



# **CRASHCOURSE**

Concussion Education Product Suite

## **Brain Fly-Through**

*A Guide for Teachers and Students*

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**TeachAids**

**Stanford**

**SPICE** Stanford Program on International  
and Cross-Cultural Education

**FSI** Freeman Spogli  
Institute for  
International Studies

## Purpose

“Brain Fly-Through” is the newest production of the CrashCourse concussion education program developed by TeachAids. Using state-of-the art technology from Stanford University’s Neurosurgical Simulation and Virtual Reality Center, world mountain biking champion Kate Courtney takes the viewer on a journey through an actual human brain. *It is intended to emphasize the complexity and fragility of the brain while inspiring an appreciation for this invaluable resource we all have.* This lesson can be used as a “springboard” for other lessons within life sciences.

For more information about concussions and their symptoms, please visit the TeachAids website for the full [CrashCourse product suite](#). All materials are available to the public for free. For a downloadable certificate of completing the curriculum, visit the [CrashCourse Product Info page](#) and click on the first question, “How do I get the CrashCourse product?”

The purpose of this Teachers Guide is (1) to provide information to review prior to the viewing of the video; (2) to suggest guiding questions to consider while viewing the video; and (3) to recommend debriefing activities.

## Our Partnerships Include:



## Review prior to the viewing of the video

### Warm-up activity

This video tells the story of one person and her experience with concussions. Before watching the video, have a group brainstorming session with your audience to come up with questions about concussions. Examples can be:

- *What is a concussion?*
- *Have you or someone you know ever experienced a concussion?*
- *What sports or other activities come to mind when you think of the causes of a concussion?*

Questions can either be shared out loud, or collected and written down on a shared platform (board, collaborative doc, etc.). They do not need to be answered, yet.

### Discussion topics to consider

For teachers' information, each topic is listed below with a summary of its importance and context within this video. During the video, important terminology is used. A list of the terms and definitions is included in the next few pages. A review of the terms and definitions is recommended prior to viewing the video.

**Topic 1: Concussions: Fact vs. Opinion** — Growing up in the age of the Internet, it is now more important than ever to be able to discern facts from opinions, especially regarding your own body and health. Because of their “invisible” nature, concussions have traditionally been difficult to understand, so there’s a lot of information you may have heard about them that may or may not be true. Keep this in mind as you learn what the experts have to say in this video.

**Topic 2: What makes you, YOU? Protect your brain!** — Weighing in at just 3 pounds, your brain controls all of your feelings, your actions, and your thoughts. It’s one of the most complicated and interesting organs of the human body. It’s important to think about protection and prevention of this organ, BEFORE a crisis happens.

**Topic 3: Learning from a Mistake** — The human brain is the most powerful computer known to man. It works so quickly that we often aren't even aware of forming thoughts before we understand we are having them. One of the ways our brain does this is to compare and contrast new information with previous information, to create "mental shortcuts." As you watch this video, think about the two different instances that Kate had brain injuries; how were they similar, and how were they different?

**Topic 4: Science and Anatomy of the Brain and Concussions** — A person is more than just a collection of organs and bones. Similarly, the brain is more than just a collection of various tissues. Let's break down the different parts of the brain to begin getting an idea of how they *work together* to make you, YOU!

**Topic 5: The Story of Concussions: Metaphors in Story-Telling** — Metaphors are a great way to take complex ideas and translate them into easily understandable, bite-size concepts. How does Kate use traffic on a highway to explain what happens in the brain during a concussion?

## Definitions

**Anxiety** — your mind and body's natural response to events that are threatening

**Axons** — the long, skinny fibers of a nerve cell that transmits the signal from one cell to another; they can be up to a foot long

**Blood vessels** — tube-like structures that carry blood around the body, including through the brain, to supply organs and tissues with oxygen and energy

**Brainstem** — the part of the brain that acts as the relay center connecting the cerebrum and cerebellum to the spinal cord; it controls automatic functions like breathing, your heart rate, body temperature, digestion, and sneezing

**Cerebellum** — a part of the brain located under the cerebrum that controls muscle movements and balance

**Cerebrospinal Fluid (CSF)** — a clear and colorless fluid made inside the ventricles that flows around the brain and spinal cord to cushion it from injuries

**Cerebrum** — the largest part of the brain that looks like “hills and valleys”; it performs high-level functions like understanding touch, vision, hearing, in addition to speech, reasoning, emotions, and learning

**Concussion** — a type of traumatic brain injury caused by a bump or hit to the head or to the body that causes the brain to move rapidly back and forth

**Depression** — a serious but treatable medical condition that affects how a person feels, thinks, and acts; though typically characterized by feelings of sadness, there are many different symptoms, so it's important to talk to a doctor or trusted person to get help

**Empathy** — the ability to sense other people's emotions, along with the ability to imagine what someone else might be thinking or feeling

**Fatigue** — exhaustion or extreme tiredness from work, stress, or physical exertion

**Gray matter** — the name given to groups of nerve cells on the surface of the cerebrum because of their grey color

**Light-sensitivity** — being hypersensitive to light; things that appear normal to others may appear way too bright for someone with light-sensitivity

**Nausea** — a stomach issue with no desire for food and the urge to vomit

**Skull** — your body's "natural helmet" formed by 8 different bones that are joined together; its primary purpose is to protect the brain

**Symptoms** — something, like a sign or signal, that shows the existence of something else

**Ventricles** — hollow, fluid-filled cavities inside the brain that contain CSF

**White matter** — pathways that connect areas on different surfaces of the cerebrum to each other to transmit messages; made of axons

Sources: Merriam-Webster Dictionary, Mayfield Clinic, Greater Good Science Center at UC Berkeley, Depression and Bipolar Support Alliance, Centers for Disease Control and Prevention

## Guiding Questions to consider while viewing the video

For teachers who share this interview with a class, consider dividing the class into five small groups and distributing one set of questions (below) to each group.

**Topic 1: Concussions: Fact vs Opinion** — List 3 facts you learned about the brain and concussions. Now, list 3 possible opinions people might have about concussions. Are they all true? How do you know? Create a “Fact Check Source,” where you list some misconceptions people have about concussions, and what the true facts are.

**Topic 2: What makes you, YOU? Protect your brain!** — Think about some of the things that make you who you are. Ask each other, what are some of those things? What can YOU decide to do, now, to be safer about the possibility of getting a concussion? If your body or head does get hit in the future, what can YOU do to protect your brain?

**Topic 3: Learning from a Mistake** — In this video, Kate Courtney will share stories from two different concussions she’s had. Create a Venn Diagram to compare and contrast similarities and differences between them. What’s different about a concussion from other sports injuries? What’s similar? What are some different ways people might get concussions, other than sports? What is an experience you had, learning from a mistake?

**Topic 4: Science and Anatomy of the Brain and Concussions** — How many different parts of the brain does she talk about? What do each of them do? Can you group together different parts of the brain in different categories? Which are similar, and how? What parts are thought to be injured specifically in a concussion? What does she mean by “invisible injury”? Can you give an example of another type of invisible injury? What can you do to heal an invisible injury, like a concussion?

**Topic 5: The Story of Concussions: Metaphors in Story-Telling** — Did the metaphor (traffic on a highway) help you understand how concussions work? What are the pieces of the metaphor? What does each piece represent? How do metaphors help us tell a story? What story did this metaphor tell? Imagine you were trying to explain concussions to a younger sibling or friend; write a poem or a short story where you create your own unique metaphor for what a concussion is.

## Recommend debriefing activities after viewing the video

### As a group:

Define and answer the following questions together:

- *What is a concussion?*
- *Did your understanding of concussions change at all? If so, how?*

Refer to "Definitions" to answer the question, "What is a concussion?"

### Individual or small group breakouts:

**Option 1:** Essay/Journal writing about the topics and questions.

1. Choose or assign one or more of the topics given above and have students answer their respective questions.
2. Free-write about these other possible prompts from video:
  - a. *The brain does everything to make you, you.*
  - b. *The brain is so powerful yet so vulnerable.*
  - c. *A concussion is an "invisible" injury.*
  - d. *Your brain does everything it can to take care of you. How will you take care of it?*

**Option 2:** Create a video sharing what you learned using a prompt below.

1. Give a review of the "Brain Fly-Through" as if you were a film critic.
2. Host an interview on the evening news. Potential roles can be "newscaster," "expert," "doctor," or even an individual impacted by a concussion.

**Option 3:** Share what you learn in a creative way: make a comic strip, write a poem, or create a drawing or poster and hang these up around school! Choose from:

1. A provided topic and its discussion questions
2. Teaching concussion awareness to others in your community
3. Story-telling of your own or someone you know's concussion experience

**Option 4:** Act out different scenarios of getting a concussion, and what are the appropriate actions the surrounding people (community, friends, teammates, coaches, etc.) should take?

Note: To modify activities for online learning: allow students to work: (1) on a Google document, (2) screen record team meetings, (3) take photos of creative work and upload/share it.

## Opportunities for Further Exploration (Extra Credit!)

The CrashCourse website is an excellent starting place for students to jump-start their research to answer the following questions.\*

**Option 1:** Find someone (in person or online) who has had a concussion! Have students use tools from the topics they discussed (collaboration, interviewing, metaphors in story-telling) to effectively tell the story of that person and their concussion. Students should think of at least 3 questions they want to ask this person about their experience. Be sure to ask that person what kind of support they wanted, as they recovered from this injury. Answer the following:

- a. *Keeping in mind all the different symptoms of a concussion (light sensitivity, sound sensitivity, etc.), what actions / activities can you do to show support for somebody with a concussion, to let them know they are not alone?*

**Option 2:** Have students dig a little deeper into the complexities of concussions by asking them to find answers to more in-depth questions. Ask them to produce something (essay, poster, video, etc.) that they could use to teach other people in their communities. Make sure they include answers to:

- a. *What is a concussion?*
- b. *How frequently do concussions occur? (Hundreds in the USA per year? Thousands? Is it likely to happen to every hundredth student? Every tenth? Every fifth?)*
- c. *What are the symptoms of having a concussion?*
- d. *How long does it take for symptoms to appear?*

They might need to do more independent research to find this information! Other sample questions you might like to include:

- a. *Do concussions affect everyone equally? (Gender, race, age, etc.)*
- b. *What are the common causes of getting a concussion?*
- c. *How long does it take to heal from a concussion?*

\*To make these activities more advanced and science-based, make sure students provide evidence to back up their claims and include resources to “cite” their facts.