



The Many Ways of Thinking: Transdisciplinary Skills

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This paper proposes that college curriculum include classes in multiple ways of thinking. It provides interesting historical and contemporary examples of thinking styles. When thinking about this presentation, it became clear to me that the same arguments used in favor of transdisciplinary (TD) education are applicable to learning multiple ways of thinking and should be an education mainstay.

Keywords: thinking, transdisciplinary thinking, business thinking, thinking exercises, thinking exercises for the workplace, business critical thinking exercises, brain trainer, mental practice, scenario planning, transdisciplinary skills and role playing.

1 Introduction

Transdisciplinary (TD) Thinking is one of the most powerful TD skills. It should be taught to all students at every level, as a foundational part of their education. Learning to think in multiple ways will advantage every student. Thinking, along with its

sister skills, memory and concentration, imagination, intuition, curiosity and inspiration provide the access to the caverns of our minds. Yet, there is precious little formal time spent on improving these TD skills. Organizing and structuring information (classification) and consciously deciding to think about a particular problem or opportunity also improves decision making.

2 U.S. Patent Office

On at least one occasion I told ATLAS the story of Charles H. Duell, who, in 1898, as head of the US Patent Office purportedly asked President McKinley to close the Patent Office because, “Everything that can be invented has been invented.” While researching for this presentation I discovered that far from wanting to close the Patent Office, Commissioner Duell was a proponent of growing technology.

Duell is quoted as saying, “In my opinion, all previous advances in the various lines of invention will appear totally insignificant when compared with those which the present century will witness. I al-

most wish that I might live my life over again to see the wonders which are at the threshold." Duell was right.

The probable origin of the famous "Everything that can be invented has been invented", may be found in a report to the US Congress in 1843 by an earlier Patent Office Commissioner, Henry Ellsworth. In his report, Ellsworth states, "The advancement of the arts, from year to year, taxes our credulity and seems to presage the arrival of that period when human improvement must end." This quote was apparently misinterpreted and then miss attributed to Duell, who held the same Commissioner's office in 1899.

So here we see two ways of thinking applied to the same set of facts. Ellsworth looked at human limitations and concluded that at some future time, humans would run out of creativity. Duell looked at human potential. He concluded that humans would continue to invent. How do we chose between these strong views?

While it is impossible to know the future, it is possible to influence the future. The job of the Patent Office Commissioner is a strategic one. It calls for forward thinking and the encouragement of human growth. The Patent Commissioner should think in positive long-term human trends. Doing so, will help to make them happen.

3 Many Ways of Thinking

It is clear that TD thinkers think differently than specialists, engineers think differently than lawyers, who think differently than doctors, who think differently than business people, who think differently than students, who think differently than professors, who think differently than Republicans, who think differently than Democrats, and on and on.

But it is a lot more complicated than that. We think differently in our personal lives than we do in our working lives. We think differently when we are young than we do when we are older. We think differently after our first cup of coffee in the morning, women and men think differently and so on. In fact, each of us has a unique thinking inventory or thinking style.

4 How We Think vs. What We Think

There is a difference between what we think and how we think. For example, we don't get to decide if it rain... but we do get to decide how to feel about the rain and what to do about the rain. You can get upset about the rain spoiling your plan for the day, you can use the time to read a good book or you can celebrate the rain as a gift of life.

The main purpose of this paper is to encourage you to think about thinking and the ways thinking can be taught and learned. For example, students can be taught to think about their work from the perspective of an employee, a manager, an employer, an entrepreneur or intreprenuer or as a business partner or owner. How students will think about their work will be critical to their success.

Students can be taught to change their way of thinking as circumstances require. They can emphasize thinking in the short-term (get things done) or thinking in the long-term (get difficult things done) they can be taught when to be focused and when to think globally.

Students MUST learn how to think about change. Change is changing. It is changing at an increasing rate. Much of the information students learn today will be obsolete tomorrow. Teach students multiple ways to think and you give them a lifeboat.

Critical thinking is yet another important way of thinking. Chinese, Korean, Indian and other foreign ways of thinking are ever more important to students everywhere, especially in a global economy. Yin & Yang teach us how opposites can be complimentary.

Successful leaders think both inside and outside the box. To do that, they must know where the box is, its direction, if moving, where it started, where it's going, where are you relative to the box, what you want to change... There is almost always more than one right-way of thinking for any given situation. To be successful, one needs to learn how to think in multiple ways and when to apply each way of thinking.

I encourage you to explore how and why all students should learn how to think in multiple ways (a TD skill).

5 Think on Demand

Many professionals and other successful people can *Think on Demand*. They have learned how to focus

their attention, explore issues from multiple perspectives and keep their mind open to alternative solutions, all at the same time. Thinking on Demand is like putting on a magic thinking cap. It is very important for students to learn to think on demand.

Think Tanks often use scenario planning to define and solve complex problems. Scenario Planning is an excellent approach for use in classrooms. Students should learn how to write scenarios and how to evaluate them.

When teaching students, to think creatively, be sure to “THINK CREATIVELY”. Following are 3 simple exercise that work surprisingly well:

1. Pose a simple problem and ask your students to think of 20 ways to solve it. Everyone participates.
2. Select a common physical or imaginary product such as a brick, a toothbrush, a toothpick, a lightbulb, etc. Ask your class to think of 100 ways to use it.
3. Start to tell a story. In the middle of a sentence, pass the story on to a student. The student adds to the story and passes it on to another student, who does the same until the allotted time has been used. The last student adds a conclusion.

6 Thinking Exercises

You can find many thinking exercises on the Internet. For examples, go to Google and search for the following key words: thinking, transdisciplinary thinking, business thinking, thinking exercises, thinking exercises for the workplace, business critical thinking exercises, brain trainer, mental practice, scenario planning, Transdisciplinary skills and Role Playing.

Thinking exercises improve thinking performance. Think of your brain as a muscle... the more you exercise it, the stronger it gets. Mental exercise helps the brain to detect and identify patterns and relationships. It also improves memory and concentration. Classes in ways of thinking will also increase student’s creative power and open their perspective on what’s possible.

7 Science Fiction Thinking

Wernher von Braun, the great rocket scientist, planned the whole earth to moon mission by working

backwards. He told the story as though it was a press release that had already happened.

Arthur Clark depicted a conscious, intelligent computer that responds to spoken instructions and communicates audibly with astronauts on a space craft in 2001 A space Odyssey. Try it on your computer... today.

Jules Vern talked about water being burned from its base elements (H₂O) in the future. That’s what Hydrogen Fuel Cells do.

8 Management Thinking

There is a simple management rule that permeates virtually all business activities. That is,

“If you cannot measure it, you cannot manage it and if you cannot manage it you can be in deep trouble, without knowing it”.

For the most part, after graduation, engineering students go to work for companies who treat engineering departments as cost centers... that’s short-term thinking. What would happen if, instead of being expensed, engineering and R&D were treated as Assets that are amortized over their useful life, just like any other asset... that is long-term thinking.

By treating engineering and R&D as investments, they would automatically appear as assets on the Company’s Balance Sheets, instead of disappearing, which is what happens when they are expensed. Engineering and R&D would instantly become Intellectual Property (IP). Management would better understand the role and importance of engineering and R&D in your organization.

I am not going to spend more time talking about Management Accounting, except to say that how management thinks about engineering and R&D is important. You might be surprised to learn that your business organization uses GAAP and Tax Accounting and non-profit organizations use Fund Accounting, but very few organizations think in terms of Management Accounting.

9 Napoleon Bonaparte

Sometimes military conclusions are spectacularly wrong, often because of short-term thinking. They had not yet learned that we do not live in a surprise free world. Here is a world changer.

In 1805, Napoleon Bonaparte (Emperor of France) dismissed American engineer, Robert Fulton, (inventor of the steamboat) for suggesting that Napoleon could use steam powered ships to defeat the British Navy. Napoleon's response was, "What, sail upstream against the wind with a bonfire under me deck? I pray you excuse me. I have no time to listen to such nonsense."

Just imagine how different the world would be today if Napoleon had a long-term perspective on ship propulsion, accepted Fulton's proposal and defeated the British Navy.

10 Railroad Transportation

In 1869, the presidents of the Union Pacific and Central Pacific railroads met in Promontory, Utah, to drive the ceremonial spike that connected their railroads. That made transcontinental railroad travel possible, for the first time.

Railroad tycoons defined their business as the railroad business. If they thought of their business as the mass transportation business, they would probably own the airlines. And if they defined themselves, as being in the transportation business, they could have owned the airlines... and the truck/auto business too.

11 Status Quo Thinking

This next example illustrates the conflict between short-term and long-term thinking.

You may be surprised to learn that the motion picture industry has been short-sighted, since its inception. It has opposed every technological advance throughout its history. On the other hand, the long-term thinkers on the technology side have persisted and are the significant winners. For many years, motion pictures were limited to silent very short stories (1-reelers)... no sound, no color. Movie moguls who controlled the industry wanted to maintain the Status Quo because it was profitable, comfortable and controlled.. by them. Screen words were used to help the audience follow the story. There were no spoken words because, "no spoken words were needed" and "the voices of the actors was not appealing". More short-term thinking.

Finally, 2-reelers, with better, longer stories were accepted. In 1927, the "Jazz Singer" starring Al

Jolson broke the sound barrier and introduced "the talkies", feature-length motion pictures.

For years, the Motion Picture Studios refused to sell motion picture features to television networks. When watching television became an American habit, it became clear that the television set makers wanted to continuously introduce new, bigger screens and higher resolution TV sets. The movie makers were dragged along, against their will.

The studios also refused to sell features to Home Video until Shelly Saltman, President of 20th Century Sports, sold 50 FOX features to Magnetic Video. That started the Home Video industry. Every other Motion Picture Studio tried to convince FOX not to honor the sale. FOX held fast. In 1978 the California District Court ruled in favor of Sony on a case Universal and Disney filed in 1976. That case ended the question of copyright infringements.

Even though every effort by the motion picture industry to stop the growth of technology failed, the industry prospered. The motion picture industry benefited because of the long-term vision of the technologists. The motion picture industry, commercial and pay television, the manufactures of entertainment and information equipment and most importantly, the public would be much better off today if long-term thinking had been applied by the studios then and now.

12 Thoughts on a University without Classrooms or Lectures

According to Wikipedia, education is defined as, "the process of facilitating learning, or the acquisition of knowledge, skills, values, beliefs, and habits." Wikipedia goes on to say, "Formal education occurs in a structured environment whose explicit purpose is teaching students. Usually, formal education takes place in a school environment with classrooms of multiple students learning together with a trained, certified teacher of the subject." So we start with facilitating learning and arbitrarily link that to doing it in a structured school environment with classrooms and lecturers. It doesn't have to be that way.

The essential characteristics of education requires the presence of following 3 elements:

1. the participation of learners (students),
2. the availability of information to be transferred to the learners and

3. a means of transferring the information to the learners.

The Challenge: Not long ago, tomorrow was very much like yesterday. That time is past. Mans knowledge is doubling at a dizzying rate. Some say the doubling occurs every one to two years. Others estimate the doubling to take place every 11 months. In either case, the current education architecture is woefully inadequate.

Technology And Evolution Are The Answer: When evolution created sight, it was a game changer. When man developed computers, memories and processors it too was an evolutionary game changer. *Mankind is evolving through technology.* It appears the growth of man and machines is limited only by man's imagination. Obviously, that means we need to increase man's imagination power. We can do that through education, but not the kind of organization that requires students to sit in classrooms and listen to lecturers. As Einstein said, "Imagination is more important than knowledge" and "Education is NOT the learning of facts but the training of the mind to THINK".

12.1 How Will Education Without Classrooms Or Lectures Work?

There are many alternatives to the current education structure of classrooms and lectures. Here are 2 such alternatives.

12.1.1 Solution Based Learning (SBL)

Under an SBL structure, a team of students, led by a coach, is assigned to solve a complex problem (the "Opportunity"). The students have access to the sources of information needed to generate a unique, practical working solution, for the Opportunity. The student team(s) organize, divide, sequence, characterize and solve the Opportunity. Innovation and invention are encouraged.

A competitive characteristic can be added to SBL by using Duplicate Bridge rules. Essentially, multiple teams start with identical information. They proceed along independent lines of inquiry.

12.1.2 Immersion Based Reality (IBR)

The processing and display requirements for Immersion Based Reality, including Virtual Reality (VR),

Augmented VR and Holographic Reality (HR) are available today. IBR learning can be thought as an extension of a theme park dark ride such as, "Back to the Future" or "Spiderman".

Learners will enter an IBR stage, don a face mask and sit in a motion controlled vehicle (for one or more people). The integrated IBR visual display and physical motion will immerse students in the learning experience.

Many different learning experiences can be made available on a single IBR system. For example, one learning experience could be a trip through the blood stream to the heart. Another trip could be space travel to a distant planet. Yet another experience can be training for the repair of auto transmissions, etc.

Each of these experiences could be designed to serve students at multiple levels of sophistication. The vascular trip could display versions suitable for young learners, for pre-med students and for vascular surgeons.

Quantum computers are currently solving some complex problems faster than digital computers can do the job. Quantum computers are still rare and costly. That condition won't be true for long. Prepare for another knowledge accelerator.

13 Conclusion

From the Commissioner of the US Patent Office to Jules Verne, Napoleon, Hollywood and the entertainment business and even a different way to think about accounting, we have seen the power of thinking. You can multiply that power by teaching your students the many ways thinking. Thinking is mankind's most powerful tool. Learning how to use it to make a better world is mankind's greatest challenge. Incredibly, man's knowledge is doubling every 2 years. Our machines are improving to support that growth. We must improve ourselves to keep growing.

Education provides the means of improving mankind's ability to think and to imagine. It is an essential step in the creation of mans future.

Man has created a world unimagined only a few generations ago. There is much more to do

Rene Descartes said it all.

I THINK, THEREFORE I AM

Think About Thinking.

About the Author



Bob block, is a Founder and a Managing Partner of LiTricity, a shareholder and Board member of USCL and the Co-Chair of the Advanced Technology Policy Committee of the National Energy Marketers Association. Mr. Block has extensive experience in the computer software, communication, energy and entertainment industries including pioneering roles in commercial and pay television and cellular telephone operating companies. He has also contributed significantly to the creation and development of entertainment and communication technologies used worldwide. Block is widely known for his pioneering work in communications, information and management technologies. He is the inventor and patent owner of more than 150 issued US and International patents, including patents relating to: Enterprise Management Systems, Information Labeling, Signal Control, Terrestrial and Satellite Distribution Systems, Real-Time Subscriber Billing Systems, Pay-Per-View, Parental Control and English Language Education. Block has multiple patent applications pending, including patents relating to interoperability of non-compatible radios, power metering and solar energy systems. Blocks inventions are licensed to most of the major consumer electronics manufacturers and have influenced entertainment, sports, and information and education services worldwide.
