

## **A THEMATIC CONSTRUCTION: A FRAMEWORK FOR LITERACY, CURRICULUM & CONTENT**

### **Designers:**

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### **Thematic Title:**

“D.A.R.E. to Be Informed: High on Biology, Numeracy, Culture, and Research”

### **Content Areas:**

Science – Biology (scientific investigations and life functions)

Mathematics – Algebra (ratios and relations)

ESL – Culture (traditions, history, and language)

English –Research (oral and written communication/publishing)

### **Grade Level and Population:**

Ninth/Tenth Grade General Studies

### **Time Frame and Delivery Plans:**

Six weeks, Collaborative Instructional Model

### **Purpose / Rationale:**

Learning is about connections -- we learn best when we are able to connect new information to information with which we are already familiar. The goal of a Thematic is to assist students in making content connections through authentic engagements, thus creating authentic learning. A Thematic approach to content constructions allows study in a real-life contextual view that prompts student interest and reveals relevance. Incorporating content literacy engagements and problem solving activities provides students with necessary reading, comprehension, and critical thinking skills. By breaking down barriers between content areas, students are made explicitly aware of the multifaceted nature of information. Touching on the same theme through multiple disciplines and perspectives provides a greater and more applicable understanding.

The purpose of this Thematic, in particular, is to prompt relationships between biology, mathematics, culture, and language arts (through research), in an effort to reveal how drugs influence the systems of both the human body and society as a whole. Students will then develop a multi-layered and purposeful understanding of the cultural history, biological effects, mathematical implications, and research options related to drugs, in order to make informed decisions.

**Goals:**

Students will investigate the cultural and physiological characteristics that lead to and result from drug abuse and addiction. Students will gain an understanding of the impact that socioeconomic status has on the treatment, both socially and clinically, of people who experiment with and become addicted to narcotics (rich coke-heads vs. poor crack-heads). Students will approach this topic through a cross-curricular format that allows them to construct meaning of the topic in a way that best suits their disposition and prior knowledge, while providing content connections to express that drug addiction is a multifaceted, multidimensional aspect of the human experience.

**Content:** Biologically, students will gain an understanding of the physiological effects of different types of drugs and how that is related to chemical compound reactions. In addressing mathematics, students will develop an understanding of several different relationships numbers can have (e.g. ratio, function, recursive), particularly as they relate to drug metabolism, drug use statistics, and economic effects of drug use. Culturally, students will be exposed to information about the history and development of drugs in regions such as Asia, The Middle East, Mexico, Columbia, and finally the influence the drug cultures have had in the United States. Students will engage in authentic learning as they research a personally meaningful topic through an “I-Search” process to craft an informative paper using prescribed research and documentation methods as well as the traditional steps of the writing process.

**Intent:** As students are faced with decisions and issues regarding drug use regularly, it is important that they are informed and feel empowered regarding discourse in this area. In particular, they should understand how drugs are metabolized in the body and thus alter body chemistry and their effects on academics, vocations, and social interactions. Also, they should have an appreciation of the cultural correlations of drug use. Within the context of this Thematic and through integrated research, reporting, and publishing students will understand the benefits of scaffolding across content areas. After completion of this Thematic, it is intended for students to appreciate the power and importance of informed decision making and problem solving.

**Knowledge:** Students will know the scientific names of common illegal drugs as well as legal drugs. Students will know how to correctly identify the symptoms and consequences associated with different drugs. Students will demonstrate a basic knowledge of the history of drug abuse and how timelines can be used to analyze trends. Students will gain a better understanding of how the English language functions around units of meaning, as well as learn about the history and traditions of some regions and how they influence the United States through language and culture. Students will know how to narrow a research topic into a focused product. Additionally, students will be able to assess research sources for validity and credibility.

**Skills:** Students will be able to correctly make connections, accurately and meaningfully between drugs and symptoms of their abuse. Students will be able to correctly list the scientific name of a popular street drug. Mathematically, students will be able to determine basic relationships (direct/indirect variation, exponential/logarithmic/linear

functions) between sets of data using various representations. They will also be adept at calculating unit conversions using their knowledge of ratios. Students will exhibit an ability to examine words by breaking them down into their particular units of meaning. English students will show proficiency in research, topic generation and focus, writing, revision and editing while using MLA prescribed formatting for quotations and citation. As content literacy spans each of these areas, oral and written competencies will be emphasized throughout.

**Objectives:**

Quantitative:

Biology-

- Students will demonstrate ability to compare and contrast between the different phases of physical reactions after the use of different drugs (e.g. Compare the effects of use of cocaine vs the use of heroine).
- Students will create tables showing the different characteristics of drugs.

e.g.

Drug Name	Common and Brand Names	Chemical Name	Description
Methamphetamine	Meth; Speed; Crystal; Glass; Crank; Tweak; Yaba; Desoxyn®	d-N-methylamphetamine	strong physical and mental stimulant available in both prescription and street forms
Cocaine & Crack	Coke; Crack; Blow; Snow; Nose Candy	benzoylecgonine	- common stimulant derived from the Erythroxylum coca plant - massive popularity in powdered and freebase (crack) forms

- Students will demonstrate ability to calculate element proportions in different drugs. (e.g. The molecular weight of heroin is 369.42. What percentage of heroin (C<sub>21</sub>H<sub>23</sub>NO<sub>5</sub>) is made up of carbon? hydrogen? nitrogen? oxygen?)

Math-

- Students will demonstrate an ability to accurately compute unit conversions. (e.g. covert kg to lb, stoichiometric conversions such as finding mass of drug suspended in solution given density and volume of solution)
- Students will demonstrate an ability to recognize linear, exponential, and periodic functions from a tabular, graphical, verbal, or symbolic representation. (e.g. will recognize the relationship  $y = 2.4x + 1680$  as linear, the relationship in the table below as exponential, the relationship in the graph below as periodic)

x	0	1	2	3	4
y	1	2	4	8	16



- Students will demonstrate an ability to write recursive formulas, particularly as they relate to drug metabolism and half-lives. (e.g.  $A(n+1) = 0.4 A(n) + 440$ ,  $A(0) = 440$ , where  $A(n)$  is the amount of Ibuprofen in the body after the n-1st dose)

- Students will identify independent and dependent variables and construct tables, graphs and/or equations based on sets of data and their relationships. (e.g. students will periodically take measurements of blood pressure after consumption of caffeine, identify time as the independent variable, construct a table and graph of the data, and attempt to find a matching equation for the graph using a transformational approach and graphing calculators)

#### Culture-

- Students will demonstrate knowledge of other cultures, their histories, and specifically the history of drugs in other cultures and regions, particularly East Asia, The Middle East, Mexico, and Columbia.
- Students will demonstrate the ability to successfully work collaboratively and respectfully on group enterprises centered on different cultures.
- Students will demonstrate the ability to reflect on the information given about other cultures (their own thoughts, experiences, stereotypes generally associated with those cultures) in their content connections journals.
- Students will demonstrate a better understanding of how drugs play a role in the economies of other countries, and their economic and social effects on the United States.
- Students will demonstrate an ability to identify and understand roots, derivative suffixes and prefixes, and common morphemes present in the English language.

#### Research-

- Students will demonstrate proficiency in research, topic generation and focus, writing, revision and editing.
- Students will cite sources and quotes using MLA format.
- Students will narrow a research topic, dealing with drugs and or drug addiction, into a research paper that will be informative to the reader and meaningful to the writer.
- Students will understand the benefits of cross-content constructions and connections.
- Students will assess research sources for topic value and credibility.

#### Qualitative:

##### *Individual-*

- Students will come to value cultural literacy, including written and oral language.
- Students will come to value the power of problem solving and decision-making skills.

##### *Group(s)/Class-*

- Students will recognize and practice organization and collaboration skills.
- Students will recognize literacy as a tool for finding information and understanding the connections between subject areas.

## **Standards Of Learning and/or Discipline Based Professional Standards:**

Biology:

*Content-*

- BIO.3 The student will investigate and understand the chemical and biochemical principles essential for life. Key concepts include
- a) water chemistry and its impact on life processes;
  - b) the structure and function of macromolecules;
  - c) the nature of enzymes; and
  - d) the capture, storage, transformation, and flow of energy through the processes of photosynthesis and respiration.
- BIO.5 The student will investigate and understand life functions of archaeobacteria, monerans (eubacteria), protists, fungi, plants, and animals including humans. Key concepts include
- a) how their structures and functions vary between and within the kingdoms;
  - b) comparison of their metabolic activities;
  - c) analyses of their responses to the environment;
  - d) maintenance of homeostasis;
  - e) human health issues, human anatomy, body systems, and life functions; and
  - f) how viruses compare with organisms.

*Skills-*

- BIO.1 The student will plan and conduct investigations in which
- a) observations of living organisms are recorded in the lab and in the field;
  - b) hypotheses are formulated based on direct observations and information from scientific literature;
  - c) variables are defined and investigations are designed to test hypotheses;
  - d) graphing and arithmetic calculations are used as tools in data analysis;
  - e) conclusions are formed based on recorded quantitative and qualitative data;
  - f) sources of error inherent in experimental design are identified and discussed;
  - g) validity of data is determined;
  - h) chemicals and equipment are used in a safe manner;
  - i) appropriate technology including computers, graphing calculators, and probeware, is used for gathering and analyzing data and communicating results;
  - j) research utilizes scientific literature;
  - k) differentiation is made between a scientific hypothesis and theory;
  - l) alternative scientific explanations and models are recognized and analyzed; and
  - m) a scientific viewpoint is constructed and defended (the nature of science).

Mathematics:

*Content-*

- 8.18 The student will use the following algebraic terms appropriately: *domain, range, independent variable, and dependent variable.*
- AII.15 The student will recognize the general shape of polynomial, exponential, and logarithmic functions. The graphing calculator will be used as a tool to investigate the shape and behavior of these functions.

- A.18 The student will analyze a relation to determine whether a direct variation exists and represent it algebraically and graphically, if possible.
- Analyze change in various contexts: approximate and interpret rates of change from graphical and numerical data. (NCTM Principles and Standards)
  - Generalize patterns using explicitly defined and recursively defined functions. (NCTM Principles and Standards)

*Skills-*

- 8.3 The student will solve practical problems involving rational numbers, percents, ratios, and proportions. Problems will be of varying complexities and will involve real-life data, such as finding a discount and discount prices and balancing a checkbook.
- A.5 The student will create and use tabular, symbolic, graphical, verbal, and physical representations to analyze a given set of data for the existence of a pattern, determine the domain and range of relations, and identify the relations that are functions.
- AII.8 The student will recognize multiple representations of functions (linear, quadratic, absolute value, step, and exponential functions) and convert between a graph, a table, and symbolic form. A transformational approach to graphing will be employed through the use of graphing calculators.

ESL/Culture:

*Content-*

- LEP 3.7 The student will expand vocabulary and concept development.
- a) Use context to read unfamiliar words.
  - b) Use knowledge of prefixes, suffixes, antonyms, and synonyms to read unfamiliar words.
- WG.4 The student will locate and analyze physical, economic, and cultural characteristics of world regions: Latin America and the Caribbean, Europe, United States and Canada, North Africa and Southwest Asia, Sub-Saharan Africa, Russia and Central Asia, South Asia, Southeast Asia, East Asia, Australia and the Pacific Islands, and Antarctica.
- WG.6 The student will analyze past and present trends in human migration and cultural interaction as they are influenced by social, economic, political, and environmental factors.

*Skills-*

- LEP 3.2 The student will use oral communication skills.
- a) Participate in social conversations on familiar topics by asking and answering questions and soliciting information.
  - b) Retell stories.
  - c) Talk about experiences, using expanded vocabulary, descriptive words, and paraphrasing.
- WG.1 The student will use maps, globes, photographs, and pictures in order to
- a) obtain geographical information and apply the concepts of location, scale, and orientation;
  - b) develop and refine his or her mental maps of world regions;
  - c) create and compare political, physical, and thematic maps;

- d) analyze and explain how different cultures develop different perspectives on the world and its problems;
- e) recognize different map projections and explain the concept of distortion.

Research:

*Content-*

- 9.4 The student will read and analyze a variety of informational materials (manuals, textbooks, business letters, newspapers, brochures, reports, catalogs) and nonfiction materials, including journals, essays, speeches, biographies, and autobiographies.
  - a) Identify a position/argument to be confirmed, disproved, or modified.
  - b) Evaluate clarity and accuracy of information.
  - c) Synthesize information from sources and apply it in written and oral presentations.
  - d) Identify questions not answered by a selected text.
  - e) Extend general and specialized vocabulary through speaking, reading, and writing.
  - f) Read and follow instructions to complete an assigned project or task.
- 9.8 The student will credit the sources of both quoted and paraphrased ideas.
  - a) Define the meaning and consequences of plagiarism.
  - b) Distinguish one's own ideas from information created or discovered by others.
  - c) Use a style sheet, such as that of the Modern Language Association (MLA) or the American Psychological Association (APA), for citing sources.

*Skills-*

- 9.6 The student will develop narrative, expository, and informational writings to inform, explain, analyze, or entertain.
  - a) Generate, gather, and organize ideas for writing.
  - b) Plan and organize writing to address a specific audience and purpose.
  - c) Communicate clearly the purpose of the writing.
  - d) Write clear, varied sentences.
  - e) Use specific vocabulary and information.
  - f) Arrange paragraphs into a logical progression.
  - g) Revise writing for clarity.
  - h) Proofread and prepare final product for intended audience and purpose.
- 9.7 The student will edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure, and paragraphing.
  - a) Use and apply rules for the parts of a sentence, including subject/verb, direct/indirect object, and predicate nominative/predicate adjective.
  - b) Use parallel structures across sentences and paragraphs.
  - c) Use appositives, main clauses, and subordinate clauses.
  - d) Use commas and semicolons to distinguish and divide main and subordinate clauses.
- 9.9 The student will use print, electronic databases, and online resources to access information.
  - a) Identify key terms specific to research tools and processes.

- b) Narrow the focus of a search.
- c) Scan and select resources.
- d) Distinguish between reliable and questionable Internet sources and apply responsible use of technology.

Computer/Technology: *(will be covered across content areas)*

*Skills-*

C/T 9-12.6 The student will use technology to locate, evaluate, and collect information from a variety of sources.

- Integrate databases, spreadsheets, charts, and tables to create reports.
- Use available technological tools to expand and enhance understanding of ideas and concepts.

C/T 9-12.7 The student will evaluate and select new information resources and technological innovations based on the appropriateness for specific tasks.

- Analyze and draw conclusions about the comprehensiveness and bias of electronic information sources.
- Design and implement a variety of search strategies to retrieve electronic information.

C/T 9-12.8 The student will use technology resources for solving problems and making informed decisions.

- Investigate and apply expert systems, intelligent agents, and simulations in real-world situations.
- Select and apply technology tools for information analysis, problem-solving, and decision-making.
- Use technology resources such as educational software, simulations, and models for problem-solving, and independent learning.
- Produce and disseminate information through collaborative problem-solving activities.

C/T 9-12.9 The student will use a variety of media and formats to communicate information and ideas effectively to multiple audiences.

- Determine the most effective tool, format, and style to communicate to specific audiences.
- Use technology-based options, including distance and distributed education, to collaborate, research, publish, and communicate.
- Practice self-directed use of advanced technology tools for communicating with specific audiences.

Health: *(will be covered across content areas)*

*Content/Skills-*

9.1 The student will apply health knowledge and skills to the development and analysis of personal goals to achieve and maintain long-term health and well-being. Key concepts/skills include

- a) the use of current research and scientific study to interpret dietary principles;
- b) a decision-making process for selecting health care products;
- c) application of personal standards regarding the use of alcohol, tobacco, and other controlled substances;

- d) maintenance of health habits that promote personal wellness;
  - e) implementation of a fitness and lifetime physical activity plan;
  - f) establishment of personal parameters for appropriate and inappropriate health behaviors;
  - g) utilization of a personal system for coping with distress and stress;
  - h) management of deadlines;
  - i) peaceful resolution of conflicts.
- 9.3 The student will analyze, synthesize, and evaluate the relationship between positive health behaviors and the prevention of injury and premature death. Key concepts/skills include
- a) risky behaviors that may result in permanent disability for self or others;
  - b) the consequences of using weapons in acts of violence;
  - c) identification of situations involving risks;
  - d) identification of situations that require first aid or CPR;
  - e) the effects of alcohol and other drug use.
- 9.4 The student will use various sources of information to evaluate global health issues. Key concepts/skills include
- a) the connections between personal health goals and state or national health issues (e.g., as found in the Report of the Surgeon General);
  - b) the benefits of information provided by recognized sources such as state and local health departments, the Food and Drug Administration (FDA), the National Institutes of Health (NIH), the World Health Organization (WHO), and the Centers for Disease Control and Prevention (CDC).
- 9.5 The student will evaluate the benefits of collaboration in relation to community health and wellness initiatives. Key concepts/skills include
- a) the impact of developing positive relationships among health professionals for promotion of healthy communities;
  - b) promotion of community projects;
  - c) development of school and community health programs for citizens of all ages;
  - d) the need for community services;
  - e) the awareness of health-related social issues such as organ donation, homelessness, underage drinking, and substance abuse.

**Assessments:**

Traditional evaluation expectations will include tests, quizzes, reports, narratives, and exams. Alternative/additional assessments for this Thematic will include a content connections journal, portfolio, and brochure.

**Journal – “W.U.I” – “Writing Under the Influence”**

The purpose of the “W.U.I” journal is to give students an organizational framework that encourages construction of, and reflection on, cross-content connections. The journal will also serve as longitudinal evidence of growth for both teacher and student.

Rationale: Content connection journals reinforce the importance of creating positive written engagements with text and provide the most to least disposed and/or experienced student with optimal opportunities for academic success.

This journal will be separated into sections by content but contained in one notebook to emphasize collaboration and content connections. Students will also perform peer reviews of their content connection journals at the end of the Thematic. Each section will be developed as follows:

**Biology-**

- Class notes, including definitions, drawings, and interesting facts/data
- Journal entries including observations/reflections
- Responses to daily prompts
- Scientific Word of the Week entries

**Math-**

- Responses to reflective and anticipatory prompts
- Reflections on content, including possible applications in other content areas, such as biology
- Class notes, including necessary equations/processes
- Brainstorming, lists, etc. as prompted by ISEs and IEs
- Completed VocabMarks

**ESL/Culture-**

- Word of the week with etymology and four square vocabulary
- Notes on world regions, their traditions, and their history of drug culture
- 'World at a Glance' information sheets compiled on world regions, once per week by groups
- Weekly reflections on class content and connections to other areas

**Research-**

- Brainstorming, lists, etc. as prompted by ISEs and IEs
- Research documentation (sources etc.)
- Peer editing/review notes
- Notes from other content areas that lead toward research (ideas they want to investigate).

## **Portfolio**

The purpose of the mathematics portfolio is to encourage self-evaluation and reflection on mathematical understanding. The portfolio will provide students with tangible, longitudinal evidence of their skills and abilities suitable for display or presentation.

Students will be expected to display representative work in a professional manner, including a cover letter. Throughout the thematic, they will choose what to include in their portfolios from:

- Student-constructed or electronically generated tables, graphs and equations, with calculations and/or procedure shown
- Solutions to contextualized problems, with reasoning outlined
- Completed VocabMarks
- Artifacts of mathematical reasoning resulting from cross-content engagements (e.g. graphs/data plots from biology)

The cover letter will include a statement regarding the purpose and development of the portfolio and a reflection on personal growth with regards to numeracy as is evident in the contents of the portfolio.

## **Brochure**

The completion of a brochure will capture and distill the major objectives of this cross-content Thematic. It will also authentically and creatively express in summative fashion the fundamental principles applicable to exploring topics connected to drugs in a safe environment. Successfully demonstrating an authentic technology medium applicable to a number of “concerned” audiences, such as parents, administrators, teachers, and community members, this brochure will provide a support document for the development of “portfolio” evidence of student fulfillment of the Thematic’s objectives. For teachers, this brochure will provide an assessment measure of student learning enterprises. It will also demonstrate students’ technology competencies.

Brochure Content Guidelines-Expectations:

The brochure is to be an 8.5 x 11 tri-folded, 6-sided document addressing the following 6 issues in the order in which they are delineated.

**Page 1:** Introduction will include a picture of a student and general personal statement introducing – identifying who the student is and what the brochure is about.

**Page 2:** Biology page will show some of the choice illegal drugs and the biological effects that occur. This page will also consist of some of the street names with the corresponding scientific name. Student may also include a myth about drug intake as it pertains to what happens to the body.

**Page 3:** Mathematics page will contain one electronically produced graph and table, and, (if appropriate) an equation pertaining to the effects, either biological or social, of drug

use. Additionally, there will be a statement regarding the relevance and importance of the relationship shown.

**Page 4:** Culture page will contain information taken from the content connections journal about a region of the students choosing, and how that culture is influenced by, and in turn influences drug culture in the United States.

**Page 5:** Research page will contain an abstract of their final project including any relevant sites to inform the reader.

**Page 6:** Closure will include an electronically produced bumper sticker design with slogan appropriate to the biological or social effects of drug use.

### **Instructional Resources:**

#### *Miscellaneous Sources-*

- drug anon informational pamphlets
- “Thrifty Nickel”
- car guides
- various catalogs

Pamphlets from local agencies are effective, but students are often apprehensive about requesting such material on their own. By using these informational pamphlets in class engagements, students are afforded an opportunity to look through them with little fear of embarrassment and so increase their awareness of services available to them and others in their community. Catalogs and such will be used by students when doing economic comparisons.

#### *School-based Texts-*

- Novels dealing with drugs and drug addiction will be used to offer a “fictional” starting point for student discussions thus relieving students of the worry of exposing too much of their own issues. A few examples are: *Smack* by Melvin Burgess, *That was Then, This is Now* by S.E. Hinton, *Go Ask Alice* by Anonymous, *A Hero Ain't Nothin' but a Sandwich* by Alice Childress, *The White Horse* by Cynthia D. Grant, *Angel Dust Blues* by Todd Strasser
- *Biology: Exploring Life*. Prentice Hall, 2004
- *Contemporary Mathematics in Context: A Unified Approach*. Glencoe/McGraw-Hill, 2003.

Textbooks will be used to support the curriculum and for quick access to basic concepts.

#### *Trade Books-*

- *A Brief History of Drugs: From the Stone Age to the Stoned Age*, Antonio Escohotado and Ken Symington
- *Narcotic Culture: A History of Drugs in China*, Frank Dikotter, Lars Laamann, and Zhou Xun

These two books will be used for an overview of drug culture in foreign regions.

- *Global Passages: Sources in World History, Volume 1: To 1500*. Edited by Roger Schlesinger.

This source will be used to explore stereotypes of other cultures.

- *Drugs Explained: The Real Deal on Alcohol, Pot, Ecstasy, and More* by Pierre Mezinski, Melissa Daly, Francoise Jaud
- *Different Like Me: A Book for Teens Who Worry About Their Parent's Use of Alcohol/Drugs* by Evelyn Leite, Pamela Espeland
- *A Teen's Guide To Living Drug Free* by Bettie B. Youngs, Jennifer Leigh Youngs, Tina Moreno

The purpose of including these three selections is to inform the students, as well as move class discussions from the “fictional” realm and all the buffers it offers into the “real” and therefore the truly meaningful learning.

#### *Consultants/Community Resources-*

- healthcare worker(s)
- reformed addict
- rehab clinic

It is important that students interact with community members who are or have been active in the fields they are studying. As such, community consultants will be invited to share their experiences and expertise and answer questions students may have.

#### *Journals/Magazines-*

- Current issues found in newspapers (both local and non-local)

These will be used to examine current relevant issues in both a local and non-local context.

#### *Artifacts-*

- clean syringes (no needles)
- before and after pictures of addicts (tooth loss, premature aging, etc.)

The purpose of including these artifacts is to inform the students, as well as move class discussions from the “fictional” realm and all the buffers it offers into the “real” and therefore the truly meaningful learning.

#### *Primary Resources-*

- first-hand accounts of taking drugs (e.g. from <http://www.erowid.org>)
- Harrison Narcotics Act
- Drug Control: Coca Cultivation and Eradication Estimates in Colombia (08-JAN-03, GAO-03-319R)

These primary resources will be used in the factual study of drugs and their effects. Students will have the opportunity to develop opinions/stances on the information included in these texts without the bias of an intermediate author.

#### *Technologies and Sites-*

- <http://www.cis.yale.edu/ynhti/curriculum/units/1986/5/86.05.01.x.html>
- <http://www.thepepproject.net>
- <http://oas.samhsa.gov/nhsda.htm>
- <http://www.census.gov>

- <http://www.drugpolicy.org/news/041806coca.cfm>
- <http://www.druglibrary.org/>
- <http://www.drugabuse.gov/>
- <http://www.cia.gov/cia/publications/factbook>
- <http://owl.english.purdue.edu/writinglab/>
- <http://www.erowid.org>

Students will use these Internet sites as resources for current statistics and public (government) information and will practice validating and citing electronic sources.

## **Instructional Sets and Engagements:**

Unless otherwise noted, all Instructional Sets and Engagements are adapted from *A Handbook Of Content Literacy Strategies* by Elaine C. Stephens and Jean E. Brown, 2005.

### **IS 1 – I’m curious (pg. 59)**

The purpose of this Instructional Set is to assess any preconceptions that students possess about the topic of drugs, and to pique student interest. Using the “I’m Curious” strategy, students will be given note cards with the ingredients of several different types of drugs on them, from vitamins to over-the-counter drugs, to illegal substances. Students will take one note card and try to figure the street/store name of the drug, what the drug is used for. After doing so, the teacher will allow students to give some of their responses. The students will then exchange cards with another student to perform the same tasks. Students should put both scientific drug names along with guesses in their journal. Afterwards, the teacher will give the street/store name that corresponds with each drug. The teacher will allow students to discuss what they know about the different effects these drugs have on the human body and students will generate at least one question regarding drug use.

Rationale: Learning is about building on prior knowledge. It is therefore essential that we have an idea of where our students stand in their knowledge about drugs in general. Also, when students are aware of the extent of their own knowledge, it can serve as a powerful motivator.

### **IE 1 – I Wonder Why... (pg. 113)**

The purpose of this instructional set is to generate and explicate possible research topics by addressing the personal curiosities students already have about drugs and drug abuse: why people abuse drugs, what it does to their bodies, etc. The instructor will model for the students the process of constructing their own meaning and tracking her/his expanded learning of the topic. We will begin the process through general discussion of what we “know” or want to “know” about drugs and begin generating topics through free writing on “what I know about drugs, and what I want to know about drugs.” Student expectations include developing a list of 3-5 possible topics of interest (to be recorded in their journal) that can be narrowed down into one personally meaningful research topic.

Rationale: Learning is born of interest; therefore any topic that will create meaningful learning must come from meaningful interest. Here the students will be able to explore their interests and create a meaningful learning experience from it.

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## **IS 2 – Take a Stand (pg. 182)**

The purpose of this Instructional Set is to continue the introduction of the thematic and prompt student interest in quantitative aspects of drug use and abuse. Using the “Take a Stand” strategy, students will read an article on the topic of Coca-Cola lore (including the presence of caffeine and cocaine) and sketch out arguments supporting and negating the statement “It is possible to die of an overdose using ingredients extracted from Coca-Cola.” These arguments must include information from the article as well as mathematical reasoning. Students will gain interest in possible content connections, activate prior knowledge, and build upon each other’s ideas. Student expectations include developing an understanding that risks are often a matter of scale (ratio and proportion) and that we cannot believe everything that we read. Responses/ideas/brainstorms will be recorded in their “W.U.I” journals.

Rationale: This activity allows students to explore possible applications of mathematical concepts as they relate to drug use, while spurring interest by addressing a few of the many urban legends that surround Coca-Cola. As most students will not previously know that Coca-Cola contains trace amounts of cocaine, they will now be more interested in the quantitative aspects of drugs and other substances they come into contact with. Discussion will be student-oriented with teacher prompting, so they will have some amount of choice regarding content covered.

## **IE 2 – A Million Dollars (Jackson, *Activities that Teach*, 56)**

The purpose of this Instructional Engagement is to enhance students’ conceptualization of large sums of money. In groups of two or three, students will use a variety of resources, such as catalogs, brochures, car guides, and Thrifty Nickel magazines, and “buy” items until they have spent one million dollars. They must make purchasing decisions as a group and cannot buy more than one of the same item. For instance, if the group wants two cars, they must be two different cars. Following this activity, students will spend 5 minutes responding in their “W.U.I” journals to the questions “How difficult or easy was it for you to spend one million dollars?” and “How might money affect people’s decisions to participate in the drug trade?” As time allows, students may discuss their responses with each other. Student expectations include cooperating to make purchasing decisions and contemplating the economic impact of one million dollars.

Rationale: Often, economic data is put in terms of millions of dollars. Also, when newspapers report on drug busts, seized drugs are also put in these terms. Throughout this Thematic, as well as in life, students will need to conceptualize large numbers in order to grasp the scope and impact of certain statistics.

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### **IS 3 – The I-Search Paper (pg. 198)**

The purpose of this Instructional Engagement is to explore research possibilities that are personally meaningful to each student, therefore creating authentic learning. Student expectations include taking the topics from “I Wonder Why” and narrowing them down to the one topic that is of most interest to them. They will achieve this “narrowing” through a process of question and answer aimed at revealing their truest interest (a version of “I Want to Know”) in an effort to create meaningful learning. Students will then choose a topic, define interview and text research sources, and develop proper interview questions from their own personal curiosities, for a variety of possible interview subjects. These may include law enforcement officers, drug abuse counselors, and recovering addicts. These lists and questions will be written in their “W.U.I” journals.

Rationale: Meaningful learning is created from meaningful interest. The goal of this Thematic is to educate students about drugs and drug addiction in a meaningful way. The I-Search paper allows the student to have his or her own voice in the research, thus making it a truly meaningful learning experience.

### **IE 3 – Check Those Facts! (pg. 184)**

The purpose of this instructional engagement is to help students develop a critical eye for Internet source credibility. Using the “Check Those Facts!” strategy, students will create a list of potential informational sites and then create a chart to cross-reference their findings in an effort to validate their sources. The instructor will model how to use a search engine (Google, Ask Jeeves, etc.) and compile a list of possible sources (best “hits” etc.) to be cross-referenced. Student expectations include using a search engine to research a given term (e.g. “methamphetamine addiction”) and then cross-referencing their findings in print sources.

Rationale: It is generally important for students to take their time and validate their sources. Given the proliferation of online research, it is increasingly important that students learn correct documentation techniques while recognizing the unregulated nature of the Internet.

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### **IS 4 – Question of the Day (pg. 68)**

The purpose of this Instructional Set is to intrigue students and activate their prior knowledge of the effects of drug use. Using the “Question of the Day” strategy, students will be given five to seven minutes to respond to questions such as, “If drugs cause damage to the body, why do people continue to use them?” Students may accompany their answers with a drawing or diagram. Student expectations include utilizing prior knowledge to write a response. Responses will be written in their “W.U.I” journal and then be used to generate a class discussion.

Rationale: Allowing students to answer questions without pressure helps them to get involved and it helps them to see the relevance of what they are learning. When students answer questions that require deeper thinking, they sometimes come up with more questions when incorporated into a class discussion with peers.

#### **IE 4 – Venn Diagram (pg. 121)**

The purpose of this strategy is to allow students to identify and categorize similarities and differences among drug effects on the human body. Using the “Venn Diagram” strategy, in pairs, students will list the important characteristics of two different drugs and their effects on the body. Characteristics of the first will be placed in the first circle and characteristics of the second will be placed in the second circle. Students then use the common overlapping areas of the circles to list similarities. Student expectations include recognizing Venn diagrams as tools for comparison/contrast and using said diagrams in this and appropriate subsequent engagements. This will be written in their “W.U.I.” journals.

Rationale: Using the Venn diagram allows students to construct a visual representation of their understanding. Visualization provides students with an organizational framework upon which to build during subsequent content engagements.

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#### **IS 5 – What’s in a Picture? (pg. 101)**

The purpose of this Instructional Set is to expose students to social and economic factors effecting production of coca in Columbia. Using the “What’s in a Picture” strategy, students will be prompted to draw on their own past experiences and knowledge to speculate on an image. An image of coca harvesting will be shown to the students. They will then be broken up into groups in order to discuss and share their ideas about the image. Students will be given a copy of the image, with questions on the back such as “What do these people seem to be doing?”, “Why do you believe they are doing this?”, and “Where do you think these people live?”. This handout will be put into their content connection journals. Student expectations include sharing their group findings with the class, while the teacher enforces their findings with facts about the economics of coca harvesting and production in Columbia.

Rationale: Images provide students with a means to connect to given content, and a more easily recollected conceptualization of that content. Pictures also help to prompt student interest and engage prior knowledge.

#### **IE 5 – Cubing (pg. 204)**

The purpose of this Instructional Engagement is to use economic and social stratification numbers to demonstrate the difficulty in halting coca production in Columbia. Using the “Cubing” strategy, students will examine the ramifications of coca plant eradication. They will have access to multiple resources with a variety of perspectives on the matter (e.g. CIA World Factbook, Drug Control: Coca Cultivation and Eradication Estimates in Colombia (08-JAN-03, GAO-03-319R)). Student expectations include utilizing prior

knowledge and working in groups to construct a new understanding about the relationship between drug production and economics. Students will write from six different mathematical perspectives: description, comparison, association, analysis, application, and argumentation. This will be written in their “W.U.I” journals. Students will be encouraged to continue this investigation in a research setting.

Rationale: As learning is about constructing meaning, students will have the opportunity to collaboratively draw information from a variety of texts. Responding to this information from different perspectives invites students to develop a broader and deeper understanding of the content.

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### **IS 6 – Card Sort (G. Lloyd, 2002)**

The purpose of this Instructional Set is to prompt connections between various representations of mathematical information. Using the “Card Sort” strategy, students will sort a collection of cards into categories. The cards will contain mathematical relationships that differ by family (e.g. linear, polynomial, exponential, logarithmic), representation (graph, table, word problem, equation), and other characteristics (e.g. continuity). Student expectations include designing categories that make the most sense to them, as a small group, given the information on the cards. Groups will share their results with the class and a list of descriptors will be constructed for each card, which will be accessible to the class for the remainder of the unit.

Rationale: This activity allows an activation and informal assessment of prior knowledge and conceptions about functions and other relationships. Students will be encouraged to take an analytical approach to data and collaborate to construct a richer understanding of the material at hand.

### **IE 6 – X Marks the Spot (pg. 115)**

The purpose of this Instructional Engagement is to foster interest in expository material related to drugs and drug culture and have students find relevant numerical information in a piece of text. Using the “X Marks the Spot” strategy, students will find information relevant to timeline construction in “7000 Years of Drug Use” and other sources found on the internet (such as “Highs and Lows: a history of intoxication” <http://www.newscientist.com/popuparticle.ns?id=in41>) and mark what they believe to be major landmarks in drug history. They will then, as a class, utilize measurement and organizational skills to construct a drug timeline on a bulletin board that will be referenced and enhanced in future engagements. Student expectations include an appreciation of the mathematical relevance of resources found outside their textbook.

Rationale: This allows students to gain proficiency in extracting and constructing meaning from mathematical information in expository text. Students will encounter increasingly difficult situations in which they must find information relevant to a problem

at hand. This skill is useful in life outside of the classroom, as mathematical information is often imbedded in texts such as newspaper and magazine articles, instruction manuals, and advertisements.

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### **IS 7 – What's in a Word? (pg. 101)**

The purpose of this Instructional Set is to prompt student interest in foreign culture and language, particularly that of the Middle East. A modification of “What’s in a Picture” strategy, students will be prompted to draw on their own past experiences and knowledge to speculate on a word written on the board by the teacher. The teacher will write the word Hashshashin on the board. The students will then be asked about their ideas on the word, and any parallels they see between it and words they are already familiar with. Students will be asked to put their thoughts into their content connection journals. The students will then share their ideas with the class, while the teacher explains how the word assassin derives from hashshashin, which was a religious sect of Ismaili Muslims named for their habit of 'eating hashish'. Student expectations include speculating on other words they believe to be derived from other cultures and compound words in the English language. Students will record this information in their Etymology of the week section in their content connections journals.

Rationale: Prompting authenticity and interest is essential to disposing students to content. Current events place a spotlight on the Middle East, and this helps promote the authenticity of the Instructional Set.

### **IE 7 – Four-Square Vocabulary Approach (pg. 95)**

The purpose of this Instructional Engagement is to introduce new vocabulary terms and to promote student awareness of the basic structure of the English language. Students will be presented with the key vocabulary term 'tradition'. Students then divide a page in their content connections journal into four squares, and number them from one to four. In the top left corner (square number one) students write the key vocabulary term. The teacher will explain the definition of the word, and students will write this in the bottom right hand square (square four). Students are invited to write their own example of a tradition in the top right square (square two). Students then share their own ideas about 'traditions' and what it means to them with the class. The final square is reserved for a class analysis of derivatives of the word 'tradition'. Students will be presented with other words that contain the word 'tradition' such as 'traditional', 'extradition', 'traditionally', and 'traditionless'. Student expectations include speculating on what these slight differences in the words do to the meaning of the words, and how the English language functions. These words will also be placed on the "wall of words".

Rationale: Understanding is key to learning. A better understanding of how the English language functions provides students with a solid foundation to learning new and challenging vocabulary.

## **Lesson Plan 1 – I'm Curious (pg. 59) – IS 1**

### **Goals:**

*Content:* Students will understand that chemicals that are similar in type can have vastly different effects on the body.

*Intent:* Students will recognize that there is often more than one name for any given drug.

*Knowledge:* By making an informational table graph, students will be able to identify the difference between the drugs, the specific effects of each drug, and the chemical names of each drug.

*Skills:* Students will be able to identify common drugs by scientific name alone.

### **Objectives:**

Quantitative:

- Students will calculate the percentage of different ingredients as it relates to the effects of the drug. (*for extension*)
- Students will demonstrate an understanding that drug effects can depend largely on proportion of ingredients as well as mere presence of ingredients.

Qualitative:

*Individual-* Students will come to value the importance of government regulation with regards to drug ingredients and the dangers associated with unregulated drugs.

*Group(s)/Class-* Students will come to value individual perspectives on the dangers of drugs.

### **Standards of Learning/Professional Standards:**

BIO.1 The student will plan and conduct investigations

BIO.3 The student will investigate and understand the chemical and biochemical principles essential for life.

### **Procedure:**

Students will be given an index card with drug ingredient information.

Students will list a possible drug name, effects of it, and questions about it.

Students will exchange cards with another student and repeat second step.

Students will enter both drug ingredient lists in journal.

Students will listen to actual names given by teacher and then have a class discussion about the different drugs and their effects on the human body.

### **Assessments:**

Students will list assumed drug name, effects, and questions in journal.

### **Instructional Resources:**

<http://www.drugabuse.gov/drugpages.html>

### **Extensions:**

**Culture:** Have students develop a running list of street names in different cultures.

## **Lesson Plan 2 – Timeline - prompted by IE 6**

The purpose of this lesson is to prompt student exploration of data trends, particularly with regard to drug use. Students will first construct a large-scale timeline in conjunction with the “X-Marks the Spot” Instructional Engagement. The bulk of the timeline should focus on the past two decades, approximately. Using tabular data regarding drug use (including overdose and DUI statistics) from the U.S. Department of Health and Human Services, as well as population data from the U.S. Census Bureau, students will construct line graphs across the length of the timeline. This data will include teen drug use and local census data to make this engagement most relevant to students. Students will then write observations on trends (both short- and long-term) in their journals and share findings with a partner. In subsequent engagements, students will make connections between drug use and population data. As students construct other graphs/tables throughout the unit (e.g. metabolism of particular drugs, effects of caffeine on heart rate), they will mount representative graphs for display on the timeline.

**Rationale:** All too often, teens (and people of all ages) fool themselves into believing “It can’t happen to me” and “If I do drugs, it’s my business and nobody else’s.” Seeing data that puts drug use in a community context can help students see it as a community issue. For instance, prescription pain pill abuse is a growing problem among both teens and the elderly, in all socioeconomic groups. This may alert students to be more aware of this issue when they, or friends, or family members are prescribed pain pills by a doctor.

### **Goals:**

*Content:* Students will see a connection between line graphs, timelines, and graphs of functions over time.

*Intent:* Students will appreciate the scope of the issue of drug use, both locally and nationally.

*Knowledge:* Students will understand that by creating a graph from data tables, one can more easily analyze trends. They will also appreciate that there are both short- and long-term data trends and that to understand the data most completely, one must look at both. For instance, from year to year, drug use among teens may fluctuate significantly, but over time, usage statistics stay relatively constant.

*Skills:* Students will be able to construct a line graph from tabular data and analyze the graph for trends.

### **Objectives:**

**Quantitative:**

Students will be able to plot data points on a Cartesian coordinate system from tabular data. (e.g. plot number of deaths vs. year given a table)

Students will be able to describe both short- and long-term data trends after analyzing a line graph. (e.g. From 1989 to 1990, there was a 1.8% decrease in number of arrests for drug-related offenses. However, from 1980 to 1990, there is a general and gradual increase.)

Students will be able to identify time as an independent variable.

Qualitative:

*Individual-* Students will begin to understand that drug use has both short- and long-term implications.

*Group(s)/Class-* Students will appreciate how mathematics can be useful in understanding cultural trends.

**Standards of Learning/Professional Standards:**

- A.5 The student will create and use tabular, symbolic, graphical, verbal, and physical representations to analyze a given set of data for the existence of a pattern, determine the domain and range of relations, and identify the relations that are functions.
- Analyze change in various contexts: approximate and interpret rates of change from graphical and numerical data. (NCTM Principles and Standards)

**Procedure:**

Students will construct a timeline as part of the “X-Marks the Spot” engagement. Students will acquire tabular data regarding drug use and general census information from various “whitelisted” websites.

Students will plot data points on the timeline.

Students will analyze trends in the data and record observations in their journals.

As the unit progresses, students will add to the timeline.

**Assessments:**

Students will prepare graphs suitable for display on the timeline.

Students will write observations in their “W.U.I” journals.

**Instructional Resources:**

- <http://oas.samhsa.gov/nhsda.htm>
- <http://www.census.gov>
- <http://www.druglibrary.org/Schaffer/library/graphs>

**Extensions:**

**Culture:** Have students construct a timeline outlining coca production and eradication efforts in Columbia.

**A Game Frame: Boggle® (Hasbro, Inc.)**

The purpose of this game frame is to allow students to demonstrate familiarity with vocabulary encountered throughout the Thematic. Students will be presented with pre-made Boggle boards that contain a sampling of the vocabulary addressed in all content areas. Using their content connections journals as a guide, they will search for the vocabulary hidden in each board. Students will be allowed and encouraged to build upon the root words they find during the game by adding pre and post morphemes such as un-, re-, dis-, in-, -ate, -ing, -s, and -ion. This will help students develop a fuller understanding of the English language and its basis in smaller units of meaning.

An example board and word list:

L	J	N	O	D
O	A	E	I	L
R	K	C	T	A
T	C	O	R	B
E	N	U	S	B

narc, narcotic, narcotics . . .  
 dilate, dilator, dilation, dilates . . .  
 action, reaction, reacts . . .  
 inject, injector, injection . . .  
 line, lineal, linear, nonlinear . . .  
 control, uncontrollable, controlled . . .  
 coke  
 crack  
 absorb, absorbing, absorption . . .  
 coca, cocaine . . .  
 kola  
 ounce  
 ratio, ration, rational, irrationally . . .  
 source, resource, sourcing, sourced . . .  
 social, antisocial, socially . . .  
 societal, society . . .  
 nitrous  
 acetone  
 latino, latinos . . .  
 toke, tokes, toking . . .  
 tract, traction, contract, contraction . . .  
 occur, concurs, recursion, recursive . . .

**Diversity Addressed:**

An important goal of a Thematic is to address the least disposed learners that may be present in a classroom. This is accomplished by creating authentic and applicable engagements in order to demonstrate the relevance of content. Instructional frameworks allow for adaptation and change in order to accommodate student needs. Establishing relevance is essential to sparking an interest in students that will help them become actively engaged in applying new knowledge and building an understanding.

In particular, this Thematic will explore gender equity in this country and those regions studied. How language and culture affect gender will be studied, as well as women's and men's gender roles and stereotypes. Female professionals will be invited to speak to the

classes on their experiences and will be invited and welcome at the closing celebration. The Thematic, itself, is gender-neutral, and it will be equally relevant and invitational to both sexes.

**Parent-Community Engagements:**

Drug abuse affects us all, whether the abuser is a family member, a friend, or neighbor. Chances are we have all experienced some level of the destruction brought on by addiction. However, as is also the case in our society, we are often too ashamed to admit our experiences and talk about them, thus, no learning can take place. We would like to invite parents and community members (law enforcement, drug abuse counselors and the like) to an event called “Talk back our lives” emphasizing the importance of discussion and disclosure in helping our students gain a greater understanding of the impact drug abuse has on society. Of course with such a topic as ours we cannot expect people to come in and freely express their lives’ transgressions, so we propose a role-playing activity in which people fill out a card and play the role of a drug addict. This will range from street addicts, to wealthy addicts who hide their addiction behind money and power. The only restriction we place on the adults is that they will portray the characters as members of their own race and gender so as not to offend anyone. The children will act as the responsible members of society and try to help the addicts to reform.

The concluding celebration will follow with a conversation party where the participants recall the feelings they experienced during the role-play, and collectively we create a pledge to open lines of communication between parents and children on the subject of drugs and drug abuse. There will be dinner, dessert and possible door prizes, as donated by request from local businesses, drug prevention units, rehabilitation centers, etc. The goal is to first get people in, and then get them talking. There will be samples of student work on display for the duration of the celebration. This will include each student’s individualized brochure and portfolio, a copy of their I-Search paper, and the completed drug timeline. Before leaving, each community participant will be asked to review one student’s displayed work and leave feedback.

## **Vocabulary & Morphology:**

### **Vocabulary Engagement 1: Words Alive**

([http://www.pen.k12.va.us/VDOE/Instruction/Reading/wordsalive\\_voc\\_acq.html](http://www.pen.k12.va.us/VDOE/Instruction/Reading/wordsalive_voc_acq.html))

The purpose of this vocabulary engagement is to expand and build upon students' knowledge of the technical jargon they will encounter during this Thematic. Student expectations include being able to scaffold between previous knowledge of drugs and drug terminology, and the jargon used within the field of drug research. Using the *Words Alive* process students will create meaning through definition, synonym and antonym recognition, usage, and expression (drawing).

Rationale: In order to successfully engage with the technical aspects of the Thematic, students will need a working technical vocabulary. Since learning is about building upon prior knowledge, scaffolding is an effective strategy in helping students construct meaning.

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### **Vocabulary Engagement 2: VocabMarks (pg. 129)**

The purpose of this Vocabulary Engagement is to encourage students to enrich their vocabulary and subsequently enhance their understanding of content. Using the "VocabMarks" strategy, on wide strips of paper, students will write words with which they are not familiar (one per strip). Student expectations include writing/drawing/expressing their understanding of the word based on context. They will be encouraged to review their strips and add to/change what they initially thought based on new knowledge and experiences. The strips may include pictures, sample sentences, examples, etc. Once per week, strips will be collected and peers will have the opportunity to review/add to/change others' strips.

Rationale: Students must have a working vocabulary concerning a subject in order to effectively communicate about that subject. Since learning is about construction of meaning based on collaboration and experience, students will have the opportunity to develop their understanding of words over time and in a variety of contexts.

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### **Vocabulary Engagement 3: Word of the Week (pg. 131)**

The purpose of this strategy is to encourage students to develop their vocabulary. Using the "Word of the Week" strategy, students will select an unfamiliar word whose meaning and use they want to know. Student expectations include adding these words to their journals and using the word regularly during the week. Each week, one student presents the word of the week. All class members use the class word as well as their own word in their assignments during the week.

Rationale: When students make new words their own, it helps them to construct an ever-widening vocabulary. As students increase their own vocabulary, they are better able to be articulate when trying to communicate a specific point.

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#### **Vocabulary Engagement 4: Wall of Words (pg. 88)**

The purpose of this ongoing Vocabulary Engagement is to enrich students' vocabularies by allowing them continuous visual access to new content-relevant words. Using the "Wall of Words" strategy, vocabulary words specific to the current unit will be placed on a board in plain view of all in the classroom (including the teacher). The teacher will incorporate these words as much as possible into daily lessons, and students will be invited to add to this list any words that they find interesting or are curious about. Student expectations include asking any questions they have about any words that appear on the Wall of Words, and attempting to utilize their new vocabulary in classroom discussions.

Rationale: When vocabulary is presented in a real world manner where students are exposed to its constant usage, the vocabulary acquires relevance. This relevance creates a need to know for the student that assists in learning. Visual stimulation and reminders of the vocabulary assists students and teachers in incorporating the new vocabulary into their own speech. When students are invited to expand their vocabulary on their own terms without fear of examination, they are allowed to learn at their pace in the way which best benefits them.

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#### **Morphology:**

*Specialized-*

Math-

**exponential** (ex-po-nen'-chul) of or relating to a function in which a variable is multiplied by itself

ex / pon / ent / al ex (forth) + pon (put) + ent (noun suffix) + al (adjective suffix)

**exponent, expound, ponder**

**logarithmic** (log-e-rith'-mik) of or relating to the inverse of an exponential relationship  
log / arithm / ic log (proportion/ratio/word) + arithm (number) + ic (adjective suffix)

**logarithm, arithmetic, logic**

**recursion** (re-cur'-zun) an expression, each term of which is relies on preceding terms  
re / curs / ion re (again) + curs (run) + ion (noun suffix)

**recursive, recurring, occurrence, concurrent**

Culture-

**culture** (kʌlˈtʃər) The customs, ideas, values, etc of a particular civilization, society, or social group, especially at a particular time.

cult / ure cult (group) + ure (noun suffix)

**cutivate, cultivation, cultured**

**inflection** (ɪnˈflɛkʃən)

An alteration of the form of a word by the addition of an affix, as in English *dogs* from *dog*, or by changing the form of a base, as in English *spoke* from *speak*, that indicates grammatical features such as number, person, mood, or tense.

- An affix indicating such a grammatical feature, as the -s in the English third person singular verb form *speaks*.
- The paradigm of a word.
- A pattern of forming paradigms, such as noun inflection or verb inflection.

in / flect / ion in (in) + flect (to bend) + ion (noun suffix)

**inflect, reflect, inflective**

**etymology** (ɛtɪˈmɒləˈdʒi) The origin and historical development of a linguistic form as shown by determining its basic elements, earliest known use, and changes in form and meaning, tracing its transmission from one language to another, identifying its cognates in other languages, and reconstructing its ancestral form where possible.

Etymo / log / y Etymo (from the greek *etymos* "true") + log (from *logos* "word") + y (noun suffix)

**etymological, etymologically, etymologist**

English-

**ci·ta·tion** (sɪˈtA-shən) an act of quoting; *especially* : the citing of a previously settled case at law **b : excerpt, quote**

cit / at / ion cite (summon/arouse) + ate (verb suffix) + ion (noun suffix)

**cite, citing, incites**

**para·phrase** (ˈpɑr-ə-ˈfrɑz) a restatement of a text, passage, or work giving the meaning in another form

para / phrase para (beside) + phrase (tell)

**paraphrasing, paraphrasable**

**pla·gia·rize** (ˈplɑ-jə-ˈrɪz) to steal and pass off (the ideas or words of another) as one's own : use (another's production) without crediting the source

plagiarist / ize plagiarist (kidnapper) + ize (verb suffix)

**plagiarism, plagiarist**

Science-

**a·nat·o·my** (əˈnætəˈmɪ) the bodily structure of a plant or an animal or of any of its parts.

ana / tom / y ana (up) + tom (to cut) + y (noun suffix)

**anatomies, anatomical, anatomist**

**bi•o•log•i•cal** (bī'ə-lŏj'ī-kəl) Of, relating to, caused by, or affecting life or living organisms: *biological processes such as growth and digestion.*

bio / log / ic / al bio (life) + log (book) + ic (of) + al (adjective suffix)

**biology, biosphere, biography**

**me•tab•o•lism** (mī-tăb'ə-līz'əm) the chemical processes occurring within a living cell or organism that are necessary for the maintenance of life. In metabolism some substances are broken down to yield energy for vital processes while other substances, necessary for life, are synthesized.

meta / bol / ism meta (change) + bol (throw) + ism (noun suffix)

**metabolic, metabolize**

*Special-*

Math-

**dependent** (de-pend'ent) relying or contingent on another for support

de / pend / ent de (from/completely) + pend (hang) + ent (adjective suffix)

**independent, depending, pended**

**variable** (var'i-e-bul) quantity that can change values

vari / able vari (to change) + able (adjective suffix)

**variation, invariability, varied, various, variety**

Culture-

**influential** (īn flū'ēn-ēns) A power affecting a person, thing, or course of events, especially one that operates without any direct or apparent effort.

in / fluen / ce in (into) + fluen (flow) + ce (inflectional suffix) + ial (adjective suffix)

**influencing, influenceable, influencer, fluent, influential**

**homogeneous** (hŏ'mə-jē'nē-əs, -jē'n'yəs) Of the same or similar nature or kind.

homo / gene / ous homo (same) + gene (from genus - kind/gender/type) + ous (adjectival suffix)

**heterogeneous, homogeneously, homogenous, homogeny**

English-

**expository (writing)** (ek-sp&-'zi-tŏr-E) discourse or an example of it designed to convey information or explain what is difficult to understand.

ex / posit / or / y ex (out of) + pos/posit (put) + or (noun suffix) + y (adjective suffix)

**expose, exposé, exposition**

Science-

**ob·ser·va·tion** (Ōb zər-vā' shən) 1. a. the act or faculty of observing. b. The fact of being observed. 2. a. the act of noting and recording something, such as a phenomenon, with instruments. b. the result or record of such notation: *a meteorological observation*.  
ob/ serv / a / tion ob (in the way, toward) + (serv) to keep + ate (verb suffix) + ion (noun suffix)

**observe, observed, observing**

**con·clu·sion** (kən-klŭ' zhən) 1. a judgment or opinion inferred from relevant facts <our *conclusion* upon the present evidence —*Missouri v. Illinois*, 200 U.S. 496 (1905)>

2. a. a final summarizing (as of a closing argument) b. the last or closing part of something

3. an opinion or judgment offered without supporting evidence; *specifically* : an allegation made in a pleading that is not based on facts set forth in the pleading  
con / clus / ion con (together) + clu(s) (shut) + ion (noun suffix)

conclude, concluding, concluded, conclusive

## **Professional Standards Addressed**

### **Interstate New Teachers Assessment and Support Consortium Standards (INTASC):**

1.22, 1.23, 1.24, 1.31, 1.32, 1.35, 1.36, 2.11, 2.21, 2.32, 2.33, 3.11, 3.15, 3.22, 3.23, 3.31, 3.32, 3.33, 3.35, 3.36, 3.37, 4.12, 4.13, 4.22, 4.23, 4.31, 4.32, 4.33, 4.34, 4.35, 4.36, 5.15, 5.23, 5.24, 5.25, 5.31, 5.32, 5.33, 5.34, 5.37, 6.11, 6.12, 6.22, 6.32, 6.33, 6.35, 7.12, 7.21, 7.22, 7.23, 7.31, 7.32, 7.33, 7.34, 7.35, 8.12, 8.21, 8.22, 8.31, 8.32, 8.33, 8.36, 9.11, 9.23, 9.24, 9.25, 9.32, 9.33, 10.21, 10.23, 10.25, 10.33

### **International Reading Association (IRA): Standards for Specialized Reading Professionals:**

2.13, 5.1, 5.2, 5.5, 5.6, 6.6, 7.3, 7.4, 8.1, 8.3, 10.1, 10.2, 12.2

### **Virginia Department of Education:, Reading Specialist Program Status Matrix:**

3 – f, 3 – h, 3 – i, 3 – j, 5:

### **International Society For Technology For Education Standards (ISTE):**

2.1, 2.1.1, 2.2.2, 2.3.2, 2.4.2, 2.4.3, 2.4.4, 2.7, , 3.1, 3.3.2, 3.3.3, 3.3.4, 3.4, 3.5, 3.5