List of Versions of the PIT UN training Module for Water Sector

1. Prototype training of trainers version - feedback from Michael Hallet from Confluence Engineering in an online networkshop with Gala staff and UM faculty is linked in the publications and media list, below. The feedback from that event highlighted existing use trends for content on youtube around accessible, entertaining certification exam prep and water related math prep for those seeking careers in water distribution (see https://www.youtube.com/@TheWaterSifu/featured, depicted in figure
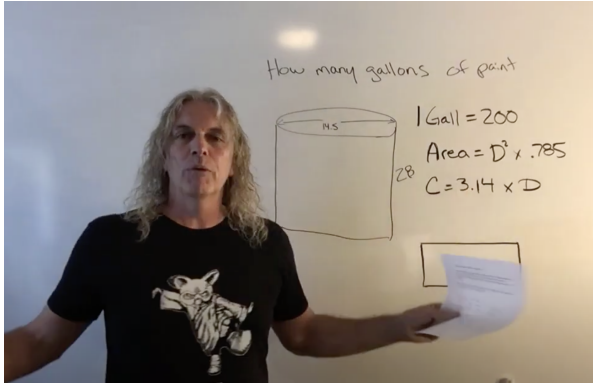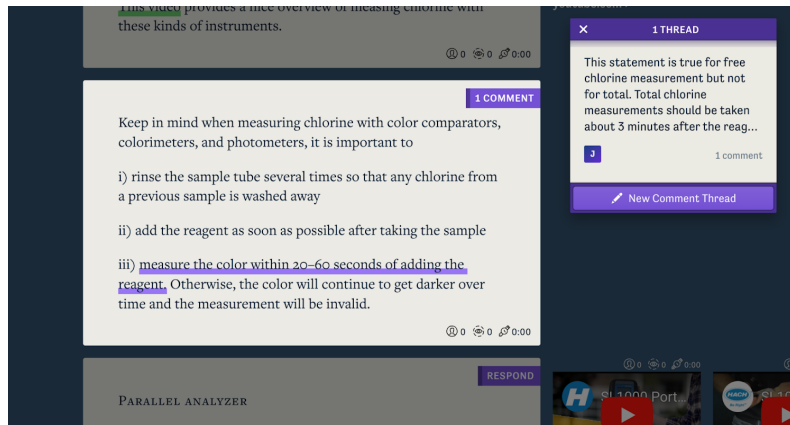

4A below). "WaterSifu" has over 10k subscribers and interacts with his learners in public comments like "no, that is not a stupid question" and "you're welcome" when they pass their exams and qualify for their desired jobs. To design for such entry level learners, many of whom have highschool degrees and highly specific goals, one would do well to take his cues. On the job training and skills boosting to improving data literacy and complex systems thinking for all is no small feat, however. Fostering better teamwork for such a workforce with managers who are likely university educated and may have graduate degrees, is no small challenge. Doing so through materials that could also be adapted for cultivating the diverse talents of potential younger learners in highschools and colleges is even more complex. But iterative development of this module was a highly instructive starting point for our team.

Study group: https://www.learngala.com/magic_link?key=gJfJXNQAjO9jh_hyEQRkGw
Module: https://www.learngala.com/cases/flush-alpha-copy

2. Prototype flushing technician concise module - shared with selected Michigan circuit riders and with staff members from The Water Tower in Georgia. These users, very knowledgeable in practice, were able to offer pragmatic threaded comments and feedback as in Figure 4B, below, using www.learngala.com embedded comment features. Some also offered long form comments over email, as the below example:

"I took a look at the training module. I liked it. I know it's unfinished but I had some thoughts on additional information you might want to add. It might help to include sections about collecting flow data and what tools can be used for diffusing water, protecting the area around the hydrant, and measuring flow and pressure. Maybe a section about record keeping. What data is useful to collect and some examples of ways to track and use the data from year to year. I know in Ann Arbor this would be told to the technicians doing the flushing and they wouldn't need to know why they are collecting it or how to track it. But, in small systems the person doing the flushing is often the same person as the one responsible for record keeping. Another thing I thought was talking about the differences between single hydrant flushing typically used for water quality issues and main cleaning and the multiple hydrant flushing techniques used for ISO ratings and hydraulic modeling. I frequently get questions about when to use the different methods. It was just some thoughts I had but the training program is good without it."

Study group: https://www.learngala.com/magic_link?key=lOytgtvWahPxuUZxFAZysA
Module: https://www.learngala.com/cases/flush-technician-concise-finished

3.Prototype dissertation defense, more data rich module - this version was shared with committee members and a viewing public at the defense on UM's campus who were interested in educational efficacy of deliverables. This context bred more discussions of the back end data gala enables content creators to review, on the number of visits per page of the module (and also by card, and even by edgenote which are like dynamic illustrations or interactive learning enhancements; data of that resolution is not included here). Such information provides formative feedback for the improvement of modules, making them a more dynamic and user driven form than most conventional classroom facing modules in engineering curricula. A sample

page	visits
1	11
2	46
3	24
4	24
5	41
6	23
7	31
8	19
9	31
10	32
11	7

data sheet (de-identified) for a community creating classroom facing modules is included as a further attachment here, for an illustration of the way that content creators, and/or their grant evaluation teams, can request specific information to better understand the impact and use patterns of the tools they make available.

The work of doing this for the water sector users highlighted for Gala some issues with our tracking around repeat visits. This allowed us to tighten up the way the platform itself tracks use, and displays it as in Table 1, and how we enable our user communities to own and use data about their content.

Study group: https://www.learngala.com/magic_link?key=yLM0MfgwGw4c2oJTH3y3xA
Module: https://www.learngala.com/cases/flush-full-draft-long-diss-defense

4. Pilot classroom use and assessment at MSU with Professor Susan Masten's undergraduate course on water management, we collected pre- and post-survey responses about knowledge retention, and interest in the industry/sector, on which we have conducted preliminary analysis despite the small sample size (especially small for post tests, for which we offered no incentives).

We indicated self assessed knowledge gain as in figure 4a below (darker green: 2 steps up in knowledge; lighter green: 1 step up in knowledge). For Industry Interest we color coded responses as in figure 4b below (green=yes, yellow=maybe, red=no) and we prepared a simple table about interest in working in the water sector in figure 4c.

Figure 4a

How would you describe your level of knowledge about distribution system flushing?

Pre-Survey		Post-Survey	Total
I know **nothing** about distribution system flushing	→	I know **a moderate amount** about distribution system flushing	2
I know **nothing** about distribution system flushing	→	I know **a little bit** about distribution system flushing	2
I know **a little bit** about distribution system flushing	→	I know **a moderate amount** about distribution system flushing	1
I know **a little bit** about distribution system flushing	→	I know **a little bit** about distribution system flushing	2

Figure 4b

PRE Have you considered working in the drinking water sector? If so, in what area(s) or what type of job(s)? If not, why not? (Briefly)	POST Have you considered working in the drinking water sector? If so, in what area(s) or what type of job(s)? If not, why not? (Briefly)
I have considered this in my experience working with distribution systems but am more interested in wetland mitigation and restoration as of now	I considered working on distribution systems but am more interested in working with water quality in relation to wetland mitigation and restoration projects
Have not considered, coursework is typically more chemistry focused than I would prefer	No, still too much chemistry
Yes. As a process engineer designing water and wastewater treatment facilities.	Yes, but as a process engineer, doing the design side.
I have not, because I am more interested in civil engineering than environmental.	No, I am more interested in civil engineering.
Yes, rainwater re-usage as well as water systems engineering.	Yes, in rainwater re-usage as well as water systems
Yes; water quality, drinking water quality, and wastewater treatment	Yes, in water quality and wastewater treatment.
No, does not interest me enough to pursue a career in that sector	No, would not be my first choice

We Inquired about learner's interest in working in the water sector:
See preliminary results, below:

Figure 4c Question: Have you considered working in the drinking water sector?

Industry Interest by First-Gen Status

	yes	no	maybe
not first-gen	14	11	5
first-gen	4	5	1

Industry Interest by Gender

	yes	no	maybe
female	12	4	2
male	4	12	4
non-binary	2	0	0

Study group: https://www.learngala.com/magic_link?key=8J8pEWvs1TY4njdXuuI35w
Module: https://www.learngala.com/cases/flush-msu-fall22