

THE CASE OF A MIDDLE SCHOOL REBEL: TEACHER GUIDE

Subject: Life Science

Grade Level: Middle School

Last Updated: February 22, 2008

Case Summary

Chad is a problem student: He acts out in class, has temper tantrums and can't ever seem to do his school work, which causes him all sorts of problems in school. His sister and parents are concerned; is Chad just a bad apple, or is something else wrong?

Credits

This case was written by Bethany Brooks (PhD student, Department of Psychology, Emory University, Atlanta, GA) and Susan Dundee (teacher, Renfroe Middle School, Decatur, GA), fellows of the Emory University PRISM program (<http://www.prism.emory.edu>). Authors can be contacted at sbrooks@csdecatur.net.

Learning Objectives

1. Students will describe how mental disorders such as ADD/ADHD are diagnosed (using the DSM-IV) and treated.
2. Students will investigate the validity of treating mental disorders in children with prescription drugs.
3. Students will compare and contrast the neuropharmacological profile of methylphenidate (Ritalin) with the profile of illicit drugs such as cocaine or amphetamine and debate the ethics behind the current methods of treating ADD/ADHD in children.
4. Students will learn about the role the brain has in determining behavioral output and how this behavioral output can be manipulated with chemicals that act on receptors in various part of the brain.
5. Students will investigate the pathology (if any) underlying ADD/ADHD using web-based articles and sites to search for imaging (fMRI, MRI, and PET) studies that have investigated the neurobiological substrates (if any) affected by or cause ADD/ADHD.
6. Students will investigate methylphenidate abuse among school-aged students.

Georgia Performance Standards

S7CS1. Students will explore of the importance of curiosity, honesty, openness, and skepticism in science and will exhibit these traits in their own efforts to understand how the world works. (NSES Content Standard A)

S7CS6. Students will communicate scientific ideas and activities clearly. (NSES Content Standard A)

S7CS7. Students will question scientific claims and arguments effectively. (NSES Content Standard A)

- a. Question claims based on vague attributions (such as “Leading doctors say...”) or on statements made by people outside the area of their particular expertise.
- b. Identify the flaws of reasoning that are based on poorly designed research (i.e., facts intermingled with opinion, conclusions based on insufficient evidence).

S7CS8. Students will investigate the characteristics of scientific knowledge and how that knowledge is achieved. (NSES Content Standard A)

Students will apply the following to scientific concepts:

- a. When similar investigations give different results, the scientific challenge is to judge whether the differences are trivial or significant, which often requires further study. Even with similar results, scientists may wait until an investigation has been repeated many times before accepting the results as meaningful.
- b. When new experimental results are inconsistent with an existing, well-established theory, scientists may pursue further experimentation to determine whether the results are flawed or the theory requires modification.
- c. As prevailing theories are challenged by new information, scientific knowledge may change.

S7L2. Students will describe the structure and function of cells, tissues, organs, and organ systems. (NSES Content Standard C, E,F)

Implementation Strategy

The Case of a Middle School Rebel is designed for implementation in middle school life science classes. Students investigate the cause of a young boy’s bad behavior, research attention deficit disorder and methylphenidate, and produce educational brochures about their research.

Methylphenidate (tradename: Ritalin) is commonly prescribed to adolescents diagnosed with attention deficit disorder (ADD) and attention deficit and hyperactivity disorder (ADHD). Although it has increasingly been used to treat ADD/ADHD in children since the 1950’s, its use among adults has only recently been on the rise. Methylphenidate shares pharmacological and behavioral profiles similar to those of other stimulants such as cocaine, amphetamine, nicotine, and to a lesser extent, caffeine.

This case can be easily modified to use with students ranging in grade from middle school to graduate school. The plot of the story can be modified in an interest/age-related fashion about methylphenidate. As a result, this case will not only interest middle school life science teachers but high school psychology and biology teachers as well as college professors. The case will not only create within the student a need to know about the neuropharmacology of methylphenidate, mental disorders, and the diagnosis of a mental disorder, but also the ethical issues surrounding a prescription drug which shares effects of several illicit drugs of abuse.

This case was first implemented in a 7th grade Life Sciences course at Renfroe Middle School. Students were given a list of recommended websites to reference for information

about research issues, but they were free to find other references including books, websites, and periodicals.

Day 1

Read Scene 1	10 min
Data, Questions, Learning Issues (whole class)	15 min
Research in computer lab	20 min
Read Scene 2	10 min
Data, Questions, Learning Issues (whole class)	15 min
Research in computer lab	20 min
Hand out Epilogue and assignment at the end of class	

Day 2

Groups report to class on what they found	30 min
Group work on assessment	60 min

Assignment due at the beginning of the next class period.

Case Notes

After facilitating this case, we felt more direction for the students was necessary. This may not be the case if students are in high school or college, but the middle school students will benefit if assigned certain websites to use (see **Resources** below).

Overall, students enjoyed this case. They knew much about psychology (maybe from personal experience of health classes) but not about neuroscience. They were stunned to realize that aspects of psychology are considered to be a science that includes experiments, biology, and hypotheses.

Facilitator Guide:

Sample Box Chart: Scene 1

<p>FACTS: -Chelsea is Chad’s sister. -Chad was uncooperative at school. -Chad and Chelsea just moved to a new school. -Chad is in 6th grade. -Tommy is Chad’s friend. Chad is mad and crying.</p>	<p>LEARNING ISSUES: -What does reprimand mean? -What does bipolar mean? Symptoms? -What are the symptoms of ADD/ADHD? -What are the symptoms of abuse or anger management problems? -How can moving to a new school affect a teenager’s behavior?</p>
<p>QUESTIONS: -Why wasn’t Chad doing his work? -Why is Chad getting so mad? -Did Chad have problems at another school? What kind?</p>	<p>HYPOTHESES: -Chad has a temper and anger management problems. -He had bipolar disorder. -He is learning disabled. -Chad does not like his school. -There is a problem from the past to which Chad is sensitive. -His parents are abusive.</p>

Sample Box Chart: Scene 2

<p>FACTS: -Psychologist said Chad might have ADHD. -Chelsea is annoyed with Chad.</p>	<p>LEARNING ISSUES: -What does Ritalin do to behavior? -What is methylphenidate? -Is ADHD inherited? -Can one get addicted to Ritalin? -Is amphetamine in Ritalin? -Does someone who is addicted to drugs have behavior like that of Chad?</p>
<p>QUESTIONS: -Does ADHD run in the family?</p>	<p>HYPOTHESES: -Chad could be on drugs or steroids. -Chad needs Ritalin to make him more cooperative at school. -Chad is stressed out. -Ritalin can have bad side effects in some people.</p>

Resources

WebMD, Inc. (2005). ADD and ADHD Guide. Retrieved October 5, 2007 from <http://www.webmd.com/add-adhd/default.htm>

National Institutes of Health. (2007, October 1). Attention Deficit Disorder with Hyperactivity: NIH Institute and Center Resources. Retrieved October 5, 2007 from the NIH website: <http://www.nimh.nih.gov/health/publications/adhd/complete-publication.shtml>