulate and respond to questions. We define ourselves by what we know and how we know it; and also by what we don't know and our curiosity to learn. New understandings are assimilated into our consciousness, becoming part of who we are, how we see, how we feel and how we reflect (Cousin, 2006).

The *'learning space'* between receiving and understanding new knowledge provides a useful metaphor to aid our awareness of the conceptual transformations learners undergo, and the stresses that accompany these transformations. But once learners enter the *learning space*, they are engaged in the project of mastery that reformulates their meaning-creation framework by asking better and better questions (Schwartzman, 2010), unlike the learner who merely substitutes understanding for mimicry. The **Reading Game** attempts to create such a *learning space*.

Thomas & Brown (2011), in *A New Culture of Learning*, discuss *'close reading'* as an activity that absorbs the world into you, and that in a changing world, we need the power of the question, not the answer, to discover new ways of knowing, that is specific and relevant to the learner. The **Reading Game** is designed to encourage learners to become *question-makers* rather than *question-takers* by getting feedback, making friends and having fun.

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