CORE LEARNING AT NOVA: CRITICAL THINKING ASSESSMENT

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Office of Institutional Effectiveness and Student Success

Office of Academic Assessment

NOVA | Northern Virginia Community College

Zoom Controls

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- Your microphone and video camera will be muted for the duration of the webinar.
- Type your questions in the Group Chat box on the right. Questions will only be seen by the Presenter.
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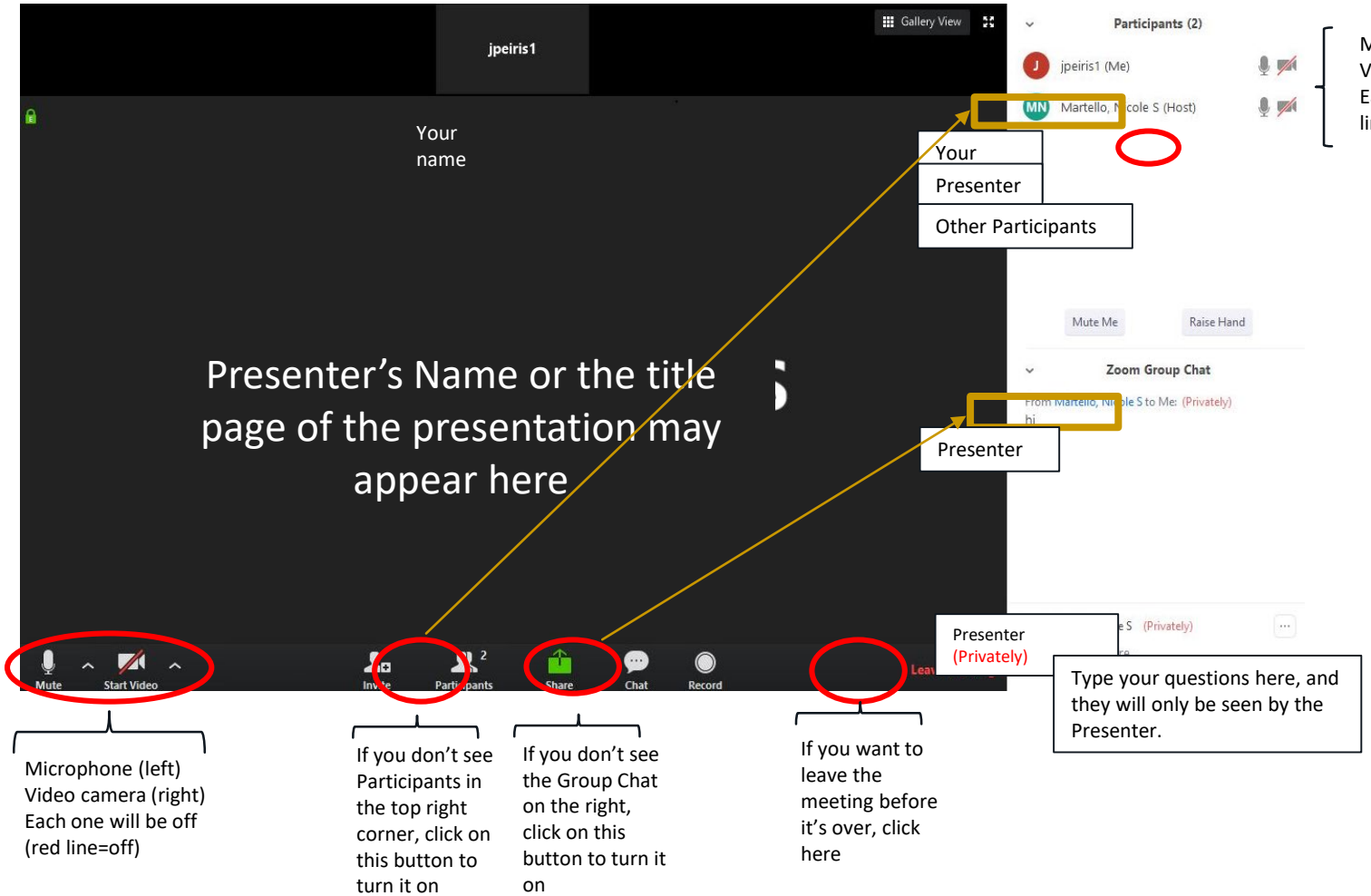
- Zoom allows you to record the presentation, but we ask that you do not. We will create video recordings at another time for distribution.



ANSWERING 6 FUNDAMENTAL QUESTIONS

I. What is General Education/Core Learning Assessment at NOVA?

II. Why does Assessing Critical Thinking Matter?

III. How has Critical Thinking looked in the Past (2017-2018) at NOVA?

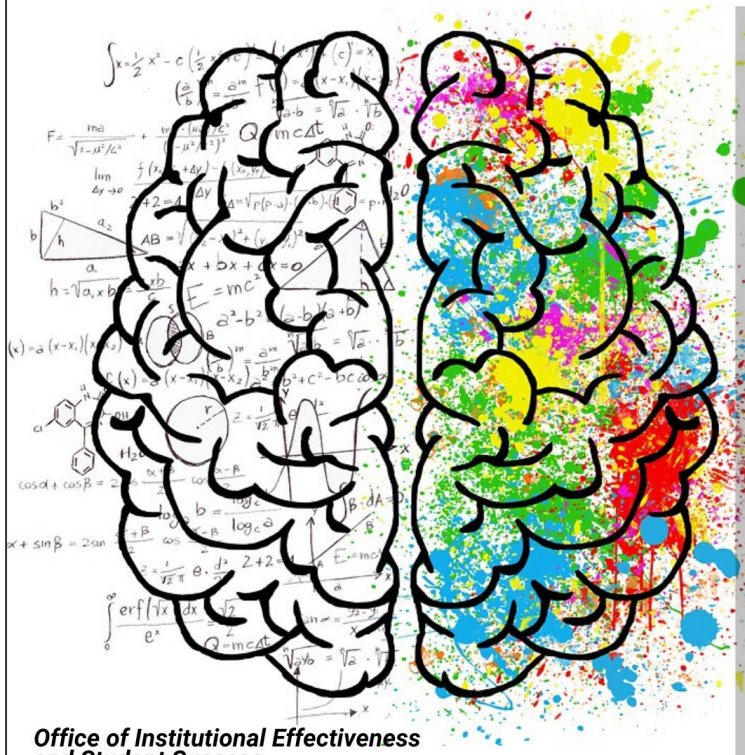
IV. What is Critical Thinking?

V. What are Resources to Assess Critical Thinking?

NOVA CORE LEARNING OUTCOME:

CRITICAL THINKING

The ability to use information, ideas, and arguments from relevant perspectives to make sense of complex issues and solve problems.



Office of Institutional Effectiveness and Student Success

Analytical Behavior

Individuals with analytical skills evaluate information and effectively apply it.

Creative Thinking

Creative thinking allows individuals to spot patterns others might not notice and/or re-frame the question.

Problem Solving

Problem solvers analyze challenges, generate and implement ethical solutions, and assess the success of the plans.

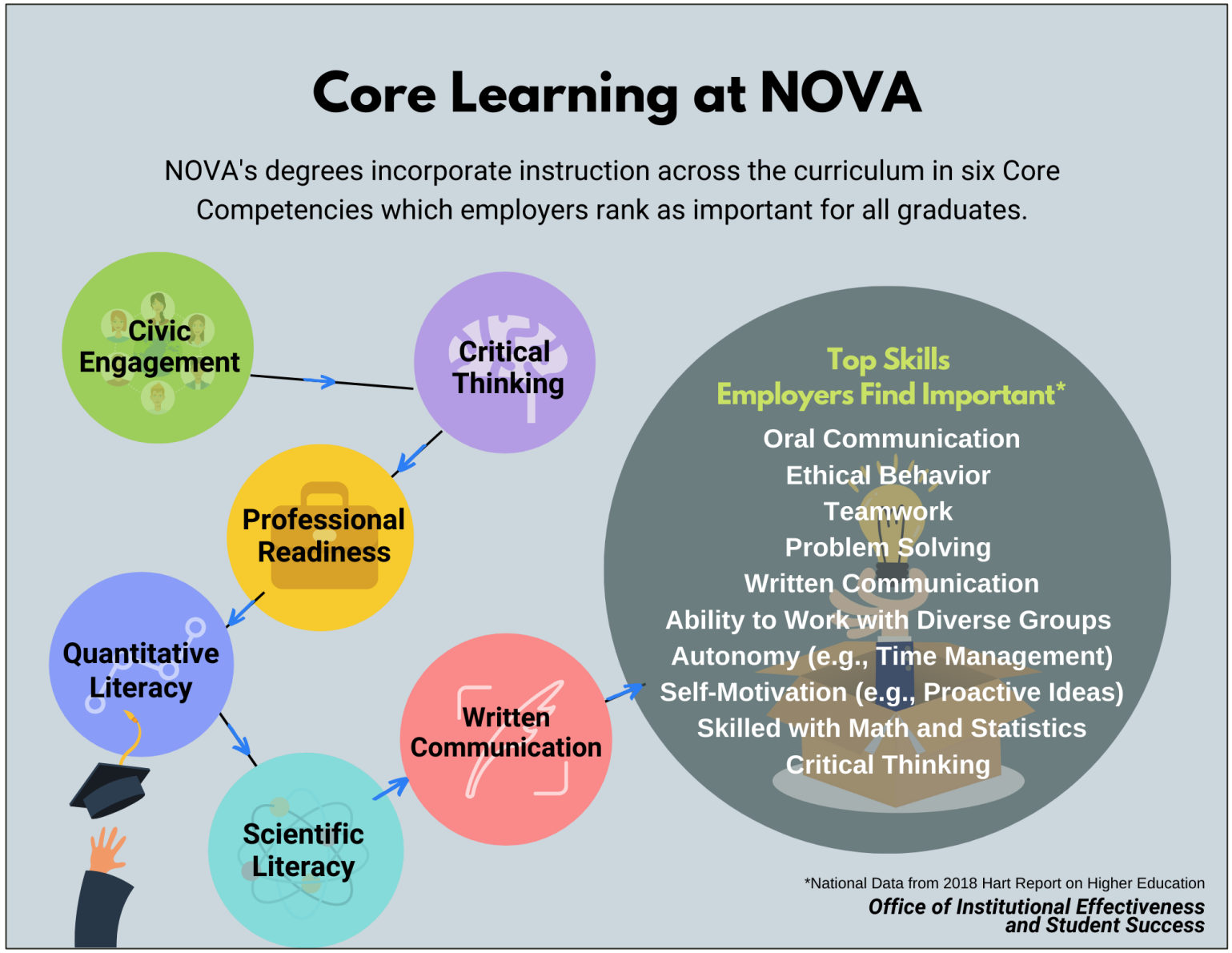
Open-Mindedness

Open-minded individuals put aside assumptions or judgement and remain as critical and unbiased as possible.

Images from Pixabay

GENERAL EDUCATION = CORE LEARNING AT NOVA

A core set of knowledge, abilities, and skills essential to the undergraduate curriculum to optimize student success for work and life.



https://phys.org/news/2013-06-teen-turkey-bananas-plastic.html

JUNE 27, 2013

Teen from Turkey turns bananas into plastic

Sixteen-year-old Elif Bilgin of Turkey won Scientific American's Science in Acti…

There's nothing slippery about Elif Bilgin's idea of using banana peels as a substitute for old-school petroleum-based plastics.

WHY DOES ASSESSING CRITICAL THINKING MATTER?

SKILLS AND KNOWLEDGES EMPLOYERS FIND IMPORTANT:

Effective oral communication	**90 %**
Ethical judgment and decision-making	87 %
Work effectively with others in teams	**87 %**
Apply knowledge in a real world setting	87 %
Work independently (time management)	**85 %**
Self-Motivation (proactive ideas/solutions)	85 %
Critical thinking and analytical reasoning skills	**84 %**
Effective written communication	78 %
Problem solve w/people from diff. backgrounds	**73 %**
Ability to work with numbers and statistics	55 %

"Fulfilling the American Dream: Liberal Education and the Future of Work." Hart Research Associates for the AAC&U. 2018.

HOW DOES ASSESSING CT HELP?

Assessment refines learning goals.

- *SLOs & CLOs become persuasive tools.*

Gives us the language to tell students what they are learning.

- *SLOs and CLOs on course descriptions/summaries, syllabi, assignment descriptions, rubrics, on exams*
- *SLOs and the college CLOs should be a part of your students' lexicon*
- *So later they can describe what they've learned*

HOW DOES ASSESSING CT HELP?

- Lay bare the hidden curriculum
  - *What's a syllabus mean? What are office hours?*
  - *Break-down assignments into parts.*
    - **What does "write a paper" mean?**
- Students don't always know why we assign the work we do. Make the purpose of an assignment clear—then students don't think it is busy work.

HOW HAS CRITICAL THINKING LOOKED IN THE PAST (2017-2018) AT NOVA?

NOVA COMMUNITY COLLEGE ALUM AWARDED $40,000 TRANSFER SCHOLARSHIP

April 06, 2018

Francesca Raoelison, a graduate of Northern Virginia Community College is one of 47 recipients of the Jack Kent Cooke Foundation's Undergraduate Transfer Scholarship. This highly competitive national scholarship will provide Raoelison with up to $40,000 annually for a maximum of three years to complete her bachelor's degree.

Originally from Madagascar, Raoelison overcame numerous hardships and economic barriers in her personal life and within her own country. She was persistent in achieving her goal to relocate to the U.S. to pursue an education. After obtaining an F-1 International student visa, in 2014, she migrated to the U.S. to live with her aunt and enrolled at NOVA.

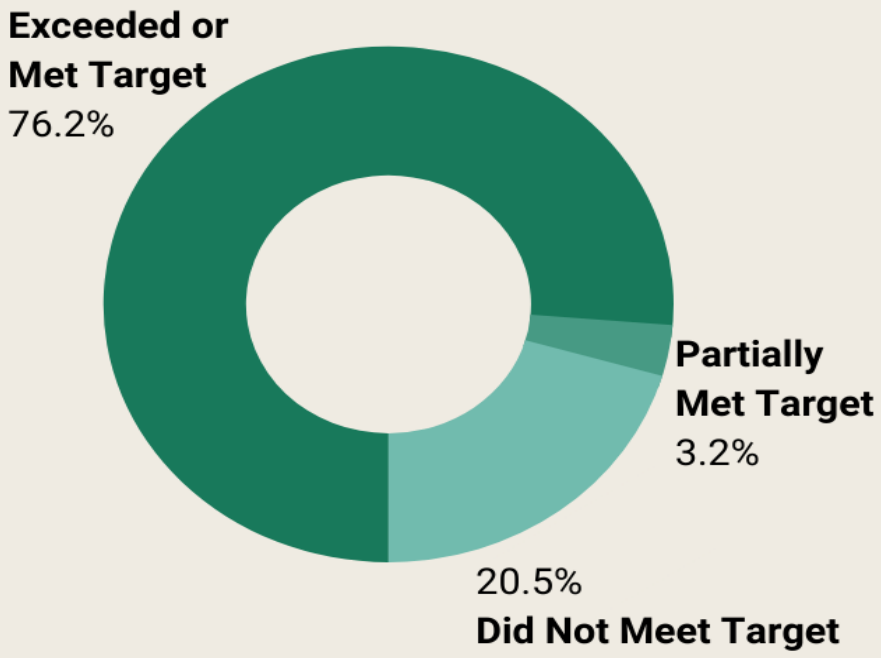
TARGETING *CRITICAL THINKING* AT NOVA

4,603
students participated in the 2017-2018 Critical Thinking assessment.*

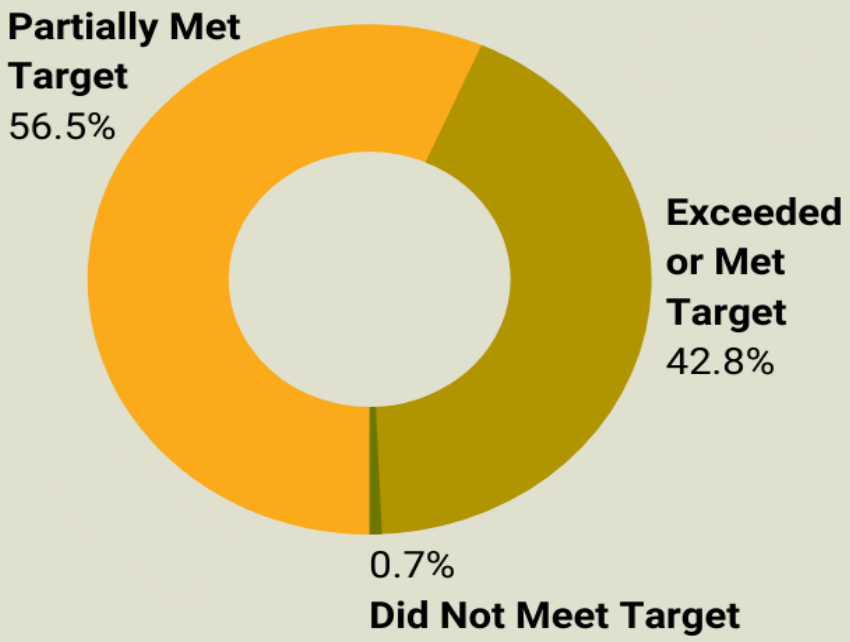
53%
met or exceeded the targets set by programs and disciplines.

76%
of students assessed in 200-level courses exceeded or met targets.

1,466 students in 200-Level Courses...

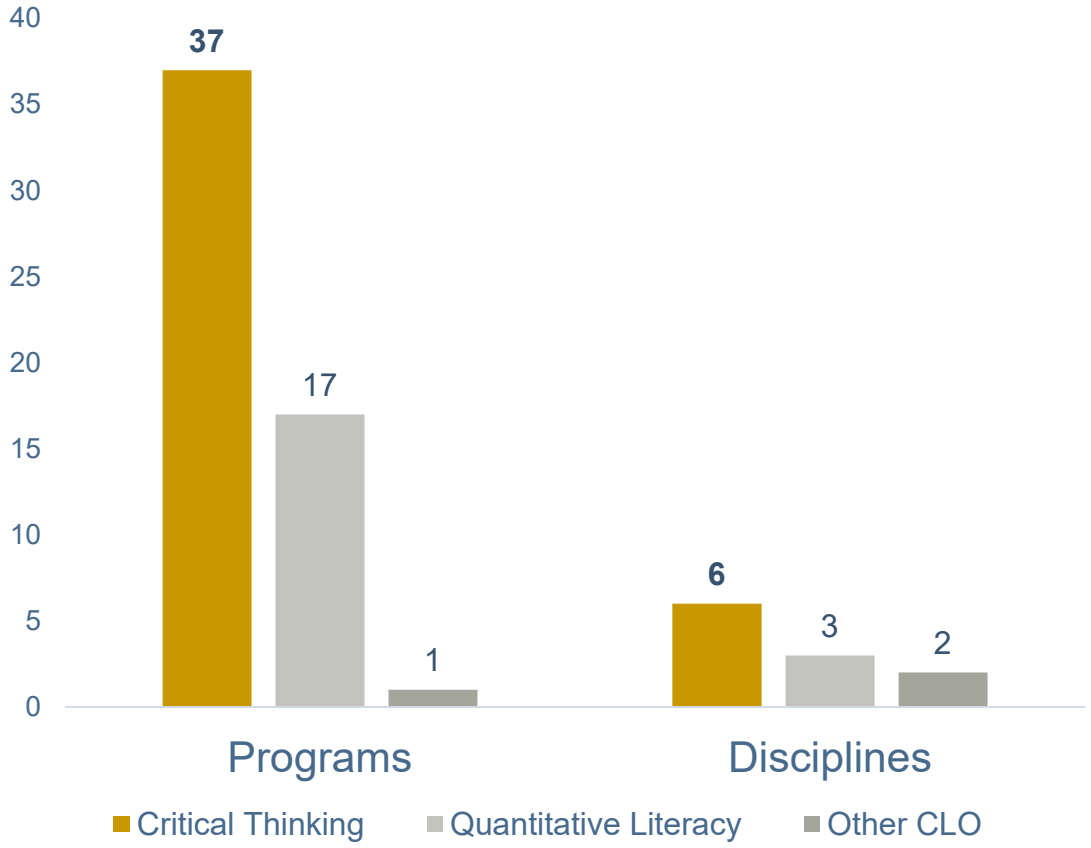


3,137 students in 100-Level Courses...

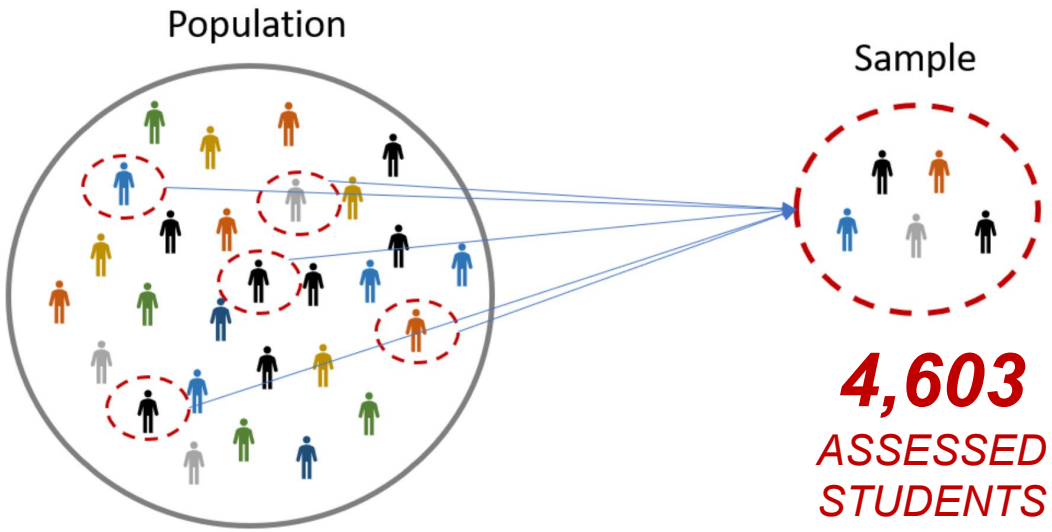


2017-2018 ASSESSMENT OF CRITICAL THINKING

Programs/Discipline Assessment



Student Sample Size



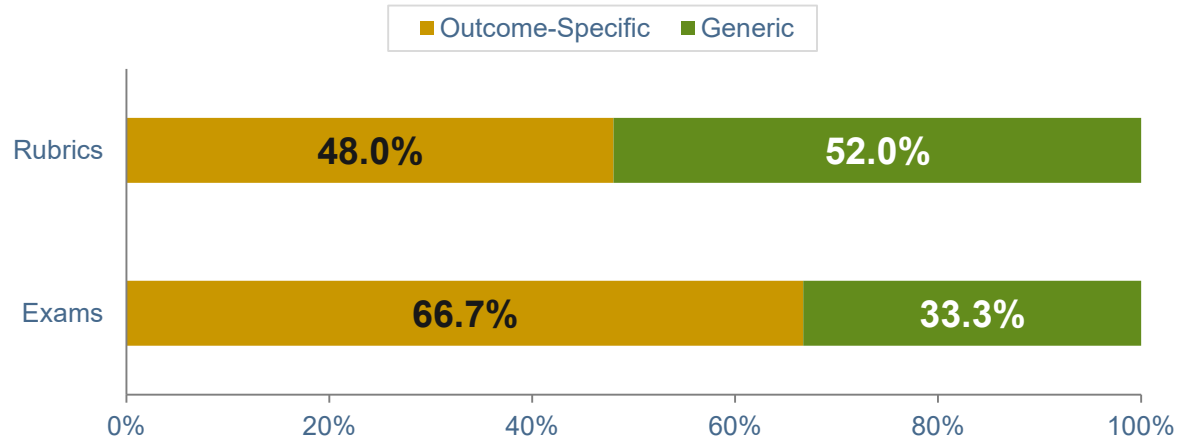
4,603
ASSESSED STUDENTS

36,365
PROGRAM-PLACED STUDENTS IN SPRING 2018

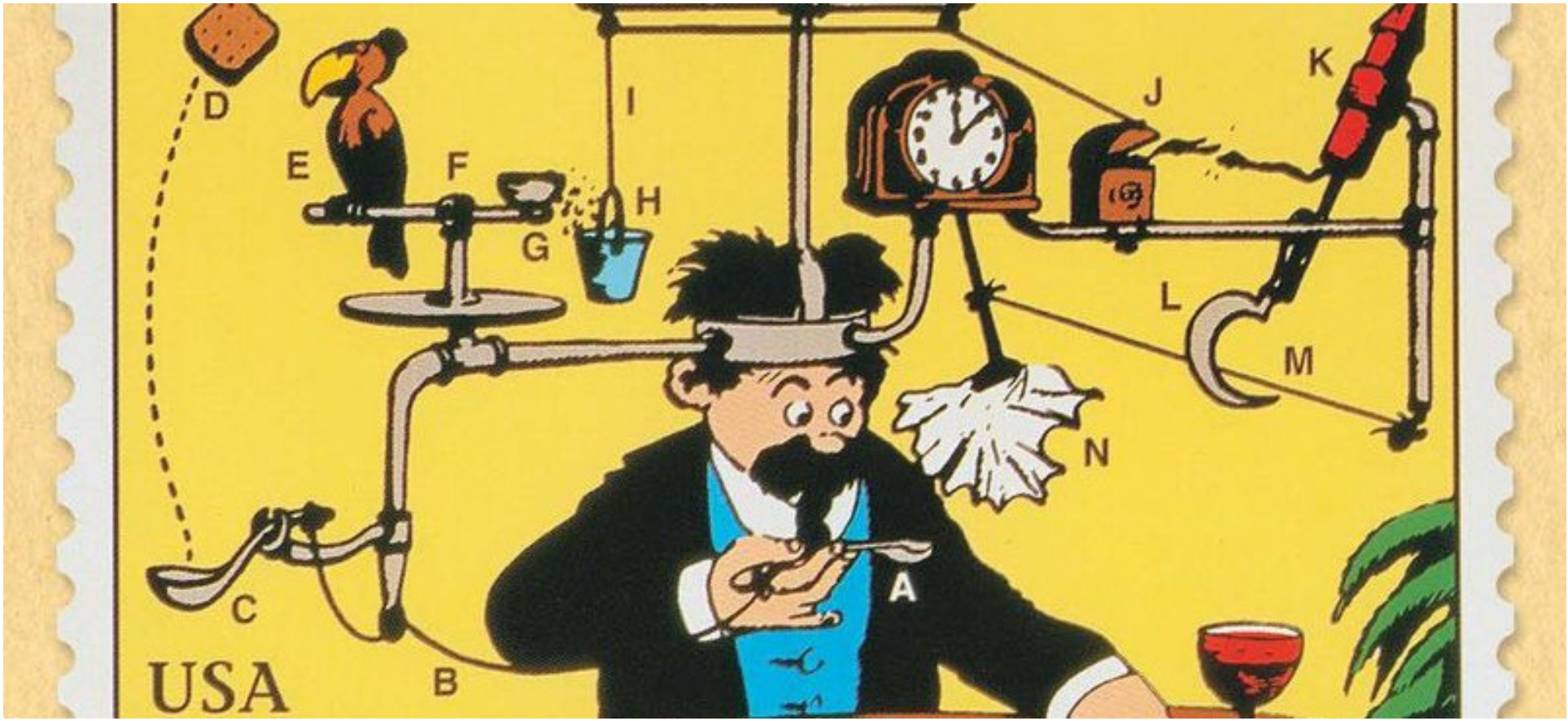
EMBEDDED COURSE ASSESSMENT

Assessing Critical Thinking

Rubric/ Measure	*Assignment-Specific Rubric (ASR):* 1. Clear description of grading criteria/grading scale is provided. 2. Provides purpose of assignment
	Generic Rubric (GR): Does not directly evaluate the CLO being assessed: is too generic; a grading scale is not provided; and/or no purpose is presented.
Examination	*Outcome-Specific Examination (OS):* The exam questions evaluate the assessed CLO by addressing 3 or more aspects of the CLO.
	Generic Examination (GE): The exam questions do not fully evaluate the assessed CLO. Only assessed 2 or fewer of the concepts and/or is unrelated to the CLO.



WHAT IS CRITICAL THINKING?



WHAT IS CRITICAL THINKING?

"The ability to use information, ideas, and arguments from relevant perspectives to make sense of complex issues and solve problems. Degree graduates will locate, evaluate, interpret, and combine information to reach well-reasoned conclusions or solutions."

CRITICAL THINKING CATEGORIES

Category	Description
Identification of Concepts (IC)	Assesses how well students identify concepts or topics.
Explanation/ Identification of Issues (ID)	Assesses how well students identify and/or explain issues relating to the assignment. (This is different from Identification of Concepts because students must understand what issues arise from concepts discussed in class.)
Evidence Utilization (EU)	Asks students to include supportive evidence to boost arguments/ solutions/ research credibility.
Context/Stakeholder Recognition (CSR)	Assesses how well students identify contexts to apply concepts/theories and/or how stakeholders are affected by the issue or solution.
Perspective/Position (P)	Assesses how well students provide their own perspectives and how well the students consider other perspectives.
Analysis (A)	Assesses how well students: analyze the situation and use inductive/deductive reasoning to determine potential issues and outcomes.
Problem Solving (PS)	Assesses students' ability to find solutions to an issue by utilizing various sources of evidence and examining all perspectives.
Creative/Innovative Thinking (CIT)	Assesses students' ability to "think outside of the box"; come up with practical solutions in a non-conforming manner.

Assessing Operational Definitions

Category	Description
Operationalization (O)	Program/discipline provided an operationalized definition of the CLO that was clear and measurable; *includes actions students will take to demonstrate learning of this outcome (e.g., demonstrate proficiency in, analyze data, interpret information, etc.)*
Rubric/Measure	***Rubric in APER (R):*** *Separate Rubric/assessment measure and/or grading scale was not provided but was explained in the APER.*
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OPERATIONALIZING CRITICAL THINKING: GREAT EXAMPLES

1. Students will be able to recognize and apply fundamental contracting techniques by utilizing the basic federal contracting processes: cost estimation procedures, requirement determinations, and characteristics of best value analysis.
2. Writing a business report with the following attributes: Explanation of issues; Evidence; Influence of context and assumptions; Students' perspective or thesis; Conclusions.
3. Students will demonstrate the ability to: discriminate among degrees of credibility, accuracy, and reliability of inferences drawn from given data; recognize parallels, assumptions or presuppositions in any given source of information; evaluate the strengths and relevance of arguments on a particular question or issue; weigh evidence and decide if generalizations or conclusions based on the given data are warranted.

OPERATIONALIZING CRITICAL THINKING: GOOD EXAMPLES

1. Apply basic machine and technique adjustments to solve typical welding problems.
2. Apply electrical theory using wiring diagrams and schematics to diagnose and repair automotive electrical circuits.

COMMENTS:

- There is a general sense of what is expected of the students, but not enough detail to know precisely students are doing.
- Also, I can't really tell if they are critical thinking.

OPERATIONALIZING CRITICAL THINKING: EXAMPLES NEEDING WORK

1. Students will be able to describe how buildings are constructed.
2. Draft legal documents including but not limited to pleadings, contracts, wills, and deeds.
3. Students provide self-analysis and reflection on the Program Capstone Project.

COMMENTS:

- Overly general
- Vague
- Lack detail
- No specific sense of what students are doing, or what particular content they are applying critical thinking to.

ASSESSING RUBRICS

Category	Description
Operationalization (O)	Program/discipline provided an operationalized definition of the CLO that was clear and measurable; *includes actions students will take to demonstrate learning of this outcome (e.g., demonstrate proficiency in, analyze data, interpret information, etc.)*
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Critical Thinking Rubric

1. Clearly states and explains the problem, issue, or thesis, providing relevant background information.

Pre-College	*Emerging*	*Developing*	*Mastering*	*Exemplary*
1	2	3	4	5
Never really states problem/issue, or shows confusion about it; thesis is unstated or unclear.	States problem/issue/ thesis accurately, gives some explanation and background information (may be incomplete).	States and explains problem/issue/thesis clearly, with adequate relevant background information.	States and explains problem/issue/thesis clearly, uses background information to frame discussion well.	Explanation of problem, issue, or thesis is clear, concise, and eloquent, well-chosen information illuminates issue.

2. Selects information from varied, appropriate sources. [This item may be modified depending on the assignment. For example, if students are told to use one source, one would focus on seeking information within it; lab experiments may also serve as information sources.]

Pre-College	*Emerging*	*Developing*	*Mastering*	*Exemplary*
1	2	3	4	5
Makes inadequate use of information sources, depends primarily on personal opinion or a single source.	Uses acceptable number of sources, but may need to be more selective with regard to quality or variety.	Includes a variety of relevant source materials, at least some of which are high quality.	Shows sophisticated research skills, seeking reasonably comprehensive, balanced information.	Sophisticated research, including novel information sources that provide a fresh perspective.

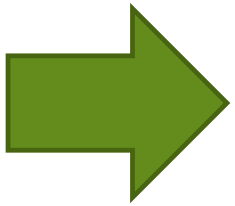
3. Summarizes and analyzes information, stating salient points and describing inferential relations.

Pre-College	*Emerging*	*Developing*	*Mastering*	*Exemplary*
1	2	3	4	5
Summarizes inaccurately or cut/pastes without	States main points clearly and accurately, as well as	Clarifies main points and details with only minimal	Clearly summarizes complex texts, using	Uses summary and analysis to improve upon

Quality Criteria	High Proficiency (4 points)	Proficiency (3 points)	Some Proficiency (2 points)	No/Limited Proficiency (1 point)	Rating (1,2,3,4 pts)
1. Identifies and explains **ISSUES**	Clearly identifies, summarizes, and explains main issues and identifies embedded or implicit issues, addressing their relationships to each other.	Identifies, summarizes, and briefly explains the main issues, but fails to mention any implicit issues.	Identifies main issues but does not summarize or explain them clearly or sufficiently.	Fails to identify, summarize, or explain the main issue. (AND/OR) Represents the issues inaccurately or inappropriately.	
2. Recognizes stakeholders and **CONTEXTS** (i.e., cultural/social, educational, technological, political, scientific, economic, ethical, personal experience)	Correctly identifies the empirical and theoretical contexts relevant to the main stakeholders, and identifies minor stakeholders and contexts showing the tensions or conflicts of interest among them.	Correctly identifies the empirical and most theoretical contexts relevant to the main stakeholders.	Shows some general understanding of the influences of empirical and theoretical contexts on stakeholders but does not identify any specific ones.	Fails to accurately identify and explain any empirical or theoretical contexts for the issues. (OR) Presents problems as having no connections to other conditions or contexts.	
3. Frames personal responses and acknowledges other **PERSPECTIVES**	Formulates a clear personal point of view and addresses relevant perspectives successfully.	Formulates a clear personal point of view and considers some other perspectives.	Formulates a vague personal point of view and/or vague alternative points of view.	Fails to formulate a personal point of view and fails to consider other perspectives.	
4. Identifies and evaluates **ASSUMPTIONS**	Identifies and carefully evaluates the important assumptions.	Identifies and briefly evaluates the important assumptions.	Identifies some of the most important assumptions but does not evaluate them for plausibility or clarity.	Fails to identify and evaluate any of the important assumptions behind the claims and recommendations made.	
5. Identifies and evaluates **EVIDENCE**	Correctly identifies and rigorously evaluates important evidence, successfully linking the evidence to theoretical concepts and frameworks while providing new or alternative data or information for consideration.	Correctly identifies important evidence, highlights its relative importance, and makes an attempt at linking evidence to theoretical concepts and frameworks.	Correctly identifies data and information that counts as evidence but fails to highlight its relative importance and/or link them with theoretical concepts and frameworks.	Fails to correctly identify data and information that counts as evidence for truth-claims (AND/OR) fails to evaluate its credibility.	
6. Identifies and evaluates **IMPLICATIONS** *("What does this mean?")*	Identifies and thoroughly evaluates implications, conclusions, or consequences of the issue.	Identifies and briefly evaluates many implications, conclusions, or consequences of the issue.	Suggests some implications, conclusions, or consequences of the issue.	Fails to identify implications, conclusions, or consequences of the issue.	

NOVA'S CRITICAL THINKING RUBRIC

ASSESSING EXAMS



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Student Learning Outcome:

C. *Students will apply their mathematical knowledge to physics related problems.*

F. *Students will be able to use mathematical reasoning to draw logical conclusions and make well-reasoned decisions*

Note: Please, include the assessment problem for a grade in your course assessment. If you do not offer any grade, students might not participate! The scoring you are doing here is independent from how you grade it for your class. This assessment is for all PHY 201 sections.

Assessment Problem and Scoring Criteria:

The thermal energy given off by 300 g of an alloy as it cools down by 50 deg. C raises the temperature of 300 g of water from 30.C to 40. C. If the specific heat of water is 1 cal/g C , **the specific heat of the alloy** (in cal/g • C.) is?

a) Students must identify the correct formula, which is energy conservation.

$$Q = m\, c\, \Delta T$$

$$Q1 + Q2 = 0$$

	0	1	2
Identify Correct Formula	Nothing written, or completely wrong	Somewhat correct formula	Correct Formula

ASSESSING USING EXAMS

Specific and clear:

List Topics Covered on Examination

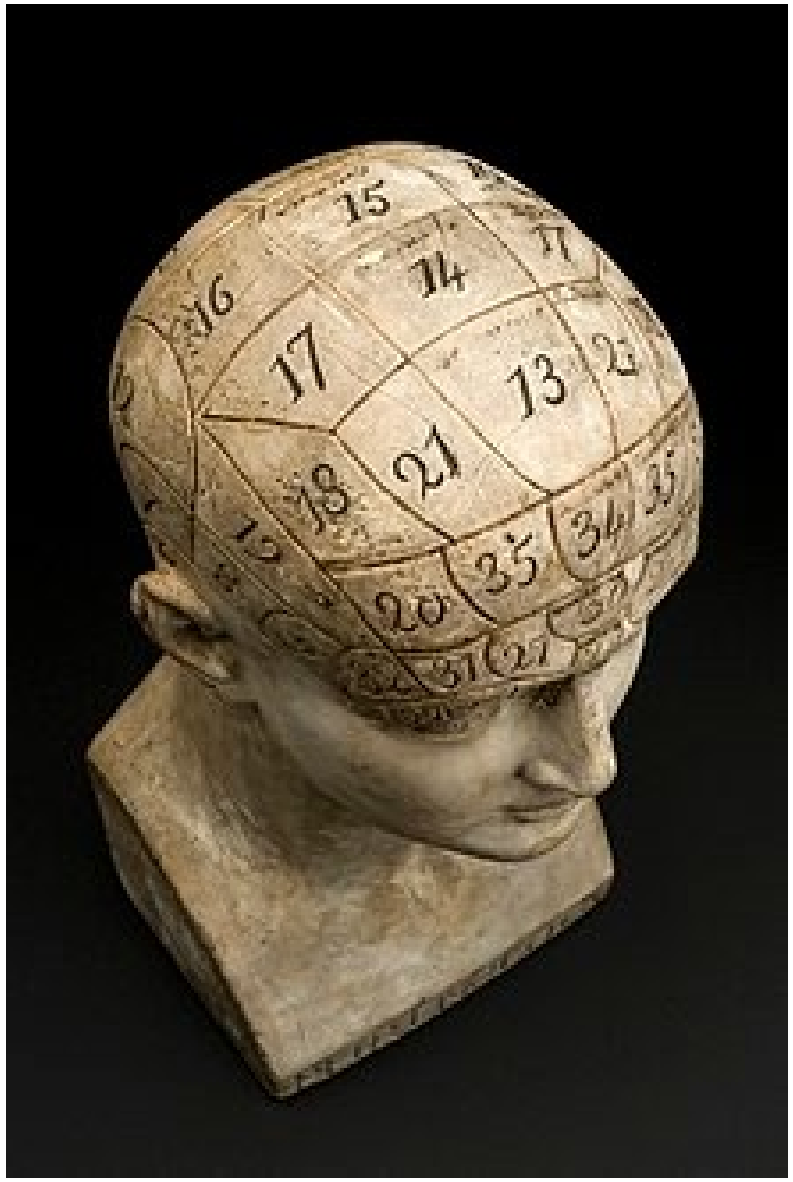
Macroeconomics: The Economic Problem; Supply and Demand; Measure of Total Production and Income; Jobs and Unemployment; Consumer Price Index and Cost of Living; Fiscal Policy; Aggregate Demand and Aggregate Supply; Aggregate Expenditure Multiplier; Finance, Saving and Investment; Monetary Policy

Microeconomics: Definition of Economics; The Economic Problem; Demand and Supply; Price Elasticity of Demand; Government Actions in Markets; Production and Cost; Perfect Competition; Monopolistic Competition; Oligopoly

Non- Specific and Limited:

- Using only one question to assess the CLO (can't disaggregate the data; what if the student understood other CT elements, but not this element)
- Using the course grade to represent CT learning. Doc says you are *80% healthy" what does that mean?

WHAT ARE RESOURCES TO ASSESS CRITICAL THINKING?



FACULTY/STAFF RESOURCES

Faculty/Staff Resources

Below are links to various types of resources to help in the assessment process

Assessment Timeline: Includes information on when Core Learning Outcomes will be assessed from academic years 2017-2018 through 2022-2023.

Templates and Instructions: Includes the templates for the Core Learning Outcome Report and the Curriculum Map as well as step-by-step instructions on how to properly fill out the templates.

Workshop Presentations: Includes presentations from the Office of Academic Assessment regarding Core Learning Outcomes assessment.

Additional/External Resources: Includes additional resources to aid in the assessment of Core Learning Outcomes such as rubrics for each CLO, websites on assessing CLOs, and educating the current generation.

SUGGESTED CT ASSESSMENTS

Scenario Question: provide students with 1-3 scenarios along with questions that include elements such as issue identification, problem solving, or analysis.

Research Paper: have students research an issue relating to an overarching theme/topic in the course. In addition, have students explore alternative solutions.

Reflection Writing Assignment: have students reflect on a major project (individual or group) by explaining their own strengths and areas needing improvement, an alternative methodology, and future directions. Reflection assignments should include examples and an analysis of how a new methodology might have changed the outcome of the project.

Test/Exam Questions: include a mix of multiple choice, identification, and open-ended questions to provide the most accurate assessment of Critical Thinking.


THE PHYSICS OF
MINECRAFT


EXTREMIST IDEOLOGIES
EXPLAINED WITH VILLAGERS


Learning Teamwork
and Cooperation
with Minecraft
©encouragingmomsathome.com


COUNCIL FOR
Economic
Education
Teaching Opportunity

MINECRAFT

Stanford mathematician: In reality, simulation is key to math education

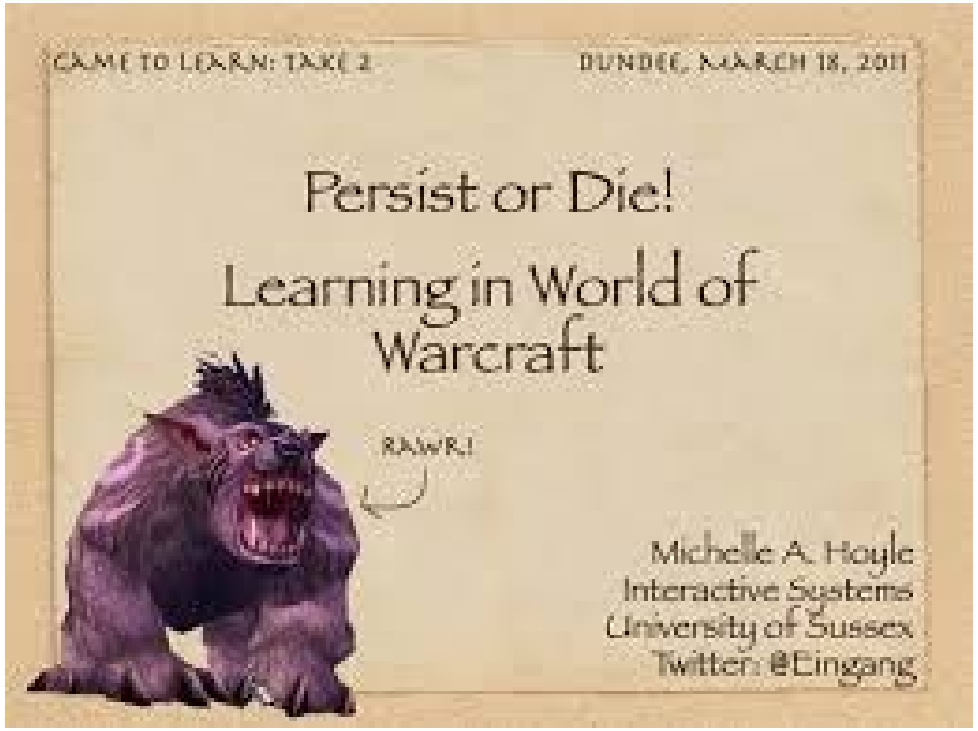
by Stanford University

Online gaming before textbook study is the key to math education, Stanford's …

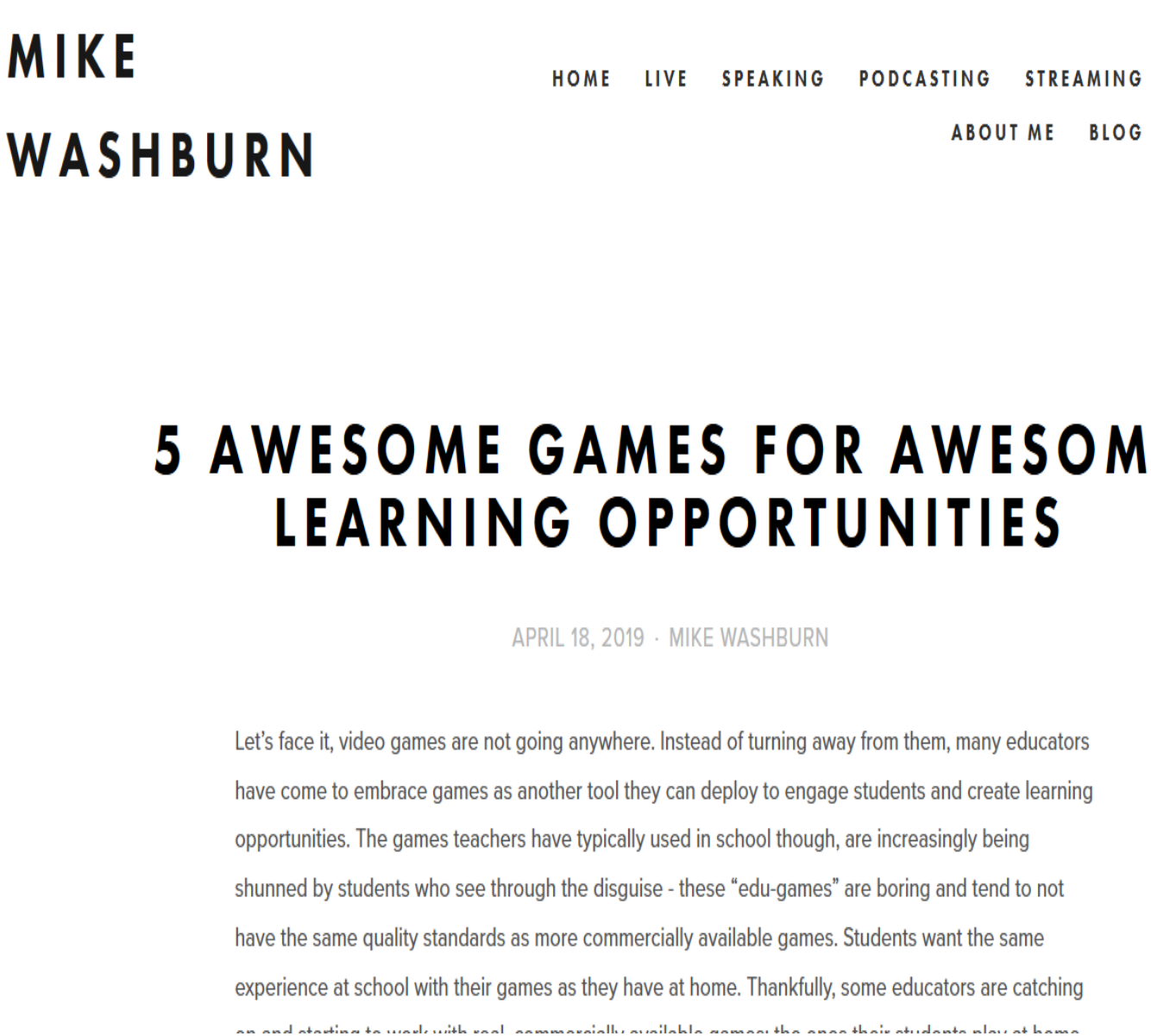
(PhysOrg.com) -- Role-playing games such as "World of Warcraft" could reverse the declining math proficiency of middle school students, Keith Devlin told an audience at the AAAS annual meeting in San Diego.


SPORE


How World of Warcraft Taught Me to Be A Better Writer
Aaron Marsden


CAME TO LEARN: TAKE 2
DUNDEE, MARCH 18, 2011
Persist or Die!
Learning in World of Warcraft
RAWR!
Michelle A. Hoyle
Interactive Systems
University of Sussex
Twitter: @Eingang


CDC Identify Patient Zero
10 9 2013
RELEASE A PLAGUE ACROSS THE GLOBE
Dead
293,836
World



1. Minecraft
2. Sid Meier's Civilization VI
3. The Sims
4. World of Warcraft
5. Fortnight