Scaling Up and Scaling Out Situative Design of Online/Hybrid Instruction and Assessment

Daniel T. Hickey, Learning Sciences Program, dthickey@indiana.edu
Rebecca C. Itow, Indiana University High School, rcitow@indiana.edu
Indiana University

Abstract Extended design research yielded a situative approach to designing online instruction with some evidence and strong potential for scalability. This approach maximizes productive disciplinary engagement via public discussion of student "wikifolios" in threaded comments. Formative self-assessments and automated quizzes minimize grading and private instructor interaction with students while supporting and documenting achievement. This approach can be implemented in any modern learning management system or using Google tools. It was successfully used to scale up an online course for hundreds of open learners. But an extended partnership to scale out at a fully online high school revealed that educators who were unfamiliar and/or uncomfortable with sociocultural theory found the approach difficult to implement. In response, five design principles have been reframed as fourteen specific steps that do not require familiarity with sociocultural theory. This promises to help users learn how the approach works while designing, delivering, and scaling courses.

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Three decades have passed since situative theories of learning emerged from extended efforts at the Institute for Research on Learning (e.g., Brown, Collins, & Duguid, 1989). For complex reasons, situative theories are less prescriptive for instruction than modern cognitive theories (Greeno, 1998). Nonetheless, numerous researchers have explored the practical implications of situative theories, typically using design-based research to generate design principles that are presented along with relevant aspects of the research contexts. Such contextualized principles contrast with more specific prescriptions from the range of applied cognitive research (e.g. van Merriënboer, Kirshner, & Kester, 2003; Duffy & Johnassen, 2013).

Some see the primary pedagogical implications of situative theories in approaches like Anchored Instruction (CTGV, 1990) and Problem-Based Learning (Hmelo-Silver, 2004). From our perspectives, such approaches are better characterized as "socio-constructivist" because they place individual learning and social interaction on a roughly equal footing. Our more resolute approach embraces Greeno's (1998) "situative synthesis" whereby different forms of individual activity are treated as "special cases" of socially situated activity. We believe that (a) this offers a better starting point for addressing historical group-based educational inequities and countering deficit-based responses, (b) disciplinary discourse (rather than presumed cognitive engagement) is an ideal focus for iterative refinements, and (c) the situative synthesis can exploit the entire range of formative and summative assessments. Specifically, a range of informal, semi-formal, and formal assessments streamlines grading, allows instructors to focus on public discussion of student work, and gives refiners trustworthy evidence of impact.

The Participatory Learning and Assessment (PLA) framework and scalability

This new approach builds on principles from five other programs of DBR that insistently explored the implications of situativity. This included Randi Engle's studies of *productive disciplinary engagement* (PDE, Engle & Conant, 2002) and *expansive framing* (Engle et al., 2012). Engle argued that learners should (a) "problematize" content from their own perspective, (b) find connections with people, places, topics, and times beyond the course, (c) hold themselves and peers accountable to disciplinary norms, and (d) be positioned as authors (rather than consumers) of disciplinary knowledge. We embedded these principles along with principles from situative studies of motivation (Filsecker & Hickey, 2014) within multiple levels of increasingly formal assessment (Hickey & Zuiker, 2012). This produced a new set of design principles deemed *Participatory Learning and Assessment* (PLA). Particularly when paired with *open badges* (Hickey & Schenke, 2019), PLA can support and recognize *generative* learning (i.e., likely to transfer to new educational, professional, and personal, contexts) while keeping instructor demands manageable.

In support of scalability, PLA only requires editable pages with threaded comments and online quizzes (in all modern LMSs and Google's *Coursebuilder*, *Sites*, and *Docs* & *Forms*). Many PLA implementations rely partly or entirely on open educational resources, which further supports scalability. Some courses feature

conversational videos or podcasts where instructors or experts model the PDE with disciplinary knowledge and resources.

Scaling up in a Big Open Online Course (BOOC) on educational assessment

Many of the features used to implement PLA first emerged in a graduate course called *Assessment in Schools* taught by the first author since 2007 and moved online in 2009. In 2013, a grant from Google was used to scale up a big (but not massive) open online course ("BOOC") using Google Coursebuilder. By enrolling enough for-credit students in each section of the "Assessment BOOC" and focusing instructor interaction on those learners, it was possible to include hundreds of non-credit open learners without requiring significantly more instructor time. The semester-long Assessment BOOC was implemented and refined annually from 2014 to 2016.

The grant supported a programmer and teaching assistants. This made it possible to iteratively streamline and ultimately automate most of the instructor/facilitator routines (Hickey, Kelly, & Shen, 2014). By the third year, the grant funds were exhausted and there were no teaching assistants. But hundreds of open learners were still able to complete their "wikifolios" and earn badges containing links to that work alongside enrolled students, while making almost no additional demands on the instructor (Hickey & Uttamchandani, 2019).

Scaling out in a Research Practice Partnership with a fully online high school

A multi-year research practice partnership (RPP, Coburn & Penuel, 2016) using design-based implementation research (DBIR, Penuel et al., 2011) was carried out to adapt PLA to the fully online Indiana University High School (IUHS). This RPP was led by the second author (a former high school English teacher) as doctoral research. The existing IUHS courses reflected the school's history as a mail-based "correspondence school." Students obtained a textbook, downloaded conventional assignments, and uploaded completed assignments for grading. When students felt prepared, they sought out a local proctor (e.g., a librarian) and completed a rigorous paper exam that the proctor mailed back for grading. These exams helped convince the NCAA to renew IUHS' endorsement in 2014 after the NCAA stopped recognizing courses from most other online schools. However, many of the athletes who began flocking to IUHS for "credit recovery" courses were failing those exams. IUHS and NCAA agreed that students needed more meaningful opportunities to engage with teachers and content. The RPP aimed to provide this interaction to support success while remaining NCAA compliant by providing valid evidence of achievement.

The RPP worked with two existing teachers (biology and 9th grade English) and two new teachers (10th grade English and social studies) to adapt PLA and create four new courses. As documented in Itow (2018), the 10th grade English and social studies teachers had learned about sociocultural theories when completing their degrees. In contrast, the biology teacher had learned about cognitive learning theory, while the 9th grade English teacher had completed an alternative certification that did not include any learning theory. The 9th grade English teacher self-described as "politically and educationally conservative" and taught full time at a private church-affiliated school. From the start, the 9th grade English teacher worried PLA would undermine educators' authority and ultimately left the partnership. Building on newfound expertise, the 10th grade English teacher quickly created the 9th grade course.

The 10th grade English teacher and social studies teacher were particularly engaged and were subsequently were hired full-time and given multiple courses. They refined the PLA framework over several years, with a focus on pacing. They ultimately gave students six months to complete self-paced courses. While this format increased completion rates, it also reduced peer-to-peer interaction that had previously peaked around weekly deadlines. Nonetheless, there was plenty of evidence that students were examining completed work of their peers and reading instructor comments on peer work; remarkably some students interacted with others who had already completed the course. The biology teacher initially struggled, but ultimately adapted PLA in a way that appears promising for STEM. All three teachers are continuing to teach their courses and student achievement is high.

A new step-by-step presentation of the PLA framework

In response to the difficulties some have had in implementing PLA, the five PLA design principles were recently reframed as fourteen more prescriptive steps, which include four optional steps. In particular, the first two principles in the PLA framework have been broken down into eight steps in which relevant experiences and examples from other courses are used to help newcomers who are unfamiliar with sociocultural theory. An article with a fully theorized description and examples from a range of courses is forthcoming elsewhere (Hickey, Chartrand, & Andrews, accepted). What follows is a summary of these "untheorized" steps that have also been presented in several recent workshops. These workshops have convinced us that this new presentation helps broad

audiences gradually come to understand (a) what it means to use expansive framing to support PDE, (b) how the same assessment can serve both summative and formative function, (c) how and why disciplinary engagement should be assessed carefully and separately from disciplinary knowledge, and (d) how and why multiple-choice tests can be used to estimate transfer to new contexts and to evaluate iterative refinements.

*Step 1: Create a personalized framing activity***.** This crucial first curricular activity helps students define a personally relevant context where they can practice using the concepts of the course. Designers are reminded that (a) some first drafts can and will be incomplete or even inappropriate, (b) that students can and should look at peer examples and instructor feedback when drafting their initial frame, and (c) that students should refine their characterization across activities as their understanding of their context expands.

*Step 2: Define an introductory engagement routine***.** This initial routine gently introduces expansive framing with relatively simple course content. In most of our courses, this is accomplished in the very first assignment, (sometimes before students define their framing context) and simply has students introduce themselves to explaining which course objective is most relevant to their personal and career goals.

Step 3: Define primary engagement routines. Create routines that engage students productively with manageable "chunks" of disciplinary knowledge. In most assignments, students (1) summarize the relevance of curated elements that make up those chunks, (2) reorder those summaries in order of relevance to their framing context, and (3) justify those rankings (e.g., explaining why the first is most relevant and the last is least relevant).

Step 4: Define secondary engagement routines. Introduce more advanced concept in secondary routines that (a) build on the concrete artifacts and insights generated in the primary routines, (b) may or may not employ the ranking strategy described above, and (c) are introduced further on in assignments and/or courses.

Step 5. Define collaborative engagement routines (optional). We suggest including collaborative "team-based" activities judiciously, if at all. This is because PLA supports extensive social interaction around individually completed work; collaborative activities can also call for synchronous engagement that many online students find difficult to manage. Of course, we defer if collaboration is elemental to disciplinary practices being learned.

Step 6: Define obligatory engagement routines (as needed). In our experience, some courses in some disciplines will include some content that most learners can't frame expansively. Put differently, we sometimes find that courses have some content that is necessary but that learners find difficult to generate a framing context. Some courses have had students frame engagement from their college major or by viewing introductory OERs.

Step 7: Define student engagement expectations and routines. PLA assumes that students will examine and discuss peer work and interact with the instructor via threaded comments directly on student work. This helps students hold each other accountable to peers and to disciplinary norms, and position students as an audience for their peer authors. But such interaction should not be graded or formally evaluated; in contrast to more abstract discussion forums, we find that most students are usually quite enthusiastic about discussing their own work.

Step 8: Define instructor engagement expectations and routines. Instructors should model and encourage PDE, but they needn't participate in every threaded exchange. We also suggest instructors prioritize helping students define and refine their framing contexts and introducing more advanced concepts within discussion threads.

Step 9: Create public informal assessments of engagement. These reflections formatively assess understanding while summatively assessing prior engagement. They are used for awarding completion points, "repositioning" (Agarwal and Sengupta-Irving, 2009) minorized students, and surfacing sociopolitical issues. We currently use prompts for *contextual, collaborative, consequential, conceptual,* and *cultural* engagement.

Step 10: Create private semi-formal self-assessments of understanding. These are private open-ended items featuring known-answer questions about key concepts in each assignment. They are intended to summatively assess prior understanding of those concepts while formatively assessing achievement in advance of achievement tests.

Step 11: Create automated formal tests of achievement. We suggest including private, multiple-choice test for clusters of assignments (i.e., "modules" in many LMSs) that are automatically scored. These should include challenging "best answer" items that can't be searched when time is limited (perhaps two minutes per item). While the contents of the tests should be "aligned" with the assignments and formative assessments, the actual items should not drive instruction and the specific associations in test items should not be directly presented in advance.

Step 12: Create model wikifolios, podcasts, or videos (optional). We suggest that designers consider creating a model wikifolio for students to refer to the first time the course is offered. In larger courses, it may be worthwhile to create videos or podcasts for each assignment. Rather than delivering content (which is challenging to do well), these recordings are more conversational, whereby more advanced professionals and/or experts model the forms of engagement expected of students, explaining relative relevance in their own context.

Step 13: Create microcredentials (optional). The public nature of student engagement in these courses is ideally suited for web-enabled digital badges. The wikifolios and threaded discussions (which the badges can link to) facilitate recognition of "21st Century" competencies like collaboration, creativity, and critical thinking.

Step 14: Design homepage, submission, and grading systems. Depending on the platform, it will likely be necessary to create a course homepage so that students and instructors can more readily access wikifolios, a routine for letting instructor know when wikifolios have been completed, whatever grading or point scheme to be used, and a gradebook that provides FERPA-protected grades and private feedback.

Next steps

Having defended her dissertation, the second author was hired as the Principal of IUHS. We are now laying the groundwork to expand the use of the PLA across the school using this new step-by-step presentation. We expect that this new presentation will help all of the teachers and course designers develop and teach new cooperative courses and further refine and streamline the existing cooperative courses.

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