

# Transforming Science for Critical Thinkers

## The Transformation of a Peer-Reviewed Article

### **Activity Description:**

How often do we hear “Research says...”? To develop critical thinking skills, students need to ask “Does it really?” At the heart of every *Transforming Science for Critical Thinkers* unit is a transformed peer-reviewed journal article. The transformed article uses plain language to convey the science content of the original article and maintains the outcomes of the original research.

Transformation activities provide opportunities to increase student engagement with science literacy.

Specific lesson objectives may change to address content specific to the article, but key objectives of all *Transforming Science for Critical Thinkers* units will include:

- Analyze, evaluate, and critique scientific explanations found while engaging in science literacy activity.
- Using empirical evidence and logic to examine scientific evidence.
- Identifying limitations and advantages of scientific research.
- Comparing and contrasting information from transformed peer-reviewed articles with that of media articles

### **Users Guide:**

- Each unit includes four sets of activities providing opportunities to apply critical thinking skills.
  - Thinking About the Study
  - The Results
  - Analyzing the Results
  - Comparing and Contrasting
- Each activity is designed for a specific peer-reviewed article.
- Each unit contains complete Teacher Materials, including answer keys and helpful background information.
- Each unit contains all information and student material needed to complete the activities.
- The activities can be modified to meet specific objectives and are designed to be used in multiple ways (individual or group activities; complete some or all unit activities)

# Transforming Science for Critical Thinkers

## Peer-Reviewed Article:

### *“Association between Opioid Prescribing Patterns and Overdose-Related Deaths”*

\*although the article deals with opioid related deaths, the actual lessons focus on analyzing and interpreting data, manipulation of data using calculations, and evaluating conclusions.

ORDER of USE of MATERIALS	Action	
	Teacher	Student
<p><b>General Transformation Support Information (teacher):</b> This will provide the teacher with general information regarding transformations, including a guide that may be used by teachers to transform other articles. Middle School Science TEKS are identified.</p>		
<p><b>Pretest &amp; Posttest:</b> Pretest taken by students prior to introducing the transformation article unit. The tests are the same and are designed to help measure the level of growth, providing teachers data to make data driven curricular decisions tailored to meet the needs of their students.</p>		
<p><b>Journal Article: Association between Opioid Prescribing Patterns and Overdose-Related Deaths:</b> This is the transformed peer-reviewed article. The original article appeared in the Journal of the American Medical Association, April 6, 2011.</p>		
<p><b>Activity 1: Support Information for Opioid Transformation Unit (teacher):</b> Identifies TEKS and provides helpful information about neural function and vocabulary related to the transformed article. Also provides teachers with references for additional information.</p>		
<p><b>Activity 1: Support Information for Opioid Transformation Unit (student):</b> Provides helpful information about neural function and vocabulary. Includes graphics and definitions which relate to the article.</p>		
<p><b>Activity 1: Thinking about the Study (student):</b> This activity is designed to help students critically analyze the article, identifying the type of study and variables. Introduces students to IV C DV chart.</p>		
<p><b>Activity 2A: The Results—Person Months (teacher):</b> Identifies MS Science TEKS, explains how to complete calculations to determine person time, focusing on person months through the use of scenario cards to calculate person months for use of aspirin and use of video games. Calculations are used to create data tables. The activity also includes a processing out section to reinforce concepts. Activity suggestions, extensions, and resources are included.</p>		

ORDER of USE of MATERIALS	Action	
	Teacher	Student
<b>Activity 2A: The Results—Person Months (<i>student</i>):</b> Explains calculations for <i>person time</i> , focusing on person months. Three sets of scenario cards included. Record the calculations and data in activity data tables.		
<b>Activity 2B: The Results—Absolute Risk (<i>teacher</i>):</b> Identifies MS Science TEKS, explains the concept of absolute risk with calculation examples to determine absolute risk. Activity suggestions, extensions, and resources are included.		
<b>Activity 2B: The Results—Absolute Risk (<i>student</i>):</b> Explains calculations to determine absolute risk. Students will use guiding questions to create a hypothesis. Using data provided, students will calculate absolute risk and complete activity data tables.		
<b>Activity 2C: The Results—Relative Risk (<i>teacher</i>):</b> Identifies MS Science TEKS, explains calculations to determine relative risk, and provides activity suggestions, extensions, and resources.		
<b>Activity 2C: The Results—Relative Risk (<i>student</i>):</b> Explains calculations to determine relative risk. Includes activity data tables to be completed. As part of the activity, students will calculate relative risks of amusement park rides and sporting activities.		
<b>Activity 3: Analyzing the Results (<i>teacher</i>):</b> Identifies MS Science TEKS, and provides background information to prepare students for graphing information from the original study.		
<b>Activity 3: Analyzing the Results (<i>student</i>):</b> Students will identify independent and dependent variables Provides an opportunity for students to graph, analyze, and interpret data.		
<b>“Pharmageddon” Transformed Media Article:</b> Published June 9, 2011 in “The Guardian”, this transformed media article investigates the abuse of opioids in the United States.		
<b>Activity 4: Compare and Contrast (<i>teacher</i>):</b> Identifies MS Science TEKS, instructions, and extensions involving other content areas such as Social Studies and English Language Arts.		
<b>Activity 4: Compare and Contrast (<i>student</i>):</b> This activity provides students with a format to do a side by side comparison of the peer-reviewed article and the media article. Students will have the opportunity to critically compare and contrast the articles using a Venn Diagram as well as writing their own evaluations.		