Personalized Learning: Toward a Grand Unifying Theory

The current context of personalized learning is technologically mediated curriculum that produces customized instruction in order to support optimal learning outcomes. Whether simple Boolean logic or advanced artificial intelligence and deep-data analytics, the engagement of personalized learning typically establishes learning pathways through assessments that identify learner deficits with the application of strategies, resources, and engagement to improve performance. The NMC Horizon Report: 2015 Higher Education Edition recognizes the importance of digitally driven personalization as a major trend in higher education, albeit with strong challenges for its nascent data-derived, scientific approach for improving student outcomes through customized learning experiences.1 The report focuses on instruction as the center of personalized learning, but that is only one part of the mix needed to help students succeed. There is synergy waiting to happen if these processes for personalization occur not within a silo, but as an organic system of many data sources that collectively impact student success. After all, the same student being tracked and evaluated while using an adaptive courseware product has a digital footprint and legacy that extends well beyond the parameters of a singularly focused electronic learning environment.

In this age of big data analytics, the view of personalized learning as being centered on learning technologies invites only a limited opportunity for using the rich digital dossier of today’s students to promote their success. Indeed, the definition of personalized learning can easily expand to include the digital footprint that a student creates in the journey toward an educational goal. This consideration of multiple inputs that influence success along a student’s life cycle is not new. Indeed, it is considered within the scope of inquiry used to validate the educational practices and student outcomes in two of the most common measures of student engagement in the United States: the Community College Survey of Student Engagement (http://www.cccse.org/) and the National Survey of Student Engagement (http://nsse.indiana.edu/). In measuring the practices that best support learning outcomes, these instruments reach for data not just potentially available through annual assessment but also already sitting and waiting to be ingested in real time from a multitude of technological interactions.2 The NSSE unequivocally models this holistic view of student life by measuring the quality of outcomes through utilization of institutional resources, curriculum, and learning outcomes.

A Welcome Mat for Big Brother

More than a half-century ago, John W. Tukey asked: “What of the future? The future of data analysis can involve great progress, the overcoming of real difficulties, and the provision of a great service to all fields of science and technology. Will it? That remains to us, to our willingness to take up the rocky road of real problems in preference to the smooth road of unreal assumptions, arbitrary criteria, and abstract results without real attachments. Who is for the challenge?”3

The challenge has certainly been answered through the emergence of platforms that have realized the future of data analysis in higher education. Systems in the first generation of big data analytics platforms are integrating multiple data sources in order to personalize and inform actions that further student retention and completion. The landmark work started by the Predictive Analytics Reporting (PAR) Framework (http://www.parframework.org/) reflects this vision of personalization for students in an analytical engine that uses common data definitions and very large data sets to provision actionable information on student risk factors. Moreover, PAR is notable in that it provides cross-walking from student success challenges to resources that have been vetted for effectiveness through the data-driven institutional responses of multiple institutions (the Student Success Matrix).

Civitas, a growing provider of big data analytical solutions for higher education, succinctly leverages “the best of data science, sophisticated predictive analytics, and machine learning” to ensure the individuality of interactions, interventions, and relationships between students, faculty, advisers, and ultimately administration (https://www.civitaslearning.com/about). Personalization extends to digesting data and providing students with the models to diagnose the time, financial, and credential implications of their choices. Civitas exemplifies the broader approach to data science and predictive analytics, drawing on multiple data sources to personalize and improve student completion. Examples of data sources now being brought into the mix extend beyond the student information system (SIS) to include the learning management system (LMS), smart card swipe activity, housing and demographics, library usage, and external data repositories.

The Education Advisory Board (https://www.eab.com), which provides consultative and technological solutions for higher education, has also entered the analytics-based platform development to harness big data for personalized support and guidance during the student life cycle. This includes bumpers that keep students away from excess credits, holistic data-driven academic planning and scheduling, and personalized advising. Although this may seem less idyllic or not even vital to
some sectors of higher education, for workforce-driven schools and those institutions with performance metrics that emphasize completion and job placement, this is certainly a welcome trend toward better outcomes for students.

With the emerging solutions just referenced, it’s not difficult to imagine the not-too-distant future where a student's educational homeostasis is being maintained through the unified workings of e-learning technologies, recruitment systems, large student data sets, governmental resources, and college recruitment and onboarding platforms. Consider too the implications for personalizing educational services through a common state or even national student identifier that would follow students as intimately as their social security number—from their earliest days of schooling through college. At this point of evolution, the processes can begin to inform administrative and policy decisions. This scenario may produce an Orwellian image, but in reality it more closely resembles the ever-tighter coordination of personal data already feeding governmental and commercial entities. If a state or national common identifier becomes the key to relational data sources such as SIS, LMS, CRM, ERP, educational clearinghouses (and the list goes on), imagine the altruistic opportunities to personalize the student learning experience. Even facilities data could be mined and interpolated to provide optimal conditions for, as an example, disabled students. Apart from addressing ADA accommodations, why not also personalize the experience of special needs students by predictively plotting preferred distances to classes and by improving campus accessibility? Imagine the potential for informed leadership that, with a paramount goal of student success, could embrace highly productive, agile modeling for resource allocation with the greatest return on investment. It is little wonder that the data scientist has become a treasured resource allocation with the greatest return on investment. It is likely that any single platform will ever fulfill the potential of an increasingly data-rich world by seamlessly melding social, educational, economic, historical, and even psychological data sources into a force for student success. Rather, it will remain the task of visionary leadership to incorporate personalized learning into a grand unifying theory—to build both the culture and the systems needed to combine these data sources into an effective analytical engine for student success.

Even though I may be holding out for a grand unification of academic technologies and big data to support our students, the most important part of this quest will be leadership—and quite possibly leadership in roles that may not yet exist. All the elements are in place, from the ever-growing social and academic footprint of each student to the emergence of data science. It is unlikely that any single platform will ever fulfill the potential of an increasingly data-rich world by seamlessly melding social, educational, economic, historical, and even psychological data sources into a force for student success. Rather, it will remain the task of visionary leadership to incorporate personalized learning into a grand unifying theory—to build both the culture and the systems needed to combine these data sources into an effective analytical engine for student success.

### Notes

### In Closing: Leadership Counts
Perhaps I’m a dreamer for imagining a future state of personalizing learning that can effectively tap the requisite data sources in order to ensure that each learner can reach his or her academic potential in the most efficient, customized way. However, whether cosmological or technological, human purpose coalesces around systemization and the normalcy of ontologies to understand our universe. While physicists view a grand unifying theory informing the questions of the universe, policymakers, college administrators, faculty, and students would most likely experience this system unification as a framework pulling together a personalized digital profile that most effectively guides each learner to success. The process has already begun with the emergence of the first data science platforms dedicated to higher education success through prototypes and visualizations now showing promise for realizing improved outcomes.

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