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BRIEF

**Personalized Learning:
The Hype, the Hope, and the Straight Dope**

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Michael Feldstein, MindWires Consulting
Phil Hill, MindWires Consulting

- **Personalized learning is a term, used increasingly in marketing contexts, that covers (and sometimes obscures) real and important trends in education.**

- **The two big changes that have driven increased interest in personalized learning are a new government policy emphasis on degree completion and the commercialization of adaptive educational technologies that have existed in academic laboratories for a long time.**

- **The core of personalization is using technology to give students more individual feedback and differentiated instruction by freeing up class discussion time through offloading lecture content to the computer, providing computer-based feedback, or a combination of the two.**

- **Because the core value of personalized learning is in the changes in course design and not the products themselves, the strategy can apply to a wide range of courses.**

"Personalized learning" is used often, unfortunately, as a marketing term. As a descriptive phrase, it doesn't tell us a lot more than "new and improved." In product pitches and in blog posts and comments, it is often used interchangeably with "adaptive learning." Other interested parties use more expansive definitions. For example, "ELI 7 Things You Should Know About Personalized Learning" describes the relevance of the term "personalized" as follows:

> *What is it? Personalized learning is intended to provide a unique, highly focused learning path for each student. If a student receives individual attention from an instructor, the lessons, feedback, and assessments will necessarily be tailored to that student's strengths and weaknesses. Such attention does not scale in traditional educational environments, and proponents of personalized learning maintain that IT systems and tools, along with rich data sets and analytics programs, can provide individualized learning pathways to large numbers of students.[1]*

This more expansive, educational problem-focused view of "personalized" reflects the fact that the increasing use and abuse of the marketing term is driven by increasing interest at the university level in a real set of student needs and related solutions that are often enabled by technology products but are not reducible to them.

Why the Term Is Taking Off Now

The idea that the traditional lecture-based undergraduate education can be passive and impersonal is hardly new. Terms like "student-centric learning design" and "active learning" have been around for a long time. The basic notion is that, while students may come to college with different educational needs, skills, and goals, many college courses—as well as advising support and degree program structures—are not designed to accommodate those differences well. This long-standing concern has taken on new relevance and, to a certain degree, a new character because of two major recent developments. On the policy side, there has been a shift in emphasis from access to degree completion. President Obama set the tone by announcing a goal that America be number one in the world in its proportion of college graduates by 2020.[2] Since then, state policy makers and grant makers have followed suit. As colleges increased their focus on improving student graduation rates and reducing average time to graduation, the students who fall through the cracks and fail out of the standard educational model have come into sharper relief. With these policy changes and the funding that follows them, being "student centric" is no longer a nice-to-have goal. Rather, it is a critical success factor for increasing student completion rates and therefore getting funding and being seen as a successful institution.

The second big change has been the current commercialization of intelligent tutoring systems and similar adaptive learning techniques that have existed in educational research laboratories for over 50 years. As the term suggests, these products provide students with a certain amount of technology-based one-on-one tutoring (although the methods that these systems use for analyzing student progress and providing useful feedback vary widely by product and discipline). This change in the software usage has been enabled by technological advances such as the increasing availability of having one networked computer for every student in a class and of having affordable developer access to machine learning tools. In addition, further changes have been driven by market forces such as the need for textbook publishers to find new business models and a sense in the investment community that those publishers may be ripe for "disruption." These products were then promoted by the vendors as solutions to the degree completion problem, and the personalized learning marketing juggernaut was born.

But underneath that hype, we still have the original educational challenges (including but certainly not limited to degree completion) that originally drove the creation of approaches such as "student-centered learning" and "active learning" (as well as "competency-based education"). And while the products marketed under the banner of "personalized learning" usually will not solve these problems in and of themselves, they can be enablers of approaches that can have meaningful impacts on very real educational challenges.

How "Personalization" Works (When It Works)

One productive way to think about personalization is the same as any technique or product that makes it easier for faculty to give and students to receive more individual attention, guidance, and feedback. The low-hanging fruit for this kind of change, particularly in developmental and core curriculum courses where students tend to get stuck and fail out, is in changing the lecture. Lectures are large blocks of reserved time when faculty and students are in a room together but students typically get very little interaction time with faculty. So personalized learning approaches typically help faculty redesign class time so that students learn on their own, either individually or in small groups, freeing up faculty from lecturing and enabling them to refocus their in-class time on being more of a coach. Although the term "personalized learning" tends to get applied mainly to the products themselves, much of the personalization comes from two factors: (1) enabling students to proceed as quickly or slowly as they

need (and sometimes to take different approaches to learning), and (2) providing increased individual feedback and help to students. Both of these benefits are possible to achieve without computers, and they are also possible to achieve at least to some degree using different technologies. For example, the flipped classroom, in which students watch lectures on video as homework so that they can spend more time in class interacting with each other and with their teacher, could also be fairly labeled as a personalized learning technique, particularly when the videos are paired with brief quizzes that help students assess whether they understood the video content.

The most highly marketed aspect of personalization that adaptive learning in particular adds to these approaches is the software's ability to give immediate and individualized feedback to the students. But the educational impact of that feedback varies widely based on the specifics of the situation—the discipline, the product, the student population, the course design, etc.—enough that it is probably impossible to come up with a meaningful *generalization* about how much of a difference these products make in and of themselves across all courses in which they are used. A less hyped but often more impactful feature of these products is that they provide faculty with analytics that enable them to see how the students are doing and adjust their teaching approach accordingly. They can see if a sizeable proportion of the class is struggling with one particular concept and needs some review time. They can also see if one particular student is struggling and needs attention. Again, the value of these analytics varies widely based on a number of factors. But the primary *potential* value of "personalized learning" products is in the feedback—the analytics—that they provide not only to teachers but also to students. When adaptive learning algorithms increase the value of these products, they do so by increasing the accuracy and specificity of the feedback that the product provides. This point may seem obvious, but it can often be lost in the hype about "machine learning" and "artificial intelligence."

Where Personalized Learning Is Useful

Under a grant from the Bill & Melinda Gates Foundation, we were given editorial independence to examine a range of different institutions that are trying different experiments in personalized learning in order to learn what they are doing and create some rich-media case studies that we call *e-Literate TV*. Based on what we have seen, it is fair to say that a lot of what gets categorized as personalized learning could just as easily be labeled with another old educational term: "differentiated instruction." Often, there is a technology-enabled twist. But the core is generally about differentiation. So where is technology-supported differentiation useful? Our campus visits both confirmed some of our suspicions and yielded some surprises:

- **Improving outcomes in developmental math:** Developmental math is probably about as close to a perfect case for personalized learning as we are likely to see. To begin with, students enter the class with a wide range of skills. For example, at Essex County College in Newark, New Jersey, they see students enter with math skills anywhere from fourth grade to twelfth grade equivalent. Some need a lot of help, while others just need help in a couple of areas—but probably not the same areas as their classmates. So they need differentiation. Second, students can't complete college without completing developmental math, the pass rates are typically low in traditional classes, and schools that get a lot of post-traditional and underserved students often have high percentages of students who place into these courses. So the impact of a better intervention is high. And finally, math in general and basic math in particular lend themselves particularly well to the kind of tutoring that adaptive learning programs are good at.[3]

- **Supplementing and supporting large core curriculum lecture courses:** It is possible to provide more differentiation in large lecture courses without doing away with them altogether. For example, the University of California, Davis, became interested in providing more differentiation in their survey biology and chemistry courses because they recognized that they

were losing a high percentage of their students during their first year, when those students typically take the large lecture courses. Rather than upending the lecture class altogether, the university chose to use several different technologies for a kind of classroom flipping design so that lecture sections can be much more interactive and discussion sections can provide students with more individual attention.[4]

- **Fostering inquiry and exploration in problem-based learning courses:** The previous two examples fit with the common understanding of personalized learning being used to help students work through traditional, didactic courses with more support. But Arizona State University incorporated the "flipping" aspect of the technology into a problem-based, online STEM lab course for non-science majors in which students, for their final project, are asked to evaluate the likelihood that there are other intelligent civilizations in a randomly assigned field of stars. Problem-based learning, when it is properly constructed, can be highly differentiated, not only based on student abilities but also on their interests and problem-solving styles. The Habitable Worlds course is an example of how using technology to support the tutorial portions of the course can enable a wide range of sophisticated learning designs, including some that promote student inquiry.[5]

- **Supporting even small classes where there is a large range of student skills:** Another surprise for us was discovering that personalized learning techniques had value even in some small courses in elite schools, provided that the students come into class with a wide range of skills. For example, at Middlebury College, a geography professor who realized that his students were coming to his class with a wide range of spatial reasoning skills—because spatial reasoning generally isn't taught at school—discovered that he could improve course results by flipping the class.[6]

It turns out that there is a wide range of educational situations in which using technology to move didactic content out of the class session, while providing increased feedback to students and teachers, proves valuable.

Emerging Best Practices

As we look across a range of personalized learning projects with varying degrees of success, both at the schools that we visited and elsewhere, a few common themes have emerged regarding strategies employed by schools whose projects have been more successful. It should be noted that these themes could be applied to any number of pedagogical innovations.

- **First, identify the student need you are trying to address:** The various personalized learning approaches are just one set of tools in the toolbox. Successful programs generally start by identifying a significant education problem in which they have reason to believe that more differentiation can make a difference.

- **Next, design the pedagogical structure:** If the problem you have identified can be addressed through differentiation, then how will the course support different students differently? The answer has to be more than just "adaptive learning." Successful programs identify opportunities in the course design to improve individual support for students.

- **Only then should you pick the products or technologies:** The details of different products or technological approaches are most meaningful when they impact what you are able to do with your course design. Successful programs pick the right tool based on the job at hand rather than on who has the best marketing pitch.

- **Don't forget faculty training:** Because personalized learning, done properly, generally means implementing new pedagogical approaches, faculty may need to learn to teach in ways that they haven't taught before. Successful programs provide faculty with training and pedagogical support.

- **Don't forget technology support:** Software helps with learning only when it works, and Murphy's Law can hit with a vengeance when you mix technology with teaching. Successful programs make sure that faculty have the technology training, equipment, and support staff that they need to be successful.

- **Be prepared to measure, fail, and iterate:** Because personalized learning approaches often require new teaching techniques for faculty, new software, new responsibilities for students, and in some cases even new scheduling challenges, you will almost inevitably get some things wrong in the first couple of iterations, and those mistakes may have real impact on outcomes. Successful programs approach implementation empirically but with patience.

To Learn More

The e-Literate TV episodes have many embedded rich-media links to content that is relevant to the conversations happening on-screen. But here are some links to get you started if you want to learn more:

- The e-Literate TV series on personalized learning

- The overview episode for the series

- Our blog posts on topics related to the series

- An article on adaptive learning for the American Federation of Teachers' *On Campus* newsletter: Michael Feldstein, "What Faculty Should Know About Adaptive Learning," December 17, 2013

- An academic overview of Intelligent Tutoring Systems written by Kurt VanLehn: "The Behavior of Tutoring Systems"

Notes

1. "7 Things You Should Know About Personalized Learning," ELI, September 8, 2015.
2. See Higher Education at the White House website.
3. For more information, see case study videos on Essex County College: Episode 1 and Episode 2.
4. For more information, see case study videos on UC Davis: Episode 1, Episode 2, and Episode 3.
5. For more information, see case study video on Arizona State University: Episode 2.
6. For more information, see case study video on Middlebury College: Episode 2.