

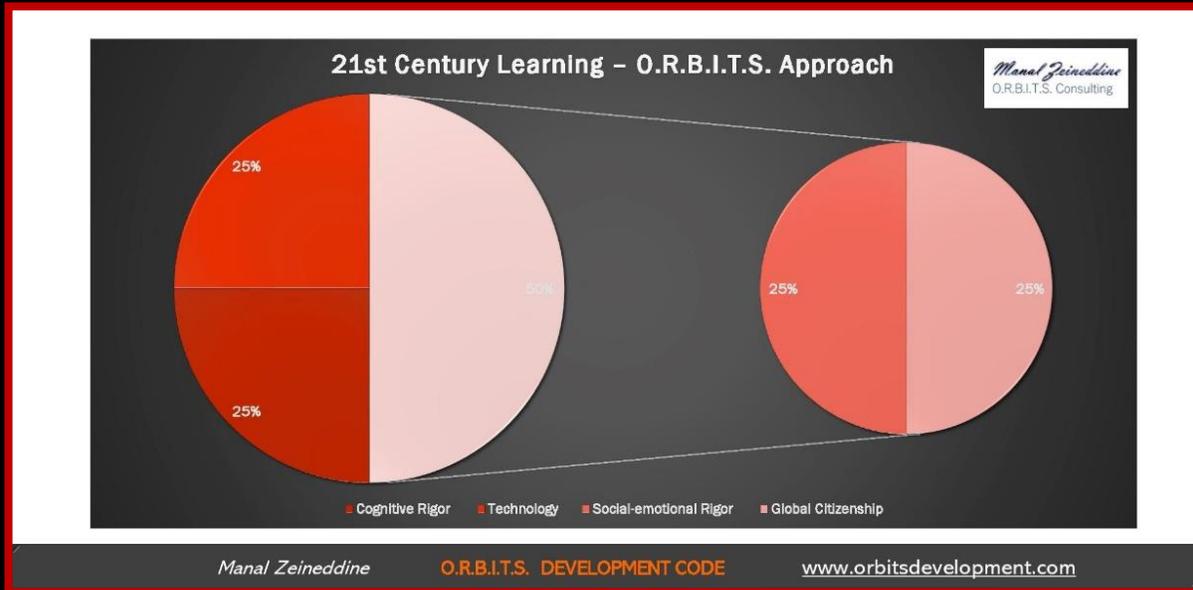


21ST CENTURY EDUCATION SERIES

O.R.B.I.T.S. MODEL

These are selections from mainstream resources sent in the monthly newsletter.

This series consists of four sections : Cognitive Rigor, Technology, Social-emotional Rigor, and Global Citizenship





COGNITIVE RIGOR



Rigor is the result of work that challenges students' thinking in new and interesting ways.

It occurs when they are encouraged toward a sophisticated understanding of fundamental ideas and are driven by curiosity to discover what they don't know.

(Sztabnik, 2015)



Rigor: the quality of being detailed, careful and complete

Cognition: “the mental action or process of acquiring knowledge and understanding through thought, experience, and the senses.”

Cognitive rigor denotes a complex process of exploring the breadth and the width of pedagogical practices and concepts. This comprises cognition or skills that learners demonstrate as they explore themes and objectives until they reach their outcomes.

One of the best ways to employ cognitive rigor is to understand how the brain works (cognition) and identify ways and strategies to stir that cognition to the benefit of every learner. These processes require close steering, monitoring, and assessing for learning, rather than of learning.

The short-term target is to help the learner build up concepts and integrate them simultaneously with other areas and disciplines as the learner progresses from one level to another and from one stage to another. The long-term goal is to prepare a learner for the future – demands of the workplace and more importantly, the demands of the learner’s interest, talents, and passion.

Cognitive rigor as a component of 21st Century Learning-ORBITS model is not the Cognitive Rigor/Matrix term only. It is the concept of rigorous learning in its original form.

The series will focus on a variety of models along with strategies and exercises. It will also highlight cognitive biases and barriers to learning, development, and growth.





Rigor: the quality of being detailed, careful and complete

Cognition: “the mental action or process of acquiring knowledge and understanding through thought, experience, and the senses.”



The Hess Cognitive Rigor Matrices (CRMs) – Part 1

Dr. Karin Hess, a renowned international leader and expert in curriculum, instruction, and assessment for forty years, writes: “**Cognitive rigor** encompasses three key ideas: the complexity of the content, the cognitive engagement with that content (sometimes called Depth of Knowledge/DOK), and the scope or breadth of the learning activity.”

Dr. Karen facilitated the understanding of Bloom’s taxonomy (classification) in its relation to depth of learning, best explained in Depth of Knowledge. This edition and the coming one will focus on **Hess Cognitive Rigor Matrices (CRMs)** as practices relate to rigor.

Few important points can be noted:

1. DOK is about complexity, not difficulty. It requires no “practice to be perfect” activities or assignments. On the contrary, DOK is about using the practices that the learners become very good at to put them in new and challenging contexts every time.
2. Focusing on the “verbs” is not the target. Although Bloom’s is a taxonomy, it does not expect teachers to focus on verbs. So is the case with DOK. DOK is described as “nominative”. The target is to navigate through the learning and show how deeply engaged the learners are in understanding and reaching certain outcomes.
3. Helping learners through scaffolding is highly-recommended to facilitate deep learning. No learner should be excluded by teachers for not thinking with depth or complexity.

The following figures can best represent Bloom’s Taxonomy, Depth of Knowledge DOK, and both Bloom’s Taxonomy and DOK combined into Hess Cognitive Rigor Matrix (General).

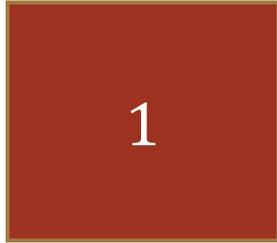


Table 1: A Comparison of Descriptors: Bloom's Original Taxonomy and the Revised Bloom's Taxonomy of Cognitive Process Dimensions

Bloom's Taxonomy (1956)	The Revised Bloom Process Dimensions (2001)
Knowledge Define, duplicate, label, list, memorize, name, order, recognize, relate, recall, reproduce, state	Remember Retrieve knowledge from long-term memory, recognize, recall, locate, identify
Comprehension Classify, describe, discuss, explain, express, identify, indicate, locate, recognize, report, restate, review, select, translate	Understand Construct meaning, clarify, paraphrase, represent, translate, illustrate, give examples, classify, categorize, summarize, generalize, infer a logical conclusion (such as from examples given), predict, compare/contrast, match like ideas, explain, construct models (e.g., cause-effect)
Application Apply, choose, demonstrate, dramatize, employ, illustrate, interpret, practice, schedule, sketch, solve, use, write	Apply Carry out or use a procedure in a given situation; carry out (apply to a familiar task), or use (apply) to an unfamiliar task
Analysis Analyze, appraise, calculate, categorize, compare, criticize, discriminate, distinguish, examine, experiment, explain	Analyze Break into constituent parts, determine how parts relate, differentiate between relevant-irrelevant, distinguish, focus, select, organize, outline, find coherence, deconstruct (e.g., for bias or point of view)
Synthesis Rearrange, assemble, collect, compose, create, design, develop, formulate, manage, organize, plan, propose, set up, write	Evaluate Make judgments based on criteria, check, detect inconsistencies or fallacies, judge, critique
Evaluation Appraise, argue, assess, choose, compare, defend, estimate, explain, judge, predict, rate, core, select, support, value, evaluate	Create Put elements together to form a coherent whole, reorganize elements into new patterns/structures, generate, hypothesize, design, plan, construct, produce for a specific purpose



2

Webb's Depth-of-Knowledge Levels

DOK-1 – Recall & Reproduction - Recall of a fact, term, principle, concept, or perform a routine procedure

DOK-2 - Basic Application of Skills/Concepts - Use of information, conceptual knowledge, select appropriate procedures for a task, two or more steps with decision points along the way, routine problems, organize/display data, interpret/use simple graphs

DOK-3 - Strategic Thinking & Reasoning - Requires reasoning, developing a plan or sequence of steps to approach problem; requires some decision making and justification; abstract, complex, or non-routine; often more than one possible answer

DOK-4 - Extended Thinking - An investigation or application to real world; requires time to research, problem solve, and process multiple conditions of the problem or task; non-routine manipulations, across disciplines/content areas/multiple sources



Bloom's Revised Taxonomy of Cognitive Process Dimensions	Webb's Depth-of-Knowledge (DOK) Levels			
	Level 1 Recall & Reproduction	Level 2 Skills & Concepts	Level 3 Strategic Thinking/ Reasoning	Level 4 Extended Thinking
Remember Retrieve knowledge from long-term memory, recognize, recall, locate, identify	Recall, recognize, or locate basic facts, ideas, principles Recall or identify conversions: between representations, numbers, or units of measure Identify facts/details in texts			
Understand Construct meaning, clarify, paraphrase, represent, translate, illustrate, give examples, classify, categorize, summarize, generalize, infer a logical conclusion (such as from examples given), predict, compare/contrast, match like ideas, explain, construct models	Compose & decompose numbers Evaluate an expression Locate points (grid/, number line) Represent math relationships in words pictures, or symbols Write simple sentences Select appropriate word for intended meaning Describe/explain how or why	Specify and explain relationships Give non-examples/examples Make and record observations Take notes; organize ideas/data Summarize results, concepts, ideas Make basic inferences or logical predictions from data or texts Identify main ideas or accurate generalizations	Explain, generalize, or connect ideas using supporting evidence Explain reasoning when more than one response/approach is possible Explain phenomena in terms of concepts Compose full composition to meet specific purpose and audience Identify theme(s) using text evidence	Explain how concepts or ideas specifically relate to other content domains or concepts Develop generalizations of the results obtained or strategies used and apply them to new problem situations
Apply Carry out or use a procedure in a given situation; carry out (apply to a familiar task), or use (apply) to an unfamiliar task	Follow simple/routine procedure (recipe-type directions) Solve a one-step problem Calculate, measure, apply a rule Apply an algorithm or formula (area, perimeter, etc.) Represent in words or diagrams a concept or relationship Apply rules or use resources to edit spelling, grammar, punctuation, conventions	Select a procedure according to task needed and perform it Solve routine problem applying multiple concepts or decision points Retrieve information from a table, graph, or figure and use it solve a problem requiring multiple steps Use models to represent concepts Write paragraph using appropriate organization, text structure, and signal words	Use concepts to solve non-routine problems Design investigation for a specific purpose or research question Conduct a designed investigation Apply concepts to solve non-routine problems Use reasoning, planning, and evidence Revise final draft for meaning or progression of ideas	Select or devise an approach among many alternatives to solve a novel problem Conduct a complex project that specifies a problem, identifies solution paths, solves the problem, and reports results Illustrate how multiple themes (historical, geographic, social) may be interrelated
Analyze Break into constituent parts, determine how parts relate, differentiate between relevant-irrelevant, distinguish, focus, select, organize, outline, find coherence, deconstruct (e.g., for bias or point of view)	Retrieve information from a table or graph to answer a question Identify or locate specific information contained in maps, charts, tables, graphs, or diagrams	Categorize, classify materials Compare/ contrast figures or data Select appropriate display data Organize or interpret (simple) data Extend a pattern Identify use of literary devices Identify text structure of paragraph Distinguish: relevant-irrelevant information; fact/opinion	Compare information within or across data sets in a text Analyze and draw conclusions from more complex data Generalize a pattern Organize/interpret data: complex graph Analyze author's craft, viewpoint, or potential bias	Analyze multiple sources of evidence or multiple works by the same author, or across genres, or time periods Analyze complex/abstract themes Gather, organize, and analyze information from multiple sources Analyze discourse styles across texts
Evaluate Make judgments based on criteria, check, detect inconsistencies or fallacies, judge, critique			Cite evidence and develop a logical argument for concepts Describe, compare, and contrast solution methods Verify reasonableness of results Justify conclusions made	Gather, analyze, & evaluate relevancy & accuracy Draw & justify conclusions Apply understanding in a novel way, provide argument or justification for the application
Create Reorganize elements into new patterns/structures, generate, hypothesize, design, plan, construct, produce	Brainstorm ideas, concepts, or perspectives related to a topic or concept	Generate conjectures or hypotheses based on observations or prior knowledge	Synthesize information within one source, data set, or text Formulate an original problem, given a situation or data set Develop a complex conceptual model for a given situation	Synthesize information across multiple sources or texts Design a model to inform and solve a real-world, complex, or abstract situation

Combining
1 & 2 :
General
Hess CRM



Rigor: the quality of being detailed, careful and complete

Cognition: “the mental action or process of acquiring knowledge and understanding through thought, experience, and the senses.”



The Hess Cognitive Rigor Matrices (CRMs) – Part 2

Continuing Dr. Karin Hess’s **Hess Cognitive Rigor Matrices (CRMs)** in four areas (Reading and Listening / Math and Science / Written and oral communication / Social Studies and Humanities)

- [Tool 1 - Reading & Listening CRM](#)
- [Tool 2 - Math & Science CRM](#)
- [Tool 3 - Written & Oral Communication CRM](#)
- [Tool 4 - Social Studies & Humanities CRM](#)

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Studying these matrices can be helpful to use during lesson planning.



TOOL 1

HESS COGNITIVE RIGOR MATRIX | READING-LISTENING CRM

Integrating Depth-of-Knowledge Levels with Bloom's Cognitive Process Dimensions



Revised Bloom's Taxonomy	DOK Level 1 Recall and Reproduction	DOK Level 2 Skills and Concepts	DOK Level 3 Strategic Thinking or Reasoning	DOK Level 4 Extended Thinking
Remember Retrieve knowledge from long-term memory; recognize, recall, locate, identify	<ul style="list-style-type: none"> o Recall, recognize, or locate basic facts, terms, details, events, or ideas explicit in texts o Read words orally in connected text with fluency and accuracy 	Use these Hess CRM curricular examples with most close reading or listening assignments or assessments in any content area.		
Understand Construct meaning, clarify, paraphrase, represent, translate, illustrate, give examples, classify, categorize, summarize, generalize, infer a logical conclusion, predict, compare-contrast, match like ideas, explain, construct models	<ul style="list-style-type: none"> o Identify or describe literary elements (characters, setting, sequence, etc.) o Select appropriate words when intended meaning or definition is clearly evident o Describe or explain who, what, where, when, or how o Define or describe facts, details, terms, principles o Write simple sentences 	<ul style="list-style-type: none"> o Specify, explain, show relationships; explain why (e.g., cause-effect) o Give non examples or examples o Summarize results, concepts, ideas o Make basic inferences or logical predictions from data or texts o Identify main ideas or accurate generalizations of texts o Locate information to support explicit-implicit central ideas 	<ul style="list-style-type: none"> o Explain, generalize, or connect ideas using supporting evidence (quote, example, text reference) o Identify or make inferences about explicit or implicit themes o Describe how word choice, point of view, or bias may affect the readers' interpretation of a text o Write multi paragraph composition for specific purpose, focus, voice, tone, and audience 	<ul style="list-style-type: none"> o Explain how concepts or ideas specifically relate to other content domains (e.g., social, political, historical) or concepts o Develop generalizations of the results obtained or strategies used and apply them to new problem-based situations
Apply Carry out or use a procedure in a given situation; carry out (apply to a familiar task), or use (apply) to an unfamiliar task	<ul style="list-style-type: none"> o Use language structure (pre-, or suffix) or word relationships (synonym or antonym) to determine meaning of words o Apply rules or resources to edit spelling, grammar, punctuation, conventions, word use o Apply basic formats for documenting sources 	<ul style="list-style-type: none"> o Use context to identify the meaning of words or phrases o Obtain and interpret information using text features o Develop a text that may be limited to one paragraph o Apply simple organizational structures (paragraph, sentence types) in writing 	<ul style="list-style-type: none"> o Apply a concept in a new context o Revise final draft for meaning or progression of ideas o Apply internal consistency of text organization and structure to composing a full composition o Apply word choice, point of view, style to impact readers' or viewers' interpretation of a text 	<ul style="list-style-type: none"> o Illustrate how multiple themes (historical, geographic, social, artistic, literary) may be interrelated o Select or devise an approach among many alternatives to research a novel problem
Analyze Break into constituent parts, determine how parts relate, differentiate between relevant-irrelevant, distinguish, focus, select, organize, outline, find coherence, deconstruct (e.g., for bias or point of view)	<ul style="list-style-type: none"> o Identify whether specific information is contained in graphic representations (e.g., map, chart, table, graph, T-chart, diagram) or text features (e.g., headings, subheadings, captions) o Decide which text structure is appropriate to audience and purpose 	<ul style="list-style-type: none"> o Categorize or compare literary elements, terms, facts or details, events o Identify use of literary devices o Analyze format, organization, and internal text structure (signal words, transitions, semantic cues) of different texts o Distinguish: relevant-irrelevant information; fact or opinion o Identify characteristic text features; distinguish between texts, genres 	<ul style="list-style-type: none"> o Analyze information within data sets or texts o Analyze interrelationships among concepts, issues, problems o Analyze or interpret author's craft (literary devices, viewpoint, or potential bias) to create or critique a text o Use reasoning, planning, and evidence to support inferences 	<ul style="list-style-type: none"> o Analyze multiple sources of evidence, or multiple works by the same author, or across genres, time periods, themes o Analyze complex or abstract themes, perspectives, concepts o Gather, analyze, and organize multiple information sources o Analyze discourse styles
Evaluate Make judgments based on criteria, check, detect inconsistencies or fallacies, judge, critique	"UG"—unsubstantiated generalizations = stating an opinion without providing any support for it!		<ul style="list-style-type: none"> o Cite evidence and develop a logical argument for conjectures o Describe, compare, and contrast solution methods o Verify reasonableness of results o Justify or critique conclusions drawn 	<ul style="list-style-type: none"> o Evaluate relevancy, accuracy, and completeness of information from multiple sources o Apply understanding in a novel way, provide argument or justification for the application
Create Reorganize elements into new patterns or structures, generate, hypothesize, design, plan, produce	<ul style="list-style-type: none"> o Brainstorm ideas, concepts, problems, or perspectives related to a topic, principle, or concept 	<ul style="list-style-type: none"> o Generate conjectures or hypotheses based on observations or prior knowledge and experience 	<ul style="list-style-type: none"> o Synthesize information within one source or text o Develop a complex model for a given situation o Develop an alternative solution 	<ul style="list-style-type: none"> o Synthesize information across multiple sources or texts o Articulate a new voice, alternate theme, new knowledge or perspective



TOOL 2

HESS COGNITIVE RIGOR MATRIX | MATH-SCIENCE CRM

Integrating Depth-of-Knowledge Levels with Bloom's Cognitive Process Dimensions



Revised Bloom's Taxonomy	DOK Level 1 Recall and Reproduction	DOK Level 2 Skills and Concepts	DOK Level 3 Strategic Thinking or Reasoning	DOK Level 4 Extended Thinking
Remember Retrieve knowledge from long-term memory, recognize, recall, locate, identify	<ul style="list-style-type: none"> Recall, observe, and recognize facts, principles, properties Recall/ identify conversions among representations or numbers (e.g., customary and metric measures) 	Use these Hess CRM curricular examples with most mathematics or science assignments or assessments.		
Understand Construct meaning, clarify, paraphrase, represent, translate, illustrate, give examples, classify, categorize, summarize, generalize, infer a logical conclusion, predict, compare-contrast, match like ideas, explain, construct models	<ul style="list-style-type: none"> Evaluate an expression Locate points on a grid or number on number line Solve a one-step problem Represent math relationships in words, pictures, or symbols Read, write, compare decimals in scientific notation 	<ul style="list-style-type: none"> Specify and explain relationships (e.g., non examples or examples; cause-effect) Make and record observations Explain steps followed Summarize results or concepts Make basic inferences or logical predictions from data or observations Use models or diagrams to represent or explain mathematical concepts Make and explain estimates 	<ul style="list-style-type: none"> Use concepts to solve non routine problems Explain, generalize, or connect ideas using supporting evidence Make and justify conjectures Explain thinking or reasoning when more than one solution or approach is possible Explain phenomena in terms of concepts 	<ul style="list-style-type: none"> Relate mathematical or scientific concepts to other content areas, other domains, or other concepts Develop generalizations of the results obtained and the strategies used (from investigation or readings) and apply them to new problem situations
Apply Carry out or use a procedure in a given situation; carry out (apply to a familiar task), or use (apply) to an unfamiliar task	<ul style="list-style-type: none"> Follow simple procedures (recipe-type directions) Calculate, measure, apply a rule (e.g., rounding) Apply algorithm or formula (e.g., area, perimeter) Solve linear equations Make conversions among representations of numbers, or within and between customary and metric measures 	<ul style="list-style-type: none"> Select a procedure according to criteria and perform it Solve routine problem applying multiple concepts or decision points Retrieve information from a table, graph, or figure and use it solve a problem requiring multiple steps Translate between tables, graphs, words, and symbolic notations (e.g., graph data from a table) Construct models given criteria 	<ul style="list-style-type: none"> Design investigation for a specific purpose or research question Conduct a designed investigation Use concepts to solve non routine problems Use and show reasoning, planning, and evidence Translate between problem and symbolic notation when not a direct translation 	<ul style="list-style-type: none"> Select or devise approach among many alternatives to solve a problem Conduct a project that specifies a problem, identifies solution paths, solves the problem, and reports results
Analyze Break into constituent parts, determine how parts relate, differentiate between relevant-irrelevant, distinguish, focus, select, organize, outline, find coherence, deconstruct	<ul style="list-style-type: none"> Retrieve information from a table or graph to answer a question Identify whether specific information is contained in graphic representations (e.g., table, graph, T-chart, diagram) Identify a pattern or trend 	<ul style="list-style-type: none"> Categorize, classify materials, data, figures based on characteristics Organize or order data Compare-contrast figures or data Select appropriate graph and organize and display data Interpret data from a simple graph Extend a pattern 	<ul style="list-style-type: none"> Compare information within or across data sets or texts Analyze and draw conclusions from data, citing evidence Generalize a pattern Interpret data from complex graph Analyze similarities-differences between procedures or solutions 	<ul style="list-style-type: none"> Analyze multiple sources of evidence Analyze complex or abstract themes Gather, analyze, and evaluate information
Evaluate Make judgments based on criteria, check, detect inconsistencies or fallacies, judge, critique	"UG"—unsubstantiated generalizations = stating an opinion without providing any support for it!		<ul style="list-style-type: none"> Cite evidence and develop a logical argument for concepts or solutions Describe, compare, and contrast solution methods Verify reasonableness of results 	<ul style="list-style-type: none"> Gather, analyze, and evaluate information to draw conclusions Apply understanding in a novel way, provide argument or justification for the application
Create Reorganize elements into new patterns or structures, generate, hypothesize, design, plan, produce	<ul style="list-style-type: none"> Brainstorm ideas, concepts, or perspectives related to a topic 	<ul style="list-style-type: none"> Generate conjectures or hypotheses based on observations or prior knowledge and experience 	<ul style="list-style-type: none"> Synthesize information within one data set, source, or text Formulate an original problem given a situation Develop a scientific/mathematical model for a complex situation 	<ul style="list-style-type: none"> Synthesize information across multiple sources or texts Design a mathematical model to inform and solve a practical or abstract situation



HESS COGNITIVE RIGOR MATRIX | WRITING-SPEAKING CRM

Integrating Depth-of-Knowledge Levels with Bloom's Cognitive Process Dimensions



Revised Bloom's Taxonomy	DOK Level 1 Recall and Reproduction	DOK Level 2 Skills and Concepts	DOK Level 3 Strategic Thinking or Reasoning	DOK Level 4 Extended Thinking
Remember Retrieve knowledge from long-term memory, recognize, recall, locate, identify	<ul style="list-style-type: none"> o Complete short answer questions with facts, details, terms, principles, etc. (e.g., label parts of diagram) 	Use these Hess CRM curricular examples with most writing and oral communication assignments or assessments in any content area.		
Understand Construct meaning, clarify, paraphrase, represent, translate, illustrate, give examples, classify, categorize, summarize, generalize, infer a logical conclusion, predict, compare-contrast, match like ideas, explain, construct models	<ul style="list-style-type: none"> o Describe or define facts, details, terms, principles, etc. o Select appropriate word or phrase to use when intended meaning or definition is clearly evident o Write simple complete sentences o Add an appropriate caption to a photo or illustration o Write "fact statements" on a topic (e.g., spiders build webs) 	<ul style="list-style-type: none"> o Specify, explain, show relationships; explain why, cause-effect o Provide and explain non examples and examples o Take notes; organize ideas or data (e.g., relevance, trends, perspectives) o Summarize results, key concepts, ideas o Explain central ideas or accurate generalizations of texts or topics o Describe steps in a process (e.g., science procedure, how to and why control variables) 	<ul style="list-style-type: none"> o Write a multi paragraph composition for specific purpose, focus, voice, tone, and audience o Develop and explain opposing perspectives or connect ideas, principles, or concepts using supporting evidence (quote, example, text reference, etc.) o Develop arguments of fact (e.g., Are these criticisms supported by the historical facts? Is this claim or equation true?) 	<ul style="list-style-type: none"> o Use multiple sources to elaborate on how concepts or ideas specifically draw from other content domains or differing concepts (e.g., research paper, arguments of policy—should this law be passed? What will be the impact of this change?) o Develop generalizations about the results obtained or strategies used and apply them to a new problem or contextual scenario
Apply Carry out or use a procedure in a given situation; carry out (apply to a familiar task), or use (apply) to an unfamiliar task	<ul style="list-style-type: none"> o Apply rules or use resources to edit specific spelling, grammar, punctuation, conventions, or word use o Apply basic formats for documenting sources 	<ul style="list-style-type: none"> o Use context to identify or infer the intended meaning of words or phrases o Obtain, interpret, and explain information using text features (table, diagram, etc.) o Develop a (brief) text that may be limited to one paragraph, précis o Apply basic organizational structures (paragraph, sentence types, topic sentence, introduction, etc.) in writing 	<ul style="list-style-type: none"> o Revise final draft for meaning, progression of ideas, or logic chain o Apply internal consistency of text organization and structure to a full composition or oral communication o Apply a concept in a new context o Apply word choice, point of view, style, rhetorical devices to impact readers' interpretation of a text 	<ul style="list-style-type: none"> o Select or devise an approach among many alternatives to research and present a novel problem or issue o Illustrate how multiple themes (historical, geographic, social) may be interrelated within a text or topic
Analyze Break into constituent parts, determine how parts relate, differentiate between relevant-irrelevant, distinguish, focus, select, organize, outline, find coherence, deconstruct (e.g., for bias or point of view)	<ul style="list-style-type: none"> o Decide which text structure is appropriate to audience and purpose (e.g., compare-contrast, proposition-support) o Determine appropriate, relevant key words for conducting an Internet search or researching a topic 	<ul style="list-style-type: none"> o Compare-contrast perspectives, events, characters, etc. o Analyze-revise format, organization, and internal text structure (signal words, transitions, semantic cues) of different print and non print texts o Distinguish: relevant-irrelevant information; fact-opinion (e.g., What are the characteristics of a hero's journey?) o Locate evidence that supports a perspective-differing perspectives 	<ul style="list-style-type: none"> o Analyze interrelationships among concepts, issues, and problems in a text o Analyze impact or use of author's craft (literary devices, viewpoint, dialogue) in a single text o Use reasoning and evidence to generate criteria for making and supporting an argument of judgment (Was FDR a great president? Who was the greatest ball player?) o Support conclusions with evidence 	<ul style="list-style-type: none"> o Analyze multiple sources of evidence, or multiple works by the same author, or across genres, or time periods o Analyze complex or abstract themes, perspectives, concepts o Gather, analyze, and organize multiple information sources o Compare and contrast conflicting judgments or policies (e.g., Supreme Court decisions)
Evaluate Make judgments based on criteria, check, detect inconsistencies or fallacies, judge, critique	"UG"—unsubstantiated generalizations = stating an opinion without providing any support for it!		<ul style="list-style-type: none"> o Evaluate validity and relevance of evidence used to develop an argument or support a perspective o Describe, compare, and contrast solution methods o Verify or critique the accuracy, logic, and reasonableness of stated conclusions or assumptions 	<ul style="list-style-type: none"> o Evaluate relevancy, accuracy, and completeness of information across multiple sources o Apply understanding in a novel way, provide argument or justification for the application o Critique the historical impact (policy, writings, discoveries, etc.)
Create Reorganize elements into new patterns or structures, generate, hypothesize, design, plan, produce	<ul style="list-style-type: none"> o Brainstorm facts, ideas, concepts, problems, or perspectives related to a topic, text, idea, issue, or concept 	<ul style="list-style-type: none"> o Generate conjectures, hypotheses, or predictions based on facts, observations, evidence/observations, or prior knowledge and experience o Generate believable "grounds" (reasons) for an opinion-argument 	<ul style="list-style-type: none"> o Develop a complex model for a given situation or problem o Develop an alternative solution or perspective to one proposed (e.g., debate) 	<ul style="list-style-type: none"> o Synthesize information across multiple sources or texts in order to articulate a new voice, alternate theme, new knowledge or nuanced perspective



TOOL 4

HESS COGNITIVE RIGOR MATRIX | SOCIAL STUDIES-HUMANITIES CRM

Integrating Depth-of-Knowledge Levels with Bloom's Cognitive Process Dimensions



Revised Bloom's Taxonomy	DOK Level 1 Recall and Reproduction	DOK Level 2 Skills and Concepts	DOK Level 3 Strategic Thinking or Reasoning	DOK Level 4 Extended Thinking
Remember Retrieve knowledge from long-term memory, recognize, recall, locate, identify	<ul style="list-style-type: none"> o Recall or locate key facts, dates, terms, details, events, or ideas explicit in texts 	Use these Hess CRM curricular examples with most assignments, assessments, or inquiry activities in social studies, history, civics, geography, economics, or humanities.		
Understand Construct meaning, clarify, paraphrase, represent, translate, illustrate, give examples, classify, categorize, summarize, generalize, infer a logical conclusion, predict, observe, compare-contrast, match like ideas, explain, construct models	<ul style="list-style-type: none"> o Select appropriate words or terms when intended meaning is clearly evident o Describe or explain who, what, where, when, or how o Define facts, details, terms, principles o Locate or identify symbols that represent . . . o Raise related questions for possible investigation 	<ul style="list-style-type: none"> o Specify, explain, illustrate relationships; explain why (e.g., cause-effect) o Provide and explain non examples and examples o Summarize results, concepts, main ideas, generalizations o Make basic inferences or logical predictions (using data or text) o Locate relevant information to support explicit-implicit central ideas 	<ul style="list-style-type: none"> o Explain, generalize, or connect ideas using supporting evidence (quote, example, text reference, data) o Support inferences about explicit or implicit themes o Describe how word choice, point of view, or bias may affect the reader or viewer interpretation o Write multi-paragraph composition or essay for specific purpose, focus, voice, tone, and audience 	<ul style="list-style-type: none"> o Explain how concepts or ideas specifically relate to other content domains or concepts (social, political, historical, cultural) o Apply generalizations to new problem-based situations o Use multiple sources to elaborate on how concepts or ideas specifically draw from other content domains or differing concepts (e.g., research paper, arguments of policy: Should this law be passed? What will be the impact of this change?)
Apply Carry out or use a procedure in a given situation; carry out (apply to a familiar task), or use (transfer) to an unfamiliar or non routine task	<ul style="list-style-type: none"> o Apply basic formats for documenting sources o Apply use of reference materials and tools for gathering information (e.g., key word searches) 	<ul style="list-style-type: none"> o Use context to identify the meaning of words or phrases o Interpret information using text features (diagrams, data tables, captions, etc.) o Apply simple organizational structures (paragraph outline) 	<ul style="list-style-type: none"> o Investigate to determine how an historical, cultural or political context may be the source of an underlying theme, central idea, or unresolved issue or crisis 	<ul style="list-style-type: none"> o Integrate or juxtapose multiple (historical, cultural) contexts drawn from source materials (e.g., literature, music, historical events, media) with intent to develop a complex or multimedia product and personal viewpoint
Analyze Break into constituent parts, determine how parts relate, differentiate between relevant-irrelevant, distinguish, focus, select, organize, outline, find coherence, deconstruct (e.g., for bias, point of view, approach/strategy used)	<ul style="list-style-type: none"> o Identify causes or effects o Describe processes or tools used to research ideas, artifacts, or images reflecting history, culture, tradition, etc. o Identify ways symbols and metaphors are used to represent universal ideas o Identify specific information given in graphics (e.g., map, T-chart, diagram) or text features (e.g., heading, subheading, captions) 	<ul style="list-style-type: none"> o Compare similarities or differences in processes, methods, styles due to influences of time period, politics or culture o Distinguish relevant-irrelevant information, fact or opinion; primary from a secondary source o Draw inferences about social, historical, cultural contexts portrayed in (literature, arts, film, political cartoons, primary sources) o Explain, categorize events or ideas in the evolution of _____ across time periods 	<ul style="list-style-type: none"> o Analyze information within data sets or a text (e.g., interrelationships among concepts, issues, problems) o Analyze an author's viewpoint or potential bias (e.g., political cartoon) o Use reasoning, planning, and evidence to support or refute inferences in policy or speech o Use reasoning and evidence to generate criteria for making and supporting an 'argument of judgment' (e.g., Was FDR a great president? Is this a fair law?) 	<ul style="list-style-type: none"> o Analyze multiple sources of evidence across time periods, themes, issues o Analyze diverse, complex or abstract perspectives o Gather, analyze, and organize information from multiple sources o Analyze discourse styles or bias in speeches, legal briefs, etc. across time or authors o Compare and contrast conflicting judgments or policies (e.g., Supreme Court decisions)
Evaluate Make judgments based on criteria, check, detect inconsistencies or fallacies, judge, critique	"UG"—unsubstantiated generalizations = stating an opinion without providing any support for it!		<ul style="list-style-type: none"> o Develop a logical argument for conjectures, citing evidence o Verify reasonableness of results of others o Critique conclusions drawn, evidence used, credibility of sources 	<ul style="list-style-type: none"> o Evaluate relevancy, accuracy, and completeness of information using multiple sources o Apply understanding in a novel way, provide argument or justification for the application o Critique the historical impact on policy, writings, advances
Create Reorganize elements into new patterns, structures, or schemas, generate, hypothesize, design, plan, produce	<ul style="list-style-type: none"> o Brainstorm ideas, concepts, problems, or perspectives related to a topic, principle, or concept 	<ul style="list-style-type: none"> o Generate testable conjectures or hypotheses based on observations, prior knowledge, and/or artifacts 	<ul style="list-style-type: none"> o Synthesize information within one source or text o Develop a complex model or symbol for given issue o Develop and support an alternative solution 	<ul style="list-style-type: none"> o Synthesize information across multiple sources or texts o Articulate a new voice, alternate theme, new knowledge or new perspective o Create historical fiction drawing on sources



Rigor: the quality of being detailed, careful and complete

Cognition: “the mental action or process of acquiring knowledge and understanding through thought, experience, and the senses.”



The Hess Cognitive Rigor Matrices (CRMs) – Part 3

Continuing Dr. Karin Hess’s **Hess Cognitive Rigor Matrices (CRMs)** in the other four areas (Fine arts / health and physical education / world languages / career and technical education)

- **Tool** : Fine Arts CRM

- **Tool** : Health & Physical Education CRM

- **Tool** : World Languages CRM

- **Tool** : Career & Technical Education CRM

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Studying these matrices can be helpful to use during lesson planning.



TOOL 5A

HESS COGNITIVE RIGOR MATRIX | FINE ARTS CRM

Integrating Depth-of-Knowledge Levels with Artistic Practices



Artistic Practice	DOK Level 1 Recall and Reproduction Having the knowledge required; do not need to "figure it out"	DOK Level 2 Connect or Apply Skills and Concepts Making connections among skills or concepts or decisions (e.g., about approach, tools)	DOK Level 3 Strategic Thinking or Abstract Reasoning Complex and Abstract; Exploring multiple solution paths; Justifying <i>with evidence</i>	DOK Level 4 Extended Thinking Relating or developing complex ideas using multi sources <i>and evidence</i>
Perceiving, Performing, and Responding	<ul style="list-style-type: none"> Identify or describe ways art represents what people see, hear, feel, believe Recall or describe a variety of instruments, forms, symbols, rhythms, conventions of music Describe how artists or dancers might represent . . . Identify or describe narrative conventions depicted in the arts 	<ul style="list-style-type: none"> Show relationships between (dance, music, film, etc.) and other arts forms Make observations or compare similarities or differences: styles, forms, techniques, etc. Explain possible reasons for selecting tools, medium, elements, principles, images, etc. Select a familiar artistic work to perform Explain the artist's central message 	<ul style="list-style-type: none"> Analyze or find evidence of how a combination of elements or principles are used to achieve a desired effect or theme Analyze narrative art work, using supporting evidence to interpret setting, characters, action, conflict, etc. Develop personal response to or interpretation of a work of art 	<ul style="list-style-type: none"> Analyze more than one performance or product (same composer, time period, theme, etc.) drawing from multiple source materials for the analyses (e.g., different treatments of same theme) Perform an "old" idea in a new way
Historical, Social, and Cultural Contexts	<ul style="list-style-type: none"> Describe processes used by artists to select or create ideas, images that reflect history, culture, tradition, etc. Identify ways symbols and metaphors are used to represent universal ideas Locate symbols that represent... Identify or describe characteristics and origins of dance, art, or music genres 	<ul style="list-style-type: none"> Draw inferences about social, historical, or cultural contexts portrayed in art, music, dance, theatre, or film Explain or compare how different art forms communicate culture, time period, issues Compare similarities or differences in processes, methods, styles due to influences of time period, politics, or culture Explain or trace the evolution of arts forms across time periods 	<ul style="list-style-type: none"> Analyze how historical or cultural context is applied to develop theme in a performance or product Plan artworks based on historical, social, political, or cultural theme, concept, or representative style Apply problem solving strategies used among the arts, humanities, and sciences to solve visual "problems" 	<ul style="list-style-type: none"> Integrate or juxtapose <i>multiple (historical, cultural) contexts drawn from source materials</i> (e.g., literature, music, historical events, media) with intent to develop a complex or multifaceted performance or product and personal viewpoint
Creative Expression, Exploration, and Production	<ul style="list-style-type: none"> Explore ideas and techniques by manipulating media, materials, tools for different effects (e.g., how color, rhythm, or camera angles create various moods) Demonstrate a variety of movements, methods, techniques Locate or compile examples illustrating different approaches (e.g., camera angles; use of white space) 	<ul style="list-style-type: none"> Select or use tools for specific artistic purposes Develop a study of _____ by combining elements, aesthetic principles, and/or forms, etc. Use or apply choreographic forms to communicate ideas, feelings, concepts Improvise simple rhythmic variations Create examples or models that represent the same topic, concept, idea, etc. 	<ul style="list-style-type: none"> Combine elements of (dance, art, music) to create _____ that conveys an intended point of view or specific idea, mood, or theme Create or compose for a specific purpose, using appropriate processes, tools, techniques Create narrative art work depicting setting, characters, action, conflict, etc. Research a given style and develop personal interpretation of it 	<ul style="list-style-type: none"> Apply <i>multiple sets of criteria</i> to develop and present a complex or multifaceted performance or product (e.g., consistent application of awareness of space, physical discipline, concentration, and projection from rehearsals to performance; development of portfolio showing evolution of ideas or personal style)
Aesthetics, Criticism, and Reflection	<ul style="list-style-type: none"> Recognize or describe choreographic forms, elements of art or music, principles of design, etc. when presented in isolation Describe criteria used for executing technical or artistic quality 	<ul style="list-style-type: none"> Explain ways in which artistic choices (choreographic forms, etc.) might affect performance or audience response Critique examples and non-examples of a given technique, style, etc. 	<ul style="list-style-type: none"> Defend the selection of criteria and evidence used to critique the quality or develop a performance or product (e.g., compose a melody, perform improvisation, direct a scene, solve a visual "problem") 	<ul style="list-style-type: none"> Formulate or use <i>multiple sets of criteria</i> and evidence to critique a complex or multi faceted performance or final product Compile and defend exemplars chosen to depict a theme or style



TOOL 5B

HESS COGNITIVE RIGOR MATRIX | HEALTH AND PHYSICAL EDUCATION CRM



Integrating Depth of Knowledge Levels with Porter's Cognitive Demand Categories*

Porter 's Cognitive Demand Categories	DOK Level 1 Recall and Reproduction Having the knowledge required; do not need to "figure it out"	DOK Level 2 Connect or Apply Skills and Concepts Making connections among skills or concepts or decisions (e.g., about approach, tools)	DOK Level 3 Strategic Thinking or Abstract Reasoning Complex and Abstract; Exploring multiple solution paths; Justifying <i>with evidence</i>	DOK Level 4 Extended Thinking Relating or developing complex ideas using multi sources <i>and evidence</i>
Memorize	<ul style="list-style-type: none"> o Recall or identify basic facts, terms, definitions, skills, rules, principles, concepts, symbols o Acquire new terms, vocabulary, etc. 	<p>Use these Hess CRM Curricular Examples with most assignments, assessments, or learning activities for Health and Physical Education. See also the Hess CRM for Fine Arts with examples for dance.</p>		
Communicate Understanding	<ul style="list-style-type: none"> o Define terms, principles, concepts o Describe how to perform a routine skill or task o Use words, visuals, or symbols to represent basic ideas, movements, procedures, etc. 	<ul style="list-style-type: none"> o Explain concepts: show or predict relationships (if-then, cause-effect); provide examples and non examples o Observe and interpret teacher or student demonstrations o Summarize a concept, series of events, movements, or a result 	<ul style="list-style-type: none"> o Use evidence (data, examples, source, observations) to justify an interpretation of a result or performance o Locate or reproduce supporting evidence for results of effectiveness of a plan (e.g., exercise or diet routine) o Create a personal plan when given criteria 	<ul style="list-style-type: none"> o Share results of comparing different plans (e.g., compare exercise or diet routines) using data and evidence from multiple sources or data sets o Explain how a concept relates across content domains or to "big ideas" (e.g., systems, patterns)
Perform Procedures	<ul style="list-style-type: none"> o Safely demonstrate or use appropriate tools or equipment o Execute or repeat basic skills or procedures (e.g., follow step-by-step directions or pattern) o Demonstrate a basic skill sequence, movement pattern, etc., with smooth transitions 	<ul style="list-style-type: none"> o Make observations; collect and record data and observations (e.g., health diary, skills progress) o Select and use appropriate tool or equipment for a given task o Complete routine tasks in a fitness assessment 	<ul style="list-style-type: none"> o Plan, execute, and evaluate multi step procedures (a dance routine, football play, rules of a new game, etc.) o Test effects and trends of using different activities by observing and collecting data (e.g., exercise or diet routines) o Select and plan how to use a combination of movements to achieve a desired effect 	<ul style="list-style-type: none"> o Design and conduct a performance (e.g., exercise or dance routine) using multiple sources or resources, and or given constraints (e.g., use of space) o Test effects of different variables on performance (e.g., applied to a new situation)
Apply Concepts/ Make Connections	<ul style="list-style-type: none"> o Apply rules or score-keeping of a game or simple routine o Apply appropriate content-specific vocabulary or terms to tasks o Brainstorm ideas, problems, or perspectives related to a situation, scenario, or observation 	<ul style="list-style-type: none"> o Create an infographic or visual to show connections or to summarize key ideas (e.g., cause-effect, heart rate-activity type, warm up-cool down, healthy or unhealthy) o Explain connections among concepts or skills in a given context (e.g., movement or open space concepts, health benefits) 	<ul style="list-style-type: none"> o Revise a plan (self, peer) based on feedback and evidence o Use concepts to explain phenomena or research or medical advances (e.g., use of steroids, drugs, food choices) o Investigate how an event or advancement led to a new perspective or outcome 	<ul style="list-style-type: none"> o Apply and adapt information and concepts to real-world situations o Integrate ideas from multiple sources to extend an idea or solve a problem with an alternative solution o Trace the evolution of (game, drug, etc.) from past to present, citing sources used
Analyze Information	<ul style="list-style-type: none"> o Identify, describe, match, or name parts in a diagram or visual (e.g., muscle groups or skeletal system) or patterns o Determine which skill, rule, or principle applies to a given situation o Record performance data 	<ul style="list-style-type: none"> o Compare-contrast routines, skill sets, or qualities (e.g., use T-chart, graphic organizer for locomotor-non locomotor) o Generate questions and make predictions based on observations or information o Classify types of . . . (movements, sports, symptoms, examples, etc.) 	<ul style="list-style-type: none"> o Analyze data in order to recognize patterns or draw conclusions based on evidence (e.g., batting averages, areas needing remediation) o Identify faulty arguments, strategies, or misrepresentations of data or media message o Defend the selection of criteria used to critique or develop a performance or product 	<ul style="list-style-type: none"> o Research a topic in-depth, evaluating relevancy, accuracy, and completeness of information from multiple sources or perspectives o Analyze evidence and recommend the most effective course of action for intended purpose (e.g., food, fitness)





TOOL 5C

HESS COGNITIVE RIGOR MATRIX | WORLD LANGUAGES CRM

Integrating Depth-of-Knowledge Levels with World Language Practices and Modes of Communication



World Language Practices and Modes of Communication	DOK Level 1 Recall and Reproduction Having the knowledge required; do not need to "figure it out"	DOK Level 2 Skills and Concepts Making connections among skills or concepts or decisions (e.g., about approach, tools)	DOK Level 3 Strategic Thinking or Reasoning Complex and Abstract; Exploring multiple solution paths; Justifying <i>with evidence</i>	DOK Level 4 Extended Thinking Relating or developing complex ideas using multi sources <i>and evidence</i>
Memorize and Recall	<ul style="list-style-type: none"> o Reproduce, recall, or repeat vocabulary, grammar rules, facts, definitions, dictated statements, etc. o Describe cultural conventions o Recite in sequence (e.g., alphabet, counting, songs, rhymes) 	<p>Use these World Language CRM curricular examples for designing most language and communication assignments or assessment tasks.</p>		
Interpersonal Communication Understand, Perceive, and Respond	<ul style="list-style-type: none"> o Understand simple, familiar messages in social settings o Identify everyday objects o Follow simple oral directions or written procedures (recipe, etc.) o Convey simple messages, express feelings (e.g., I'm sad because...) o Ask or answer literal questions after reading, listening, or viewing 	<ul style="list-style-type: none"> o Explain how or why alternative responses may be correct (where do you live?) for different situations o Carry on a short conversation using familiar vocabulary and grammar o Paraphrase, summarize, or retell what was said, read, viewed (with cues) o Make logical predictions (e.g., what might happen next . . .); describe event 	<ul style="list-style-type: none"> o Prepare for an interview or develop survey on topic of interest anticipating audience questions or possible responses o Initiate and extend a conversation about an unfamiliar topic, appropriately using language mechanics or tense throughout o Create a theme-based photo essay o Justify interpretation of purpose or tone (in media message, photo essay, etc.) 	<ul style="list-style-type: none"> o Carry on an extended conversation responding appropriately to multiple speakers (e.g., using multiple tenses, asking and answering, elaborating on ideas, raising questions) o Deepen knowledge of a topic using multiple (oral, visual, textual) sources for an informational communication (e.g., "by the numbers" infographic)
Interpret and Apply	<ul style="list-style-type: none"> o Match vocabulary (e.g., picture-word; synonyms); locate details o Apply a spelling or grammar rule (e.g., conjugate a verb, make plural) o Use resources to translate literally o Use nouns or verbs in familiar contexts 	<ul style="list-style-type: none"> o Infer and explain meaning using context, cognates, or structure in a familiar situation o Translate to identify use of non-literal, figurative, or idiomatic language o Sequence events for given text or visual 	<ul style="list-style-type: none"> o Explain inferences or colloquial expressions using supporting evidence o Interpret symbolic or abstract meaning (from music, video, reading, art, etc.) o Interpret idiomatic or figurative language in context (poem, song lyric, media, etc.) 	<ul style="list-style-type: none"> o Make and justify conclusions based on 2+ ads for the same product or two political cartoons about the same event or person o Write, draw, or perform in the style of a known author/artist/cartoonist
Compare, Analyze, Critique or Evaluate, and Reflect	<ul style="list-style-type: none"> o Edit a sentence or phrase o Select appropriate word or phrase for intended meaning o Answer what, when, and where questions using a source (map, calendar, schedule, visual, photo) o Connect words or phrases between languages (origins, meanings, etc.) 	<ul style="list-style-type: none"> o Categorize or compare (objects, foods, tools, people, etc.) using oral, physical, or textual stimuli o Self-correct when speaking or reading o Evaluate message or cultural nuances (e.g., gestures, language) using listening and observational skills 	<ul style="list-style-type: none"> o Evaluate and correct inaccuracy of a message - print or non-print text (e.g., facts, sequence, cultural nuances) o Support an opinion, argument, or disagreement with evidence, reasoning o Determine if source can or cannot answer specific questions and why (e.g., websites) 	<ul style="list-style-type: none"> o Critique authentic literature, arts, or historical events from multiple sources: authors, perspectives, or time periods o Evaluate relevancy, accuracy, and completeness of information o Keep a journal and use it to reflect on or evaluate personal progress
Presentational Communication Produce or Create	<ul style="list-style-type: none"> o Represent vocabulary or common phrases in pictures, symbols, visuals, gestures, pantomime o Brainstorm related words, ideas, images, possible responses o Label information on a diagram, map, visual o Tell or select phrases as thumbnail sketch for a narrative text or story line 	<ul style="list-style-type: none"> o Perform a memorized dialog o Choose which tense to use in a less familiar context o Create an ABC book connecting entries by central or organizing topic (e.g., animals, foods) o Create text messages or description (narration/voice over) for a visual stimuli or "muted" video scene o Make or label a timeline of key events 	<ul style="list-style-type: none"> o Develop a vocabulary-based game to teach about geography, culture, etc. o Develop a new scene or ending, consistent with the original text o Create or perform a dialog based on visual stimuli or a current or cultural event (integrating academic vocabulary) o Co-plan website or event highlighting target culture (foods, traditions, places to visit) 	<ul style="list-style-type: none"> o Produce an 'old' idea in a new way (e.g., multimedia, podcast) o Integrate ideas from several sources o Research a topic with evidence pro-con for debate, essay, or cartoon o Research and present performance or presentation using multiple sources o Design a theme-based café, including the menu, location, décor and develop an ad for targeted clientele



HESS COGNITIVE RIGOR MATRIX | CAREER AND TECHNICAL EDUCATION (CTE) CRM



Integrating Depth-of-Knowledge Levels with Bloom's Cognitive Process Dimensions

Revised Bloom's Taxonomy	DOK Level 1 Recall and Reproduction	DOK Level 2 Skills and Concepts	DOK Level 3 Strategic Thinking or Reasoning	DOK Level 4 Extended Thinking
Remember Memorize, recognize, recall, locate, identify	<ul style="list-style-type: none"> Recall or locate key facts, terms, details, procedures (e.g., explicit in a technical manual) 	Use these Hess CRM curricular examples with most assignments, assessments, or inquiry activities for Career and Technical Education		
Understand Construct meaning, clarify, paraphrase, represent, translate, illustrate, give examples, summarize, generalize, infer a logical conclusion, predict, observe, match like ideas, explain, construct models	<ul style="list-style-type: none"> Select correct terms or graphics for intended meaning Describe or explain who, what, where, when, or how Define terms, principles, concepts Represent relationships with words, diagrams, symbols Solve routine problems 	<ul style="list-style-type: none"> Specify and explain relationships (e.g., non-examples/examples; cause-effect; if-then) Summarize procedures, results, concepts, key ideas (paragraph) Make and explain estimates, basic inferences, or predictions Use models to explain concepts Make and record observations 	<ul style="list-style-type: none"> Explain, generalize, or connect ideas using supporting evidence (quote, example, text reference, data); Justify your interpretation when more than one is plausible Explain how a concept can be used to solve a non routine problem Develop a multi paragraph manual or infographic for specific purpose or focus 	<ul style="list-style-type: none"> Use multiple sources to outline varying perspectives on a problem or issue Explain how a concept relates across content domains or to 'big Ideas' (e.g., patterns in the human or designed world; structure-function) Apply generalizations from one investigation to new problem-based situations, using evidence or data
Apply Carry out or use a procedure in a given situation; carry out (apply to a familiar task), or use (transfer) to an unfamiliar or non routine task	<ul style="list-style-type: none"> Apply basic formulas, algorithms, conversion rules Calculate; measure Use reference materials and tools to gather information Demo safe procedures 	<ul style="list-style-type: none"> Select and use appropriate tool or procedure for specified task Use context to identify the meaning of terms or phrases Interpret information using diagrams, data tables, etc. 	<ul style="list-style-type: none"> Build or revise a plan for investigation using (new) evidence or data Use and show reasoning, planning, and evidence to support conclusions or to identify design flaws Conduct a designed investigation 	<ul style="list-style-type: none"> Draw from source materials with intent to develop a complex or multimedia product with personal viewpoint Conduct a project that specifies a problem, identifies solution paths, tests the solution, and reports results
Analyze Break into constituent parts, determine how parts relate, compare-contrast, differentiate between relevant-irrelevant, distinguish, focus, select, organize, outline, find coherence, deconstruct (e.g., for potential bias, point of view, technique or strategy used)	<ul style="list-style-type: none"> Identify trend, pattern, possible cause, or effect Describe processes or tools used to research ideas Identify ways symbols or metaphors are used to represent universal ideas Retrieve data to answer a question (e.g., diagram, graph) 	<ul style="list-style-type: none"> Compare similarities or differences or draw inferences about _____ due to influences of _____ Distinguish relevant-irrelevant information; fact/opinion; primary from a secondary source Extend a pattern Organize and represent data Categorize materials, data, etc., based on characteristics 	<ul style="list-style-type: none"> Interpret information from a complex graph or model (e.g., interrelationships among variables, concepts) Use reasoning, planning, and evidence to support or refute inferences or results stated Use reasoning and evidence to generate criteria for making and supporting an argument Generalize and support a pattern/trend 	<ul style="list-style-type: none"> Analyze multiple sources of evidence (e.g., compare-contrast various plans, solution methods) Analyze and compare diverse, complex, or abstract perspectives, models, etc. Gather, organize, and analyze information from multiple sources to answer a research question
Evaluate Make judgments based on specified criteria, detect inconsistencies, flaws, or fallacies, judge, critique	"UG"—unsubstantiated generalizations = stating an opinion without providing any support for it!		<ul style="list-style-type: none"> Develop a logical argument for conjectures, citing evidence Verify reasonableness of results or conjectures (e.g., of others) Critique conclusions drawn or evidence used or credibility of sources 	<ul style="list-style-type: none"> Evaluate relevancy, accuracy, and completeness of sources used Apply understanding in a novel way, provide argument or justification for the application Critique the historical impact of _____ on _____.
Create Reorganize into new patterns or schemas, design, plan, produce	<ul style="list-style-type: none"> Brainstorm ideas, concepts, problems, or perspectives related to a given scenario, observation, question posed 	<ul style="list-style-type: none"> Generate testable conjectures or hypotheses based on observations, prior knowledge, and/or artifacts 	<ul style="list-style-type: none"> Develop a complex model for given concept and justify reasoning Develop an alternative solution and justify reasoning 	<ul style="list-style-type: none"> Synthesize information across multiple models, sources, or texts Articulate new knowledge or new perspective



HOLISTIC LEARNING SUSTAINABILITY CONSCIOUS LEARNING AND BEING

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