Gmail

[learninganalytics] Learning engineering, learning analytics, educational data mining

25 messages

George Siemens <gsiemens@gmail.com> Wed, Jul 15, 2020 at 10:29 PM
Reply-To: gsiemens@gmail.com
To: learninganalytics@googlegroups.com

Hi all,

When I see the term “learning engineering”, I experience inexplicable sadness. It is one of my least favorite words. I’m undergoing deep mindfulness practices to understand this reaction. And I’m willing to learn what I’m not understanding.

Those of you who position your work under the LE frame, how do you see it differing from LA or EDM? What does it add that is missing? Or is it mainly a group of parties largely outside of LA/EDM making a field for themselves to play in?

George

Neil Thawani <neilthawani@gmail.com> Wed, Jul 15, 2020 at 11:46 PM
Reply-To: neilthawani@gmail.com
To: Learning Analytics <learninganalytics@googlegroups.com>

I do not know what LA is and I have done very little EDM. But as a METALS student, my perspective of the field is that learning engineers combine actionable strategies from learning science research (a la WWC) and data acquired from student formative/pre- and post-assessments to iteratively improve upon curricula.

A learning engineer can also be a software engineer, designer, or other practitioner who puts these strategies into practice - reading research and building products to help stakeholders in education like students, parents, teachers, administrators, etc.

On Wednesday, July 15, 2020 at 10:30:07 PM UTC-4, George Siemens wrote:

> Hi all,
>
> When I see the term “learning engineering”, I experience inexplicable sadness. It is one of my least favorite words. I’m undergoing deep mindfulness practices to understand this reaction. And I’m willing to learn what I’m not understanding.
>
> Those of you who position your work under the LE frame, how do you see it differing from LA or EDM? What does it add that is missing? Or is it mainly a group of parties largely outside of LA/EDM making a field for themselves to play in?
>
> George

Lina Markauskaite <l.markauskaite@gmail.com> Thu, Jul 16, 2020 at 1:30 AM
Reply-To: l.markauskaite@gmail.com

To: gsiemens@gmail.com
Cc: learninganalytics@googlegroups.com

Hello George,

For me, as an outsider, the term “learning engineering” semantically doesn’t make sense. You cannot engineer “learning", similarly as you cannot engineer “happiness”. Learning is what a student does, not what somebody designs or engineers.

Closer to your question, George, for me this situation reminds two engineering teams who are digging the same tunnel but from two different ends without being aware about each other.

Kind regards

Lina

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To view this discussion on the web visit https://groups.google.com/d/msgid/learninganalytics/301FF38C-8CA6-4A7B-9BAF-62FC7130D7A9%40gmail.com.

Adriana Wilde <adriana.wilde@gmail.com> Thu, Jul 16, 2020 at 5:49 AM
Reply-To: adriana.wilde@gmail.com
To: neilthawani@gmail.com
Cc: Learning Analytics <learninganalytics@googlegroups.com>

I’m with George here. I feel like it is a made-up name which is not filling any real void (but do please correct me if I am wrong). Learning engineers should be able, at the very least, to position themselves as working in a different discipline from LA (or EDM). Hard to do that not even knowing what LA is (or know very little about EDM). I can suggest to start here: https://www.solaresearch.org/hla-17/hla17-chapter14/

Or would anyone like to suggest an even more authoritative source to highlight these differences?

Adriana

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To view this discussion on the web visit https://groups.google.com/d/msgid/learninganalytics/163D4E96-BD4F-45D6-97CA-B1A50FB72ABE%40gmail.com.

Deepti Yadav <drbs.contact@gmail.com> Thu, Jul 16, 2020 at 6:27 AM
Reply-To: drbs.contact@gmail.com
To: adriana.wilde@gmail.com
Cc: neilthawani@gmail.com, Learning Analytics <learninganalytics@googlegroups.com>

Hello George

I also agree with you as 'engineering learning' seems to make learning mechanical. Learning is a natural process. It can be analysed,
guided, supported and much more but 'engineering' learning would be killing the natural process which is essential for the joy of learning.
LA is more about analysing to understand or improving the process but not engineering it.

Also, when we work on individual learning, personalised learning, it's a natural process with unique abilities of the learner, whereas
'engineering learning' seems to take back to 'old school' where all minds were treated alike.

Kind regards

Deepti Yadav

Peace is Possible!! 

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To view this discussion on the web visit https://groups.google.com/d/msgid/learninganalytics/CAALmTeeChGWf9_F%2BWi4UPAT8K3B7%3D7WqDPD_fD1BaY76yV8KLw%40mail.gmail.com.

Deepti Yadav <drbs.contact@gmail.com> Thu, Jul 16, 2020 at 6:29 AM
Reply-To: drbs.contact@gmail.com
To: adriana.wilde@gmail.com
Cc: neilthawani@gmail.com, Learning Analytics <learninganalytics@googlegroups.com>

Also it seems the eagerness of coining of new phrases but the process remains the same. It won't help.

Deepti Yadav

Peace is Possible!! 

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To view this discussion on the web visit https://groups.google.com/d/msgid/learninganalytics/CAALmTecdY_BTKiyBSJdVvSHh%2B0HN6wy2JWe-mWe04MHpDSYDRA%40mail.gmail.com.

JoJo <zhou.eye8@gmail.com> Thu, Jul 16, 2020 at 11:08 AM
Reply-To: zhou.eye8@gmail.com
To: Learning Analytics <learninganalytics@googlegroups.com>

I do not agree with most of the discussions here. I am an educational technologist and my work overlaps LA and EDM. LE is to translate the data insights from LA and EDM into improvements of educational technologies.

Let me ask the awesome learning analysts and educational data researchers in this group: if your research discovers video-based discussions of a course are irrelevant to the course videos, who will develop technology scaffolds in the video learning platform in order to guide the discussions? If your research identifies correlation between course elections and career paths, who are going to code up the AI Intelligent Agent to provide on-spot course election suggestions to the students? As analysts and researchers, most of you won't do that right? You will ask software engineers for help. And you will require the software engineer to understand both education and data science. This kind of software engineer is called a Learning Engineer.

I agree learning is natural and cannot be engineered. But learning technologies are engineered and that is what LEs do: to engineer technologies that support learning. This is like you claim Financial Engineer is not a valid profession because Finance cannot be engineered. Do you think that really makes sense?
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To view this discussion on the web visit https://groups.google.com/d/msgid/learninganalytics/CAPC4AvBiBkRV65xOAooaHn13wxe5Ef3-hrtZ5yxxjDa0pOTWZw%40mail.gmail.com.

Motz, Benjamin Alan <bmotz@indiana.edu> Thu, Jul 16, 2020 at 7:36 AM
Reply-To: bmotz@indiana.edu
To: "adriana.wilde@gmail.com" <adriana.wilde@gmail.com>, "drbs.contact@gmail.com" <drbs.contact@gmail.com>
Cc: "neilthawani@gmail.com" <neilthawani@gmail.com>, Learning Analytics <learninganalytics@googlegroups.com>, "Borner, Katy" <katy@indiana.edu>

George,

I'm sorry that the phrase "learning engineering" makes you sad. It's good that you're seeking help, both through mindfulness training and by asking questions of the Learning Analytics community. Allow me to also recommend that you could request to join a Google Group for the learning engineering community here: https://groups.google.com/g/learning-engineering ... after all, systematic desensitization through exposure is also a highly effective therapy.

I respect Neil for identifying himself as a "learning engineer," and I see how strong affiliation with a named community can be beneficial, but personally I'm not interested in these kinds of fences or labels. Forgive me for being pluralistic, but I think there's room for more than one community (or two communities), despite a lot of overlap. After all, this thread seems to be revealing that there'll be some resistance to the word "engineering" in the learning analytics community (closing the loop?), even though it provides a useful frame for some smart and innovative people who are extraordinarily conscientious about the learning process. Why assume that LA/EDM could/should contain all activity in this space?

I like your questions, George. The questions you're asking seem like they could be answered empirically through bibliometric analysis. That's a project I'd love to see happen. I've CC'd Katy in case she's not already on this list.

Warmly,

Ben

Ben Motz, PhD

Director, eLearning Research & Practice Laboratory
Research Scientist, Department of Psychological & Brain Sciences
Indiana University

From: learninganalytics@googlegroups.com <learninganalytics@googlegroups.com> on behalf of Deepti Yadav <drbs.contact@gmail.com>
Sent: Thursday, July 16, 2020 6:29 AM
To: adriana.wilde@gmail.com
Cc: neilthawani@gmail.com; Learning Analytics
Subject: [External] Re: [learninganalytics] Learning engineering, learning analytics, educational data mining

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To view this discussion on the web visit https://groups.google.com/d/msgid/learninganalytics/1594899413927.89971%40indiana.edu.

JoJo <zhou.eye8@gmail.com> Thu, Jul 16, 2020 at 11:33 AM
Reply-To: zhou.eye8@gmail.com
To: l.markauskaite@gmail.com, Learning Analytics <learninganalytics@googlegroups.com>

And let me tell you a truth in case you don't know: as long as school exists, there is no absolutely "natural" learning.
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To view this discussion on the web visit https://groups.google.com/d/msgid/learninganalytics/CAPC4AvAjDr30RvU4voR6uSCG%2BWWD4t95GK%2BikoWmXVqvZZBwXQ%40mail.gmail.com.

Neil Thawani <neilthawani@gmail.com> Thu, Jul 16, 2020 at 9:38 AM
Reply-To: neilthawani@gmail.com
To: "Borner, Katy" <katy@indiana.edu>
Cc: "Motz, Benjamin Alan" <bmotz@indiana.edu>, "adriana.wilde@gmail.com" <adriana.wilde@gmail.com>, "drbs.contact@gmail.com" <drbs.contact@gmail.com>, Learning Analytics <learninganalytics@googlegroups.com>, "Ginda, Michael Patrick" <mginda@indiana.edu>, "Myers, Rebecca Sara Ciaglia" <rsciagli@iu.edu>

Glad we're all learning from each other. I'd also like to share this journal article, written by the director of my academic program: Instructional Complexity and the Science to Constrain It

It was one of the first things I read when I began this grad school journey and sums up the learning engineering field's efforts to synthesize methods in order to improve student outcomes. And for the curious, here's a long list of topically related articles.

On Thu, Jul 16, 2020 at 9:07 AM Borner, Katy <katy@indiana.edu> wrote:

> Good morning everybody,
>
> Very glad to see an active learning sciences, analytics, engineering community at IU and beyond.
>
> In these pandemic times, it is more important than ever to understand how people learn, to use this understanding to improve teaching, and to develop new LMS and methods to make teaching and learning ever more efficient and fun.
>
> Education and training is IU's core business and we all must continue to innovate. There is much innovation going on right now (as there is in S&T). Feel free to consider submitting to https://www.frontiersin.org/research-topics/14745/complex-innovation-systems-metrics-models-and-visualizations
>
> As for the term 'engineering': Many of my colleagues engineer diverse socio-technical systems, using BIG data in close collaboration with policy makers, educators and other decision makers. Data modeling and visualization can be used to identify discrepancies between S&T progress, education, and labor market needs, https://www.pnas.org/content/pnas/115/50/12630.full.pdf or to visualize and optimize learner engagement and performance
>
> https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0215964
>
> Oftentimes, the technology used to teach and learn needs to be optimized as well.
>
> With COVID moving most teaching online, IU (and many other institutions) has very rich data and many challenging Qs to answer.
>
> Hope you all get to innovate together,
>
> k
>
> [Quoted text hidden]

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Neil Thawani
Graduate Student @ CMU
m 660.888.2907 | **w** lioninawhat.com

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You received this message because you are subscribed to the Google Groups "Learning Analytics" group.
To unsubscribe from this group and stop receiving emails from it, send an email to learninganalytics+unsubscribe@googlegroups.com.
To view this discussion on the web visit https://groups.google.com/d/msgid/learninganalytics/CAFHq9vn2TSoL6RqDWRwLMRGsLqLDwW-0eGyYHphioqpUG-sMqA%40mail.gmail.com.

George Siemens <gsiemens@gmail.com> Thu, Jul 16, 2020 at 4:05 PM
Reply-To: gsiemens@gmail.com
To: Learning Analytics <learninganalytics@googlegroups.com>

Thank you for respecting and acknowledging my journey.

The uphill climb of LE as a concept will not be easy. Most people, other than those closely affiliated with promoting, have an almost visceral reaction on first hearing it. As others on this thread have noted: social processes are not engineered. And if they are, it's manipulation.

LA/EDM face a challenge of trust going forward. We are in the middle of massive pushback to data use at a societal level. Almost weekly there is a new organization formed that addresses "ethics/ai/transparency" or some similar concept. You couldn't intentionally select a term more antagonistic to the vibe of the room in education currently than "learning engineering". My questions centre on what LE offers the learning space that existing terms do not. Other than perhaps a legacy nod to Simon at CMU.

Can you have more than two communities? Absolutely. You can have dozens. At some point we'll self-select the ones that hold the most promise for us. But I also think it's important for edtech/data science in education people to give thought to how practices are communicated to a broader and non-technical audience. If LE is a McGuffin, then it's a fantastic one.

George
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To view this discussion on the web visit https://groups.google.com/d/msgid/learninganalytics/CACnKZ%3DSydj%2BsR54P%2B_7481_ErUqiyVt0o4Lhtrn01m1Fr5JfwA%40mail.gmail.com.

Steven Dang <stevencdang@gmail.com> Thu, Jul 16, 2020 at 4:17 PM
Reply-To: stevencdang@gmail.com
To: Learning Analytics <learninganalytics@googlegroups.com>

Hi George,

I believe the term learning engineering can be best understood as an analogy. Electrical engineering is a field derived around the practical application of principles of electromagnetism to the design and creation of objects. Likewise learning engineering is the practical application of principles derived from the science of learning to the design and creation of products(technology platforms, curricula, devices, games, etc). To delineate this from the field of EDM, the focus of learning engineers is potentially more broad in that there isn't a specific constraint that the application of learning science be in the context of feature engineering or data modeling. I think many EDM researchers may reasonably be called learning engineers in that the models they create are practical applications of the science of learning. I think it may be harder to delineate this term from the field of learning analytics broadly because the field encompasses much of the work I've outlined here (as evidenced by perusal of past LAK proceedings for anyone interested). However, I would argue that the term "learning engineering" carries a broader intuitive definition than a "learning analytics" specialist for those not specifically familiar with the field. Someone who is a "learning analytics" specialist sounds like someone who produces analytic measures of learning, and this doesn't capture the broader roles of curricula design, learning system design, etc that do fall within the realm of learning analytics research. Some who is a "learning engineer" can be more easily explained as someone who engineers things that support learning. This is my understanding of the delineation between this terms. I hope this is helpful.

Regards,
Steven Dang
Phd Student
Carnegie Mellon University

On Wednesday, July 15, 2020 at 10:30:07 PM UTC-4, George Siemens wrote:
> Hi all,

> When I see the term “learning engineering”, I experience inexplicable sadness. It is one of my least favorite words. I’m undergoing deep mindfulness practices to understand this reaction. And I’m willing to learn what I’m not understanding.
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>
> George

Kristi Larson <okoboji86@gmail.com> Thu, Jul 16, 2020 at 4:26 PM
Reply-To: okoboji86@gmail.com
To: gsiemens@gmail.com
Cc: learninganalytics@googlegroups.com

I see learning engineering more closely related to technology design and instructional design, rather LA. From my perspective as an ID, Learning Engineering applies the work of LA to provide a more effective system of instruction, delivery, and/or adaptation.

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Simon Buckingham Shum <s.buckingham.shum@gmail.com> Thu, Jul 16, 2020 at 9:18 PM
Reply-To: s.buckingham.shum@gmail.com
To: Learning Analytics <learninganalytics@googlegroups.com>

Hi all,

I'm less worried about the labelling, seeing the "engineering" language in part as reflecting a particular academic tradition (Herb Simon / CMU / ITS) as one of the many tributaries flowing into the rich river that I see as Learning Analytics, and in part because we are creating new infrastructure. We can use "engineering" language to draw attention to the fact that we are unquestionably inventing technology to augment human activity, and that we want these to be professional disciplines, grounded in research, and with high standards of ethical practices. But many people aspire to all of the above without using that term.

I see very close overlaps in the explanations offered in replies to this thread, with the kinds of Learning Analytics that I do. Note that this goes beyond researchers using LA as a power tool to study T&L phenomena, critical though that is:

> “The potential of learning analytics is arguably far more significant than as an enabler of data-intensive educational research, exciting as this is. The new possibility is that educators and learners — the stakeholders who constitute the learning system studied for so long by researchers — are for the first time able to see their own processes and progress rendered in ways that until now were the preserve of researchers outside the system. Data gathering, analysis, interpretation, and even intervention (in the case of adaptive software) is no longer the preserve of the researcher, but shifts to embedded sociotechnical educational infrastructure. So, for educators and learners, the interest turns on the ability to gain insight in a timely manner that could improve outcomes.” (Handbook of Learning Analytics, Chap. 1)

My work is concerned explicitly with co-designing digital infrastructure and teaching practices, with key stakeholders engaged in the design process, to close feedback loops to educators and students. This kind of LA = LE: it's unapologetically interventionist (new tools for new ways of working) to "augment human intellect" (in Engelbart's memorable language), but we want to do this using human-centred design processes — else the tools will never embed, and go the way of so many other innovations crowding the ed-tech graveyard. If LE = human-centred design of data science-powered tools, that doesn't trouble me (see this paper which acknowledges the importance of HCI to inform ITS system design).

It's probably more productive to talk about specific examples, e.g. we just rolled out 24/7 instant feedback on writing to the entire campus (the R&D program). That takes...

- **Research-based Pedagogical design** — a language shaping the ways in which students are encouraged to think about their writing
- **Instructional/Learning Design** — integrating such an infrastructure into teaching practices
- **Technical design and implementation** — NLP software and UX, security, integration with identity-management, etc.
- **Upskilling** — tutorials and training for learning technologists and academics
- **Continuous evaluation** — to inform future versions.

I suspect that we're actually all in violent agreement that this is the sort of mix that it takes to embed analytics/AI-powered infrastructure in real world contexts. Elsewhere I've reflected on why this happens all too rarely in universities who are often not geared up to translate LA R&D into properly engineered *systems* (that's both human and technical).

So while I've never bothered to use the term engineering, it's OK, because it reminds us that we're building a particular kind of infrastructure (in fact, knowledge infrastructure).

Simon

http://Simon.BuckinghamShum.net

On Thursday, July 16, 2020 at 12:30:07 PM UTC+10, George Siemens wrote:

> Hi all,
>
> When I see the term “learning engineering”, I experience inexplicable sadness. It is one of my least favorite words. I’m undergoing deep mindfulness practices to understand this reaction. And I’m willing to learn what I’m not understanding.
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>
> George

George Siemens <gsiemens@gmail.com> Fri, Jul 17, 2020 at 2:18 AM
Reply-To: gsiemens@gmail.com
To: Learning Analytics <learninganalytics@googlegroups.com>

Simon,

Regarding your points "reflecting a particular academic tradition (Herb Simon / CMU / ITS)"...and "we're actually all in violent agreement that this is the sort of mix that it takes to embed analytics/AI-powered infrastructure in real world contexts". I agree with both assertions. Which is why I'm hung up on "what does LE do that isn't done elsewhere"? And then leads to the question if its main contribution is in creating a new field - not so much to contribute to knowledge gains, but to position researchers for grants. New ideas=new grant programs. If that is what LE provides, then I can understand why people are promoting it and I can see its value. If it's providing something to the research base of teaching/learning/technology that LA/EDM/LS are not providing, then I'd like to better understand what that is.

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George Siemens <gsiemens@gmail.com> Fri, Jul 17, 2020 at 2:30 AM
Reply-To: gsiemens@gmail.com
To: Learning Analytics <learninganalytics@googlegroups.com>

Steven - thanks for your comments.

To summarize your reflections: EDM is similar to LE, but LE is broader. LE differs from LS in that it uses the insights LS researchers generate (so it's more an application of other research insights?). And LE differs from LS in that it considers learning design and curriculum design? (I know there have been several papers on this in LAK conferences)

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Simon Buckingham Shum <Simon.BuckinghamShum@uts.edu.au> Fri, Jul 17, 2020 at 4:07 AM
Reply-To: simon.buckinghamshum@uts.edu.au
To: "learninganalytics@googlegroups.com" <learninganalytics@googlegroups.com>

George,

Introducing “engineering” is IMHO (1) another **handy metaphor** (which are always partial) to evoke some important concepts. (2) It also serves as a **brand** which is clearly meaningful to many people, particularly industry partners who are stronger in ICICLE than IEDMS/SoLAR. Brands are important for catalysing people.

But as an outsider looking at LE, I struggle to see a new **conceptual** contribution, e.g.

- When we look at this CMU Learning Engineer job description the term looks like a rebranding of what might otherwise be called a Learning Technologist or Online Learning Designer.
- When we look at the ICICLE SIGs, they’re clearly all about tech infrastructure and interoperability (fair enough for an IEEE group), building on existing standards.
- I have Chap.1 introducing the LE book and can’t find anything in that which is new. I’d like to read the final chapter that seeks to distill the key insights of the book, but it’s an edited collection of activities that were well underway before the LE symposium that led to the book.

So, beyond 1-2 above, I too would be interested in pushing LE-insiders to clarify what’s new conceptually, methodologically or technically, beyond good examples of LA/EDM + Design Based Research + Human-Centered Design + Systems Thinking for organisational change. Perhaps that *is* what LE seeks to encompass. I come back to the need for concrete examples, to ground us so we don’t float off into definition heaven/hell!

But even if the answer is essentially that the concept catalyses coordinated action to get good online learning systems into use at scale (by people who for whatever reason don’t call the current EDM/LA communities their home) — well, that’s valuable.

Simon

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To view this discussion on the web visit https://groups.google.com/d/msgid/learninganalytics/F951CE33-E3E1-4C75-B452-371366C35568%40uts.edu.au.

Shayan Doroudi <shayan.doroudi@gmail.com> Fri, Jul 17, 2020 at 11:25 PM
Reply-To: shayan.doroudi@gmail.com
To: gsiemens@gmail.com
Cc: learninganalytics@googlegroups.com

Thanks for spearheading this very interesting thread, George! I haven't read all the responses, so apologies if what I am saying has already been addressed. I'm not going to express my full thoughts on these questions, but I want to point out an issue in the name "learning engineering" (which seems to be bothering at least some point). If we look at the names of some of the most prominent engineering fields, we see a pattern:

electrical engineering
mechanical engineering
chemical engineering
biological engineering (bioengineering)
biomedical engineering
civil engineering
industrial engineering

They all end in "l"! More seriously, the word "engineering" is preceded by an adjective laying out the field in which that engineering takes place, which governs the tools used to take out the engineering task and the scope of what can be engineered (but not explicitly)*. "Learning engineering" does follow this pattern. It gives the impression that learning is being engineered, which some people have clearly taken fault with. To follow this pattern, we could call the field "educational engineering", "instructional engineering", or "pedagogical engineering." The last two are my impression of what most "learning engineering" entails, but I could be wrong. I know it's not easy to change the name of a field, and maybe there are reasons people wouldn't want to even if we could. But if we are trying to draw the analogy to other fields, I think it's important to note the limitations of the term "learning engineering." I think "learning engineering" is liked because it addresses what our ultimate goal is (to improve learning), but we don't see that in other fields. For example, in electrical engineering the goal is not to engineer electricity, but to engineer things that harness it for various purposes.

*There are exceptions to this trend, like computer engineering and software engineering, but in these fields, computers and software are literally what is being engineered, so a noun is appropriate.

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To view this discussion on the web visit https://groups.google.com/d/msgid/learninganalytics/CAHD%3Dx%3D11buf-2Fg4PEAEuf8LLcw4yWFuoVPjyamK-asM_n6ssw%40mail.gmail.com.

Collin Lynch <cflynch@ncsu.edu> Sat, Jul 18, 2020 at 12:46 AM
Reply-To: cflynch@ncsu.edu
To: shayan.doroudi@gmail.com
Cc: George Siemens <gsiemens@gmail.com>, learninganalytics@googlegroups.com

For better or worse I'd like to add my perspective to this and try to tie the two threads together as I feel both comfortable and extremely bothered by the term "Learning Engineering."

On the one hand it is an accurate descriptor of what many of us do which is apply scientific tools and principles to solving practical design problems. If we go by Samuel C Florman's history we can see engineering in the modern sense as a systematic structure of practices to solver practical prpoblems. In that respect it makes sense to describe some of what we do with spaced practice and other tasks as a form of "learning engineering." Whether that means that this is really a new field, a brand, or a blanket term for things many people do is another issue. I would also argue that learning engineering from this perspective isn't new as statisticians have been applying IRT to design exams for years and structural items like concept ordering go back further.

On the other hand, where I get uncomfortable is, I suspect, where George is coming from. Learning, writ large, is a process, a complex

human-centric one, one that is more complex controlling the flow of a river, and we aren't very good at that. One of the reasons I am hesitant to call myself a learning engineer is that I don't see how we can really either reduce the real problem of learning down to engineerable problems or solve a problem irrespective of the context in which it is used. And I dislike framing something as an "engineering problem" if it implies that we can control it, predict it, or manage it in the same way we can manage a fuel pump or a car.

Consider a school system. Piotr made a good point about thinking of schools as a system and in that respect we can think about engineering them. But, school is not really a closed system, like say a pump, that has clear inputs and outputs. Even the problem space of a car is relatively well defined. Schools and school systems on the other hand are complex cultural artifacts that are formed by laws, policies, history, etc. It is difficult to claim with any plausibility that we can engineer it without ignoring what really makes it complex. We can apply engineering principles to it, but that also means butting heads with policy, social structures, and other wicked problems that make driving safety look trivial.

Ultimately I could see the argument for "branding" learning engineering but I am not sure that there is a clear definition that will work without more discussion and a manifesto or two.

Collin.

On Fri, Jul 17, 2020 at 1:14 PM Adriana Wilde <adriana.wilde@gmail.com> wrote:
>
> Nobody is killing a concept Zhou. I think that the discussion is that rather than creating a schism and coming up with a “new” discipline, as a community, we need to improve the understanding of what LA is. All the challenges you describe are very much at the core of LA, so I really think that the discipline “that unites it all” (as you suggest we need) is not a new branded subdiscipline, it is rather LA itself, which has, as a research discipline, reached some maturity now. Spending our efforts in LA adoption across all levels in educational institutions is what we should be doing if we wanted to accelerate innovation (which, you are right, is slow — but if it were a trivial process, EdTech alone would have solved it all a good 60 years ago or so).
>
> Adriana
>
>
>
>
> On 17 Jul 2020, at 12:07, JoJo <zhou.eye8@gmail.com> wrote:
>
> George,
>
> I apologize if you felt my writing was aggressive. I admit I was a bit offended by your bias (if you admit) that LE was coined by people in order to win grants. This is my last response to this email thread.
>
> I consider LE a useful framework to solve many problems existing in today's EdTech sector - it applies to both the practice of making specific learning technology as well as creating a healthy ecosystem for EdTech products. Like in the world of software engineering, programmers respect the open-source and other industry standards when they create software so that innovation can scale and sustain. I feel an overarching framework like this is missing in EdTech.
>
> Take my own work for example. I am IT Administrator at a startup school specialized in competency-based education. Our Registrar keeps student records and course information in a commercial Student Information System (SIS) which has a crippled API. My team has to manually export the CSV from the SIS and import into our course platform - a self-deployed open-source LMS. In the LMS, our teachers create course content, assign homework, do grading, and give feedback to students. Then my team has to synchronize all those things from the LMS to our own competency development management platform (Dashboard) which in theory can be automated because the LMS provides a seemingly powerful API. Still, tremendous research and development work is needed in order to capture the necessary information so that we can proceed to our next step: to provide learning scaffolds for students to visualize and manage their learning progress, to provide tools for teachers to assess their teaching strategies in order to improve, and for school

administrators to evaluate the curricula setup in order to set the right policies and procedures. I consider LA/EDM the future of learning technologies because we cannot instrument these systems correctly without LA/EDM. There is tons of work I am really motivated to do so that we can support our teachers in teaching math, physics, technology, social science, data... in innovative ways.
>
> But we are stuck in the current step because 80% of the learning process data, for example the artifacts created during student collaboration, communication, and self-directed learning, are extremely difficult to obtain. Because most learning technologies do not allow us to aggregate the student learning data in order to make it possible for LA/EDM researchers to jump in. xAPI is a great standard but unfortunately not many learning technologies follow it. Do you see why I am frustrated and why ICICLE was by no means "creating your own demand so you can provide the supply"? Because without such standards, we cannot create an ecosystem for learning systems that make teaching and learning agile. Innovation in EdTech and education is slow because of this.
>
> I am not a native English speaker. But I don't understand why a Learning Engineer has to engineer learning itself? Why cannot they engineer systems that support learning? Is labeling so important that a great concept is killed even before its value is understood?
>
> Zhou
>
> On Fri, Jul 17, 2020 at 1:53 PM George Siemens <gsiemens@gmail.com> wrote:
>>
>> JoJo - I'm going to charitably interpret your reply. I find aggressive discussion techniques such as "you don't understand" and "you don't get" counter-productive. You clearly don't understand just how deeply I understand this. I wish you would get it so you and I could converse as informed equals.
>>
>> If you've been following this thread, you'll note that my response was directly in response to Piotr's framing of LE. Conversation happens in context and words are socially negotiated. I was referring to the structure that Piotr provided. Your view of LE "unites them all" is interesting. If I unite many factions and become the organizing entity, I would have subsumed them. So, what you're saying is I misunderstand in stating that LE subsumes other fields, but instead it just unites them to better serve its own purposes?
>>
>> What do you think are the problems that LE solves or the opportunities it enables?
>>
>> In your response:
>>
>> 1. You state that the entire edtech system needs to be re-engineered and that LE helps here. That's a huge leap in scope. I thought we were engineering learning? Now we're engineering an entire tech sector?
>>
>> 2. Good point about the need for proper design of learning settings as critical to providing LS/EDM/LA researchers with the types of data that they need. Much of what is currently done fits into "autopsy" analysis rather than intentional planning. I agree.
>>
>> 3. ICICLE - this is creating your own demand so you can provide the supply. The same mindset here is "it's all a mess, we'll provide a solution" as with LA/EDM/LS. So now, LE is not only engineering learning and the edtech ecosystem, it is now about designing missing standards as well? Like I said earlier, it's looking like a Theory of Everything for learning.
>>
>> 4. Regarding the "amazing change in schools" that you are engineering, can you share a bit more about that? What results have you been able to achieve with LE that is not achievable otherwise?
>>
>> George
>>
>> On Fri, Jul 17, 2020 at 12:15 AM JoJo <zhou.eye8@gmail.com> wrote:
>>>
>>> Hi George,
>>>
>>> Whereas I respect your thoughts, I think you misunderstood LE totally. LE does not subsume EMD/LA. It does not subsume LS/ID/SE either. Instead, LE unites all of them and aims to architect and implement proper learning systems with accuracy, stability, reliability, agility, and scalability. Please recognize the fact that systems need to be engineered disregarding whether they involve modern technologies. Just like Piotr pointed out, you can engineer a system without technology, such as a curriculum. Besides, I also want to point out that schools are also systems. A school must be architected and engineered properly so that students can learn effectively, the curricula are comprehensive, the departments can hire capable teachers, Admissions can enroll qualified students, and the graduates can get jobs or enter higher-level schools. Only this way a school can be effective and sustainable.
>>>
>>> A few other notes:

>>>
>>> - The ideal learning process should be natural. But most students cannot afford that kind of learning. 90% of the students go to public schools where learning is not natural. And everyone (including adults) consistently learns from random sources such as books and websites where learning is largely ineffective because no learning scaffolds are available for them. For these self-directed learners, they need systems too - with or without technology - to learn more effectively. Sadly, not many technologies exist today to help with this type of learning.
>>>
>>> - Without a properly engineered system, people working in LA/EDM may not even be able to obtain the data they need in order to analyze learning. For example the kind of data produced in physical learning environments (i.e. classrooms, professional spaces) - without engineering the system that can effectively capture the learning process data, there is no food for LA/EDM researchers to chew.
>>>
>>> - I do not think you get the classroom example Piotr previously mentioned. A classroom is not only built but also engineered. How you choose/arrange the desks and chairs, where you place the projector, where you make the teacher stand (or walk around), and whether you provide teaching artifacts (e.g. interactive whiteboard) significantly impact the social and cognitive processes inside the classroom.
>>>
>>> - The whole EdTech sector needs to be re-engineered. There are too many learning products out there, each of which has different and proprietary standards, data structure, API norms etc. This has caused massive redundant work, waste of resources, and chaos for teaching practitioners. We need an overarching system in EdTech so that the learning data from different learning technologies can flow around and LA/EDM researchers can understand learners better. That is why IEEE founded the IC Industry Consortium on Learning Engineering (ICICLE), a workgroup to design the missing industry standards.
>>>
>>> Some people may use the term LE to have a better chance to win grants. But it's a bias if you say the concept was invented for that purpose. I am no longer in academia and I don't care about grants. But I practice the concept of LE in forming my R&D team so that I can unite learning science, data science, design, software/hardware engineering together in order to create some amazing change in schools. To me this cross-disciplinary practice has been rarely seen in either EdTech or LA/EDM. It is totally worth coining a new term.
>>>
>>> Zhou
>>>
>>> On Fri, Jul 17, 2020 at 12:01 PM George Siemens <gsiemens@gmail.com> wrote:
>>>>
>>>> Piotr,
>>>>
>>>> Part of my discomfort with LE is captured here.
>>>>
>>>> Learning is constant. We cannot NOT learn. It doesn’t require engineering. A bridge won’t build itself because its elements lack life/agency. What requires engineering is the curriculum (i.e. the thing we want students to jump through). Where is agency and self-regulation in LE? It doesn’t seem sensible for researchers to just through all the things together into a new bucket and call it a new thing. Ready this thread, I’m not clear on what LE adds that is missing in current research programs or discipline areas.
>>>>
>>>> In your example below, the complex integrated aspect of learning concepts socially is the opposite of engineering. It’s like saying building a classroom is learning engineering. No. It’s building a room. What happens inside is a function of social and natural cognitive processes. That’s complexity. And it’s not engineer-able.
>>>>
>>>> George
>>>>
>>>>
>>>> On Jul 16, 2020, at 9:13 PM, Piotr Mitros <piotr@mitros.org> wrote:
>>>>
>>>> To make this even more concrete, I'll give one specific example of an engineering design process in developing this specific curriculum. There is a set of concepts I'd like kids to repeat on a specific schedule -- such as addition, subtraction, multiplication, fractions, exponents, variables, sequences, various concepts from geometry, and all sorts of other things (most of which people normally assume 5-year-olds can't learn, but prior scientists found they can). There are tons of activities for kids, thoughtfully designed, but not scientifically designed, which exercise those concepts (although most of those require significant adaptation).
>>>>
>>>> I want to build a sequence which places such activities on a spaced repetition schedule for each concept, ideally aligned to transitioning from exposure to ZPD to shallow learning, to deep learning, and to transfer learning.
>>>>
>>>> The process of designing activities, adapting existing activities, and sequencing all of this is exactly the engineering design process. Resources fit into engineering as well. If a child is scheduled to develop a concept, I can:

>>>> (1) Give them a worksheet (15 minutes)
>>>> (2) Adapt an activity I found online (an hour or two)
>>>> (3) Develop fun an multiconcept activity, where a mixed-age group of kids, from 3-year-olds to 3rd graders, are being exposed to a mixed set of fairly complex concepts, and understanding those concepts together socially at different levels. This can take between a day and a few days of work.
>>>>
>>>> And of course, (3) is more effective than (2) is more effective than (1). An exercise like this takes a huge amount of both creativity and engineering rigour to pull together.
>>>>
>>>> Piotr
>>>>
>>>>
>>>>
>>>> --
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George Siemens <gsiemens@gmail.com> Sun, Jul 19, 2020 at 5:54 AM
Reply-To: gsiemens@gmail.com
To: Learning Analytics <learninganalytics@googlegroups.com>

Shayan - words kind of mean things. We negotiate their meaning or they inherit meaning from other contexts. Negotiation takes time, especially when inheritance brings assumptions and bias. Engineering is one such term. Clearly, LE isn't going away. The heavy participation from edtech companies as well as the IEEE collaboration and affiliation with academics/researchers from the CMU/learning sciences lens ensures that. But the response to the term "engineering" in social processes is consistent in learning circles and will likely quarantine the concept to a dedicated cluster, unless it is more succinctly communicated than it currently is. Even on this list, a definition of LE is hasn't been provided (I'm picking that up on another thread). We're arguing about a concept that hasn't been defined. And my main question remains: what does it provide that EDM/LS/LA don't?

> On Jul 17, 2020, at 10:25 PM, Shayan Doroudi <shayan.doroudi@gmail.com> wrote:
>
> Thanks for spearheading this very interesting thread, George! I haven't read all the responses, so apologies if what I am saying has already been addressed. I'm not going to express my full thoughts on these questions, but I want to point out an issue in the name "learning engineering" (which seems to be bothering at least some point). If we look at the names of some of the most prominent engineering fields, we see a pattern:
>
> electrical engineering
> mechanical engineering
> chemical engineering
> biological engineering (bioengineering)
> biomedical engineering
> civil engineering
> industrial engineering
>
> They all end in "l"! More seriously, the word "engineering" is preceded by an adjective laying out the field in which that engineering takes place, which governs the tools used to take out the engineering task and the scope of what can be engineered (but not explicitly)*. "Learning engineering" does follow this pattern. It gives the impression that learning is being engineered, which some people have clearly taken fault with. To follow this pattern, we could call the field "educational engineering", "instructional engineering", or "pedagogical engineering." The last two are my impression of what most "learning engineering" entails, but I could be wrong. I know it's not easy to change the name of a field, and maybe there are reasons people wouldn't want to even if we could. But if we are trying to draw the analogy to other fields, I think it's important to note the limitations of the term "learning engineering." I think "learning engineering" is liked because it addresses what our ultimate goal is (to improve learning), but we don't see that in other fields. For example, in electrical engineering the goal is not to engineer electricity, but to engineer things that harness it for various purposes.
>
> *There are exceptions to this trend, like computer engineering and software engineering, but in these fields, computers and software are literally what is being engineered, so a noun is appropriate.
>
> On Wed, Jul 15, 2020 at 7:30 PM George Siemens <gsiemens@gmail.com> wrote:
>> Hi all,
>>
>> When I see the term "learning engineering", I experience inexplicable sadness. It is one of my least favorite words. I'm undergoing deep mindfulness practices to understand this reaction. And I'm willing to learn what I'm not understanding.
>>
>> Those of you who position your work under the LE frame, how do you see it differing from LA or EDM? What does it add that is missing? Or is it mainly a group of parties largely outside of LA/EDM making a field for themselves to play in?
>>
>> George
>>
>> --

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George Siemens <gsiemens@gmail.com> Sun, Jul 19, 2020 at 5:59 AM
Reply-To: gsiemens@gmail.com
To: Learning Analytics <learninganalytics@googlegroups.com>

Appreciate your reflections Collin. I have a mild reaction to LE as a term. But I can lay that aside and use ointment for treatment. Of greater consequence for me is to understand what it adds to the digital learning research space. There are clearly brilliant researchers affiliated with LE. And if it's mainly a branding tactic for reputation, PR, and grants, then awesome. I can understand that. If it's a novel research domain that people in LA need to be more aware of and learn from, then I want to understand that. I currently do not.

[Quoted text hidden]

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Dan Suthers <danielsuthers@gmail.com> Sun, Jul 19, 2020 at 8:49 AM
Reply-To: danielsuthers@gmail.com
To: Learning Analytics <learninganalytics@googlegroups.com>

+1 to those with a visceral negative reaction to "learning engineering", from an old timer.

On a less visceral and more logical basis: one poster argued that learning is what is being engineered, so it is just like other fields such as software engineering. No, learning is not being engineered. Pedagogical or instructional tools and situations are being engineered. Learning is a process we do not engineer directly. So, pedagogical engineering or instructional engineering (close to instructional design, a narrower focus) are less arrogant and misleading. I'm not enthusiastic about them either, but they are below threshold for my visceral reaction.

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Dan Suthers <danielsuthers@gmail.com> Sun, Jul 19, 2020 at 8:53 AM
Reply-To: danielsuthers@gmail.com
To: Learning Analytics <learninganalytics@googlegroups.com>

> On Thursday, July 16, 2020 at 8:21:46 AM UTC-10, JoJo wrote:
> > You will ask software engineers for help. And you will require the software engineer to understand both education and data science. This kind of software engineer is called a Learning Engineer.

If a software engineer writes a program to predict how to make investments, is that a "profit engineer"? No, that's the hoped for outcome, not what is engineered. Similar with learning. Perhaps engineering discussion prompts for videos, but learning is the hoped for outcome.

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