

Learning to Learn Control System model: Application to online content development for independent study and cognitive skills acquisition amplification.

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Small Scale Research Inquiry Objectives:

- To present Learning to Learn as a Control System
- To develop a pilot content (on line) as an application of the model.
- To collect and record students' reflections to use in a possible next stage
- To suggest a template for online content development .

Main Characteristics:

- Tripartite structure that stimulates attention at the phases of learning.
- A distinct part of this structure aiming to facilitate transition from declarative to procedural knowledge.
- Feedback embedded to refine learning
- Learning and Learning to Learn : one closed loop control system

Control System?

- A control system is an arrangement of components connected or related in such a manner as to dynamically or actively command, direct, or regulate itself or another system.
- The aim of any control system is optimisation.
- Example:
- The act of pointing at an object with a finger requires a (biological) control system consisting of the eyes, the arm, hand and finger, and the brain. The input is the precise direction of the object (moving or not), and the output is the actual pointed direction.

Learning to Learn Control System Model:

Learning to Learn (L2L) involves monitoring learning and ensuring the deployment of skills and techniques that make learning more effective, retainable and transferable.

What do we gain by approaching Learning to Learn as a control System, especially in instructional design?

- >**focus** at understanding its dynamics, recognise and filter out “noise”, and test its efficacy,
- >**consider** that what one learns is directly dependent on what they already know.
- >**acknowledge** that the pace of learning is directly dependent on the learner’s current knowledge status in comparison with the instructional aims.
- >**appreciate** Feedback as an integral part that finetunes learning by reinforcing successfully acquisitions and fading out potential misconceptions.
- >**utilise** Feedback to engage the learner and stimulate metacognitive skills.

The three phases in the acquisition of a cognitive skill.

Cognitive skill acquisition (Anderson,1988) (Rasmussen 1986)	Phases of Learning (Fitts,1964), (Tenison, Fincham, and Anderson,2016).	Cognitive skill acquisition (VanLehn,1996).	Improving motivation and cognition (Bellard <i>et al.</i> ,2013)	Cognitive Apprenticeship. (Collins <i>et al.</i> , 2018)
Declarative	Cognitive	Early	Acquisition	Modelling
Transitional	Associative	Intermediate	Consolidation	Scaffolding
Procedural	Autonomous	Final	Tuning	Coaching

Three stages in programming (computer science): data encoding, compilation and execution .

Learning to Learn Control System Model:

- Read :the learner develops understanding of what the content block is about and what information is delivered through this content block.
- Debrief the learner has the opportunity to verify their understanding, review and recollect key points, attempt a summary of what read, assimilate associations and logic, as they attempt to answer properly designed questions embedded in the content.
- Practice the learner answers one or two more questions strongly related to the recently read information, or performs a simple task.

Feedback (correct answer confirmation, incorrect answer explanation and hints) as provided in the second and the third part enriches and completes the information in the online content block.

The learner can either review the page as it is, or in a later revision, go through the three stages again.

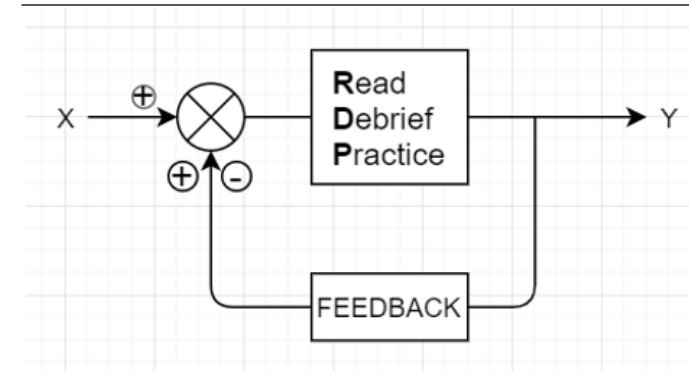


Figure 1 Block diagram of the L2L control system. X represents learner's current knowledge status and Y the updated knowledge or skill learning status. Feedback elicited by the second and the third part enriches and completes the information in the online resource. The learner can either review the page as it is, or in a later revision, go through the three stages again.

Methods and Results

Invitation to participate in the online survey which accompanies the content was sent to the learners, lecturers and tutors of the research methods module in psychology at level 5 and 6. Participation was voluntary and anonymous. Participants were classified as learners and lecturers. The survey's questions belonged to three parts: study preferences, reflections on content parts, and future considerations about the studying approach.

Participants in their comments stated that they appreciated answering questions at the debriefing and practising as it “definitely helped to solidify the knowledge”. They also found feedback helpful to check their understanding and that it was “explained easily ‘why’ when got one wrong”

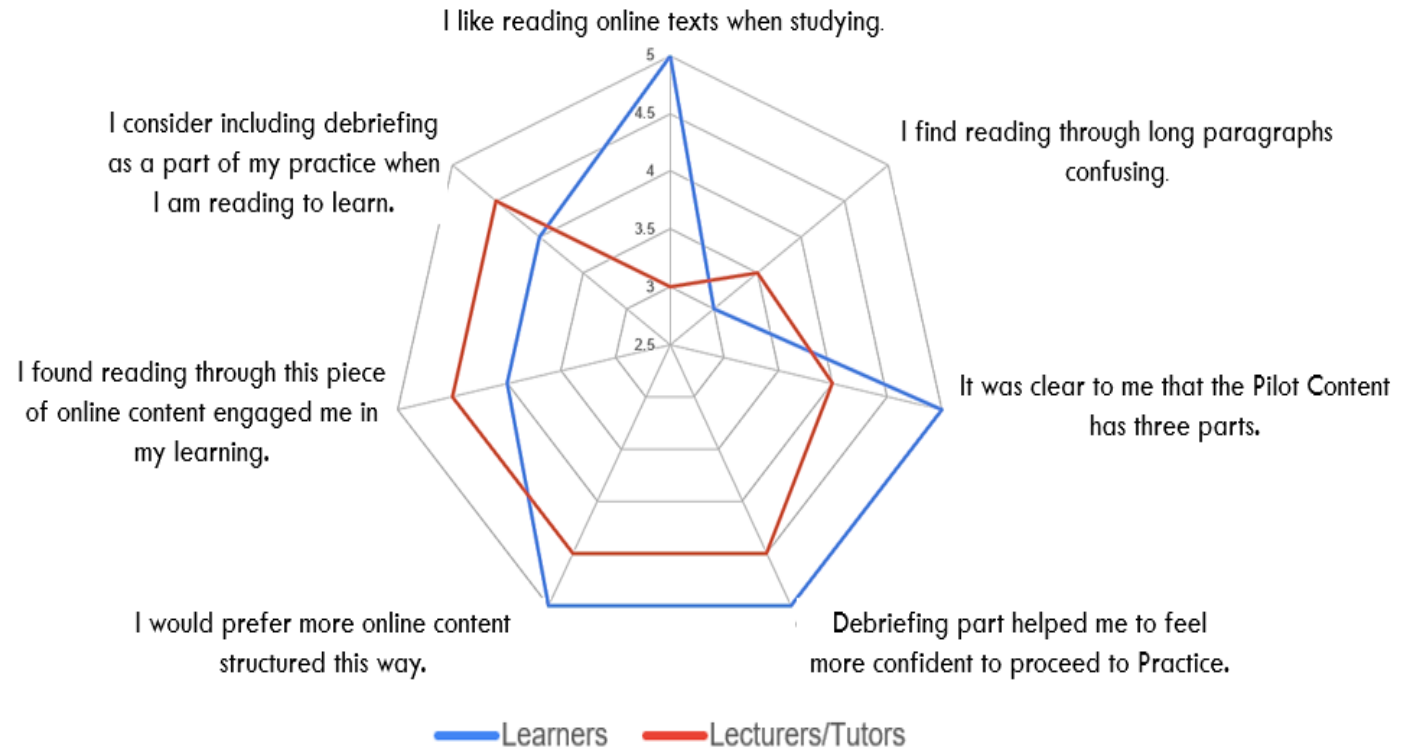


Figure 2: The median of the answers to questions with differences among the two groups. Numbers correspond to the five point Likert Scale.

Observations/Discussion

Learners completely accommodated reading online in their study routines. Both groups find long paragraphs confusing, tutors even more as long texts is the opposite of their good practices.

Learners found content's structure and debriefing part effective in their learning, but not absolutely willing to include debriefing in their learning habits.

Do we as tutors, project our perception of good practices to our judgements?

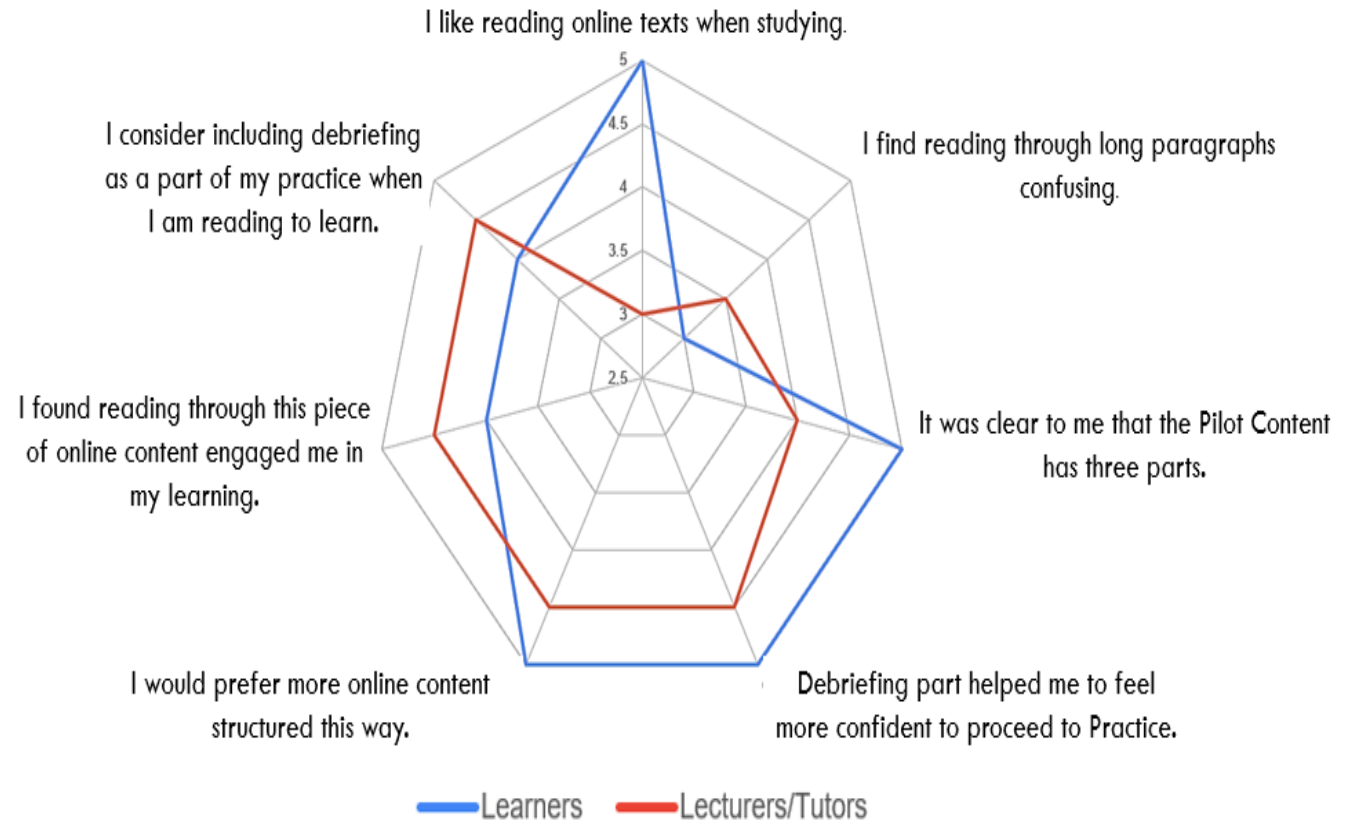


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Future work

We developed online content structured along the three phases of cognitive skill acquisition, and capitalised on feedback in quizzes to enhance and improve learning.

The survey revealed that the learners accommodated the structure and appreciated the role of debriefing and were willing to adopt this as a study habit.

This researcher is particularly interested in the debriefing part of the content and the feedback embedded in it. The debriefing part aims at playing an important role in the transition from the declarative to the procedural stage of cognitive skill acquisition. Methods used in debriefing was: summarising and common misconceptions detecting

Research needs to be continued with aims to:

- Establish more and evaluate further methods (e.g. eliciting self explanations, or answers comparing) used in Debriefing,
- Measure the individual contribution of Debrief, Practice, Feedback from Debriefing, and Feedback from Practice in successful learning.

References

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