

TOPKIT DIGEST

This month's TOPkit Digest is brought to you by **Jim Paradiso** (james.paradiso@ucf.edu), M.Ed., Curriculum and Instruction. Jim is a Senior Instructional Designer from the [Center for Distributed Learning](#) at the [University of Central Florida](#). He discusses **Learning Engineering**.

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The More You Play It, the More It Sticks

Simon Approach: Learning Engineering



Carnegie Mellon University shares “The Simon Approach to Learning Engineering,” hallmarked by a process that begins with a model of expertise produced from a learning theory, which, having been instrumented for data collection around student learning, is used in an instructional setting. The data are then used to improve the instructional model, which helps the domain continue to advance.

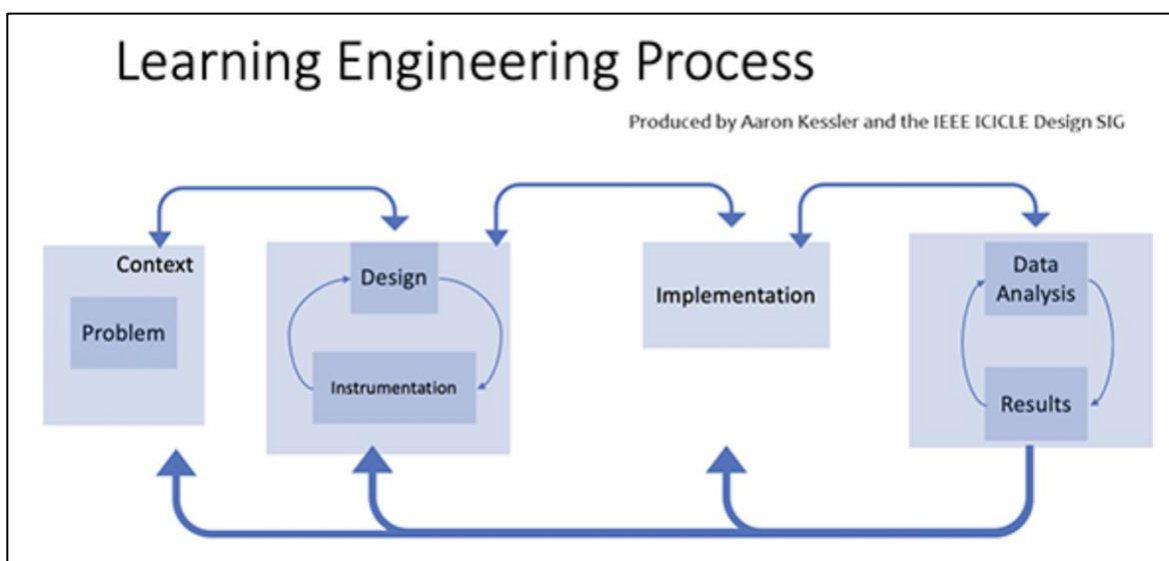
CMU-OLI (description written by James R. Paradiso, adapted from video)

Top Tips

Framing the Learning Engineering Process

Scratching the Surface

While the term “learning engineer” dates back to some 50 years ago when Herb Simon used it to describe professional designers of learning environments, the learning engineering (LE) domain is still evolving quite a bit. Part of what makes this process such a complex endeavor to grapple with is that it looks to solve problems that require diverse skillsets and a shared understanding in the learning and data sciences, instructional design, software engineering, assessment/measurement, et al. as well as expertise in any number of academic disciplines—qualities often distributed across teams of people rather than an individual. To begin assembling a theoretical and working knowledge of the topic, a diagram developed by the IEEE ICICLE Design SIG and some thoughts on how to interpret it will be used to frame LE process and practice.



1. **Define the problem and problem space.** No problem or challenge exists devoid of a context layered in nuanced values associated with learners ‘doing’ learning (and all the complexity that brings) along with the physical, technological, fiscal et al. resources available to work on a viable solution. Making clear connections between these elements is key to getting started.
2. **Construct a team.** While a team is certainly not required to carry out the LE process, in many cases, the work benefits from having experts in the areas of assessment and evaluation, learning design (and learning sciences), data science, and, of course, subject-matter expertise to collaborate concurrently on all the stages of the LE process. Working as a cohesive team (i.e., collective) from start to finish may seem

a bit excessive (or too complex to manage) but addressing any given problem(s) holistically rather than dividing it into (individual) component parts is a strength of the LE approach.

3. **Engage in iterative, intentionally instrumented design cycles.** An important takeaway for this part of the process is to create design goals that include purposeful instrumentation that measures the learner and content performance. This process involves deciding on a question (for whom and why), a method and metric (how to calculate), the data needed (from where), and whether that data has integrity (measures as intended).
4. **Collect data from instrumented design implementation.** Data is collected throughout the implementation, yet rather than discarding outlier data as potential system 'noise,' LE seeks to embrace the non-linear complexity of learner (interaction) trajectories, which, in practice, results in a more inclusive approach to implementing design solutions in diverse learning contexts and settings. Keep in mind, however, that while quantitative measures of question response accuracy, for example, are important, consider measures of non-academic (socio-emotional) performance, too, as these matters also impact learner success.
5. **Analyze the data to evaluate efficacy.** Exploring learning outcomes through data analysis may result in more questions than answers (and may involve multiple rounds of analysis), but this iterative, evidence-based approach reveals what to do next (to an extent).
6. **Iterate based on data insights and perceived gaps.** The need to revisit all or some of the previous parts of this process (post data collection and analysis) is highly likely due to areas in which evidence warrants the need for improvement(s).

This work is an adaptation of the IEEE ICICLE "The Learning Engineering Process" CC BY-NC-SA 4.0.

From the Community

What Is Learning Engineering?

A Podcast



Take a listen to some of the work being done by a multi-disciplinary team of volunteers working together through the Industry Connections Industry Consortium on Learning Engineering (ICICLE) group to build on the empirical and practical foundations in the field of learning engineering.

[Listen Now](#)

References for Top Tips

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<https://sagroups.ieee.org/icicle/learning-engineering-process/>

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