First Edition

Framework for Critical Thinking: A Corruptive Approach

Chuck Crawford - Professional Educator

Framework For Critical Thinking: A Corruption Approach

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This is a document that has been developed during the professional career of Chuck Crawford. The views that have been expressed in this document may not be the views and opinions of his current, past or future employer.

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Overview

1

"The direction in which education starts a man will determine his future life."

- PLATO

To Corrupt

Cor·rupt

[kuh-ruhpt]

1. **guilty of dishonest practices, as bribery; lacking integrity; crooked: a corrupt judge.**
2. **debased in character; depraved; perverted; wicked; evil: a corrupt society.**
3. **made inferior by errors or alterations, as a text.**
4. **infected; tainted.**
5. **decayed; putrid.**

"Education would be much more effective if its purpose was to ensure that by the time they leave school every boy and girl should know how much they do not know, and be imbued with a lifelong desire to know it."

William Haley, British Editor

My senior year in college I was able to here a teacher speak about his profession. He asked a number of us who were undergraduates what it is we would be teaching. Unwilling participants continued to get the seemingly simple question wrong. They responded with their area of expertise. Although I could not tell you who this man was, it is one of the most important things for an educator to keep in mind. We all teach children and the vehicle in which we choose to use is our content area.

It can be said that formal educators are responsible for the corruption of the young minds in the community. It does not take much time to find news story of how parents are not happy with the viewpoints that are being shared in the classroom.

Teachers can find it a difficult position when it comes to personal beliefs. In many cases, teachers imprint their personal beliefs on students, and students – consciously or unconsciously leave the class with a belief system that they have not constructed themselves but have inherited from their teacher. It is imperative that teachers are aware of this and actively try not to bias students with their personal beliefs.

We were in the middle of a discussion about alternative energy when a question was posed to me asking which I favored. In traditional Socratic style I returned the question with “was Juliet beautiful or ugly?” Looks of

bewilderment passed and then many strong feelings entered the classroom about her beauty including citations from the famous *Romeo and Juliet*. Students finally were looking at me wondering why I had asked the question. I quenched their curiosity by stating, “maybe Romeo killed himself because he could not deal with the social pressures of falling in love with an ugly woman.”

The story was meant to illustrate the fact that it is not what my opinion of energy sources that matters, but what it is that each individual believes aligns with their values. In my classroom the answer to most everything, annoyingly to many students, is “IT DEPENDS.” Although there are many places in which students need to know certain facts, the vast majority of life comes down to individual preferences. What we call “trade-offs.” This is not the same as saying pros and cons of a situation. I do not allow these terms to be used, because the terms themselves implies that there is a right or wrong answer.

I have always taken my craft seriously. And yes I believe that being a teacher is a craft. The following pages are my attempt to explain the framework that has evolved since entering the teaching profession. It is appropriate to mention here the norms in which I operate from:

1. Students, when given the opportunity, will always choose the simple/easy way out.
2. Administrators, rarely understand what it is that happens in my classroom
3. Fellow educators are thoughtful about the way they construct their learning environments.

These norms are the sources of many frustrations, but that is a completely different topic.

What you are about to read is a manifesto if you will. A story of the grand plan to corrupt my students. It is a story that I want each of my students to hear loud and clear. I am trying to infect them with what I believe is the most important skill a person can have, that is **critical thinking**. ▪

C

Characterize

2

"One had to cram all this stuff into one's mind for the examinations, whether one liked it or not. This coercion had such a deterring effect on me that, after I had passed the final examination, I found the consideration of any scientific problems distasteful to me for an entire year."

- Albert Einstein

TO CHARACTERIZE

Char·ac·ter·ize [kar-ik-tuh-rahyz]

1. to mark or distinguish as a characteristic; be a characteristic of: Rich metaphors characterize his poetry.
2. to describe the character or individual quality of: He characterized her in a few well-chosen words.
3. to attribute character to: to characterize him as a coward. (2.1)

"If you are curious, you'll find the puzzles around you. If you are determined, you will solve them."
- Erno Rubik

Outcome: When presented with a new situation, students will be able to characterize the physical nature of the event.

Triggers: These are based on observation skills in which physical elements are measured using tools and/or one of the five senses.

The primary task when evaluating situations is that of the characterization of the event that is happening. This can be anywhere within the space-time continuum. The initial state of witnessing the event begins the process of **decoding.** Decoding is based on the senses and is greatly enhanced by experiences and content knowledge – although it can be done with learners at any level.

When presented with a new situation, the learner will have to deconstruct the system and and be able to use their senses to sort out the pieces of the puzzle. The initial stage of the event can cause bias to the learner, but never the less it is part of the decoding process. As content knowledge and experiences increase, so to will the ability to identify characteristics of the situation.

Take for example the Rubik's Cube. The perception of the cube is drastically different when looking at it solved, or unsolved. What one can tell though, is that it is a square. It has colors. Once it is picked up, you can tell that the pieces can be interchanged.

It is of paramount to only look at the characteristics to begin with. The most difficult task is training yourself to look at things for what they are before you start yo process them as something that they are not. Meaning will come, but only after clear observations of the system. ■

Educations in not about the filling of a bucket, but the lighting of a fire.”

- W.B. Yeats

3

TO CLASSIFY

Classify

clas·si·fy [**klas**-*uh*-fahy]

verb (used with object), clas·si·fied, clas·si·fy·ing.

1. to arrange or organize by classes; order according to class.

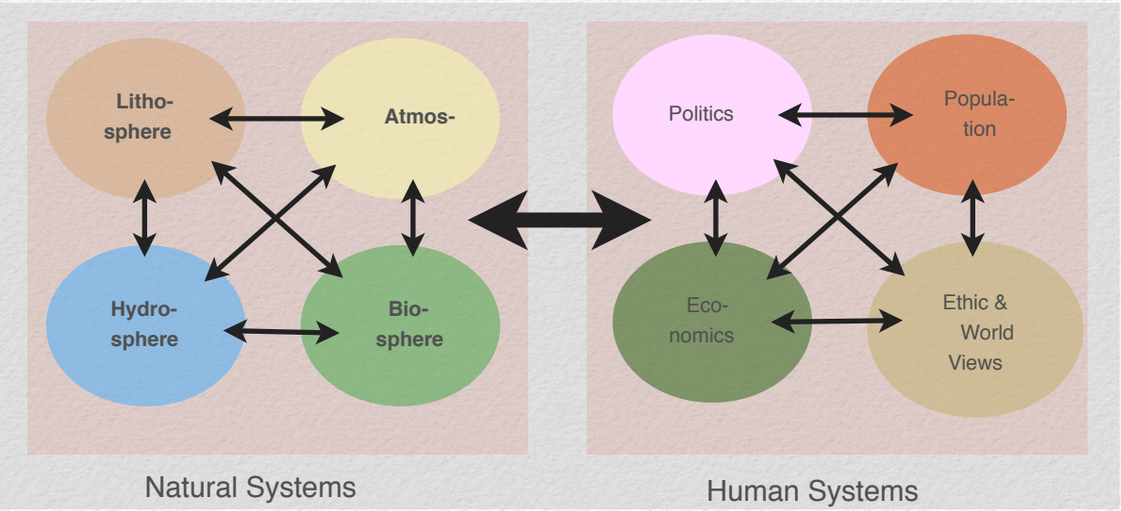
2. to assign a classification to (3.1)

OUTCOME: Using the initial characterizations that have been made, students will organize the object or phenomena into a useful classification system based on patterns that are observed and the structure and function of the object.

EVIDENCE: The construction of a physical, graphical, or thought model of the object enabling a deeper understanding.

The classification is where the learner is starting to process information. This is referred to as the **primary processing** of the collected information. This involves the use of known and/or unknown nomenclature to group or chunk variables into more manageable categories that will allow for further analysis.

Sustainability is used as an anchoring point for all of the classes in which I teach. This is significant because it shows the interconnections that we have with the environment around us. Using this as the basis, we come to this diagram as a reference point. 3.2

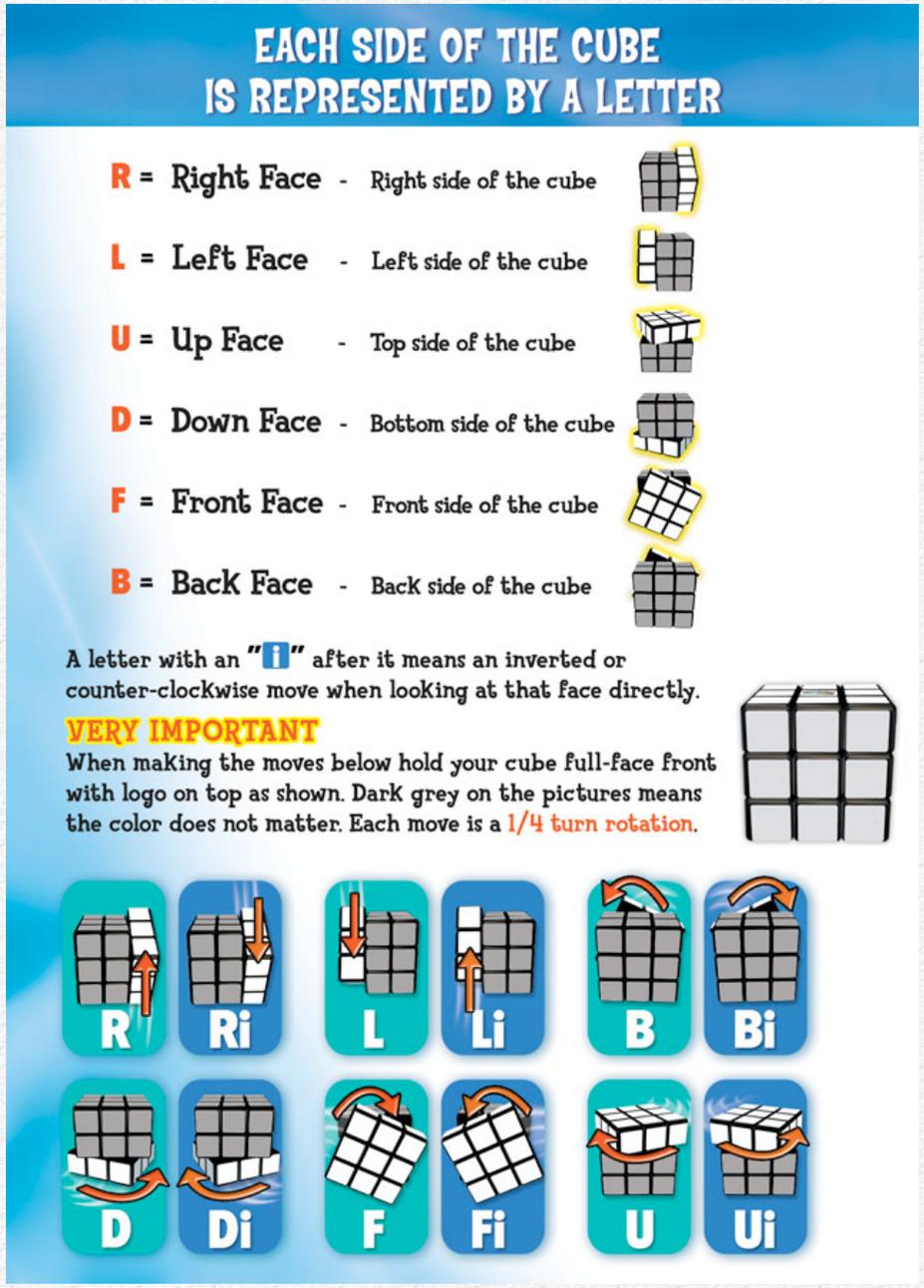


These classifications are used as examples for how to fit information into a framework of understanding. This framework does not preclude any other organizational structure, but it does allow for characteristics to be include both in a macro and a micro level.

Some have misinterpreted the use of this framework as only being scientific. This drastically underestimates the power of connecting content across disciplines.

Let us return to the example of the Rubik's Cube. When you start to classify the pieces of the cube, you quickly see that they are in colors. There are nine pieces that make up one side. There are 4 corner pieces, 1 center piece, and four interior edge pieces. In reality, those who follow the "Magic Cube" realize that there are more technical terms, as illustrated to the right, that are used to characterize and classify the object. These refer to the faces of the cube.

The implementation of the framework can be applied by both novices and experts. The framework is just that, a framework that creates the structure in which learners can apply the process of critical thinking. ▪



Source of Image: http://creativentechno.files.wordpress.com/2011/11/rubiks_3x3_solving_guide_p2.jpg

4

“You cannot teach a man anything; you can only help him discover it in himself”

- Galileo

TO COMPARE

COMPARE

com•pare [kuhm-pair]

verb (used with object), com·pared, com·par·ing.

1. to examine (two or more objects, ideas, people, etc.) in order to note similarities and differences

2. to consider or describe as similar (4.1)

OUTCOMES: Using classification systems and models, individuals are able to draw comparison both within the system and outside of it.

EVIDENCE: This includes an understanding of the rate of change or stability of the system.

The comparison of events/objects is the **secondary processing** of information. This relies on evaluation, supposition, inferences, gut feelings, etc. If someone has ever asked you the question "what did you get from reading that book," that is what is being done in this comparison.

Understanding the Experience

You are looking for ways to illustrate what it is that you have experienced. Brain researchers now believe that our brain holds information through experiences and connections in timeline, rather than just in a file cabinets like it was once believed. This shows that it is imperative to have experience when trying to process information. (A whole section could be dedicated to the idea of brain research and how it relies on experiences to remember, but we will have to leave it at that, for now.)

Experience

The act of being engaged with an object or an event in which there is a vested interest in the outcome of the interactions. One can be reading a book, but until they start to interact with the text in a meaningful way, they are not experiencing the book. Similarly, one can be doing an activity in a science classroom, but not actually being engaged in what is happening. This is where the idea of hands-on versus minds-on has come into play.

Experiences are what fascinates us about those who are experts in their fields. People are in awe of their knowledge, but in reality they are in awe of their experiences and how those experience have allowed them to compare factors in the rest of their field of study. This is why ***good*** mentorship/apprenticeship programs are so powerful. The old wise one helps to share knowledge that may have taken decades to acquire.

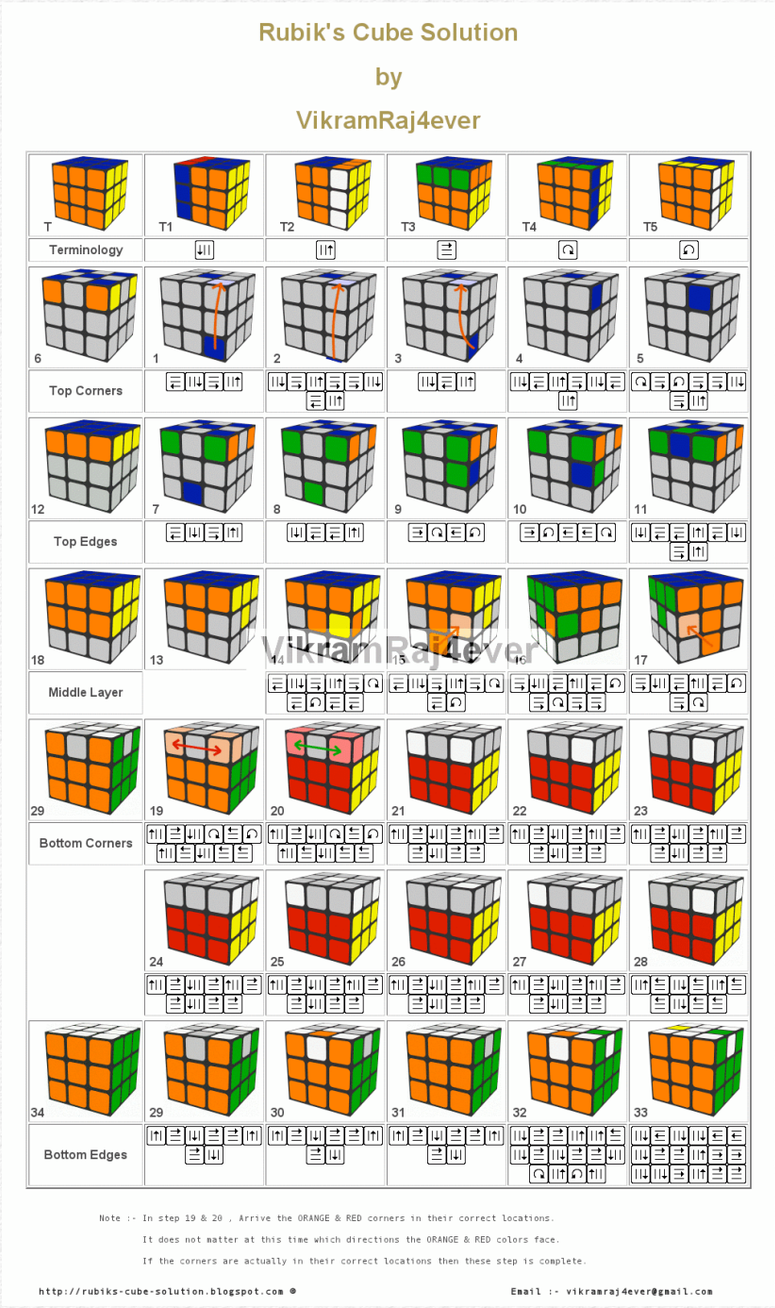
Process of Comparing

Comparisons are made from both within the system and outside of it. This allows for deeper comprehension of the classification and characterizations we have already done. This comparison should be evaluated keeping the following questions in mind:

- What is the **SCALE** in which this is happening?
- What is the **SCOPE** of the occurrence?
- What **STAKES** are involved and who are the stakeholders?
- What is the **SPEED** at which this will occur? Can this be sped up or slowed down? And what will cause the change in speed?

The diagram to the right brings us back to the example of the Rubik's Cube. Remember back to the first time that you experienced the cube when it was mixed up. This is when you start moving parts and hoping to get at least one set of three colors correct. Then you realize that the other edge is not the same so you have to rethink your strategy. Would it not of been nice to have the diagram to the right. This diagram shows an understanding of the the developed vocabulary and the process of comparison to illustrate how to accomplish the task of solving the puzzle.

One can use the diagram to the right to solve the cube based off the initial state referring to the faces as illustrated to the right, but this was only possible because the author was able to identify characteristics and classify them into starting points and then walk the end user through the steps to completion. ▪



Source of Image:
https://sites.google.com/site/71omnia/documents/Rubiks_Cube_Solution_by_VikramRaj4ever_l1.gif

5

“The one real object of education is to have a man in the condition of continually asking questions.”

- Bishop Mandell Creighton

TO COMMUNICATE

OUTCOME: The comparisons allow for of deeper comprehension of the classification and characterizations that has been constructed and is evident in arguments used in writing and speaking.

EVIDENCE: The ability to communicate the findings within and outside the appropriate community allows for community members to make informed decisions that have short and long-term effects as well as local and global trade-offs.

Communicate

com·mu·ni·cate **[kuh-myoo-ni-keyt]**

verb (used with object), com·mu·ni·cat·ed, com·mu·ni·cat·ing.

1. to impart knowledge of; make known: to communicate information
2. to give or interchange thoughts, feelings, information, or the like, by writing, speaking, etc.
3. to express thoughts, feelings, or information easily or effectively. 5.1

For our discussion, we will talk about communication taking on two forms of delivery. One being what an individual shares outwardly verses that which it being shared to the individual. The bombardment of information that makes its way to us in this information rich environment needs to be deciphered and organized within our framework of understanding and then disregarded or communicated back to our circle of influence. As electronic means continue to lower the barriers of distance, the circle of influence has become larger and we face more information that needs to be processed.

To Communicate

In a classroom environment, the vast majority of assessments are the measurement of a student communicating their knowledge to the teacher. Take for example a simple electricity conversation in an introductory physics course. Two common devices that are used are a capacitor, which stores electric charges and a resistor which reduces the flow of the electric charge. The concern from the teacher is does a student actually know that the learner understands the basics of electricity.

This table to the right models the construction of knowledge and assists the learner in their critical thinking. *What it does* is the **characterization** using appropriate terminology. *What it is used for* should begin the conversation about **classification** of the uses for different capacitors and resistors with reference to their known world. It also allows for the hanging of new material in a place where it can be scaffolded in with existing knowledge. *What is it's limitation* is the **comparison** as they apply it to their known world.

Capacitor	versus	Resistor
	what it does	
	what it is used for	
	what is it's limitation	

To Be Communicated To

Decisions and viewpoints are based on perspectives that an individual holds. These CHOICES can be based on the simplest natural consequences or can be complex and rooted in whether the individual believes that it is their RIGHT, or that they have a RESPONSIBILITY to make that decision.

The tone that is being portrayed is based upon the viewpoint of the author. It is up to the consumer of the information to understand the information that is being delivered and what tone is being used. Below represents the continuum of a persons passion that is present in any controversial issue.

Ignorant ⟷ Aware ⟷ Concerned ⟷ Zealot

Once the passion of the individual is identified one can then look to the principles that the individual holds. The principles will be what govern their decision making and their process of evaluation. It is important that we emphasis that there really is no right or wrong answer, there are trade-offs and priorities that must be taken into consideration. These priorities are represented by their perspectives.

When a person is making a decision they are basing the decisions on the trade-offs that they have evaluated in which their priorities are clearly represented. If a person believes they are making the decision based on it being a CHOICE, then they can be **Altruistic** or **Egoistic**. If they believe that it is their RIGHT, then they can be said to be a **Steward** or a **Warden**. When the decision is believed to be more of a responsibility RESPONSIBILITY then they can be said to be **Egalitarianist**, **Utilitarianist** or an **Objectivist**

The use of the words above were merely attempting to understand the persons goals within the communication. Great care was taken to use words that would not carry with them a negative connotation. Using these terms are not passing judgement on one way of thinking or another. It also does pigeonhole a person to just one. In reality people move from one to another with great fluidity. ▪

6

The formulation of a problem is often more essential than its solution, which may be merely a matter of mathematical or experimental skill. To raise new questions, new possibilities, to regard old problems from a new angle, requires creative imagination and marks real advances...

-Albert Einstein

Assessing the progress

Development of the Assessment

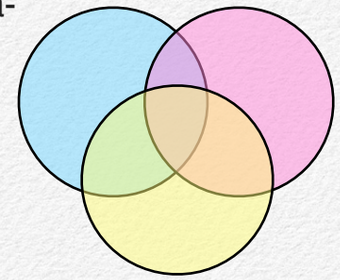
A colleague once stated to me that if a student does not receive a mark of an A in a class, then the class really hasn't been that good of a learning experience for them. I could not disagree more. A student learns much more than content in my class, they are learning a way of thinking. But how is it that you can tell? That is where he had me – I had no data to support my argument. I had no way to really tell how much growth the student has gained because everything I had assessed them with was about content.

In order to tell if each student is growing, there must be a vehicle in which you can measure their level. This is always the conundrum one has when developing the assessment vehicle for over one hundred students in a teachers day. The primary key to assessment is that it must be accurate and efficient and cannot cost more than the paper it is written on. Unable to find an existing instrument that met all of the parameters above, I found myself developing my own instrument.

I settled on a written assessment to address the needs of efficiency. This enables all students to take the assessment at one time and to ensure that I would minimize the amount of time taken away from other opportunities that are afforded to my students. and poses minimal interruption to the day.

The assessment must be able to show a complexity of thought by the student and must be able to illustrate content knowledge without using science as the driver of the assessment in order to accurately determine the growth of critical thinking.

The appropriate level of complexity suitable for high school aged students can be illustrated in a three circled Venn Diagram[2] illustrated to the right. This allows for students to compare each of the three objects to each other looking for similarities and differences which, in turn, allows for the student to compare and contrast.

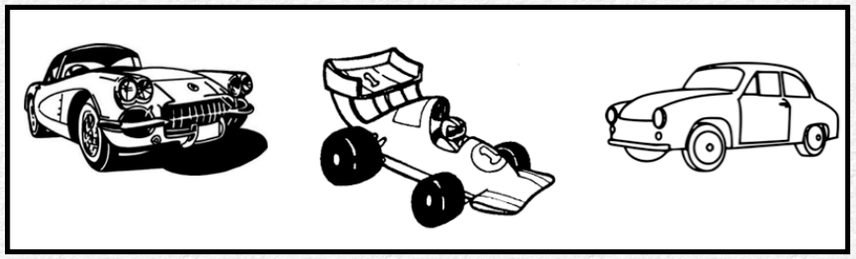


As for the writing itself, it would be evaluated using the specific content standards from the science classroom merged with the information gathered by the Common Core[3] writing standards.

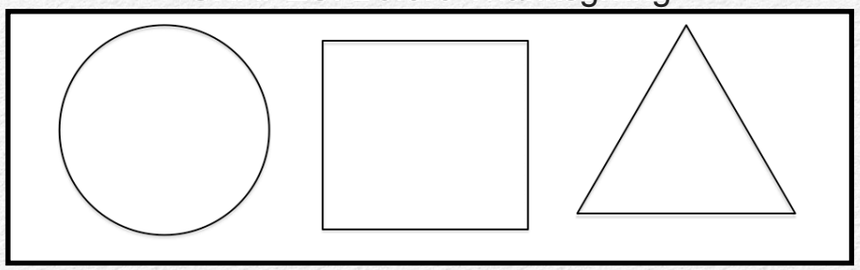
Assessment Protocol

What is then left is the assessment prompt, time frame and implementation of the assessment tool. The first prompt is given in the first week of school with no background to the students. This serves as the baseline. It is then replicated three more times throughout the course of the year. Each assessment is timed for ten minutes only. Students are given no verbal instructions except read and follow the directions. The prompt that they are given is ***Characterize, Classify & Compare, the three images below then communicate what you have concluded.***

CARS: First week of school



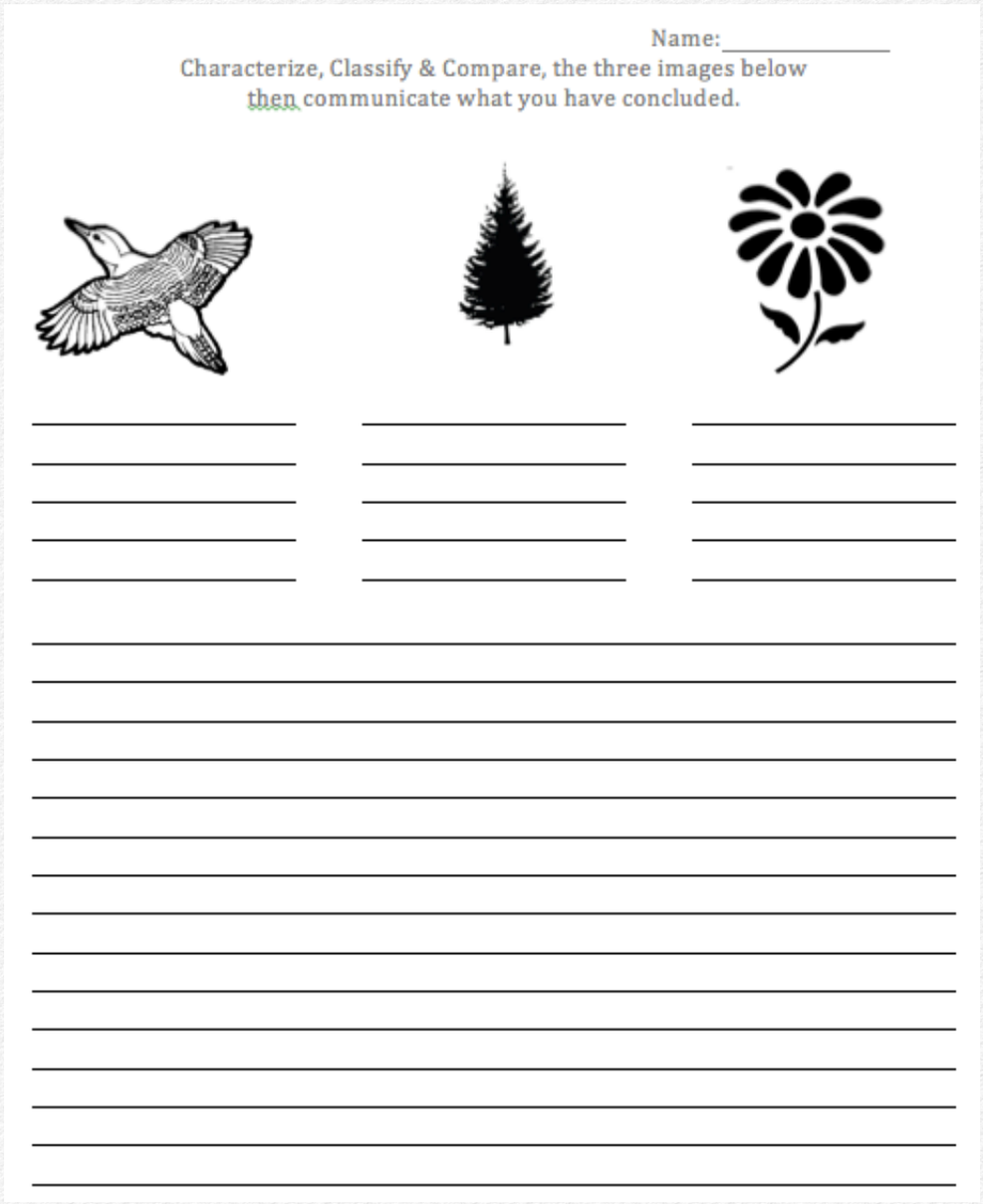
SHAPES: Before Thanksgiving



ECOSYSTEM: Near President's Day

TRUCKS: Near Spring Break

The significance of these images is that they could be about science or they could have nothing to do with science. This allows for students to express themselves in whatever way they are most comfortable. As an evaluator, the most important is that you cannot give credit to something that is not true. For instance, you cannot say that the bird is really a dragon, but it would be permissible to identify it by the wrong common name by saying it was a Cardinal rather than a Common Flicker. The actual testing document looks like the image below.



Evaluation of the Assessment

Scoring for a student is based off of the following scoring criteria. It is important to note that there is not an upper limit to the points possible. Because this is a timed test, the assumption is that with more practice they are able to score higher because the can process the connections better.

I. **Characterizes:**

Identification of physical traits that are known from the picture:

Appropriate identification of a trait for each of the objects (1 point)
Appropriate identification of 2 traits for each of the objects (2 point)
Appropriate identification of 3 traits for each of the objects (3 point)…
…continue for more traits
Marked each characteristic with a 1,2, or 3

II. Classifies:

Clearly identifies and articulates a classification system that represents:

All of the objects classified as a whole – showing the interconnections of the objects (1 point) ***Marked with a C3***

Each additional sub-classification made for two of the objects (1 points for each sub-classification) ***Marked with a C2***

III. Compares:

Clearly explains comparisons that exist between the objects:

Explains the similarities and differences based on classification between all three objects (1 points) ***Marked with a SD3***

Explains the similarities and differences based on classification between pairs of the object (1 point) ***Marked with a SD2***

IV. Communicates:

(Based on College & Career Readiness Anchor Standards for Writing: Text Types and Purposes #2)
Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.

Introduce topic and organize ideas, concepts, and information so that each new element builds on that which was precedes it to create a unified whole (1 point) ***Marked with a I***

Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. (1 point for each appropriate transition) ***Marked with a T***

Use techniques such as metaphor, simile, and analogy to manage the complexity of the topic (1 point for each occurrence) ***Marked with a MSA***

Provide a concluding statement or section that follows from and supports the information or explanation provided. (1 point) ***Marked with a C***

Scoring results are recorded for the four times that students are given the assessment. Traditional assessments would look at achievement and say that all students need to **achieve a score of 7**. A more contemporary way of indicating success is showing growth in a range as indicated in the table to the right. These are targets that can be applied to groups with in a learning community. Preliminary results indicate that it is more difficult to move the students who have scored higher on the baseline to start.

	Scores		
baseline	**1-3**	**4-6**	**7+**
2nd	3	2	1
3rd	2	2	2
4th	2	3	2
overall	8-10	11-13	12+

IMPORTANT TO NOTE: If looking at a student's success through a growth target, the task of educating whole classes becomes very different than it is today. The focus on differentiation will come to the forefront and teachers will have to know and push students individually. This paradigm will be met with resistance in the profession. ▪

References

SECTION 1

1.2 Venn Diagram. Consider each color as a separate idea or topic. Within these circles you list characteristics. These characteristics can overlap with each other which would indicate the similarities. The areas that do not are the difference. Further information available at http://en.wikipedia.org/wiki/Venn_diagram

1.3 Common Core Writing Standards These are newly adopted standards for math and reading, but there are standards that are identified to be cross curricular such as the writing component that has been used here. Further information available at http://www.corestandards.org/ELA-Literacy/W/11-12/

SECTION 2

2.1 To characterize has been defined by Dictionary.com http://dictionary.reference.com/browse/characterize

SECTION 3

3.1 To classify has been defined by Dictionary.com http://dictionary.reference.com/browse/classify

3.2 The Study of Environmental Science diagram is a reference to the work done by G. Tyler Miller, Jr. The first place where I saw the diagram was in “Living in the Environment, 15th edition textbook published by Thomson - Brooks/Cole. He did refer to what is called the Human System as the Human Culturesphere and the Natural System as Earth’s Life-Support System.

SECTION 4

4.1 To Compare has been defined by Dictionary.com http://dictionary.reference.com/browse/compare

SECTION 5

5.1 To Communicate has been defined by Dictionary.com http://dictionary.reference.com/browse/communicate

Altruistic

Unselfish concern for the welfare of others; selflessness

Related Glossary Terms

Egoistic

Index Find Term

Chapter 5 - TO COMMUNICATE

Egalitarianist

Affirming, promoting, or characterized by belief in equal political, economic, social, and civil rights for all people.

Related Glossary Terms

Objectivist, Utilitarianist

Index Find Term

Chapter 5 - TO COMMUNICATE

Egoistic

limited to or caring only about yourself and your own need

Related Glossary Terms

Altruistic

Index Find Term

Chapter 5 - TO COMMUNICATE

Objectivist

reality exists independent of consciousness; proper moral purpose is the pursuit of one’s own happiness

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Related Glossary Terms

Egalitarianist, Utilitarianist

Index Find Term

Chapter 5 - TO COMMUNICATE

Steward

manage or look after (another's property)

Related Glossary Terms

Warden

Index Find Term

Chapter 5 - TO COMMUNICATE

Utilitarianist

actions are right if they are useful or benefit the majority

Related Glossary Terms

Egalitarianist, Objectivist

Index Find Term

Chapter 5 - TO COMMUNICATE

Warden

a person responsible for the supervision of a particular place or thing or for ensuring that regulations associated with it are obeyed

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Related Glossary Terms

Steward

Index Find Term

Chapter 5 - TO COMMUNICATE