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It may be that those who do most,
dream most.

Stephen Leacock

Perfection of means and confusion of ends
seems to characterize our age.

Albert Einstein

If at first you don't succeed,
you're running about average.

M.H. Alderson

Some people handle the truth carelessly,
others never touch it at all.

Anon.

All empty souls tend toward extreme opinions.

William Butler Yeats

Education cannot be substituted for intelligence.

Gerald H. Grosso

Much more is known than is actually true.

J. R. Pierce ('50s and '60s Bell Labs worker)



Education: The often mis-firing magic weapon

Every nation, whether large or small, *has the ability to transform itself into a new future through the influence and impact of education.* This is a social force of incredible power, literally a magic force that can change cultures and alter the path of history yet to come. For the most part, we waste it on the memorization of city names and multiplication rules, and see it as an opportunity to grade and categorize the nation's young for our later casual convenience.

When we educate ourselves, we pass on our understanding of the world, largely as it is now, and subject to our individual talents and vision. Usually we teach *what*, and not why, since the *why* may be more difficult to explain, locally controversial, and less convenient to grade. History has become only the recital of dates and players, not the *reasons* for war or exploration. Math the boring subject that involves trains racing toward each other for the greater glory of word problems, rather than being the analytical key to the universe. We have also

become truly obsessed with the naming of things, as if that somehow substitutes for the understanding of the thing itself. Unfortunately, names are often just empty knowledge, whose only purpose is to identify the eligible players and pieces, explaining nothing.

Each student is treated as a special case, graded and judged in isolation, **and cooperation is seldom encouraged or rewarded** unless on the playing field in some team sport. Even then, the stars are treated well, and the rest are seen as window dressing or convenient stage props to showcase the better players. As a final insult, students are then categorized and forced to fit some woefully mis-applied bell curve for “grading”, no matter how poor a fit this may be in practice.

For most children, schoolwork is rarely exciting, and seldom informative or interesting. For our society, this is a wholly escapable tragedy, and one that we will pay for many times over in the years to come.

For education to serve us all well, it must **first teach people how to teach and to learn**, and how to **share their understanding** with other people. The simplest way to begin to do this is to have older children help to teach younger ones as a regular part of their education. This program is already in place in some BC schools, and serves as a valuable tool to help students who are having difficulty, as well as instilling some responsibility and compassion in older students.

An already popular and productive program, **work terms** and student work placements need to expand and develop so that children see what work and potential jobs are like long before they have to make all of their educational decisions. Work placements also allow people in industry to share their own knowledge and improve their own understanding by regularly teaching others who may be interested. Everyone involved benefits from this interactive process.

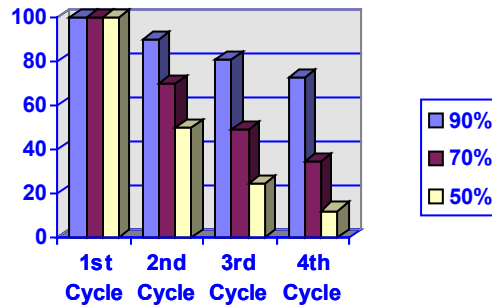
It is important to remember that we are different people to everyone we come in contact with, in education as well as romance and every other area. Some bring out our best features, and some our worst through mutual interaction. **And while we may not see ourselves as changing in these different settings, it is true none the less**. Every educational setting and instructor will have a different impact on the same student, and that student will appear quite different to each instructor. It is especially worthwhile to remember that the setting that brings out the best features of each person is not universal.

Our goal must be to **convey understanding** and help develop competence in essential skills. Every class of students must understand that our goal is not met until they have **all** achieved that position. It is **not satisfactory** to have some do well, and many do poorly.

There is *no escape from each other in the world*, we will all suffer if we accept marginal education as satisfactory. Who will visit a doctor or car mechanic with 50% competence? *There is no job that is so irrelevant in the world that it can be done poorly. It's worth remembering that we are all sitting in a very small boat, and none of us is untouched by the actions of the others.*

It is critically important to understand that the concept of 50% competence has within it a dangerous flaw that is largely to blame for many problems in North America. This is simply that the 50% level is *50% of what the teacher knows*, which may in fact, be far less than 100% mastery of a given subject. This decreasing competence spirals downward at a fantastic rate, once it is accepted as a workable method.

A comparison of the results of competence transfer rates



After 4 generational cycles,
the 90% group still has 72.9% competence
The 70% group has only 34.3%,
but the 50% group has only 12.5%

While this is a highly simplistic model, I have to consider that this point needs to get through to many people that may be at an unattractive point on this graph, so some simplicity is called for. The inescapable fact is that to get good results, you need good standards, which get *regular outside review and independent test to stay good*. This is just like calibrating an electronic meter, the use of regular external standard checking is essential to maintain viable and accurate systems.

This is understood in the manufacture of almost everything, is the cornerstone of all calibration, measurement science and metrology world-wide, but is *completely ignored* in education to our extreme detriment.

The concept of grading needs a massive overhaul both with regard to function and delivery. *The goal of education must be to impart the best knowledge and understanding we can achieve to every student.* They will be our future, like it or not, and the work product of society that we will all be judged on in years to

come. We **cannot accept** mediocrity and marginal competence as a routine outcome of this process. We need to challenge them with problems that will ignite their interest, and that will address issues in every community that need solving.

For many skills, **competence is 100% understanding**, such as basic math. Is math skill without knowledge of 5's and 3's 80% competence, and should that get a "B" grade? Hardly. Many skills have **threshold competence that must be achieved**, and to have less is to have **nothing** in practice.

The concept of "curve grading", which is a gross misapplication and totally false understanding of statistical distribution, should be completely abandoned. The idea that there can **only** be so many "A" grades, so many "B" grades, that most must be "C" grades, and that some must fail in a given class is completely wrong. There is no reason why interested students and a dedicated teacher cannot achieve **all "A" grades or 100% competence** for an entire class. In fact, that **must become the goal** of all education, to find out how to interest and educate young students to become fully competent in as wide a range of areas as possible.

Grades serve only one purpose, to illustrate what has been absorbed, and what still needs improvement. Grades are a flag to students, teachers and parents that time has been well spent, or that more needs to be done. They are not really suitable as sorting devices to classify children as stupid, bright or gifted. In different circumstances, all these roles may be reversed or altered. Low grades most often indicate that a student was not motivated, did not have the right foundation material before the class, or that they did not respond to a given teacher or class situation. Students must be made to understand the seriousness of their lack of attention and interest. A different setting should be tried, to improve that condition, and combined with the help of other students that understand the material and can convey that understanding.

A better grading system should take into account threshold skill levels, and reflect their mastery in a system that is more like many university settings: pass/fail/pass with distinction. Students & parents **must** take more responsibility for these skills, and realize that they cannot be passive players in their education, but must be involved and committed. Students that are disruptive, indifferent or unmotivated need to be placed in other settings, possibly not classrooms, where their behavior won't compromise other students, and where they may find something that **will** motivate them.

Our educational system must also incorporate challenges that cannot be solved by a single individual, but require students **to plan and work together** to achieve a goal. Teams, groups, classes, whole schools and whole cities may look for ways to involve their students in the solution of some problem or situation that affects them all, and needs to be fixed. There is no reason why students should not

become involved in the maintenance and upkeep of their own schools, from cleaning to painting and food preparation, or take on public service work. There may be many students that would find those activities far more appealing once in a while than what we are subjecting them to now. They may want to operate a farm, run an internal business, help rebuild houses, publish a paper or operate a recycling station, just to name a few eminently practical possibilities.

We ran a project locally for about two years to test this concept, where we took kids that were interested in computers and electronics, and had them work together to repair & recycle donated computer hardware for use in local schools. The students got valuable work experience and training, and local schools received hundreds of pieces of equipment they normally couldn't afford in their budgets. This program worked so well as a pilot project, that it is now being expanded province-wide to service more schools and students. It's just one experimental example of how students might work in a non-conventional way to get better educated, and help the other students around them.

The skills required to work in groups are essential for all phases of adult life, and yet are routinely ignored in favor of highly polarized individual achievement. Sports were intended to show this group process, but have gotten so far off track, they are often more harmful than helpful. This hardly sets the stage for good cooperation or teamwork in later business life, and ***fails completely*** to instill the critical skills needed for citizens, voters, employees or managers. This is very risky for our culture, and coupled with an age of ***increasing personal gratification at the expense of others***, is likely to reinforce the worst aspects of our society in an ever increasing way.

There are many things that need doing in our society, and adults seem to have lost their motivation to do them, so it may be that our children will ultimately be the ones to help revitalize our culture and society, which is quite appropriate. They are already far more aware of recycling and pollution than adults, and are more prepared to adapt to the systemic inconveniences they demand to achieve the benefits.

We ***cannot throw away those that do poorly***; we will have to live with them, and their problems that they bring into their adult and working lives. For this reason, we ***must improve*** our first contact with students to make sure that they understand what is at risk, and why it is so important that they get as rich a range of choices as possible for their futures. No one knows what the future really holds, and what skills and abilities we will need, but we do know that ***strong basic skills and problem solving insight are critical***.

One of the most dangerous developments for human culture has been the explosive and gratuitous growth of ***time expiring knowledge***. We have a questionably motivated computer industry to thank for this nightmare.

Historically, people could learn a skill, and have some confidence that it would have value for them, and be in demand after their education was completed. This is ***no longer true in any field***, and the more common pattern that has emerged is that all education other than very basic skills is already ***deteriorating in value*** by the time it is introduced into schools.

Many things are now taught that are already displaced or made obsolete, which demoralizes students and teachers alike, and fails to satisfy the needs of the community at large. Only more interactive contact with industry and education can possibly change this pattern, and extraordinary difficulties will remain in some areas where basic tools and science are changing almost monthly.

At the same time, many things of lasting value and deep cultural importance such as literature, philosophy, history, art and mathematics ***are being ignored as irrelevant***. This combination is extremely dangerous on a societal level, and will shortly result in a new population with only the shallowest understanding of their circumstances, and no useful insight into their future.

It is also critical to understand that while ***the general society may see itself as mature or knowledgeable in some area***, and understands that it is shaped by the observing of important current events, ***this is totally lost on every new child that is born. The greatest failing of education is that it has yet to successfully impart the consciousness of current culture to new members.*** Every child has to start at zero, and run desperately to assimilate what those around him or her already know comfortably. This is a very imperfect process, and leads us over and over to the same mistakes on both the big and small scale. ***This is really the critical achievement required by the human race if it is to ever genuinely improve its state.***

No government can survive an ignorant population for long, especially one that depends on the decision making skills of its citizens, such as any representational form of government. The inevitable social outcome of bad education is dangerous social bias, repressive and totalitarian governments, and the loss of individual rights and freedoms. On a business level, it is low productivity, uncompetitive industry and a deteriorating economy. Slow and painful death by any other definition. ***No binding force is more critical than good education to a society, but very few use this tool well or with any detectable grace.***

It is a telling indication of far we have fallen in our quality of education that we regard teachers and their skills poorly, and a far worse situation, that some clearly deserve that assessment.

If I had a magic wand, I would use the incredible power of the movie industry to illustrate and teach history, and the causality of our situation. It could be an extraordinary tool to convey in much more vivid and memorable fashion the key

elements of science, mathematics, geography and sociology, and to expose children to the incredible variety of life and culture on this world and others. The written word is powerful, but the full visualization of those ideas is much more powerful, and we desperately need to stop wasting this effort on mindless sitcoms, car chases and gory stabbings and focus it on the education of everyone on this planet. ***When the Oscars routinely feature awards for then best historical film, best science presentation, and best educational work, then we will have finally started to improve our situation.***

The Internet and our ability to search, inform and communicate as never before is an incredible opportunity for everyone. The chance is there to improve and educate ourselves regardless of where or who we are, or our economic situation. If we choose to waste this incredible opportunity on endless pornography and Viagra ads, our future will not be so attractive.

We put considerable emphasis and significance on science and technology in our educational system, but that status is often misplaced. After thousands of years of human history, it is much more surprising to list what fundamental things we do not know, rather than our “knowledge”.

For example, we have no idea what makes something alive. We can't measure it, define it or even describe it. What is missing from a person when they are dead? We don't know, and science is not especially good at analyzing this problem. What is it that makes something just born alive? Where was it before that life occurred, and where does it go afterwards? Where does the organizing force come from that takes one cell and creates a complex living organism?

In an extraordinary global effort, we have mapped the human genome, and we use DNA evidence every day in court. ***Yet, we have no idea how identical DNA in the body's cells expresses as totally different cells.*** Hair, corneal tissue, heart and lungs, skin. Such a simple question, and no answers are looming on the horizon. We can't regrow tissue like a simple starfish, or really heal most injuries, our medicine remains quite primitive, although it appears very complex and sophisticated. Surprisingly, though we seem to have conquered erectile dysfunction, we are powerless against most viruses, and our entire race could be easily destroyed in a year by something so tiny, we can barely see it with our best instruments. Over-medication has destroyed the value of most of our hard-won antibiotics to fight bacterial infection, and our global medicine chest is quite bare at the moment. It is reasonable to say that we still exist as a species more through good luck than as a result of great skill.

As we push to both the very small and very large scale of the universe, science and even observation collapses in both areas, and philosophy becomes more significant as we examine the structure of the subatomic and galactic. ***It appears***

that our science fails at these extremes, and even our basic concepts of matter, gravity, space and time are now in serious question.

On a social level, we struggle with concepts of good and bad, types of government, crime and punishment, goals and direction. While every culture seems to think its culture and ideas are “clearly self-evident”, the world has considerable diversity, often placed in fierce opposition. What is universal moral behavior, and how can we teach it so that it will be understood by everyone, and percolate effectively through our world?

There is no question that there is much we still need to know, and the process of education needs to blend with discovery, experience, philosophy and art to unlock these mysteries, and advance our understanding beyond the memorized recitation of names and dates. Our challenges are huge, and quite unforgiving if we are unprepared.