Designing an AI-Augmented *Knowledge Synthesis* Tool for Collaborative Learning

Xinran Zhu, Bo Shui, Ishita Asnani, Liam Magee
University of Illinois Urbana-Champaign
Contact: xrzhu@illinois.edu

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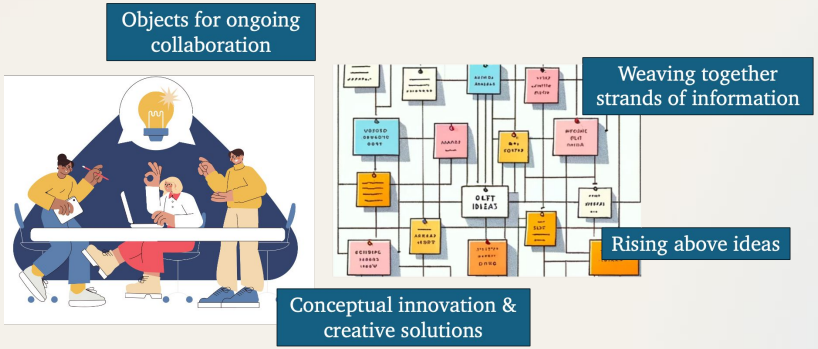
Why Knowledge Synthesis?

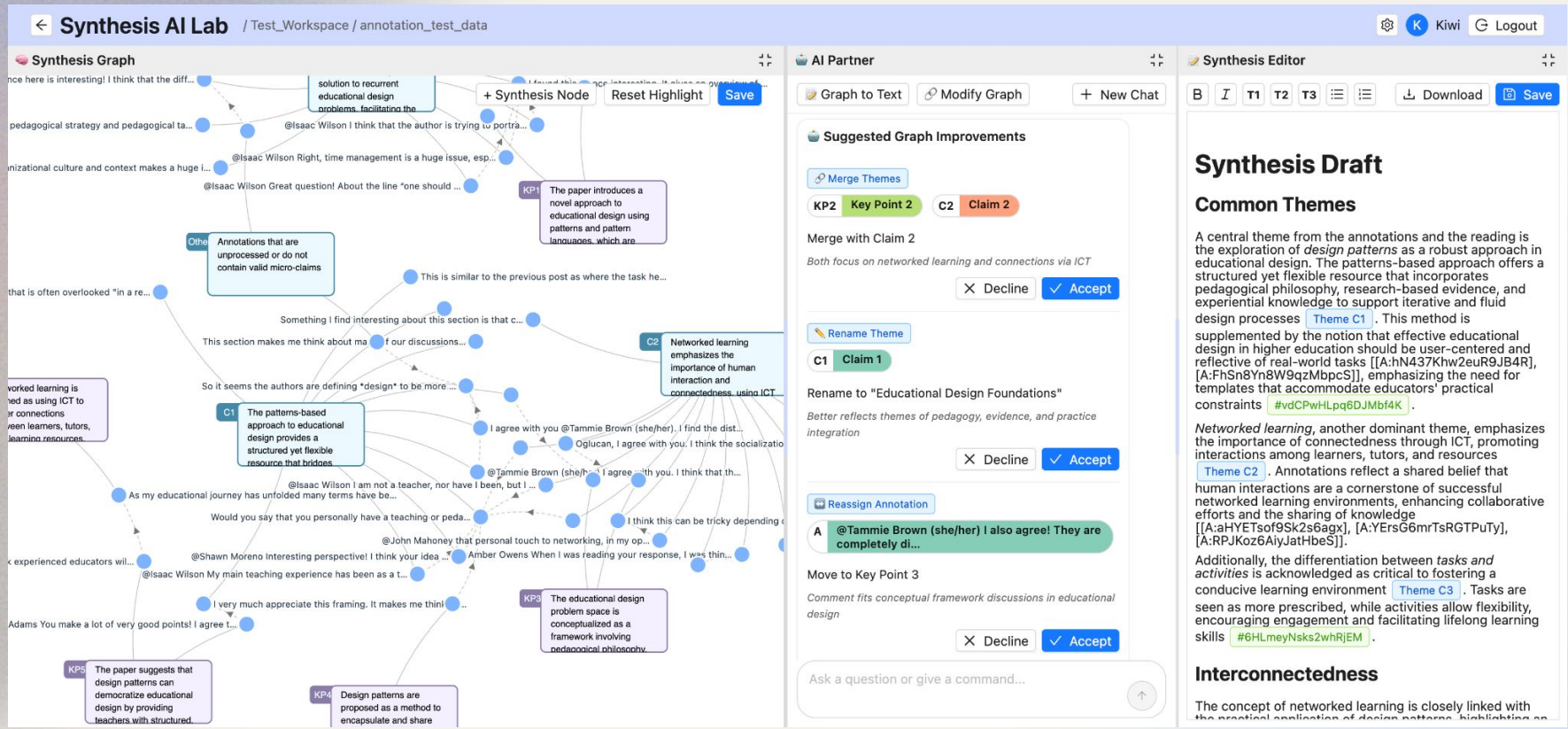
- **Knowledge Synthesis:** the process of connecting, analyzing, and integrating ideas to foster conceptual innovation, generate novel knowledge, and create creative solutions. (Deschryver, 2014; Morabito & Chan, 2021; Qian et al.,2020).

- Knowledge synthesis plays a vital role in **collaborative learning**: it serves both as a **product** that reflects what students have learned and as a **mediator** that supports ongoing learning (Zhu et al., 2026)



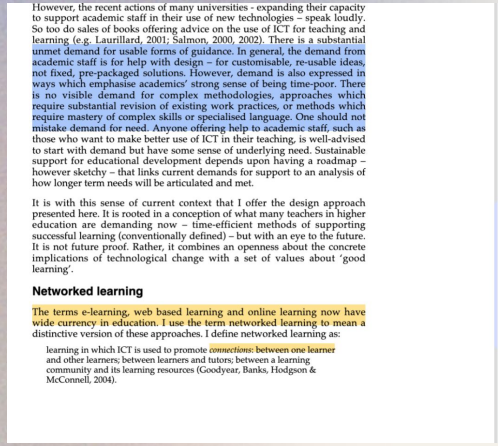
- However, creating **effective syntheses is both rare and challenging** due to the cognitive demands involved as well as inadequate support from information systems (Morabito & Chan, 2021; Qian et al., 2020; Zhu et al., 2026).

Synthesis AI Lab (SAIL): AI Augmented Reading and Knowledge Building in Collaborative Learning



Check out our research lab website for more details: https://lc3-lab.github.io/lab-site/projects/synthesis-ai/

Next Steps



However, the recent actions of many universities - expanding their capacity to support academic staff in their use of new technologies – speak loudly. So too do sales of books offering advice on the use of ICT for teaching and learning (e.g. Laurillard, 2001; Salmon, 2000, 2002). There is a substantial unmet demand for usable forms of guidance. In general, the demand from academic staff is for help with design – for customisable, re-usable ideas, not fixed, pre-packaged solutions. However, demand is also expressed in ways which emphasise academics' strong sense of being time-poor. There is no visible demand for complex methodologies, approaches which require substantial revision of existing work practices, or methods which require mastery of complex skills or specialised language. One should not mistake demand for need. Anyone offering help to academic staff, such as those who want to make better use of ICT in their teaching, is well-advised to start with demand but have some sense of underlying need. Sustainable support for educational development depends upon having a roadmap – however sketchy – that links current demands for support to an analysis of how longer term needs will be articulated and met.

It is with this sense of current context that I offer the design approach presented here. It is rooted in a conception of what many teachers in higher education are demanding now – time-efficient methods of supporting successful learning (conventionally defined) – but with an eye to the future. It is not future proof. Rather, it combines an openness about the concrete implications of technological change with a set of values about 'good learning'.

Networked learning

The terms e-learning, web based learning and online learning now have wide currency in education. I use the term networked learning to mean a distinctive version of these approaches. I define networked learning as:

> learning in which ICT is used to promote *connections*: between one learner and other learners; between learners and tutors; between a learning community and its learning resources (Goodyear, Banks, Hodgson & McConnell, 2004).

Isaac Wilson 5/5/2026, 11:54:39 PM Reply

I found this stance interesting. It gives an overview of the kind of demand academic staff is the most likely to do, and I was not expecting this being about help with design, even if I never thought about it before. I would say it is probably a good thing that academic staff is mostly looking for reusable ideas and concepts rather than 'pre packaged' solutions, even if I do agree with the fact time management (and time in general) is a big issue in academia as a teacher. We are mostly looking for easy options and tools to make us and our students save some time rather than making things more complex. I'm however curious about the last sentence 'one should not mistake demand for need'. What do you think about it ?

Alexis Tucker 5/5/2026, 11:54:40 PM Reply

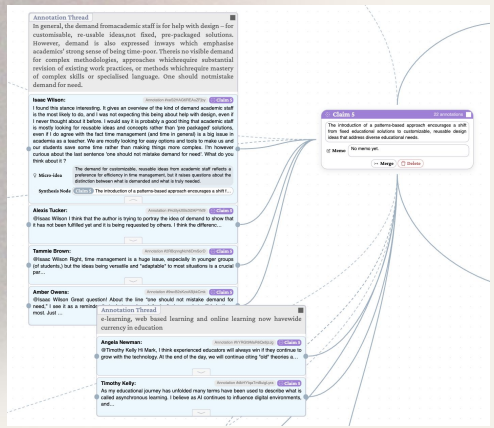
@Isaac Wilson I think that the author is trying to portray the idea of demand to show that it has not been fulfilled yet and it is being requested by others. I think the difference between demand and need shows the persuasion of the argument.

Tammie Brown 5/5/2026, 11:54:40 PM Reply

@Isaac Wilson Right, time management is a huge issue, especially in younger groups (of students,) but the ideas being versatile and *adaptable* to most situations is a crucial part of a tool being "easy to use".

Empirical study of classroom implementation:

- Research-practice partnership - co-design with classroom instructors
- Focusing on
  - epistemic moves
  - human-AI interaction patterns



Design refinement:

- Integrated social annotation feature
- Refined Synthesis Graph: more effective representation of student ideas
- Pedagogically aligned AI agent

Resources & Get in Touch!

- **Proceeding paper:** https://lc3-lab.github.io/lab-site/docs/sail-cscl2026.pdf
- **SAIL v1 tutorial (v2 coming this Fall!):** https://synthesisai-lab.github.io/
- **Lab website:** https://lc3-lab.github.io/lab-site/
- **Contact**: Xinran Zhu, xrzhu@illinois.edu | zhu-xinran.com

THANK YOU!