

EDUCATION – FROM CONTENT TO INFORMATION BUSINESS

Education is perhaps the oldest content business in history. In the days of antiquity parents told stories to children as educational vehicles. Parents personal attention let them personalize the story to an individual child based on their capacity and style of learning, and a continual assessment of their learning.

In just the last 10 years, however, education morphed from content solely to an information business, and forever changed and improved the prospects of better product and ultimately far better educated children. All to solve for personalizing and adapting the content, tools and assessment to an individual child to catch their attention, motivate them and make it fun. How did this happen?

The shift began when entrepreneurial educators realized the data stemming from assessment results was more than just “exhaust data” – the data itself was rich with information if only patterns in the assessment results could be codified and used to diagnose student performance.

In short order intelligent algorithms arose, which would spot patterns in student behavior from the assessment results. The initial applications centered on informing a teacher where the student body, and individual students, was missing out on understanding learning objectives. The information was cleverly packaged in color codes to suggest the severity levels of learning progress. The algorithm suggested where the teacher missed. This alone allowed teachers to alter lesson plans, and better results followed from re-teaching and using perhaps a different approach to teach the same learning objective.

But the process described above is rudimentary, and progressed. As algorithmic data interpretation skills improved, educators learned that by combining all student data from various sources – student demographics, health, attendance records, for example – much further information could be gleaned about a student. Not just *what* a student missed, but the *why*. The combination of pinpoint understanding at the student level is giving rise to a whole new class of instruction, called personalized learning. Rather than a teacher using mass instruction approaches, which tends to teach to a lower common denominator, the power of low cost technology and algorithmic design paves the way to tailor student instruction. Differentiated instruction (i.e. mass customized) can be delivered in not just content per student, but the *mode* in which content is delivered (e.g. does the student prefer video, audio, small groups, large teacher-lead groups, active content, et al)? Further, subjects can be connected, such as math and history to give each yet more meaning when paired. **Students don’t have to adjust to a school; schools now have to adjust to the student.** This is a complete paradigm shift of a 10,000 year-old tradition!

The paradigm shift is only beginning. Real time information and data capabilities are giving rise to *adaptive learning*, which allows curriculum to change in real time so that students can be challenged only with lessons that they need to learn. Adaptive learning makes the learning process more **efficient**. Personalizing the instruction to a student's tastes, such as teaching fractions by using batter averages for sports fans, add to the joy of the experience, making more **effective** as well.

The benefits accrue to the whole education system, not just the students. Data can be positioned to enhance professional development, as teachers can compare their own results to other teachers, pinpointing exact lessons that are not yielding as strong student performance as their peers. This data can also be used for teacher evaluation, which is controversial and sometimes counterproductive to professional development opportunities. Finally, the comparisons can be made between schools, districts, and states, opening powerful benchmarking opportunities. Anything that can be measured can normally be improved upon.

In time, as neuroscientists understand the brain, and its plasticity, education will be delivered tailored precisely to a student's cognitive functions, truly customizing the learning experience.

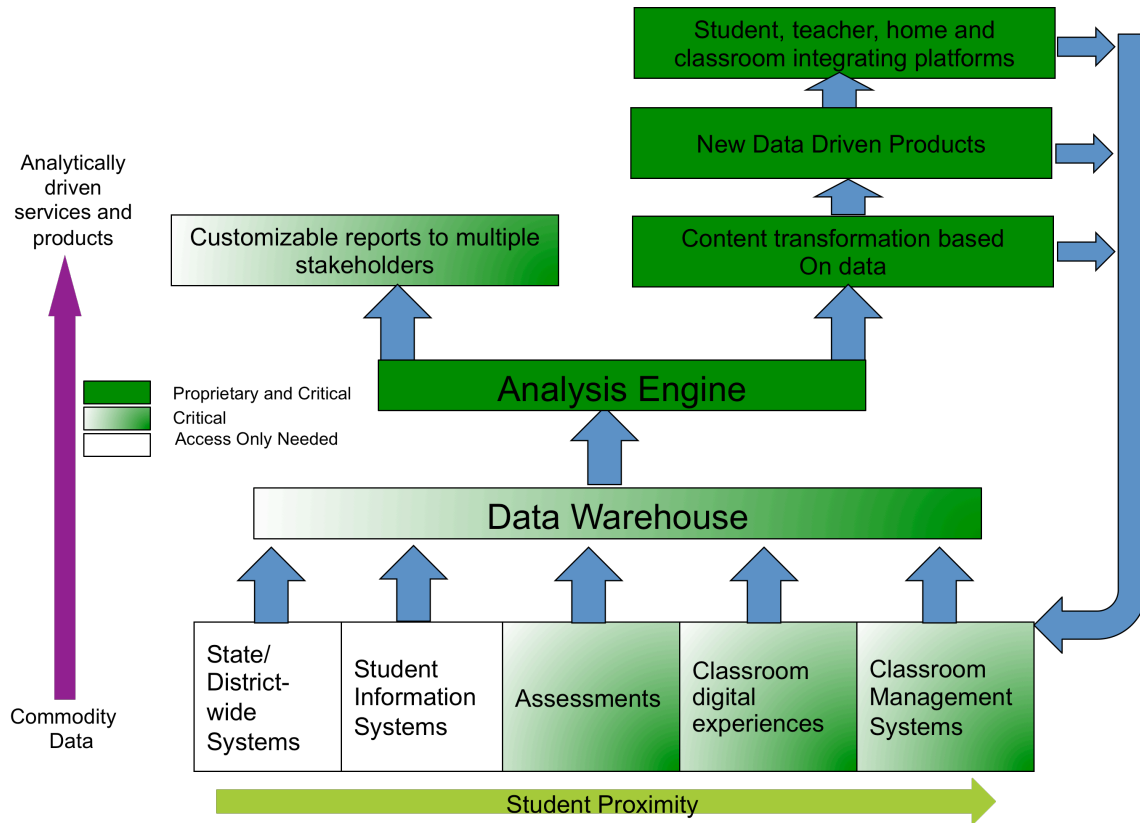
How personalization in education is done

Figure 1 below summarizes the data sources and processes that make education personalization possible. Data from all sources, both "commodity" or "bulk" data are combined with proprietary data gleaned from usage interactions that take understanding of student knowledge beyond simple demographics or attendance records. The information is stored in a data warehouse, where an algorithm/analysis engine extracts pattern recognition and makes increasingly accurate diagnoses regarding student performance, issues facing the student (and teacher), and then makes specific curriculum recommendations, as well as the style the curriculum should be served.

Not only does this personalization improve student learning, but also the combined data from thousands of students can be used to imagine entirely new classes of products. These new products can be tested almost immediately by feeding them back into the evaluation loop.

In education, as any business, some data is openly available to all, some is critical to have, and some even more critical to be proprietary to retain a competitive advantage. The combination of proprietary data and proprietary analytical algorithms is a "killer app" in content personalization. With further effort, a platform can be created to integrate applications from many sources.

Figure 1: Data and Process in Content Personalization



Education is a useful model for all businesses with “exhaust data”. What business cannot better personalize experiences by understanding at the deepest individual level? Where does this feedback loop **not** apply? Algorithmic-based user experiences are coming to all businesses. Make sure you’re prepared for this future.