

Exploring Google + Internet Resources as a memory amplifier. Spending more time thinking and less time navigating web sites and forgetting?

Thoughts about building an IT infrastructure that facilitates Internet-centric problem solving

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Education is all about enabling learners and training their brains. Enabled learners can adapt, chase their curiosity and achieve excellence. Web-accessible tools that facilitate transport of information from wherever to your desktop enable learners and problem solvers. Google is one example of an enabling transport tool. Disabled learners avoid Internet accessible resources, shun search engines and fail to grasp that Google and the Internet can extend their memory. These learners are destined to a rather dull and boring life.

My brain does four things: doing, learning/memorizing, remembering and thinking). Our current educational objective seems to be patterned after *learn-everything-just-in-case -you-might-need-it*, which clearly produces folks with a highly developed skill for memorizing. ([Click here for background about the biology of learning and remembering and background about the case for elearning.](#) For me, as one who always had trouble with memorizing, the cost was high: I performed poorly on tests that required remembering and there was less time for fun things like thinking and problem solving. I believe that memorizing is essential during the early stages of brain development. Memorizing builds my store of facts and concepts, the substrate for future thinking and problem solving. But when should I shift my educational objective from adding to my mental store of knowledge and improving my skill in memorizing/remembering to improving my skill in thinking/problem solving?

Before the Internet, there were no good alternative ways to access information. The only way for me to locate and transport data from some repository to my desk was to travel, phone or through discussions. With the global connectivity provided by the Internet, I have an alternative. I am convinced that the information store touched by the global *Internet-memory* (Internet + Google + a desktop/laptop computer) exceeds that of my biological memory, the combined memory of my colleagues and the library. Moreover, retrieving information from this global information warehouse does not depend on the interval of time that has lapsed since I last retrieved it. (The internet does not forget unless someone removes the information.) I can tap into this reservoir of information by improving my skill in searching for and transporting information to my desk for my personal use. I believe that combining my biological memory with my Internet-memory makes me a better problem solver because I spend less time trying to remember information and concepts that I forgot. I can retarget remembering time to productive information locating, data transporting, thinking and problem solving. By realizing my Internet-memory is a primary information resource for thinking and problem solving, I believe I can reduce the time spent developing my memory skills (whether explicit training, or implicit training associated with memorizing new facts that will soon be forgotten) and increase the time I spend learning and solving problems. Said another way, the time is right for building an Internet-centric educational strategy that invests more time in developing critical thinking and problem solving skills and less time in developing memory and remembering skills.

Learning is use-dependent and forgetting is inversely use-dependent, i.e. forgetting increases with disuse. (The neurobiology analogs are long term potentiation and long term depression. See also) Consequently, there is no cost effective justification to memorize rarely used material since it will be soon forgotten. I prefer to redirect energy that used to be expended in memorizing soon-to-be-forgotten material toward

improving thinking and problem-solving skills. Remember, every minute spent memorizing soon-to-be-forgotten information is lost. Every minute spent improving thinking skills is an investment in the future. Improved skill in critical and analytical thinking at the expense of memorizing unused material will clearly give students a better return on their educational investment.

Education is also all about adaptation. Insights derived from research today become products tomorrow. Our service-based economy is driven by new ideas, new products and new tools. The pace of change impacts all of us - whether professor or student or clerk or auto mechanic. Tracking and adapting to change requires convenient access to information. The Internet levels the information access playing field - whether in the upscale suburbs of Westchester County or in a tribal village in Gingee India.

Rapid change and a level information access playing field alters the traditional relationship between students and faculty. I do not see myself as a professor and those young people around me as students. Rather I see myself as a senior, experienced learner and my younger colleagues as junior, inexperienced learners. These junior learners bring energy and curiosity to our discussions and help me identify what changed since yesterday and where, within the Internet, I can look for assistance.

I find a major obstacle to shifting education from one-time *just-in-case* learning, to continuous Internet-centric *just-in-time* learning is that few appreciate the importance of learning *with* (contrasted with *from*) computers and the Internet. Learning is not anytime-anywhere access to my lecture in powerpoint format. Learning is all about conveying my ideas and insights where the computer and the Internet are both essential tools of conveyance and exploration. I believe I can more effectively chase my curiosity with Google and the Internet than I can without it. I need to find ways to help my colleagues make the transition from viewing education as simply presenting students some knowledge to understanding education is really brain development where conveying ideas and insights is the name of the game.

One cannot be a serious educator without fully appreciating the interaction between memorizing and the forgetting curve. The forgetting curve measures the loss of memory as a function of the time since a fact was last remembered. Said another way, the forgetting process is the opposite of the learning process. Learning requires repetition in order to move it from short term to long term storage. Forgetting requires the absence of repetitive use. Lack of repetition weakens the memory with time. After a surprisingly short time, the learned or memorized fact that has not been recently used is no longer rememberable, a mental disuse atrophy.

I find that my learning efficiency is dependent on both my curiosity and my ability to continue to fuel my curiosity as I chase it down some path. I find that my learning is accelerated if I have a frame of reference or *scaffolding*, from which I can hang new insights and concepts. Such a frame of reference is essential for efficient curiosity chasing. Google and access to Internet resources fuel my curiosity by reducing the mechanics of information access to a minimum. Now that Internet access is pervasive, I am less likely to miss an opportunity to chase my curiosity when it is unpredictably ignited.

With these pages I am exploring the use of Internet tools to construct an Internet-centric learning center that facilitates just-in-time learning and can often act as a surrogate memory for infrequently used facts and concepts. I find that navigation within a web site often as important as the content of a web site. I am exploring this by building my content within a consistent navigational framework consisting of 1: a *hat* with links to major resources and a search box and 2: a left menu bar to facilitate locating site-specific material.

I am using our portal (<http://my.musc.edu>) to harvest and aggregate information from around the world in order to amplify my Internet-memory. This permits me to retarget more remembering energy to doing/learning/thinking - thereby restoring the joy of learning. I have pieced together some thoughts about IT infrastructure necessary to support Internet-centric learning and Internet-memory. In addition Josh and I are identifying what we call *main ideas*, the scaffolding we use to build our understanding of different disciplines. This scaffolding also helps remembering and understanding. The overall goal of my work is to identify and develop the infrastructure components essential for *just-in-time* Internet-centric learning centers, using all the tools, tricks, gimmicks etc to make learning both efficient and fun, while sparing us the agony of trying to remember things we never use.

Where to go?

I think great progress can be made by joining RSS feeds with documents we publish. RSS feeds, consolidated within a portal or an aggregator will remove click from web navigation, thus freeing brain energy from remembering URLs and clicking and making it available for thinking and problem solving.

- We must publish both documents and abstractions via RSS (why? It saves clicks and avoids remembering URLs at the receiving end) see also.
- We must harvest web resources with RSS aggregators in order to consolidate harvested information. Why? It saves clicks and avoids remembering URLs. In other words - you can retarget brain energy from clicking and remembering to thinking and problem solving.