

### Helping Students Ask Better Questions About Data

**Per capita cheese consumption**  
 Number of people who died by becoming tangled in their bedsheets  
 Correlation: 0.94718 (r=0.94718)

Year	Cheese consumed (lb/capita)	Deaths
2000	28.25	200
2001	29.50	250
2002	30.75	300
2003	32.00	350
2004	33.25	400
2005	34.50	450
2006	35.75	500
2007	37.00	550
2008	38.25	600
2009	39.50	650

Connie Williams, NBCT  
 July 12, 4PM EST

VIRTUAL CONFERENCE  
 DATA LITERACY  
 CREATING DATA LITERATE STUDENTS

### Door Prizes

STATISTICS AND DATA COMPREHENSION  
 UNDERSTANDING DATA VISUALIZATIONS  
 BIG DATA  
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 DATA IN ARGUMENTS  
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SCHOOL OF INFORMATION  
 UNIVERSITY OF MICHIGAN

### 2018 – 2019 Clients and Partners Sought!

The University of Michigan School of Information offers organizations an opportunity to benefit from students' developing skill sets through client-based courses and programs.

Students are available to:

- Establish and maintain internal library systems or archival collections
- Provide community profiles to inform questions affecting cities, non-profits, or libraries
- Organize and analyze information systems
- Improve information flow through process analysis
- Provide user experience and design recommendations for websites, apps, and software
- Gather, manipulate, analyze, and visualize data
- Develop, implement, and analyze social media strategy
- Analyze or develop guidelines for online communities
- Develop a content management system (CMS) or interactive website

Contact [umsi.client.engagement@umich.edu](mailto:umsi.client.engagement@umich.edu)  
 Visit [umsi.info/clientopportunities](http://umsi.info/clientopportunities) to learn more and propose a project.

### SCECHs

Log in with your **full name**

Attend *all of* at least 4 live sessions and up to 8

Scan/photograph your form and email to [contact.data.literacy@umich.edu](mailto:contact.data.literacy@umich.edu) by 11:59pm Eastern on Friday, July 13.

More information:  
<http://dataliteracy.si.umich.edu/scech>



### For non-Michigan educators needing proof of attendance ...

Follow SCECH instructions (scan and email).

#### Plus

- Go to <http://bit.ly/4t-store>
- Pay \$25 there no later than 11:59pm Eastern on Friday, July 13.
- Submit your form to [4t.data@gmail.com](mailto:4t.data@gmail.com)



<http://dataliteracy.si.umich.edu/conference>

#4tdl



VIRTUAL CONFERENCE ON DIGITAL WRITING  
TEACHERS TEACHING TEACHERS ABOUT TECHNOLOGY

October 10 and 16, 2017

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October 5-6, 2018

Join us for innovative digital writing invitations and collaborate with K-16 educators about the teaching of writing in virtual spaces.  
FREE REGISTRATION & SCECHs #4TDW

Register NOW for 4TDW 2018!

VIRTUAL CONFERENCE ON DATA LITERACY  
CREATING DATA LITERATE STUDENTS

### Today, we'll ...

- 1.learn why questions are important
- 2.discuss a great thinking routine for helping kids ask more questions
- 3.discuss when/how to implement this routine in your class & library
- 4. apply this to understanding data



### Helping Students Ask Better Questions About Data

Connie Williams, NBCT, MLS  
[chwms@mac.com](mailto:chwms@mac.com)



Hoover House

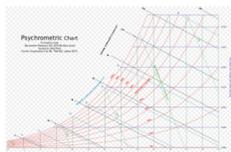


Washington D.C.



Bodie, CA

### Data?



<https://commons.wikimedia.org/wiki/File:PsychometricChart.StatLevel.51.org>

You mean.... Numbers?



lickr

### Resources:

**Right Question Institute**  
[rightquestion.org](http://rightquestion.org)

**Jamie McKenzie**  
**The Question Mark**  
<http://questioning.org/>  
<http://fno.org>

**A More Beautiful Question**  
 by Warren Berger  
<http://amorebeautifulquestion.com/>



# WHY?

"Without strong questioning skills, you are just a passenger on someone else's tour bus. You may be on the highway, but someone else is doing the driving."  
Jamie McKenzie



Wikimedia Commons: Hourts tour bus. AF The Bus ex London Transport's RM204 AEC Kouchemaster Park Royal 739 LXA ex WLT 994 in Portsmouth, Hampshire 16 April 2009.jpg

## The skill of asking questions

### CURIOSITY

For moving from ignorance as weakness to ignorance as opportunity



Lerdorf, Rasmus. "Tough Curiosity". Flickr. Flickr. 4 Sept. 2012. Web. 13 Mar. 2016. <<https://www.flickr.com/photos/lerdorf/1987151778/>> Creative Commons Attribution/No Changes

### ENGAGEMENT

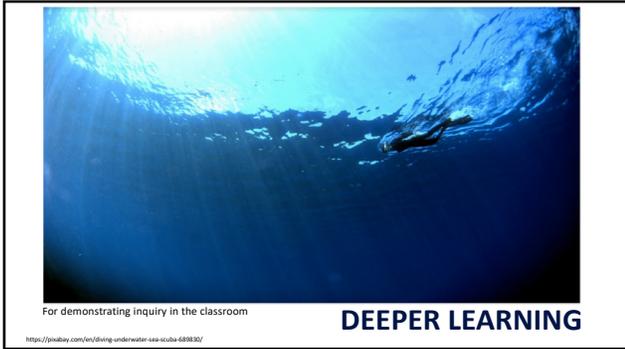


Students Engaged with Technology. *Learner Experiences of Technology*. JISC, 2005. Web. 13 Mar. 2016. <<https://www.jisc.ac.uk/rd/projects/learner-experiences-of-technology/>>

For arriving at better answers (and more questions)



Glöckler, A. "Students Working on Computers during Glöckler's Class". *Glöckler's Students Working*. Wikimedia Commons, 25 June 2011. Web. 13 Mar. 2016. <[https://commons.wikimedia.org/wiki/File:Glöckler's\\_students\\_working.jpg](https://commons.wikimedia.org/wiki/File:Glöckler's_students_working.jpg)>



## Democracy

"We need to be taught to study rather than to believe, to **inquire** rather than to affirm." - Septima Clark. See Chapter 6 on Septima Clark in *Freedom Road: Adult Education of African Americans* (Peterson, 1996).

Right Question Institute

Engagement...  
Inquiry...  
Learning...

All start with a question.

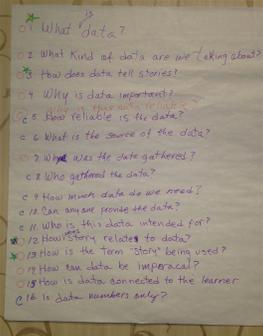
1. Who were the first settlers?  
 2. Why was the American Bison chase to be on the flag?  
 3. What is the print of 1620?  
 4. Was Wyoming in the original 13 colonies?  
 5. Who is the governor?  
 6. What is the most common resource?

<https://www.flickr.com/photos/hulawalky/4387942895/>

**What is the Question Formulation Technique?**  
 The Question Formulation Technique (QFT) is a simple, but rigorous, step-by-step process designed to help students ask more questions.

QFT asks participants to:

1. Produce their own questions
2. Improve their questions
3. Strategize how to use them;
4. Reflect on what they have learned; and how they learned it.



Handwritten questions on the whiteboard:

- 01 What is data?
- 02 What kind of data are we taking about?
- 03 How does data tell stories?
- 04 Why is data important?
- 05 How reliable is the data?
- 06 What is the source of the data?
- 07 Who uses the data gathered?
- 08 Who gathered the data?
- 09 How secure data do we need?
- 10 Can anyone provide the data?
- 11 Who is this data intended for?
- 12 How/Story relates to data?
- 13 How is the term "story" being used?
- 14 How raw data be interpreted?
- 15 How is data connected to the learner?
- 16 Is data numbers only?

QFT develops:

**Divergent thinking-**  
think big, create lots of questions



<http://bit.ly/2uPAHIG>

**Metacognition-**  
what might be difficult about following the Rules?  
Making them think about the process.  
They have to imagine the "big picture" as they're doing it.



<http://bit.ly/2u9YC1j>

**Convergent thinking**  
narrowing down when prioritizing

Right Question Institute

**Components**

1. The Question Focus (QFocus)
2. The Rules for Producing Questions
3. Producing Questions
4. Categorizing Questions
5. Prioritizing Questions
6. Next Steps
7. Reflection

RQI:  
Right Question Institute

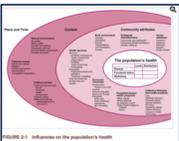
The process starts with a **Q-Focus**: a compelling statement, item, artifact, image, quote, document or video

Next year the agency (NIH) will launch a massive new study with the aim of documenting in unprecedented detail exactly what happens inside a body in motion. Its hope: to prove that exercise is medicine.  
<http://time.com/4475628/the-new-science-of-exercise/>

"Every day, sanctuary cities release illegal immigrants, drug dealers, traffickers, gang members back into our communities," he said last week. "They're safe havens for just some terrible people."  
 D. Trump, quoted in:  
<https://n.pr2tmtopN>



<https://www.scienceof.com/this-hilarious-flu-chart-tells-you-whether-you-have-simple-cold-actual-flu>



<https://www.ncbi.nlm.nih.gov/books/NBK54296/>

**Let's do it!**



<http://pwhere.com/en/photo/953604>

Q FOCUS:

Students are not asking enough questions.

RQ:  
Right Question  
Institute

### **RULES FOR PRODUCING QUESTIONS**

Ask as many questions as you can

Do not stop to discuss, judge or answer the questions

Write down every question exactly as it is stated

Change any statement into a question

<http://www.rightquestion.org>

**What might be difficult about following these rules?**

**Share your thoughts at [bit.ly/conniechat](http://bit.ly/conniechat)**



Open clip art gallery

RQ:  
Right Question  
Institute

Which rule do you think you'll break first?

RQI:  
Right Question Institute

**RULES FOR PRODUCING QUESTIONS**

Ask as many questions as you can

Do not stop to discuss, judge or answer the questions

Write down every question exactly as it is stated

Change any statement into a question

**Q-focus:  
Students are  
not asking  
enough  
questions**

<http://www.rightquestion.org>      Number your questions as you write them

**Two Kinds of Questions:**

Closed-ended questions can be answered by 'yes', 'no' or other short phrase.

Open-ended questions are much longer.

**At <http://bit.ly/conniechat>, respond to these questions:**

<small>What are the advantages of open ended questions?</small>	<small>What are the advantages of closed ended questions?</small>
<small>What are the dis-advantages of open ended questions?</small>	<small>What are the dis-advantages of closed ended questions?</small>

Right Question Institute

**Next up is choosing two questions based on actions you want to take.**

**For example:**

- The two most important questions
- The two questions you would like to address first
- The two questions you want to explore further
- The two questions that clump together by topic

**You base your priority questions on your task.**

YOUR task is

Choose the top two questions that will help you inform your practice.

Share at <http://bit.ly/conniechat>

Next: *determine*:

- your two priority questions
- your rationale for selecting those two
- the numbers of your priority questions

Share at <http://bit.ly/conniechat>: your two questions and the numbers they were in your list.

RQI:  
Right Question Institute

## Strategize: Prioritizing Questions

### After prioritizing consider...

- Why did you choose the question?
- Where is your priority question in the sequence of your entire list of questions?
- What do we notice about the numbers of priority questions within this group?

Prioritizing Questions: What task do you want students to complete? Here are some suggestions for use:

Tell students to: **choose three questions that...**

**most interest you.**

Because: *I want students to find a topic of interest to use for a project [create a project]*

**you consider to be the most important.**

Because: *I want students to pick the 'big ideas' [We are going to discuss]*

**will best help you design your research project**

Because: *I want students to begin to prioritize next steps for their project [write a paper, present]*

**will best help you design your experiment**

Because: *I want students to find the questions that will be useful to follow up with – as experiments [build something, test something, hypothesize]*

**will best help you solve a problem**

Because: *I want students to pursue to solve a problem [create something]*

**you want/need to answer first**

Because: *I want students to start here [we're going to dig into a big topic and we want to know where to start]*

How can you use these questions next year  
In your classes?

Share on the chat  
(bit.ly/conniechat)

RQI:  
Right Question Institute

## Reflection

Share with your group  
Then share with chat: [bit.ly/conniechat](http://bit.ly/conniechat)

What did you learn?  
How did you learn it?

How might you use questions in other venues?

RQI:  
Right Question Institute

Do. Not. Skip. Reflection with your students



<http://www.afmc.af.mil/News/Photos/igphoto/200110508/> used with permission

The QFT, on one slide...

- 1) Question Focus
- 2) Produce Your Questions
  - ✓ Follow the rules
  - ✓ Number your questions
- 3) Improve Your Questions
  - ✓ Categorize questions as Closed or Open-ended
  - ✓ Change questions from one type to another
- 4) Prioritize Your Questions
- 5) Share & Discuss Next Steps
- 6) Reflect

1. Ask as many questions as you can
2. Do not stop to discuss, judge or answer
3. Record exactly as stated
4. Change statements into questions

**Closed-Ended:**  
Answered with "yes," "no" or one word

**Open-Ended:** Require longer explanation

Credit: Sarah Westbrook\_RQI

# When?

## Ask OURSELVES a few questions:

- Where does this topic live in the world?
- What will students find relevant about this topic?
- Why would someone care about this topic?
- What are the ways that experts in this field do their work?
- What counts as evidence or proof within this topic?
- How might students access or create authentic sources of data on this topic?
- Where will students have the opportunity to solve problems, test ideas, recognize patterns, or invent build or design a solution or product?

*Introduction to Inquiry Based learning by Neil Stephenson*

Hmmm... about those 20<sup>th</sup> Century research projects...



Sharon Drummond Flickr CC

AKA: "bird reports"

California:



Santa Barbara Historic Museum

The Mission Report

Ok then...when?????

When do I ask /encourage my students to ask questions?

*Hopefully every day, every assignment, all the time....*

### At the beginning of a unit

create a compelling entre to your unit  
(using images to jumpstart thinking...)



The Plague

<https://commons.wikimedia.org/>



And how it spread world-wide...



Science – Ecology – Environment

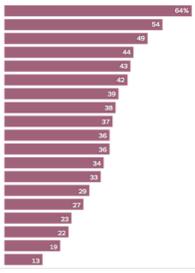
<https://www.flickr.com/photos/hayesvalleyfarm/4815894552>

### At the beginning of a unit

Use the data you want to investigate right from the beginning.

**Why Young Adults Are Having Fewer Children Than Their Ideal Number**

For the people who said they had or expected to have fewer children than they considered ideal, here's the share that cited each of these reasons as a factor.



Reason	Share (%)
Child care is too expensive	64%
Want more time for the children I have	54
Worried about the economy	49
Can't afford more children	44
Wanted because of financial instability	43
Want more leisure time	42
Not enough paid family leave	39
No paid family leave	38
Worried about global instability	37
Struggle with work-life balance	36
Worried about domestic politics	36
Met a partner too late	34
Worried about climate change	33
Responsible for other family care	29
Worried about population growth	27
Prioritized my education and career	23
Split from my partner	22
Partner doesn't want children	19
Don't think I'm a good parent	13

<https://www.nytimes.com/2018/07/05/upshot/americans-are-having-fewer-babies-they-told-us-why.html>

### At the beginning of a unit

Remember this from the previous slide?

Next year the agency (NIH) will launch a massive new study with the aim of documenting in unprecedented detail exactly what happens inside a body in motion.  
Its hope: to prove that exercise is medicine.

Teaching physical education?  
Health?  
Statistics?

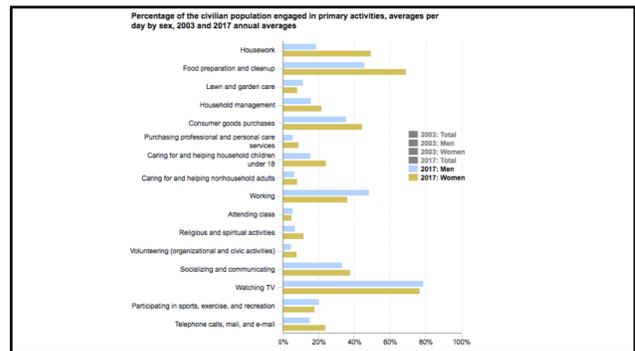
Would you like your students to find data to back up the evidence they find as they research?

What kind of data will your students want to find to answer the questions this Q-focus brings up?

What kind of experiment might your students create that they can use throughout your unit on exercise?

<http://time.com/4475628/the-new-science-of-exercise/>

**Q-Focus:**  
**Exercise is medicine**



Create activities that keep active questioning alive

**Throughout the unit – fact gathering for those “create context” assignments**  
*Great Expectations / The Jungle / Freakonomics*

Try a class / library timeline to cover the wall and start with assigning an area to a group to add to it throughout the reading.

<http://blog.comtabindia.com/learning-design/ways-to-present-timelines-in-learning>

**In the middle of a unit:** create activities that keep active questioning alive

**Q-focus: minimum wage equals maximum unemployment**  
 Socratic seminars – debates... Drop-in for a quick data check and questioning

Generate questions in the middle of a unit that can help you jump-start conversations.

Locate data to support your claim. Identify correlation / causation

<https://science.howstuffworks.com/innovation/science-questions/10-correlations-that-are-not-causations7.htm>

Striking fast-food workers are joined by supporters, union members and activists at a rally in New York City's Foley Square to demand an increase in the minimum wage to \$15 an hour. © ANDREW LICHTENBERG/REUTERS

**Q-focus:**

Start with the data itself to set up the inquiry. OR throw in the data during the discussion. Now...watch the questions grow and change.

<http://bit.ly/2K3hhYU>  
 (google Public Data)

**Q-focus:**

$24 = \text{☺} + \text{☺} + \text{☺}$

**At the end of a unit:**

**ASSESSMENT**

Have students ask questions that seek answers

Build answers upon the fact-seeking questions

Where are we in our progress?

Formative Assessment

Final Assessment: what questions should be on our test? Why?



[https://commons.wikimedia.org/wiki/File:Gulliver\\_academy.jpg](https://commons.wikimedia.org/wiki/File:Gulliver_academy.jpg)

Help your students remember:  
If you get stuck in your research...



Go back to your question

**Create your own questioning toolbox**

**Prime Questions:** why / how /which

**DIG & DIVE questions:** who, what, when, where, what happened, who did, when did,....

**Question starters**

How might... I wonder... what might have...what if... Why did...

How would you have felt....what was the difference between...

If \_\_\_\_ then....

Jamie McKenzie: FNO.org

- Probing
- irreverent
- subsidiary
- telling
- inventive
- Clarification
- unanswerable
- Organizing
- Provocative
- Sorting & sifting
- Essential
- irrelevant
- Planning
- Strategic
- Elaborating
- Hypothetical
- divergent

"Inquiry is not merely 'having students do projects' but rather strives to nurture deep, discipline-based way of thinking and doing with students."  
*Neil Stephenson*



http://quest.ed.com

**INQUIRY, like research**  
*...is also a process*

The only way to help kids want to complete the research you have assigned...

is to help them create their own compelling questions.

We utilize inquiry questions all the time

- What movie should we see today?
- What computer [bike, phone] should I buy?
- How will I complete all my homework on time?
- What do I need to do in order to get to college?
- Who are the 3 most influential authors of the 20th Century?

Taking our information need statements:

*I want to go to Iceland*

and asking questions of them, allows us to take steps to completing the task.

...then give them time to explore

..because this is when they learn their:

# Terms of Art



WHO WHAT WHEN WHERE : content rich resources... answer question... ask more.. Develop thesis/claim....

Post the rules – use them as ‘touchstones’  
 Place questions around the room  
 Create a place for questions to be written / and answered. “Seed” it with your own questions

**Let’s create a welcoming environment For questions**




**WHEW!**



<https://www.flickr.com/photos/lobsterize/2641823663> Manuel Antonio / Parque Nacional

Now  
what?



[https://commons.wikimedia.org/wiki/Category:Confusion#/media/File:2006-10-14\\_-\\_London\\_-\\_Victoria\\_-\\_Lost\\_-\\_Cutout\\_-\\_Red\\_-\\_Woman\\_\(489780538\).jpg](https://commons.wikimedia.org/wiki/Category:Confusion#/media/File:2006-10-14_-_London_-_Victoria_-_Lost_-_Cutout_-_Red_-_Woman_(489780538).jpg)

## Recap:

1. Questions are important
2. QFT works for all information needs

## Questions?

Connie Williams

chwms@mac.com



## Access Materials



The Right Question Institute offers materials through a Creative Commons License and we encourage you to make use of and/or share this resource. Access materials at [rightquestion.org](http://rightquestion.org).

We are deeply grateful to the John Templeton Foundation for their generous support of the Million Classrooms Campaign.

## RQI Educator Network

Join our Educator Network to Access:

- Templates you can use tomorrow in class
- Classroom Examples
- Instructional Videos
- Forums and Discussions with other Educators

<http://rightquestion.org/>

<http://rightquestion.org/educators/seminar-resources/>

Please take the evaluation  
(link in chat)  
to be entered for door prizes!

