



Increasing the Velocity of Knowledge – Accelerated

By Gene Frodsham, M.S., S.E.

An article in the August 2013 issue of *Scientific American*, “Learning in the Digital Age,” addresses the abilities of gaming technology ported over for educational use in Massively Online Open Courses (MOOC). Sugata Mitra, BBC news (www.bbc.co.uk), noted that students in rural Africa can use Skype to get the best teachers. These stories address the availability of knowledge, not the presentation of knowledge for comprehension, speed of transfer, or integration, and are chained to the two-dimensional world.

The idea that I presented in my previous Structural Forum column, *Increasing the Velocity of Knowledge* (July 2013), is that an immersion in organized interactive knowledge with programmed or live tutors allows the fastest transfer of knowledge; a virtual world in 3D space where we can experience simulated reality. We now present knowledge at a set rate, then grade on how much is learned at that rate. The interactive emergent system allows the student to choose tutors and a preferred method of presentation for really learning. The brain is modeled crudely, and Internet tools are not optimized. We cannot know the limits of the mind; all we can do is continually remove constraints to learning. The ancient Greeks recognized the difference between “memory” and “recollection,” what we know and what is referenced; immersion in organized interactive knowledge will extend recollection, blurring the line between it and memory, and thus accelerating learning.

Lawrence Lessig, in *The Future of Ideas*, describes the commons where everyone can contribute and the efforts of society are coordinated. Lessons and courses can be used by others to provide variations or new uses without the constraints of the patent and copyright systems restricting the flow of knowledge. It is not necessarily free information, but freely available for use and reuse. It will take the coordinated effort of societies to complete the massive project for the display of human knowledge in a 3D, interactive, integrated format. It takes a commons to create the framework to make the next great step in human knowledge. Mr. Lessig provides this

idea in which to develop an emergent system for the collection and extension of knowledge.

Conrad Wolfram (www.computerbasedmath.org) has an idea for math that can be expanded to the 3D world. The site states, “The importance of math to jobs, society, and thinking has exploded ... Meanwhile, math education is in worldwide crisis – diverging more and more from what’s required by countries, industry, further education ... Computers are key to bridging this chasm: only when they do the calculating is math applicable to hard questions across many contexts. Real-life math ... education needs this fundamental change ... to redefine math education ... toward real-life problem-solving situations that drive high-concept math understanding and experience.” Imagine real-life problems with 3-D representation, mathematics displayed with equations and methods in an interactive calculation format, with a tutor (live or programmed) and references surrounding the student.

Being knowledgeable is not the same as being adept. Schooling gives knowledge, but provides little basis for engineering judgment. With presentation in 3D immersion, students can see projects from conception to construction; from analysis and design to field engineering, troubleshooting, and problem solving. A programmed tutor or live professor can guide them in the development of engineering skills. It will not replace experience or mentoring, but offers a huge advantage by saving and transmitting experience. What is applicable for structural engineering is true for electronic design, chemistry, the mechanical arts and the trades, history, geography, and ideas in general.

Imagine donning goggles and special gloves to capture hand motion, and then overhauling a motorcycle. A tutor of the student’s choice disassembles a bike, describing every step, specification and tolerance along the way. Students then pick up virtual tools and dismantle and inspect every part, repairing as needed, and then reassemble the bike.

A new taxonomy is needed for presentation of the required adjunct knowledge, as the traditional preparatory education is replaced

by associated knowledge that is given as it is required. It is inherent in the emergent commons that its measurement and modification will become the grounds for the study of human intellectual capabilities and the testing of educational theories, rather than the hundreds of millions now spent on “educational research.” The danger is that an oral culture could develop in the 3D world, unconstrained by the exactness of the written word as the uneducated masses, deprived of the traditional preparation, get a chance to learn. Gresham’s Law – “bad money drives out good” – also applies to information, and the prevention of the sheer mass of noise is necessary. A commons must still be governed.

The first step is programming the 3D space, then making virtual equipment and materials for each discipline and trade with the programming needed for creating classes. The rules for the commons and for governance can be developed in parallel. Much of the coding for this has already been created, and the hardware is now off-the-shelf. It only remains to organize the knowledge of the human race.

We battle time. Tools matter; slide rules to calculators to computers to a virtual reality of knowledge allow us to fight this enemy. The gigabit internet and 5G phone systems being developed will provide high-speed access and computing ability everywhere, making deployment possible. With the equipment in a small briefcase, a child anywhere could access the best laboratories, teachers and classes for any of the sciences, arts and trades; an educational commons for the world. We are now in possession of the tools to accomplish this as never before. It is the work that we can do as a society and a generation to free us from the tyranny of ignorance and time. In the words of the poet, Delmore Schwartz, “Time is the fire in which we burn,” and all can have the opportunity to burn brightly.■

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