

Re-imagining Education

Seven Tools, Seven Disciplines, Seven Joys

The Seven Tools of Critical Thinking
The Seven Disciplines of Global Citizenship
The Seven Basic Joys of Life

Argument

Without training in the use of the seven tools of critical thinking and the seven disciplines of global citizenship the oft-stated goals of critical thinking and responsible citizenship are empty.

Without disciplined training in art, music, sports, poetry, numbers, experiments, and engineering the promise of well-roundedness is hollow.

Without the experience of these seven basic joys, informed life choices are impossible.

It is time to re-imagine education.

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Critical Thinking, Global Citizenship, Well-Roundedness

Critical thinkers, responsible citizens, and well rounded individuals are the three promises of schools and colleges across America.

But what exactly critical thinking, global citizenship, and well-roundedness mean is never made clear.

Our goal here is to define these terms precisely, explain how the current system fails, and outline a system that will fulfill these three promises.

This new system is based on the coordinated use of the seven tools of critical thinking, the seven disciplines of global citizenship, and the seven basic joys of life.

Three Measures of Failure

The simplest measure of failure is the widespread lament among employers that American high school and college graduates can't write clearly, think critically, or solve problems. A second is the performance of native born adult Americans on civic literacy tests relative to naturalized citizens. A third is the inability of most adult Americans to sing or draw and their belief that only the talented few can.

What is critical thinking? How can it be taught?

Critical thinking has three basic units. The first basic unit of critical thinking is the sentence. Think of it as a stroke in tennis. Or a note in music. The second basic unit is the paragraph. Think of the paragraph as a point in tennis or a phrase in music. The next basic unit is the essay. Think of the essay as a match in tennis or a concert performance in music.

Just as a young child aspiring to be a proficient piano or tennis player must spend at least an hour or two a day practicing the basics (whether scales and arpeggios or backhands and forehands), so, too if the goal is produce a critical thinker by age 18, students should spend at least an hour or two per day writing sentences and paragraphs.

They don't. This is a tragedy. The older you try to acquire any skill the harder it is to do so. The result is utter panic among high school students who for the first time are asked to write essays. Sometimes you can get to college before having to write an essay. And, as many employers have experienced, many graduates from college without ever reaching a most rudimentary level of mastery.

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Daily Writing Across the Curriculum:

Reading without writing is like eating without digesting

Students are required to read a lot – in all subjects. Textbooks in every grade and every subject are long and heavy. But reading without writing is like eating without digesting. This is as true of science as it is of history or literature.

If a subject is worth teaching, it is worth remembering. If it is worth remembering, it is worth understanding. The best test of understanding is your ability to explain in coherent sentences what is worth remembering and why.

No lesson in any subject on any day in any grade should not have a writing component. The harder the subject matter the more indispensable this writing is.

The Seven Tools of Critical Thinking

The seven tools of critical thinking are the thematic before and after test, the thematic journal, the thematic matrix, the thematic capstone, the thematic conversation, the thematic calendar, and the thematic checklist.

Tool #1 Thematic Before and After Test

Without a pre-test in any subject there is no baseline. Without a baseline, final exams are meaningless. No baseline, no accountability. For the student or the teacher. In any subject. Proper design of the thematic before and after tests is all-important. It should be responsibility of the highest level academic officials in the particular field of study in the country. All opinions on the subject are not created equal. Some are based on decades of research, experience, and thought. Others are not. Just as teachers and students must be held accountable, so must be the designers of the tests. The tests should specifically target knowledge goals, process goals, and attitudinal goals.

Tool #2 Thematic Journal

The pre-test should be the first entry in the thematic journal – a daily log of progress in a specific field. Each paragraph written in class or at home should be included in the journal. There should be a thematic journal entry every day a subject is taught. Every entry should be checked, corrected, and commented on by the teacher.

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Tool #3: The Thematic Matrix

With a regular periodicity, perhaps weekly or bi-weekly, the daily journal entries should be reviewed, organized, and summarized.

If a picture is worth a thousand words, and a good diagram 10,000, perhaps the standard matrix is worth a million.

The matrix is a graphic representation of what it means to think. Thinking is coming to mental attention and asking a question or series of questions. It's about making distinctions and connections. It's about distinguishing the important from the unimportant. It's about breaking the important down into its principal parts or dimensions and analyzing these in turn. It's about seeing the complexity behind apparent simplicity and simplicity behind the apparent complexity. It's about linking the abstract and the concrete.

Metaphors are bridges to understanding. The matrix is a metaphor for thinking itself.

The matrix is the foundation upon which to build an essay or an oral presentation demonstrating a thorough understanding of whatever the topic is.

The matrix is the bread and butter of consultants and investment bankers because time is money and the matrix conveys more valuable information in less space than any other simple graphic device. The matrix is also ubiquitous at scientific conferences in the form of three by three poster-boards.

The matrix deserves comparable prominence at every level of instruction whether at home or in school – from pre-K to adult ed. If currently blank walls of school hallways and classrooms are plastered with the most eye-catching and thought provoking matrices, the daily life of students will be transformed.

Tool #4 Thematic Capstone

Every course in every subject should lead to a capstone performance. The performance should include written, oral, and graphic presentations.

Tool #5 Thematic Conversation/Matrix Exchange

Thematic matrices should be exchanged in class with a regular periodicity and class level matrices should be constructed and recorded and incorporated into the thematic journals of each student.

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Tool #6 Thematic Calendar

Any important question worth asking and investigating in any depth merits revisiting on a periodic basis over the course of a K-12 education – whether every year or every two or three years. This calendar deserves the attention of the most senior administrative bodies in the school system as well as debate among the general public.

Examples of such questions are: the meaning of justice, the difference between science and pseudo-science, how to recognize rhetorical fallacies and statistical manipulation.

Tool #7 Attitude Checklists

Whatever the topic, whatever the situation, there will be moments of panic and crisis. It is important to have re-centering checklists in order to maintain focus.

The first checklist is internal: be confident, be calm, take one step at a time. Haste makes waste. Saying “I can’t” is a self-fulfilling prophecy.

The second is a version of the scientific method: observe, ask, guess, test, tell, record iterate. Whatever the subject: am I being observant? analytical? methodical?

The third involves communication with others. One version would be: listen, empathize, encourage, thank. Another is to remember that how you say what you say can be more important than what you say. You can speak too loudly to be heard. Be self-aware and do the triple check: tone, look stance.

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Part Two

The Seven Disciplines of World Citizenship

You can not be civically literate without understanding the basics of ethics, economics, history, political science, rhetoric, statistics and science. These basics are not a matter of opinion. But this understanding is not there.

During the last decade working in various capacities at Harvard University I have found Harvard Law School professors who confuse the Preamble to the Constitution with the second paragraph of the Declaration of Independence. I have found Harvard seniors whose favorite course was “Justice” who are unable to come up with even a rudimentary definition of the term. I have found economics majors who can not articulate the most basic laws of economics.

But these essentials should be as automatic for a high school graduate as naming the five continents or running through the multiplication table. No more difficult than for an 18 year old tennis player to demonstrate the proper motion of a serve or for a piano player to play an arpeggio. Or for a chemistry major to explain how the periodic table works or what the most important elements in it are. Or a physics student to explain Newton’s three laws of motion, the phases of the moon, or the cause of the seasons.

Why is this essential knowledge lacking? Too much focus on coverage of material. Too much reading, not enough writing. This is the perfect illustration of the rule that reading without writing is like eating without digesting.

Civic curricula should have a clear aim: the ability to make a strong case for both sides in the next election marshalling principles, facts, and solutions for each of the issues of compelling importance in the next election. Without a fundamental understanding of each issue, the student is unprepared to prioritize them. This very straightforward test would be given at the beginning, mid-point and end of each year of schooling from first grade through twelfth, from freshman to senior year of college. Each exam result would be included in the student’s civics journal. Each exam would be graded on the clarity of writing, the mastery of principles across all fields, the mastery of facts quantitative and non-quantitative, and the understanding of proposed solutions.

Each class hour would involve active participation of each student – written and oral. Each capstone project would have written, oral, and graphic components. All would be included in a digital thematic journal. The best would be displayed on the walls of the school.

Ideally, all civics courses would be co-taught by teachers with differing political premises.

The seven issues of paramount importance are: foreign policy, economic policy, social policy (justice), climate change, education, health care, and identity.

For more details, see: www.thinkingcitizen.com

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Part Three: The Seven Joys of Life

Education is ultimately about taking kids from “I can’t” and “I don’t like” to “Wow! I can!” and “Wow! This is so cool!” in the basic joys of life – the joys of words, numbers, experimentation, engineering, art, music, and sports. Without the experience of each of these joys, the child can not possibly make informed life choices with respect to career or use of free time.

What is a reasonable level of mastery for an average child in music, art, drama?

In music, a reasonable capstone performance would be the composition and performance of a twelve bar blues on the guitar or piano or the equivalent.

In art, the equivalent would be the drawing of a self-portrait in perspective. In sports, the joy of playing a two out of three set tennis match.

In drama, the joy of delivering a Shakespearean monologue.

In math, the joy of walking a class through a proof of the Pythagorean theorem.

In science, the joy of demonstrating Galileo’s inclined plane experiment.

A great teacher can take a student to joy through discipline within a matter of weeks. A poor teacher given years will fail.

School principals and college Deans should identify the teaching methods of the greatest teachers and hire those capable of implementing them.

This is not rocket science. Examples of such master teachers are:

Betty Edwards and Brian Bomeisler Drawing on the Right Side of the Brain,

Scott Houston, The Piano Guy

Tim Galwey , The Inner Game series (Tennis, Golf....)

Stephen Fry, The Ode Less Traveled

Alex Filipenko, Astronomy, UC Berkeley

Michael Starbird statistics, University of Texas, Austin

Stephen Ressler in engineering, West Point

Rafe Esquith, fifth grade teacher

APPENDIX

Supplemental Matrices

- 1. 10 Critical Thinking Attributes**
- 2. 8 Course General Education Plan**
- 3. The Seven Tools of Critical Thinking**
- 4. Three Liberal Arts Goals**

The Ten Attributes of Critical Thinking – A Matrix

Elements of Thinking	Principle	Practical Tool
Sustained	Continuity is the key to depth of thought	Thematic Journal Thematic Calendar Thematic Capstone
Analytical	To understand x Must break it down into parts	Thematic Matrix Thematic Matrix Exchange
Synoptic: Prioritized, sequenced	If you don't see the big picture, it's impossible to prioritize and make an informed decision.	Thematic Matrix Matrix Exchange Thematic Capstone
Research-based	Facts matter. Half of what you think is wrong. Only research will help you shrink the percentage.	Thematic Journal Matrix Exchange
Collaborative	Solo thinking can be creative but runs risk of sterility as well as retreat into a private universe and private language.	Thematic Matrix Exchange
Skeptical	All premises must be identified and turned into hypotheses If truth is to be found.	Thematic Checklist: How can I be wrong? What am I missing? What questions should I be asking?
Decision-focused: (prioritized, precise)	Life is a tissue of decisions with respect to what matters in daily life and civic life.	Thematic Journal Thematic Matrix Thematic Capstone
Accountable	No test, no accountability	Before and After Test Capstone
Multi-disciplinary	Most important issues cross disciplinary lines.	Seven literacies Of world citizenship
Quantitative if possible	If something can be quantified, it should be.	Thematic Data Packet

8 Course General Education Package: a draft proposal

	World Citizenship (5)	Fuller Life (3)
Aim	Habit of sustained , collaborative, research-based quantitative and non quantitative analytical thought	To reach a deep appreciation for at least three of the following life joys: Music, art, drama, dance, athletics
How -1 <i>Number and nature of courses</i>	Five courses on each of the most important issues facing mankind – peace/security, sustainable prosperity, Justice, freedom, and truth. To understand any one of the 5 demands studying all 5.	Three courses in the three areas in which the student is least proficient. Deep appreciation requires practice. The goal will be to reach a basic level of proficiency that brings a deep joy and perhaps a life long hobby.
How - 2 <i>Capstones</i>	Each class of each course structured around preparing a capstone project incorporating the seven disciplines: economics, politics, history, ethics, science, statistics, rhetoric.	Capstone projects could include a 12 bar blues composed and performed, a self-portrait drawing, a film, a balanced fitness program designed, executed, logged
How - 3 <i>Elements of capstone</i>	The capstone project should incorporate an oral presentation, a written essay, and a three-by-three posterboard.	Each capstone would include a portfolio of each stage of skill development as well as journal entries explaining each stage.
How - 4 <i>Ideology and Models</i>	The courses should be co-taught by professors from opposite ends of the political spectrum.	Great models for how to do this already exist: The work of Betty Edwards, Scott Houston
How - 5 <i>Toolkit and Hiring</i>	The course toolkit should include: the thematic journal, before and after test, checklist, matrix, and calendar, setting a foundation for disciplined civic life after graduation.	Colleges will have to hire many more practicing musicians, artists, dramatists, dancers, and coaches to accomplish this. Funding options are many.

The Seven Tools of Critical Thinking

“Reading without writing is like eating without digesting.”

	Synonyms	Epitomes	Precedents
Thematic Journal	Log Diary Blog Notebook Commonplace Book	“No record, No remember.” “Reading without writing is eating without digesting.”	Archimedes Newton Darwin Emerson Thoreau Anne Frank
Thematic Matrix	Diagram Chart Table Grid Graphic	“No grid, no understand.” “No diagram, no analysis.”	Durer Mendeleev Descartes Eisenhower Mendel
Thematic Before and After Test	Photographs, Mirrors, Videos Backward Design Core question sets	“No before test, no baseline. No after test, no accountability.”	Mazur/Physics Mosteller/Statistics Rosling/History
Thematic Calendar	Calendar Schedule Ritual Intervallic Repetition	“If it’s not on the schedule, it will not happen.” “If it is worth remembering, it is worth repeating”	Liturgical Financial Fiscal Calendars
Thematic Conversation And Peer Group	Socratic method Harkness system Support group Idea exchange	“No buddies, lose interest” “No challenge, slower progress.”	Pythagoreans Peripatetics Universities
Thematic Micro and Macro Checklists	Mantras Core questions Core models Scientific method Spiritual discipline Prayer Myelin	“Observe, ask, guess, test, tell, record, iterate.” “Confident, calm, patient, one step at a time”	Provonost Osler Herbie Benson Hippocrates Warren Buffett Atul Gawande St. Benedict Harriet Ball/KIPP
Thematic Capstones	POU: performance of understanding	Scientific poster-boards	Theses Dissertations

Three Liberal Arts Goals

Critical Thinking	Responsible Citizenship	Closing the “Joy Gap”
Critical thinking must be sustained, analytical, collaborative, research-driven, synoptic, collaborative, skeptical, decision focused, accountable, and quantitative if possible.	The first challenge of responsible citizenship is to see the big picture. If you can't how can you rationally prioritize your civic time? The second is to align your life with your vision.	Every student should experience the joy of math, science, words, music, art, dance, drama, and sports before graduation. Making fully informed life decisions depends on it.
To achieve these qualities the integrated application of a set of seven tools can be game-changing: the thematic journal, checklist, matrix, conversation, before and after test, thematic calendar, and capstone	To see the big picture means applying the tools of critical thinking to at least seven issues of paramount importance: foreign policy, economic policy, justice, climate change, education, health care, identity.	Let's call it the “joy gap” component of the liberal arts program. A few very fortunate students already have reached joy in all areas and can be exempted. A full life comes from experiencing a full range of joys.
These tools until now have been used singly or in combination in haphazard ways across many fields.	To understand the big picture requires mastering the fundamentals of seven disciplines.	Joy comes from doing. These should all be practice courses culminating in a capstone performance.
The key to maximizing human potential for critical thinking is to use them all in a systematic way.	The big seven are: ethics, rhetoric, economics, politics, history, statistics, and science	Examples: compose and perform a 12 bar blues, Demonstrate a balanced life long fitness program, Draw a self portrait.
The three most urgent and important areas of application of critical thinking are: first, how to live the fullest possible life day to day, second, major life choices (career, parenthood), third, allocating scarce civic time and making decisions with respect to party affiliation, voting, community service.	A serious citizenship training program would address each of the core issues from each of these eight disciplinary perspectives culminating in a capstone presentation by each student which would lay the foundation for the life long habit of sustained, multi-disciplinary analysis.	Model courses exist for each field – the Betty Edwards 3 day Drawing on the Right Side of the Brain program, Scott Houston, The Piano Guy's program, Tim Galwey's The Inner Game of Teniis, Golf, etc. Colleges will have to hire more practicing artists and coaches to do this well.