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What is an Innovation in Learning?

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Part 1

Innovation in Learning

What Is an Innovation in Learning?

Sam Redding, Janet S. Twyman, and Marilyn Murphy

But Smithies not only taught us particular things. He got us to think—often by questioning us in a way that forced us to follow out the logic of what we were saying to its ultimate conclusion. Often some policy that sounded wonderful, if you looked only at the immediate results, would turn out to be counterproductive if you followed your own logic beyond stage one.

Thomas Sowell describing his teacher, Professor Arthur Smithies, in an essay titled *Good Teachers* (para. 9)

What's new? Americans have a penchant for the new. Always expecting a better tomorrow, we are not ones to look back. Thomas Paine wrote, and we have forever believed, "We have it in our power to begin the world over again." We are innovators.

Seeking innovations in learning, we inhabitants of the Information Age reflexively turn our eyes to technology. Rightly so, given the vast improvements technology has brought to our lives. But an innovation is a different way of doing something that is also a *better* way of doing something. In education, an innovation is a deviation from the standard practice that achieves greater learning outcomes for students than the standard practice given equal (or lesser) amounts of time and resources. Innovation does not always involve a mechanical, electronic, or digital device. To condense a few historical narratives, we might say that Benjamin Franklin discovered electricity, Thomas Edison invented the light bulb, and John Travolta danced to innovative disco lights. Or, more to our point, Alan Turing discovered computing, Steve Jobs invented the iPad, and educators made use of the iPad in blended learning. If proved more effective than the standard practice of teacher-directed, face-to-face instruction, blended learning (with an iPad) would be an *innovation in learning*. So, any new device is really just an

invention, and only the successful use of it—its application—for a specific purpose, in a specific context, makes it an innovation. The innovation may be methodological, technological, or both.

While we (rightly) argue that innovation is not necessarily technology but rather a better way of doing something, we cannot ignore the technology tsunami. The technology tsunami brings abundant new devices and capabilities, but its wake is littered with the detritus of failed programs, outdated thinking, and obsolete gadgetry. How do we sort through this morass with any confidence we are making a good choice? How do we keep up with what's new? How do we hold on to what is best?

To identify an innovation in learning, we must define the standard practice as well as the new way and determine that the new way is better. That is a high bar to clear. Validating the comparative advantage of a new practice with gold standard research is a desirable goal but one that lays a cold hand on the experimentation that fosters innovation. However, chasing after the next new thing with little evidence of its efficacy wastes valuable time and money and puts students at risk of missed opportunity to learn. A balance must be struck in highlighting the emerging practices that show promise as true innovation. A proposed innovation can be tested via formative, iterative evaluations prior to the needed validation with randomized, controlled trials (Layng, Stikeleather, & Twyman, 2006).

For decades, we have felt our system of public education creaking and groaning as waves of reforms have attempted to dramatically lift the trajectory of student learning. “Innovations” in education seem to occur based on each new societal demand placed on the educational system (Miles, 1964). The mildest reforms aim at improving the implementation of standard practice—simply getting better at what we are already doing. The boldest reforms seek transformation of the entire system through what Frederick Hess (2013) calls “cage-busting leadership”—smashing the debilitating glacier of bureaucracy, over-regulation, collective bargaining, and small thinking. Innovation is a third way—replacing standard practices in teaching and learning with demonstrably better practices.

Innovation is valued as a catalyst to growth. Other sectors have invested in the study of innovation: They have defined it, documented it, and attempted to spread it to obtain results that add value to desirable objectives (see Mobbs, 2010). The process of adopting new innovations has been studied for almost a half a century, with the work of Everett M. Rogers (especially his ground breaking 1962 book *Diffusion of Innovations*) setting the stage for research on innovation. As defined by Rogers (1983), an innovation is “an idea, practice, or object that is perceived as new by an individual or another unit of adoption” (p. 11). An innovation provides an alternative solution to a problem or creates a novel solution to meet needs for an individual, group, or organization:

The effectiveness of innovation, no matter at what level it is initiated in a school organization, is dependent on the extent to which the people

concerned perceive a problem and hence realize the existence of a need, are knowledgeable about a range of alternative solutions, and feel themselves in a congenial organizational climate. (Karmel et al., 1973, p. 126)

The “newness” of an innovation does not just involve new knowledge, but also new ways to approach the problem (Rogers, 1983, 2003). As stated, and by extension of that idea, innovation may also come from a different way of “connecting the dots,” thus providing a solution to a need we might not have even known we had.

In education, innovation has been poorly or inconsistently defined, undermining our ability to harness and scale “it” for better, more efficient learning results. Without a standard for innovation, everything—or nothing—qualifies. A common understanding, with shared definitions, language, and measures, will allow us to describe the characteristics of learning innovations, the trajectories of their adoption, and the ways in which they are spread from one group to another, within and across layers in our education systems. This consistency will ultimately help us encourage and stimulate different ways, better ways, and more effective ways of learning—all tied to specific educational practices and student results.

Innovations in learning solve problems and add value. They:

- a. provide fresh solutions or remove traditional barriers to existing, articulated challenges in teaching and learning (and add value by building capacity for implementation);
- b. identify a previously undetected need or barrier, then enhance the teaching and learning process with a novel solution (and add value by understanding the limiting factor in a new way and responding accordingly);
- c. introduce new possibilities to enhance the teaching and learning process (and add value by providing new, more efficient opportunities for obtaining better results); and
- d. allow the education system to adjust to new avenues through which students learn (and add value by capitalizing on and directing student use of technology).

In sum, innovation = improvement, but not improvement by simply getting more proficient with the standard practice. Our premise is that the new practice produces observable, measurable, sustainable improvements through replacement of a standard practice rather than more proficient implementation of it. Innovation solves a problem, sometimes by replacing a standard practice and at other times by articulating a previously unfelt problem or need and proposing a solution. If a new practice is implemented (even those using the latest technologies) and it does not result in observable, measurable, sustainable improvements, it is *not* an innovation. By identifying specific practices from which innovations emerge and the conditions under which the innovations are most successful, we will be able to talk specifically and precisely about what

innovations in learning are, whom they help most, what they require, and how they work. We begin with the following definitions.

Defining the Work

Innovation. Innovation is the application of an idea or invention, adapted or refined for specific uses or in its particular contexts (Gertner, 2012; Manzi, 2012). The implementation of an innovation proceeds over time, often with adjustments in course as the innovation is fitted to the context. An innovation replaces the standard product, program, practice, or process with something better, and as the majority adopts it, the innovation then becomes the new standard.

Learning. Learning is a positive change in the learner's cognitive, psychomotor, social, and/or emotional knowledge and skill as exhibited in the learner's behavior.

Innovation in Learning. An innovation in learning occurs in a specific teaching and learning context, improving upon the implementation of the standard practice or introducing a new practice, thus achieving greater learning outcomes.

The whole aim of good teaching is to turn the young learner, by nature a little copycat, into an independent, self-propelling creature, who cannot merely learn but study... This is to turn pupils into students, and it can be done on any rung of the ladder of learning.

Jacques Barzun, *Teacher in America*

Innovative practices may be ordered into processes and procedures, bundled into programs, and packaged into products.

Practice. A practice is the specific way an instructor teaches or a student learns. Effective practices are rooted in principles of learning and adapted to the context, including the learning environment and the student's

readiness, prior mastery, and motivation. A standard practice is an effective practice that has been widely adopted. An innovative practice improves upon the standard or creates a standard for a previously unarticulated problem or need.

Processes and Programs. An instructional or metacognitive process is an efficient ordering of practices to produce an expected learning outcome. A program is a coherent assemblage of processes and practices, with procedures, instructions, and tools.

Principles of Learning. Principles of learning are the underlying psychological or behavioral principles upon which effective instructional and metacognitive practices, processes, and programs rest.

A Culture of Innovation

Innovation frequently requires an investment in human capital and tools. Whatever the degree of change an innovation occasions, success depends upon

the clear communication of purpose, the personal engagement of everyone involved, the attention to short-term and long-term progress, and the consolidation and institutionalization of the improvements (Kotter, 2012). To make a meaningful difference, the “doing” part of an innovation must be executed systematically, with performance measures for determining progress and making course corrections. As part of a comprehensive initiative to advance the transformation of American education, the Obama administration and the U.S. Department of Education are encouraging a culture of learning powered by technology. Programs and projects within this national plan encourage “a strategy of innovation, careful implementation, regular evaluation, and continuous improvement” (U.S. Department of Education, 2010).

A culture of innovation, within an educational organization or across a system of organizations, systematically institutionalizes a five-phase innovation process that (1) stimulates innovations to improve learning outcomes; (2) enables potential adopters to select innovations appropriate to their context and need; (3) ensures that the innovation is implemented with fidelity to its essential elements and with adaptations to enhance its effectiveness in the given context; (4) facilitates the scaling of the innovation through implementation in multiple classrooms, schools, and districts; and (5) provides a system for monitoring the effects of the innovation and its scaling, implementing change as necessary.

Research can provide the foundation when building and supporting a culture of innovation (Kasper, 2008), which both philanthropic and government-funded incentives can facilitate (e.g., U.S. Department of Education, 2013; Warren, 2013). McGuinn (2012) found that the federal Race to the Top grant program stimulated innovation and “has had a significant impact on the national political discourse around education” (p. 136) by providing a national framework around innovation and helping states build capacity to implement these innovations effectively. Angehrn and colleagues (2009) were able to stimulate and support knowledge, collaborative learning, and innovation across community members by focusing on increasing different types of value (connection, actionable learning, and gratification). The ability to select appropriate innovations should be greatly influenced by the evidence-based framework and practices that assist teachers in making any curricular or instructional choice (Kazak et al., 2010; Miller, 2009).

We know that to support selection and implementation, training should be provided to teachers about an innovation (Fullan, 1982). The growing science of implementation offers guidelines on effective implementation practices (Fixsen & Blase, 2009; Penuel, Fishman, Yamaguchi, & Gallagher, 2007) and identifies specific measures to be used to support instructional fidelity (Fixsen, Blase, Naoom, & Van Dyke, 2010). We can benefit from education’s several brushes with large-scale educational reform by reviewing what has and has not worked in the past. Based on a review of previous attempts at large-scale reform, Elmore (1996) offers recommendations for addressing scalability and improving

practice in education. Other research helps us define “scale” and its dimensions (such as depth, sustainability, spread, and shift in ownership) to better support and sustain consequential change (see Coburn, 2003). Finally, the research on formative evaluation and iterative testing of a program or process, as well as summative evaluation procedures, can provide useful guidance on evaluating both the overall effects of an innovation, as well as each phase in the process (Layng, Stikeleather, & Twyman, 2006; see also Markle, 1967).

Evaluating the Innovation Process

Each of the first four phases of the innovation process applies its own evaluative criteria to determine and improve that phase’s effectiveness. Therefore, innovators develop metrics to analyze the degree to which (a) the organization’s

All learning is either by instruction or by discovery; that is, with or without the aid of teachers....The teacher who actually knows something must put himself in the position of inquiring to aid inquiry on the part of the learner, who must inquire in order to learn.

Mortimer J. Adler,
Teaching and Learning

efforts to stimulate innovation result in innovations taking hold and increased learning taking place, (b) the selection criteria and process match the innovation to the adopter’s context and need, (c) implementation adheres to the innovation’s essential elements and makes appropriate adaptations, and (d) the innovation is successfully taken to scale.

The fifth phase takes an overarching view of the effect of the innovation, asking, “How well, in this context, does the innovation result in improved outcomes?”

Conditions for a Culture of Innovation

A culture of innovation requires leaders who are aware of their organization’s capacity, strengths, weaknesses, and needs and who also understand (a) the innovation process and (b) the human dynamics of change (Redding, 2012). The innovation process must be exercised within a climate of clarity and trust that encourages people to seek better ways to teach and learn, and can correct course or adapt when the evidence shows change is needed. The culture of innovation values, assesses, and understands the potential for both reward (e.g., likely positive impact on learning within the organization’s particular conditions) and risk (e.g., the chance for diminished learning, wasted resources, and loss of clarity and trust).

Framework for Innovations in Learning

The following narrative framework provides a conceptual structure for identifying innovations in learning. The framework is organized around three domains: content, instruction, and personalization. Within each domain, principles of learning establish a psychological foundation for the standard practices.

The standard practices provide a basis for comparison in assessing a new practice's effectiveness and determining its status as an innovation in learning. The text describing the indicators of a standard practice presents in plain language a behavioral illustration of the standard practice's implementation.

Content

The content is what is to be learned, otherwise known as the curriculum. Educators put in place many practices, processes, and programs to determine and organize the curriculum, including both the core curriculum and each student's opportunity to expand upon the curriculum defined by the school and teacher. Educators organize the content into instructional plans and may choose existing curriculum materials, create their own, or a blend of both. Content (or the curriculum) must be offered on a platform of good instructional design. The design of effective curriculum materials requires a systematic process that includes performing content, task, and learner analyses; clearly defining the learning objectives; determining the criteria and corresponding assessments for understanding or mastery; establishing what entry repertoire would be needed by the student to be successful in the curriculum; and making student motivation more likely by incorporating a program's fundamental principles throughout the instructional sequence (e.g., The goal should not be to make history fun, but to help learners find the fun in history; Tiemann & Markle, 1990; see also Dick & Carey, 1996; Smith & Ragan, 1999; Twyman, Layng, Stikeleather, & Hobbins, 2004).

Examples of Principles of Learning for Content

- ***Explicitness:*** Learning is most efficient when its intended outcomes are explicit, measurable, and understood by the teacher and student.
- ***Cumulative knowledge:*** Learning occurs best when new knowledge is built upon prior knowledge.
- ***Fluency:*** Knowledge and skills that are "fluent" (i.e., automatic) are easier to maintain and apply to other things.
- ***Concept formation:*** We learn through discrepancies, and we extend what we know through "samenesses."
- ***Acquired relevance:*** A student's interest in a topic and motivation to pursue learning related to it are amplified by the student's exposure to new topics and engagement with them.

Examples of Standard Practices for Content

- a. Establish a team structure with specific duties and time for instructional planning.
- b. Engage teachers in aligning instruction with standards and benchmarks.
- c. Enable teachers to critically evaluate and select appropriate, relevant curriculum resources.

- d. Engage teachers in assessing and monitoring criterion-based student mastery.
- e. Engage teachers in differentiating and aligning learning activities.
- f. Assess student learning frequently with standards-based assessments.

Examples of Indicators of Standard Practice for Content

- a. Teachers are organized into grade-level, grade-level cluster, or subject-area instructional teams.
- b. Instructional teams meet for blocks of time (4- to 6-hour blocks, once a month; whole days before and after the school year) sufficient to develop and refine units of instruction and review student learning data.
- c. Instructional teams develop standards-aligned units of instruction for each subject and grade level.
- d. Instructional teams use student learning data to plan instruction.
- e. Instructional teams review the results of unit pre- and post-tests to make decisions about the curriculum and instructional plans and to “red flag” students in need of intervention (both students in need of tutoring or extra help and students needing enhanced learning opportunities because of early mastery of objectives).

Instruction

Instruction encompasses the world of ways to get information from one place (a book, a webpage, the teacher’s head) to another place (the student’s head, shown by a change in the student’s behavior). Good instructional delivery requires active learner engagement with frequent opportunities to respond (Rosenshine & Berliner, 1978) and immediate, relevant, and related (i.e., contingent) feedback (Mory, 1992; Shute, 2008). Instruction should support the learner in moving forward at his or her own pace (Wang & Zollers, 1990) so that new material is not presented until the student has demonstrated mastery or application of current material (Bloom, 1968; Keller, 1968; Kulik, Kulik, & Bangert-Drowns, 1990). This progression of instruction and content should be tied to actual measures of student learning and not dictated by curriculum content chunks such as chapters or units or the passage of marking periods or calendar years.

Teachers “deliver” instruction through a variety of modes (including at a distance and via technology) and should provide opportunities for student self-direction and exploration. Student self-assessment is a key component of metacognition, and teacher or program assessment of student learning is critical to effective instruction.

Examples of Principles of Learning for Instruction

- ***Exercise:*** Those things most often repeated are best remembered.
- ***Feedback:*** Students learn best when they receive immediate feedback on their progress toward mastery of specific learning tasks.

- **Pacing:** Students learn best when instruction and the presentation of new material is contingent upon their mastery of current material.
- **Reflection:** Students use background knowledge and real-world prior experience to enhance both comprehension and motivational engagement.

Examples of Standard Practices for Instruction

- a. Expect and monitor sound instruction in a variety of modes (whole-class, teacher-directed groups, student-directed groups, independent work, computer-based, and homework).
- b. Expect and monitor sound homework practices and communication with parents.
- c. Expect and monitor sound classroom management.

Examples of Indicators of Standard Practice for Instruction

- a. The teacher is guided by a document that aligns standards, curriculum, instruction, and assessment.
- b. The teacher develops weekly lesson plans based on aligned units of instruction.
- c. The teacher differentiates assignments (individualizes instruction) in response to individual student performance on pretests and other methods of assessment.
- d. The teacher maintains a record of each student's mastery of specific learning objectives.
- e. The teacher interacts instructionally with students (explaining, checking, giving feedback).
- f. The teacher interacts managerially with students (reinforcing rules, procedures).
- g. The teacher interacts socially with students (noticing and attending to an ill student, asking about the weekend, inquiring about the family).
- h. The teacher uses open-ended questioning and encourages elaboration.
- i. The teacher encourages peer interaction.
- j. The teacher encourages students to paraphrase, summarize, and relate.
- k. The teacher encourages students to check their own comprehension.
- l. The teacher uses a variety of instructional modes (whole-class, teacher-directed groups, student-directed groups, independent work, computer-based, and homework).
- m. The teacher systematically reports to parents the student's mastery of specific standards-based objectives.
- n. The teacher models, teaches, and reinforces social and emotional competencies.

Personalization

A student's motivation to attempt and persist in learning is centered upon certain psychological principles that are operationalized through

teacher–student interaction as well as instructional design, delivery, and personalization. Essential to learning are the student’s facility in directing his or her learning, self-assessing mastery, applying learning strategies, using learning tools and technologies, and finding information.

Examples of Principles of Learning for Personalization

- ***Readiness:*** Concentration and eagerness stem from the student’s prior learning and motivation to learn.
- ***Reciprocity:*** A student learns best in a reciprocal relationship with a teacher whose knowledge of and concern for the student is apparent to the student.
- ***Transferability:*** A student learns best when aware of the current learning task’s future applicability, including its usefulness in achieving the student’s personal aspirations.
- ***Freedom:*** A student learns best when the student exercises some degree of freedom in selection of the content and application of learning strategies.

Examples of Standard Practices for Personalization

- a. Use fine-grained data to design for each student a learning path tailored to that student’s prior learning, personal interests, and aspirations.
- b. Develop each student’s metacognitive skills to gauge his or her own mastery, manage his or her learning strategies, use learning tools, and direct his or her learning processes.
- c. Allow students freedom to choose learning content and learning activities.

Examples of Indicators of Standard Practice for Personalization

- a. The teacher encourages self-direction by giving students choice in the selection of topics and the application of learning strategies.
- b. The teacher builds students’ metacognitive skills by teaching learning strategies and their appropriate application.
- c. The teacher builds students’ metacognitive skills by providing students with processes for determining their own mastery of learning tasks.
- d. The teacher builds students’ ability to learn in contexts other than school.
- e. The teacher connects students’ out-of-school learning with their school learning.
- f. The teacher builds students’ ability to use a variety of learning tools.
- g. The teacher uses appropriate technological tools to enhance instruction.
- h. The teacher helps students articulate their personal aspirations and connect their learning to the pursuit of these aspirations.

This conceptual framework provides a starting point for the work of the Center on Innovations in Learning and other groups seeking to identify innovations in learning. We will be considering learning principles, as well as standard practices. Variations in the standard practices and new practices to address previously unarticulated problems will be studied to determine their potential as true innovations.

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