



Are we missing ‘the single most important thing for teachers to know’? Cognitive Load Theory and Learning Development

Steven White

University of Southampton, UK

Presentation abstract

It is reasonable to assume that a core focus of Learning Developers is student learning and the techniques we use to support this learning. It is interesting to note, therefore, that Cognitive Load Theory (CLT) – seen by some as ‘the single most important thing for teachers to know’ in compulsory education (William, 2017) – receives very limited attention in the Learning Development literature. More broadly a survey of key higher education teaching concepts published in the International Journal of Academic Development makes no mention of this theory (Kandlbinder and Peseta, 2009). CLT relies on well-established findings in cognitive psychology relating to the limits of working memory, and capacities of long-term memory. This seems significant as according to CLT advocates, ‘without knowledge of human cognitive processes, instructional design is blind’ (Sweller, Ayres and Kalyuga, 2011, v). This presentation will first outline the basic principles of and evidence for CLT. It will then highlight the ways it has been used to challenge the use of minimally guided, experiential teaching approaches such as discovery, problem-based or inquiry learning. Participants will have the opportunity to consider possible implications for Learning Development practice: can we, for example, use more strongly guided approaches in our teaching and learning interventions with some learners, without having to feel guilty about ‘sages on stages’ and ‘guides on the side’?

Keywords: cognitive load theory; Learning Development; academic development; educational development; cognitive architecture; direct instruction; social constructivism.

Community response

This thought-provoking session by Steven White offered a compelling invitation for the Learning Development (LD) community to critically reconsider the theoretical underpinnings of their pedagogical practice. Rather than presenting new empirical research, the presentation served as a scholarly provocation, rooted in literature review and personal reflection, arguing that Cognitive Load Theory (CLT) – despite its prominence in educational psychology – remains surprisingly underexplored in LD discourse.

White's central question – 'How can we develop learning without knowledge of human cognitive processes?' – was designed to unsettle comfortable pedagogical defaults. Audience reflections demonstrated both interest and intellectual tension. Jack Rundell (West Suffolk College) appreciated the opportunity for critical reflection on practice, noting:

I found this talk really helpful to think about different teaching approaches and reflect on my own experience and viewpoint. The most useful reflection for me was about 'problem solving' as a teaching method. Steven highlighted research that questioned its effectiveness compared with more direct instruction methods, but it occurred to me that there might be an important distinction between problem solving where the problem is formulated by the teacher and given to the students as compared [with] where the problem arises from the student themselves. Perhaps the crucial thing is not the technique and more the extent to which students are emotionally invested in their learning and feel it is something they are doing rather than is done to them. As a side note, cognitive load theory was a central part of my training to provide the DSA-funded role of 'specialist one-to-one study skills support for student with specific learning difficulties' so that is somewhere in HE that it is well established.

Steve Rooney (Aston University) echoed the presentation's provocations while noting the need for a broader contextualisation:

This was a characteristically engaging, provocative and entertaining presentation which introduced me to an area of pedagogical theory and practice about which (I must somewhat sheepishly confess) I knew next-to-nothing. Thanks to the curiosity it spawned, I have spent a little time since reading up, with interest, on CLT. Predictably enough, this process has yielded plenty that supports CLT's conceptual foundations, empirical claims, and pedagogical prescriptions, but also plenty that challenge these, too. Some of the latter come from within the field of cognitive science, whilst other critiques challenge strictly cognitivist models of human learning as such... A

fuller acknowledgement of the fact that CLT has its reasoned detractors would, I think, have aided the session's cause.

Rooney also raised broader questions about epistemic agency (Heikkilä et al., 2020), the development of practical knowledge and LD's complex entanglement with power, all of which deserve further exploration if CLT is to gain a foothold in LD theory.

Georgia Koromila (University of Reading) drew attention to learner agency and variability, cautioning against overly teacher-centric interpretations of CLT:

I had encountered the term Cognitive Load Theory before, when reading research on note making practices. Sometimes, making notes and the instinct to transcribe may interfere with learning! This prompted a question that I was unable to ask during the session: are we putting aside the student/learner when we are discussing CL as dependent on teaching methods? For example, what they choose to do during a taught session... is also contributing to their individual cognitive load. I think the discussion feels incomplete without this consideration.

One can easily agree with Steven in that CLT can offer valuable tools for thinking about how learning happens – but it is important to situate it within a broader ecosystem of learning theories, student experiences, and institutional realities. Education is a practical and interdisciplinary endeavour. LD practitioners must remain critically informed professionals – ready to draw from neuroscience, sociology, psychology, and pedagogy – to support students who are diverse in background, ability and learning preference.

In sum, this was not just a presentation on CLT – it was a call for the LD community to be more theoretically agile, evidence-informed and open to discomfort when it challenges our assumptions. Steven White deserves recognition for once again prompting the kind of critical questioning that lies at the heart of our field's scholarly practice.

Author's reflection

I freely admit that this session was a bit of a stretch (and apologise for the clickbait title!) – I am no expert in Cognitive Load Theory (CLT), but I think the insights from it might be useful, and it certainly seems rarely discussed in our discipline. As highlighted in the presentation, the central point comes from Sweller, Ayres and Kalyuga: 'How can we

understand teaching and learning without considering human cognitive architecture?' (2011, p.161).

This applies to LDs and learners, as I discuss below. Thanks to those who have kindly contributed below, and I deal with each in turn.

Student autonomy and problem-solving, Jack Rundell

Regarding student formulation of problem-solving tasks, I agree that it is very useful if students are engaged and motivated during such tasks. I think the contributor's phrasing is important in that problems to be investigated can 'arise' from students' ideas. I am sceptical of the extent to which students, especially at early stages of university study, can formulate useful and feasible research questions which meet module learning outcomes without dialogue with (dare I say input from) a knowledgeable other. This might be obvious, but it is not always clear from the discourse around student autonomy, and it is important to test our theoretical claims against our actual practice. I think most would agree that research questions (at dissertation level, for example) are usually formulated in dialogue between learners, peers, the literature and lecturers/supervisors. Some CLT-adjacent researchers have written interestingly on the balance of student autonomy-control necessary for learning. Content warning: readers of a deficit-language-sensitive nature may find this quote distressing:

learners neither are skilled in information problem solving (i.e., they are not really information literate) nor have the expertise needed to determine what they do *not* know and what they, therefore, need to learn (Kirschner and Van Merriënboer, 2013, p.177).

Their conclusions are less emphatic, allowing for significant flexibility for educators and learners in their approach but remain in line with Wood, Bruner and Ross's (1976) original conception of scaffolding learning: 'appropriately limit students' control in consideration of their developmental level' (Kirschner and Van Merriënboer, 2013, p.178).

It is interesting that CLT is a familiar idea in Specific Learning Difficulties discourse and practice – perhaps because of the links between practitioners in compulsory and higher education?

Criticising the critics/reasoned detractors, Steve Rooney

It is fair to say that I could have engaged with criticisms of CLT in more depth in the presentation. This is something I try to do in my work but admit I focused more on team CLT this time – partly as I could not assume all participants would be familiar with it. However, for those interested I would highlight slide 28 which outlines Spiro and DeSchryver's claim that CLT cannot be used in teaching 'ill-structured domains' such as some subjects in Humanities or Social Sciences (2009, p.107). I also cited Boon, Orozco and Sivakumar, who, despite being proponents of constructivist-inspired project-based learning, admit that research evidence showing its efficacy is 'often below expectations' (2022, p.2). Those interested in further exploration might find Tobias and Duffy useful as it features detailed debate between constructivist and explicit instruction fans (2009).

Steve Rooney raises three distinct questions on epistemic agency, CLT and LD practice, and CLT and power relations:

1. In relation to student agency, you refer to a study by Heikkilä et al. (2023) and ask 'how does CLT, and the direct-instructional methods it appears to favour, enable the kinds of practical and intellectual participation in disciplinary knowledge production that higher education programmes expect of students?'

CLT advocates encourage increasing the degrees of learner agency, moving from direct instruction explaining key concepts, using worked examples, and then moving from controlled to freer practice (Sweller et al., 2023, also see my slide 29). This seems consistent with the curriculum which the university students follow in developing their research skills in Heikkilä et al. (2023). Before they exercise greater agency in conducting research, these learners acquired a thorough understanding of research skills, for example through 'studying strategies, information literacy, research ethics, data analysis methods and scientific writing' (Heikkilä et al., 2023, p.461). They also get controlled, but freer practice when they, for example, 'rehearse research methods' (p.461), before moving on to using and reflecting on their research skills in their classroom practice.

This seems completely compatible with a CLT-informed approach, which moves from controlled practice to more open inquiry using the evidence-based but commonsense finding that 'worked examples are better for novices, and problem solving is better for experts' (Lovell, 2020, p.58).

2. What would a CLT approach to the development of practical knowledge in HE actually look like, and how might it differ from/be preferable to existing LD practices?

Assuming we value CLT insights as important for learning, we might:

- (a) Help students to gain a basic knowledge of human cognitive architecture and its implications for learning. If we, as Learning Developers, want students to learn how to learn, and become independent, agency-filled learners, they'd surely benefit from knowing this.
 - (b) Optimise any diagrams and visuals we use to account for the 'split attention effect' as per CLT guidance (Lovell, 2020).
 - (c) Consider other CLT-derived effects such as the redundancy effect which can, for example, inhibit comprehension when identical text is presented simultaneously verbally and visually (Lovell, 2020).
 - (d) Explain to learners our (relatively expert) thinking process in handling a cognitively demanding task relevant to a learning outcome, rather than feeling the need to attempt to (sometimes exhaustively) elicit and question our way to a place which we pretend was the students' idea, but actually was our intended outcome all along.
3. Once concerns [about power relations] have been raised [...] what are we to do with them? Are we to heed them and consider their implications for practice, or ignore them and let them trouble our practice no further? Or, are we to reject them altogether and, if so, why and to what end(s)?

I cannot remember the exact context in which Academic Literacies (AL) was discussed (as relates to questions of power relations in question 3 above), but the slides highlighted a contrast between an AL and CLT approach, especially in that 'what AcLit seeks to explicitly avoid is the idea that students first need to learn "the basics" and only then can be exposed to a pedagogy which leaves space for questioning and change' (Lillis and Tuck, 2016, p.34).

CLT is very much in favour of using quite a directed approach to ensuring students learn 'the basics' as outlined in slides 29/32. However, Sweller et al. are at pains to emphasise that direct instruction 'neither asks nor requires learners to be passive, nor does it exclude

instructors from "active teaching" methods' (2023, p.2). The idea that HE teaching, particularly interventions by LDers does not 'leave space for questioning and change' is a straw man argument. I have never observed an LD session, or indeed one in wider HE which does not create space and actively encourage questioning and consider change. Indeed, module handbooks, reading lists, and observable teaching practices demonstrably do this every day.

A wider discussion of power relations is outside the scope of this commentary, but I'd suggest that the existence of growing academic literacies and critical pedagogy communities and literatures evidences the fact that academia makes space for questioning and change. The discussion becomes more complex at institutional and policy level, but that is way out of scope of this discussion of learning theory in LD.

Load and the learner, Georgia Koromila

Georgia highlights the importance of considering learners in relation to Cognitive Load Theory. I fully agree that a discussion of CLT without students is as she says, 'incomplete'. As highlighted in point (a) above, I think learners should definitely be made aware of human cognitive architecture and its implications for learning. This seems a crucial part of enabling our learners to learn most effectively both in the short term and for the rest of their lives, and is nicely illustrated in the example she gives about note making.

I would be happy to see CLT coherently situated 'within a broader ecosystem of learning theories, student experiences and institutional realities' as suggested above. However, in the current Learning Development literature and discourse it is not. That is what my talk aimed to highlight and ultimately change, and I hope it was useful in that sense.

Acknowledgements

Thank you to all the contributors who shared their reflections and enriched our insight into this conference presentation and its impact on the audience.

The author did not use generative AI technologies in the creation of this manuscript.

References

- Boon, M., Orozco, M. and Sivakumar, K. (2022) 'Epistemological and educational issues in teaching practice-oriented scientific research: roles for philosophers of science', *European Journal for Philosophy of Science*, 12(1), pp.1-23. Available at: <https://doi.org/10.1007/s13194-022-00447-z>
- Heikkilä, M., Hermansen, H., Iiskala, T., Mikkilä-Erdmann, M. and Warinowski, A. (2023) 'Epistemic agency in student teachers' engagement with research skills', *Teaching in Higher Education*, 28(3), pp.455-472. Available at: <https://doi.org/10.1080/13562517.2020.1821638>
- Kandlbinder, P. and Peseta, T. (2009) 'Key concepts in postgraduate certificates in higher education teaching and learning in Australasia and the United Kingdom', *International Journal for Academic Development*, 14(1), pp.19-31. Available at: <https://doi.org/10.1080/13601440802659247>
- Kirschner, P. A. and Van Merriënboer, J. J. G. (2013) 'Do learners really know best? Urban legends in Education', *Educational Psychologist*, 48(3), pp.169-183. Available at: <https://doi.org/10.1080/00461520.2013.804395>
- Lillis, T. and Tuck, J. (2016) 'Academic literacies: a critical lens on writing and reading in the academy', in K. Hyland and P. Shaw (eds) *The Routledge handbook of English for Academic Purposes*. Abingdon: Routledge, pp.30-43.
- Lovell, O. (2020) *Sweller's Cognitive Load Theory in action*. Melton: John Catt Educational.
- Spiro, R. J. and DeSchryver, M. (2009) 'Constructivism: when it's the wrong idea and when it's the only idea', in S. Tobias and T. M. Duffy (eds) *Constructivist instruction: success or failure?* Abingdon: Routledge, pp.106-123.
- Sweller, J., Ayres, P. L. and Kalyuga, S. (2011) *Cognitive load theory*. New York, NY: Springer.

Sweller, J., Zhang, L., Ashman, G., Cobern, W. and Kirschner, P. A. (2023) 'Response to De Jong et al.'s (2023) paper "Let's talk evidence – The case for combining inquiry-based and direct instruction"', *Educational Research Review*, 42, pp.1-6. Available at: <https://doi.org/10.1016/j.edurev.2023.100584>

Tobias, S. and Duffy, T. M. (eds) (2009) *Constructivist instruction: success or failure?* Abingdon: Routledge.

William, D. [@dylanwiliam] (2017) 'I've come to the conclusion Sweller's Cognitive Load Theory is the single most important thing for teachers to know', 26 January [Tweet]. Available at: <https://x.com/dylanwiliam/status/824682504602943489?lang=en-GB> (Accessed: 17 September 2025).

Wood, D., Bruner, J. S. and Ross, G. (1976) 'The role of tutoring in problem solving', *Journal of Child Psychology and Psychiatry*, 17(2), pp.89-100.

Author details

Steven White is a Senior Teaching Fellow in Education Development at the University of Southampton. He has had an interest in contrasting perspectives on learning and teaching since a senior colleague told him he 'bloody well better be' a social constructivist. His research interests include third-space perspectives on HE, digital and media literacy, and teaching/learning critical thinking.

Licence

©2025 The Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC-BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. See <http://creativecommons.org/licenses/by/4.0/>. *Journal of Learning Development in Higher Education (JLDHE)* is a peer-reviewed open access journal published by the Association for Learning Development in Higher Education (ALDinHE).