

Data Visualization and Infographics: Using Data to Tell Your Story

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University Life

Assessment, Research, and Retention

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Session Outcomes

Participants will be able to:

1. Identify the process and analytical design principles required for effective data visualization.
2. Evaluate the usefulness of data visualization techniques and infographics for making meaning of and sharing higher education data.
3. Identify tools and resources for getting started with data visualization and infographic design.

The Beauty of Data Visualization



Link: http://www.ted.com/talks/david_mccandless_the_beauty_of_data_visualization.html

January 11, 2012

Excellent Examples are Everywhere

- ESPN

<http://www.espn.com>



- National Weather Service

<http://www.weather.gov/>



Tell Your Story With Data

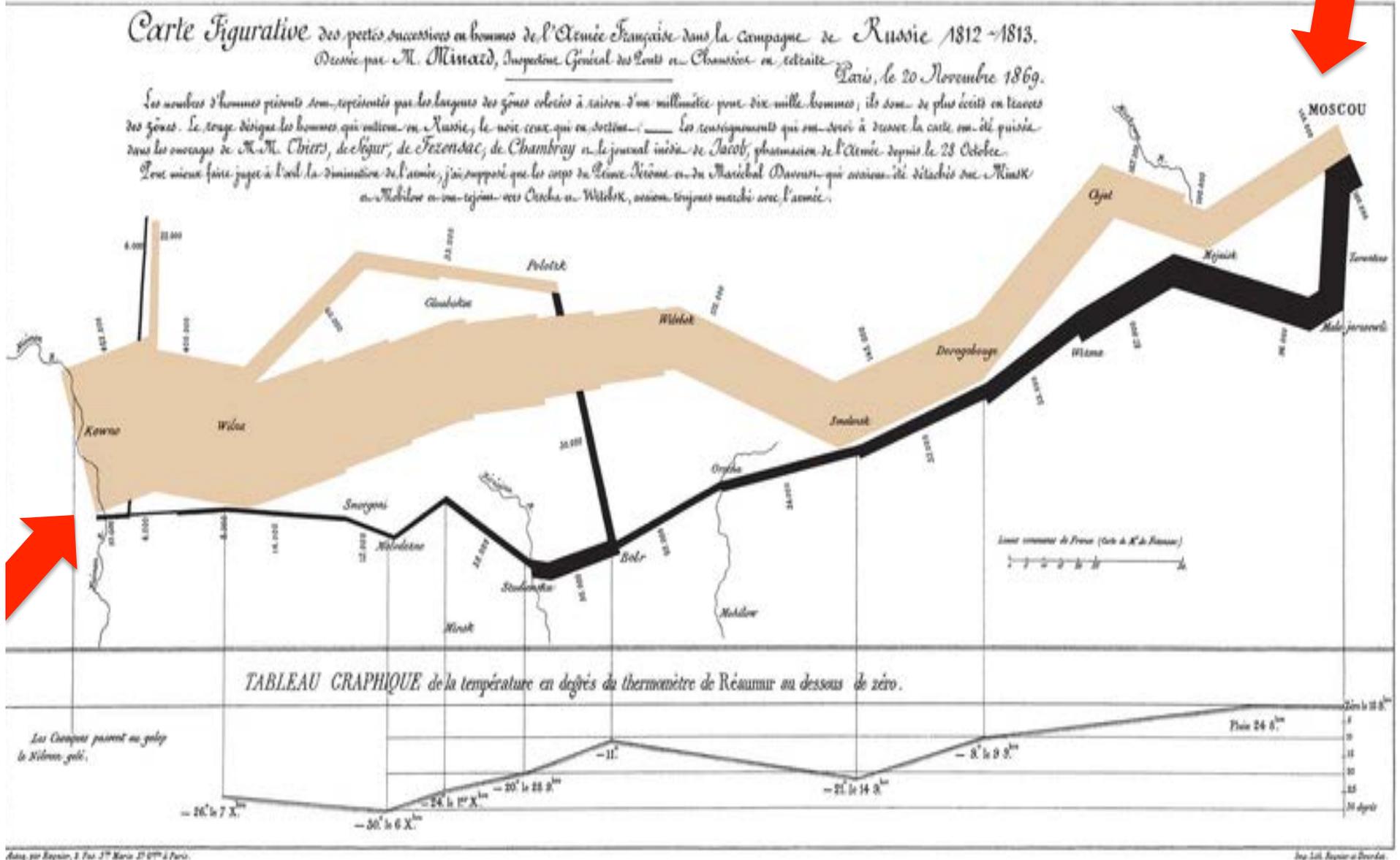
- Collect your data
 - primary and/or secondary sources
- **Think, Think, Think**
 - Question
 - Explore
 - trends, patterns, differences, relationships
 - across categories, space, time
 - Identify your story
- Design your visual
 - start simple
 - keep it clear and interesting
 - keep your audience in mind

Analytical Design Principles

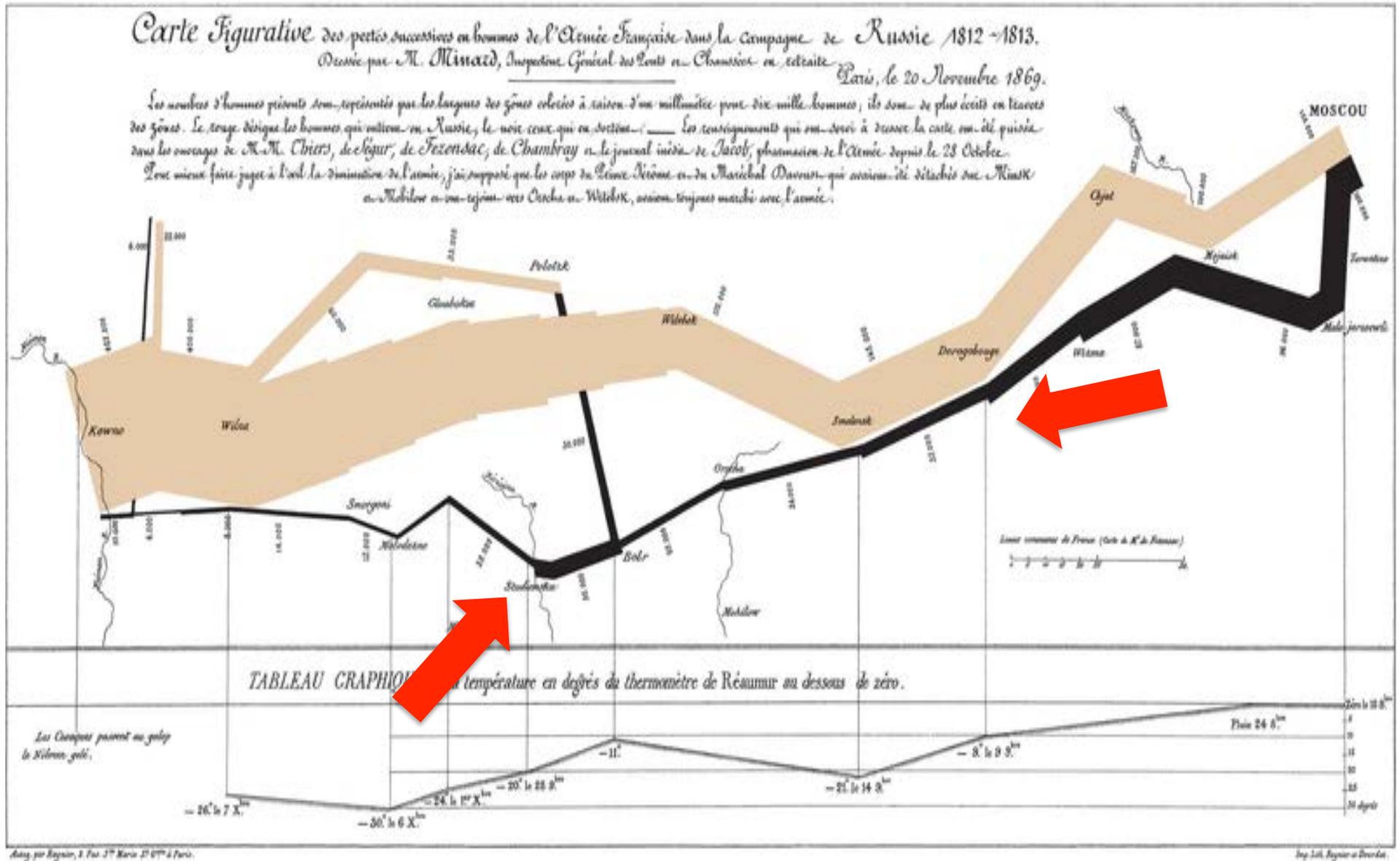
(Tufte, 2006)

1. Comparisons, Contrasts, Differences
2. Causality, Mechanism, Structure, Explanation
3. Multivariate Data
4. Integrate Words, Numbers, Images, Diagrams
5. Describe and Document Evidence
6. Content Counts Most of All

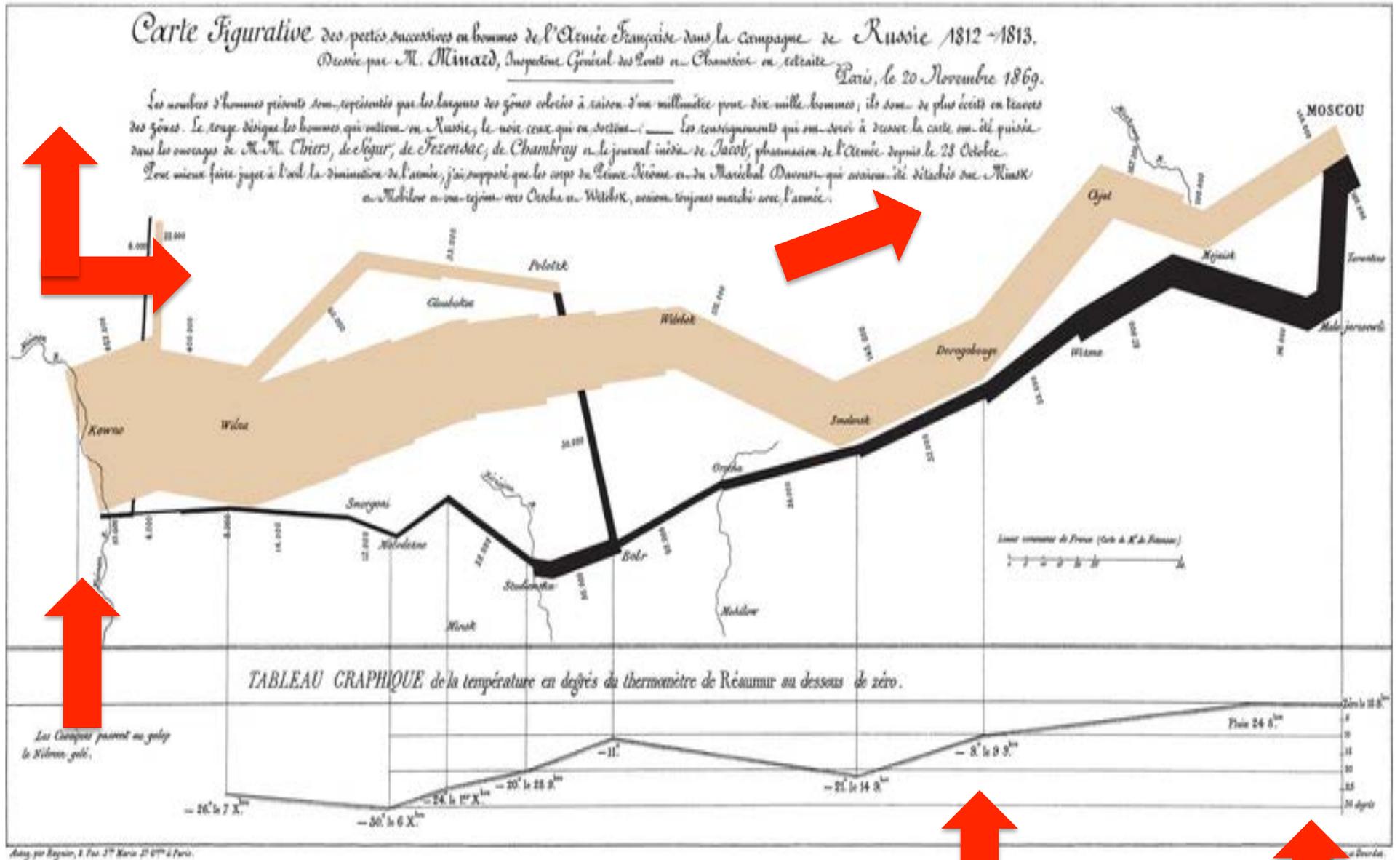
Comparisons, Contrasts, Differences



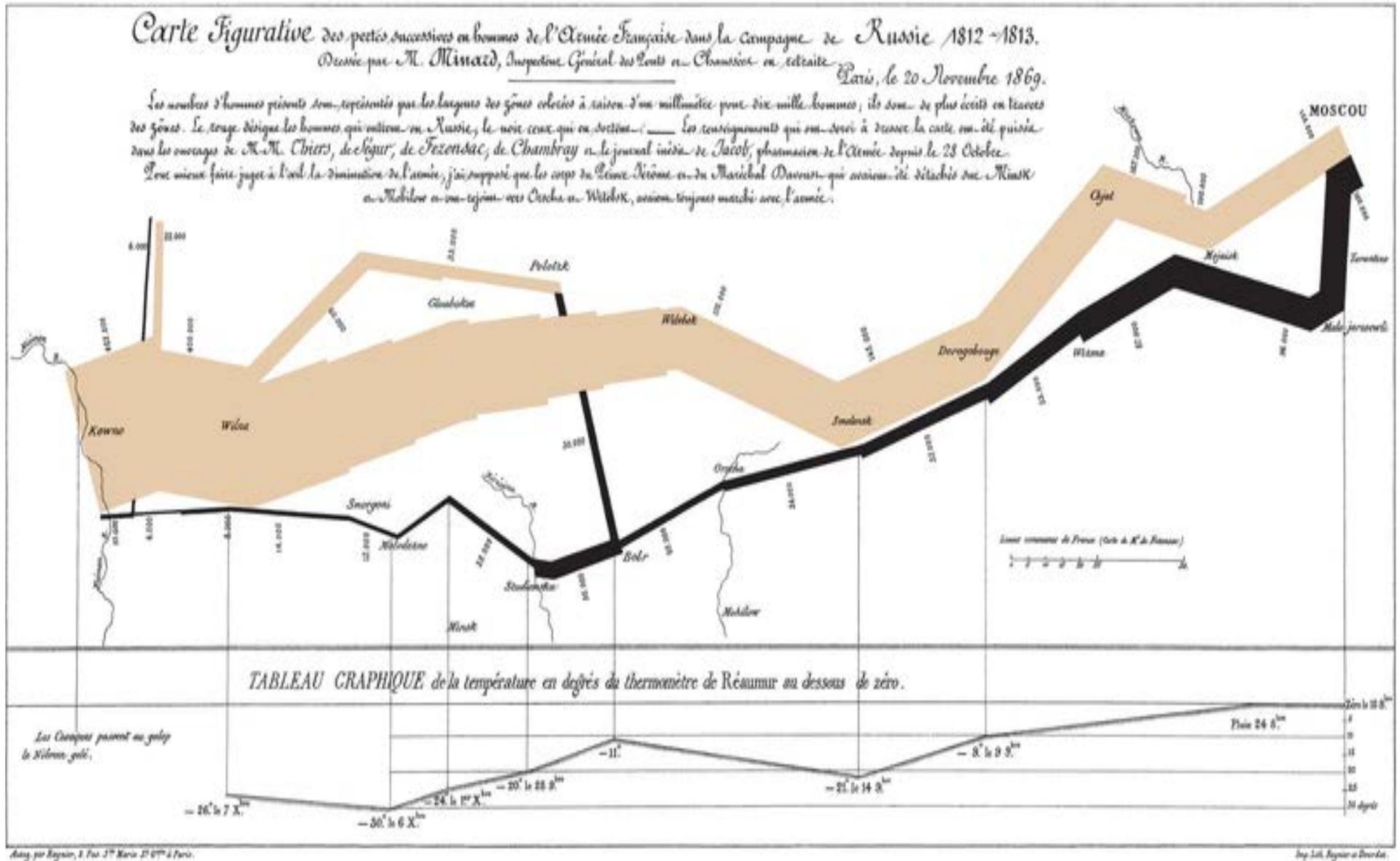
Causality, Mechanism, Structure, Explanation



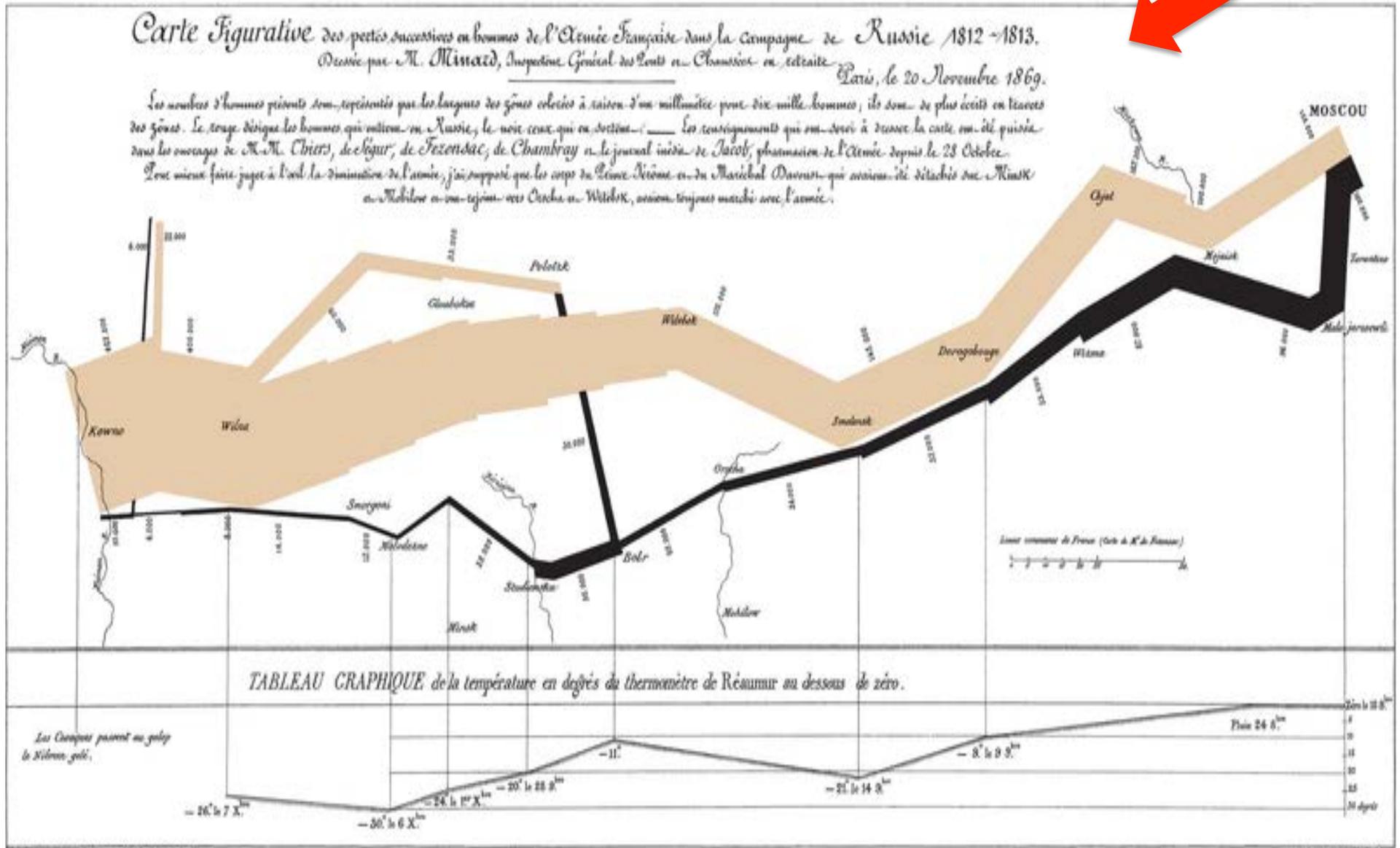
Multivariate Data



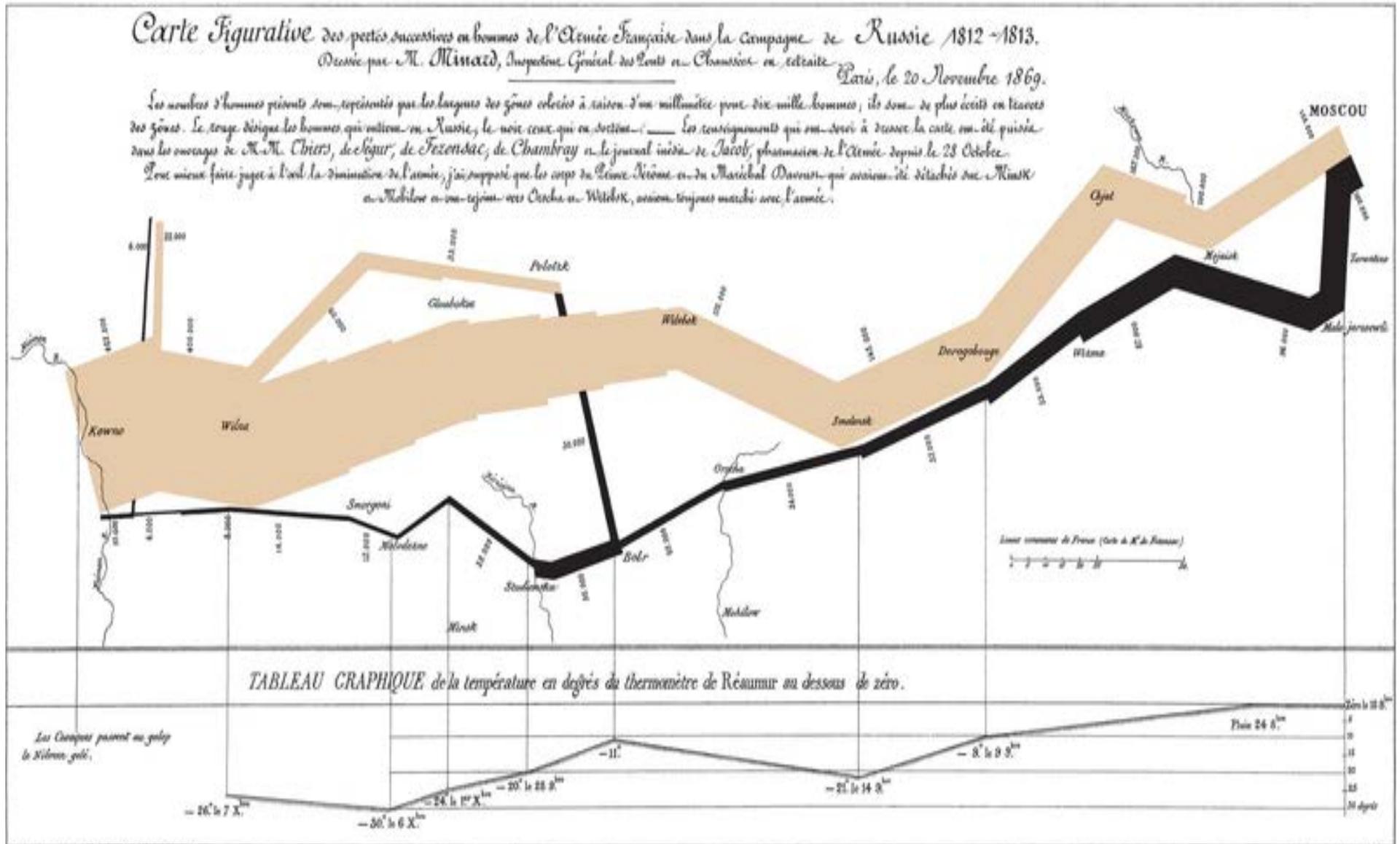
Integrate Words, Numbers, Images, and Diagrams



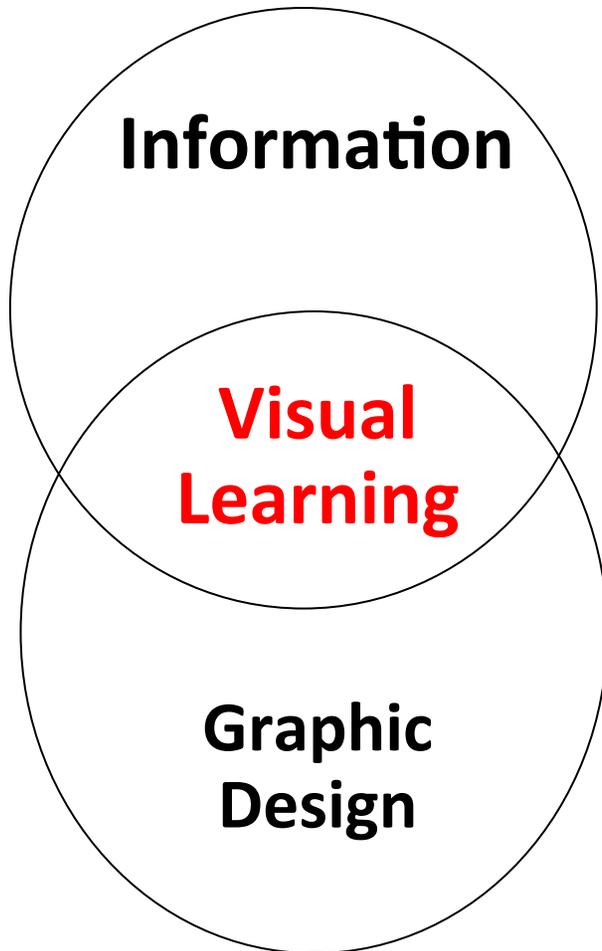
Describe and Document Evidence



Content Counts Most of All



Infographics



“A visualization of data or ideas that tries to convey complex information to an audience in a manner that can be quickly consumed and easily understood”

Smiciklas (2012, p. 3)

Types of data can be visualized

(Smiciklas, 2012)

- **Statistics** – KPIs, surveys, research
- **Processes** – pathways, customer service
- **Ideas** – concepts, theories, thought leadership
- **Chronology** – history, timelines, schedules
- **Geography** – metrics by region
- **Hierarchy** – organizational structure
- **Relationships** – internal, external, products/services
- **Personality** – brand, culture

Who is doing this well?

- Journalists (e.g., The Chronicle, USA Today)
- Bloggers
- Non-profits (e.g., Educause, PewInternet)
- Marketing agencies
- Federal, state, and local government agencies
- Others?

Examples from Higher Education (the good and the bad...)

January 11, 2012

Analytical Design Principles

(Tufte, 2006)

1. Comparisons, Contrasts, Differences
2. Causality, Mechanism, Structure, Explanation
3. Multivariate Data
4. Integrate Words, Numbers, Images, Diagrams
5. Describe and Document Evidence
6. Content Counts Most of All

Examples from Higher Education: To Explore a Question

THE FLIPPED CLASSROOM

Turning Traditional Education on Its Head

Many educators are experimenting with the idea of a flipped classroom model. So what is it and why is everyone talking about it?

WHAT IS THE FLIPPED CLASSROOM?

The flipped classroom inverts traditional teaching methods, delivering instruction online outside of class and moving "homework" into the classroom.

THE INVERSION

The Traditional Classroom
Teacher's Role: Stand on the Stage

LECTURE TODAY

➔

The Flipped Classroom
Teacher's Role: Guide on the Side

ACTIVITY TODAY

WHAT A FLIPPED CLASSROOM MODEL DOES

- Students watch lectures at home at their own pace, communicating with peers and teachers via online discussions.
- Concept engagement takes place in the classroom with the help of the instructor.

A THEORETICAL FRAMEWORK

Educational technology and activity learning are two key components of the flipped classroom model. They both influence student learning environments in fundamental ways.

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    graph TD
      ET[Educational Technology] -- uses --> CF[Classroom Flip]
      ET -- influences --> LE[The Learning Environment]
      CF -- provides opportunity for --> LA[Learning Through Activity]
      LA -- influences --> LE
  
```

HOW IT CAME TO BE

Many factors influenced the creation and adoption of the flipped classroom model. However, two specific innovators played a key role.

ITS INFANCY

2007: Teachers Jonathan Bergman and Aaron Sams of Woodland Park High School in Woodland Park, CO discovered software to record PowerPoint presentations.

They recorded and posted their live lectures online for students who missed class.

Bergman and Sams were asked to speak to teachers around the country about their methods.

The online lectures started spreading.

Teachers began using online videos and video products to teach students outside class, reserving class time for collaborative work and concept mastery exercises.

WHAT'S DRIVING IT?

Two key factors are driving increased adoption of the flipped classroom model.

POOR LEARNING OUTCOMES

The traditional one-size-fits-all model of education often results in limited concept engagement and severe consequences.

Yearly High School Dropouts

69% graduate, 31% don't

Only 48% of students who start high school finish four years later.

7,200 each day

1.3 million a year

An average of 7,200 students DROP OUT of high school each day, totaling 1.3 million a year.

PREVALENCE OF ONLINE VIDEO

The availability of online video and increasing student access to technology has paved the way for flipped classroom models.

Adults Who Have Viewed an Online Educational Video

2007: 18% of Internet Users

2010: 30% of Internet Users

+2,400 online video lessons in Khan Academy

THE Gamification OF EDUCATION

Classical games and educational potential in the education arena. How can we use it to make things meaningful and fun for students?

"Game players regularly exhibit persistence, risk-taking, attention to detail, and problem-solving, all behaviors that ideally would be regularly demonstrated in school." —The Education Arcade at MIT

1.2 MILLION STUDENTS

28 OVER 5 million people harvest their success every day.

As a planet, we spend 3 billion hours a week playing video and computer games.

What elements of gaming can we harness for educational purposes?

PROGRESSION

Levels: Ramp up and increase content.

Points: Increase the existing numerical value of your work.

INVESTMENT

Achievements: Earn points/recognition for completing work.

Collaboration: Work with others to accomplish goals.

Veracity: Be incentivized to involve others.

Appointments: Check in to receive new challenges.

Self-Meaning: Work to achieve something sustainable or transcendent.

CASCADING INFORMATION THEORY

Unlock information continuously

Rewards: Receive unexpected rewards.

Discovery: Navigate around your level using new information and resources.

Infinite Play: Learn something an expert.

Checkdown: Tackle challenges in a limited amount of time.

Team Adventure: Play to accomplish what you have gained.

Synthesis: Work on challenges that require multiple skills to solve.

According to the MIT paper, "Moving Learning Games Forward," games in schools today can be used as...

Authoring Platforms: Game is used to produce an artifact, be it another game, a model, virtual text, or written text.	See: Students produce a model in <i>StarCraft</i> .
Content Systems: Games deliver content about a particular subject area.	See: Students gain knowledge of Civilian history by playing <i>Flames</i> .
Simulation: Students use games to test theories about systems and tinker with variables.	See: Students gain a systemic understanding of engineering problems by working with a limited budget and available materials in <i>Bridge Builders</i> .
Flipped Systems: Games are used as a jumping point for discussion.	See: <i>Zenopsis & Dragons</i> is used to explore probability.
Technology Gateways: Students use games to explore themselves with technology.	See: Instead of taking a class on how to use PCs or mobile devices, students simply engage in their favorite game.
Examples of Point of View: Games allow students to take on different identities.	See: Students learn to think like a city mayor in <i>SimCity</i> .
Documentary: Students use games to document their learning process and reflect on it.	See: Students reflect on their playing to recognize patterns in their own performance and decision-making.
Tools to be Critiqued: Students critique the ideology behind the game.	See: <i>Armed & Dangerous</i> is employed as an expression of late 20th century capitalism.
Research Assignments: Students design games themselves and in doing so, research the subject.	See: Students decide to make a game about the Great Depression and learn history in the process.

A Short History of Gamified Learning

1945: **EDUCATION OF CHILDREN'S SOFTWARE INDUSTRY IN THE '40s**

- 1945: *Simon Stulman*
- 1947: *The Legend of Zelda*
- 1948: *Arthur Hays Sulzberger Teaching Typing*
- 1949: *Reader Rabbit*
- 1950: *Abakus Master*
- 1951: *Flines*

1950s: **GROWING SUBCULTURE OF EDUCATIONAL GAMES IN THE LATE '50s**

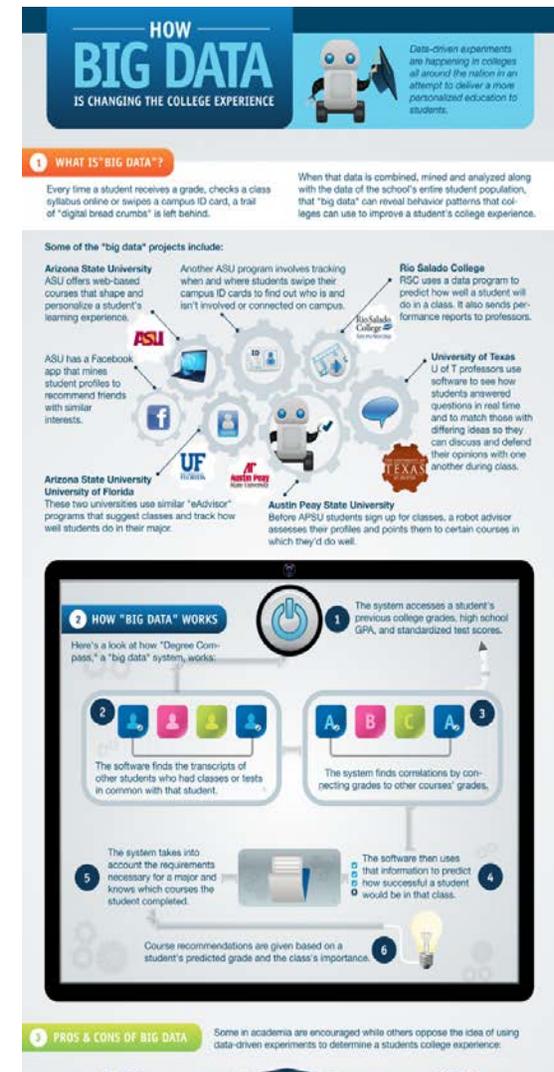
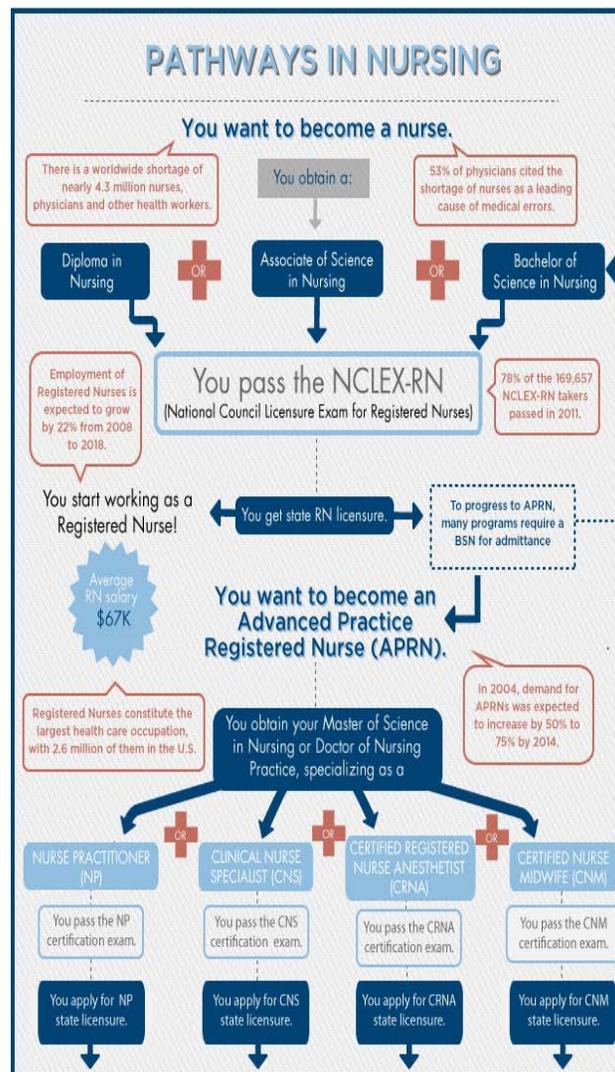
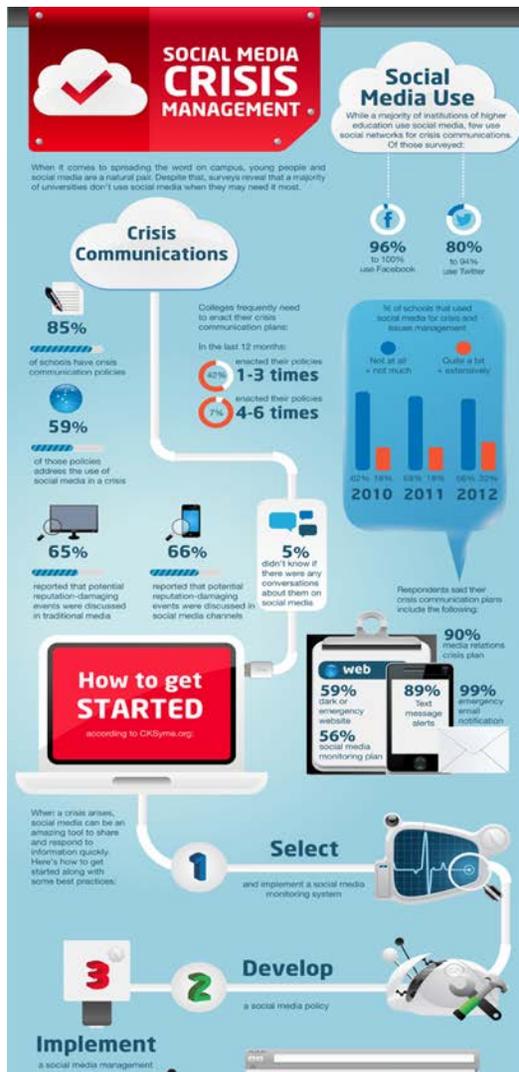
1955: **TECHNOLOGICAL REVOLUTION IN THE '50s** (IN THE '50s, THE MAINSTREAM OF VIDEOGAME CONSOLES, MOBILE DEVICES)

- 1955: *Excursion*

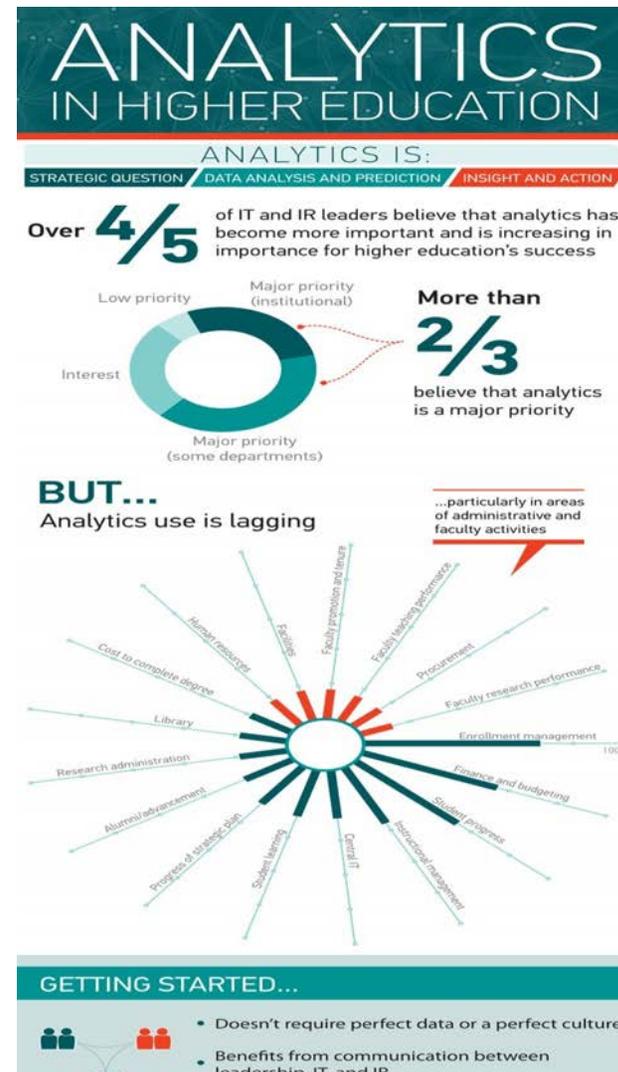
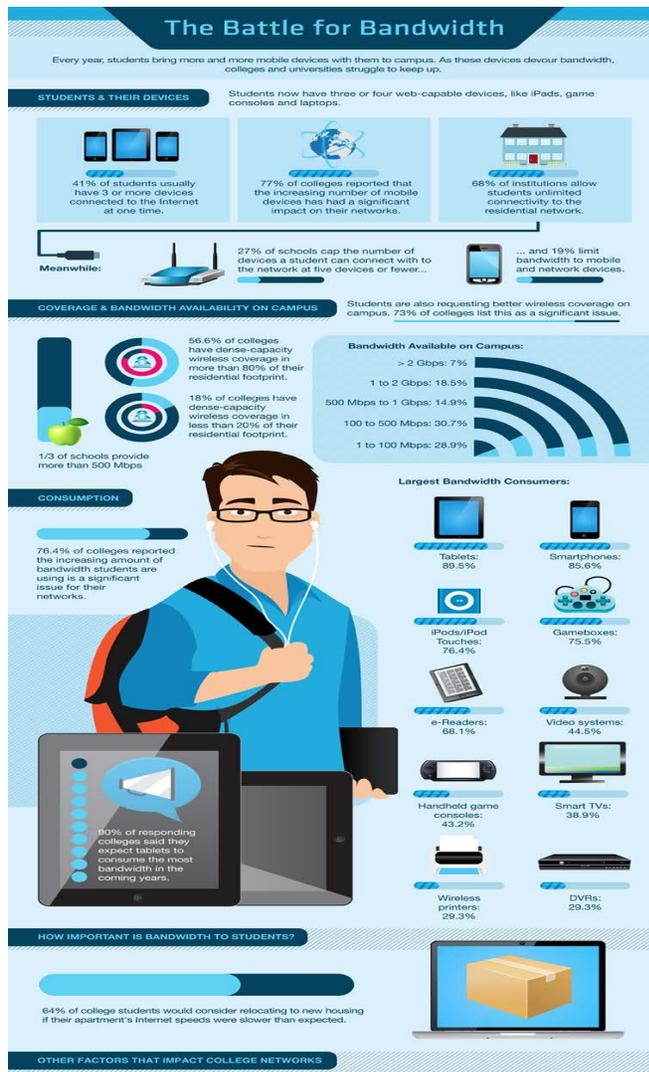
1990s: **VIRTUAL WORLDS WITH USER-CREATED CONTENT** (GAMES BECAME CUSTOMER USER EXPERIENCE BECAME A PROFESSION)

- 1990: *Avatar Worlds* (VR Chat enables learning platform)

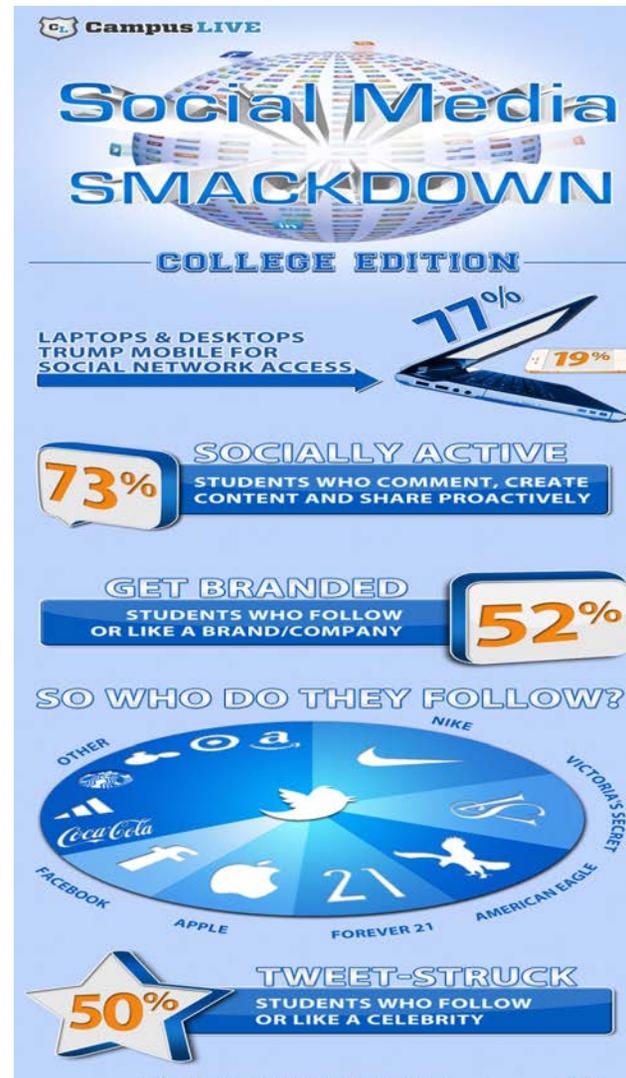
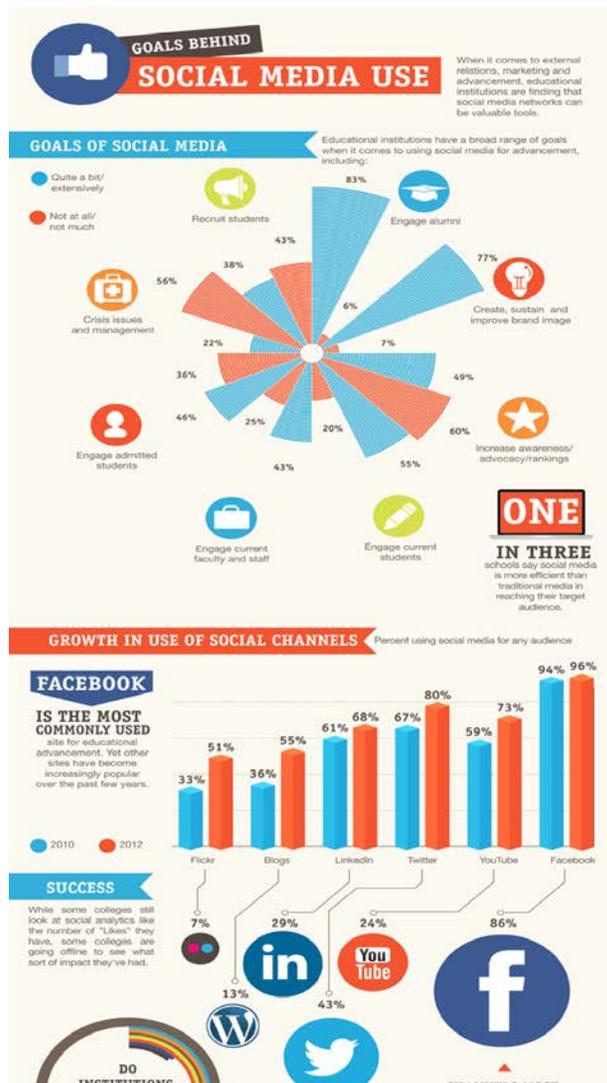
Examples from Higher Education: Processes and Pathways



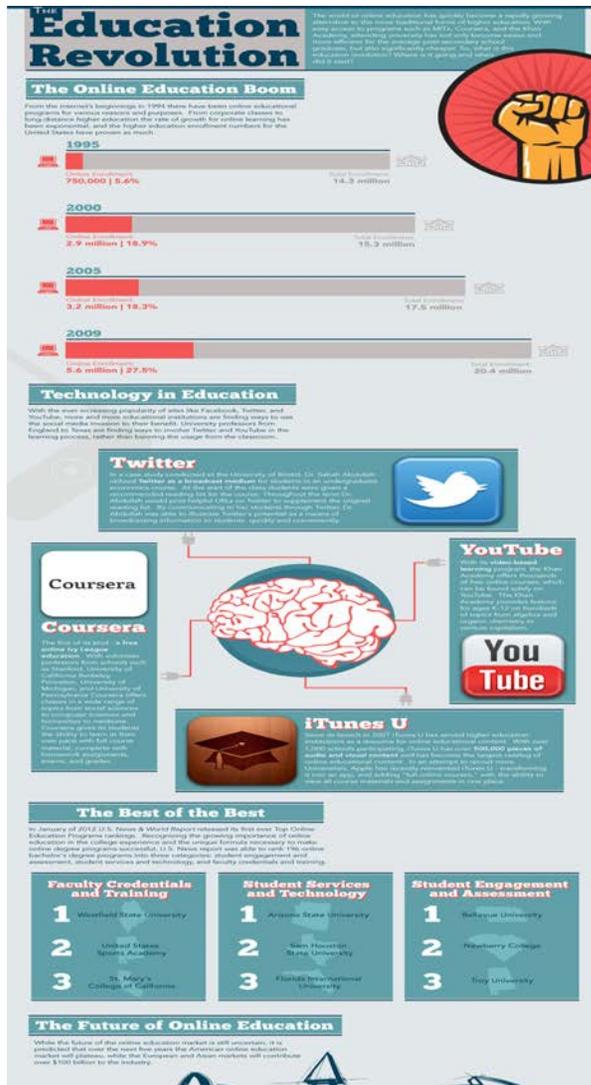
Examples from Higher Education: Ideas/Concepts/Thought Leadership



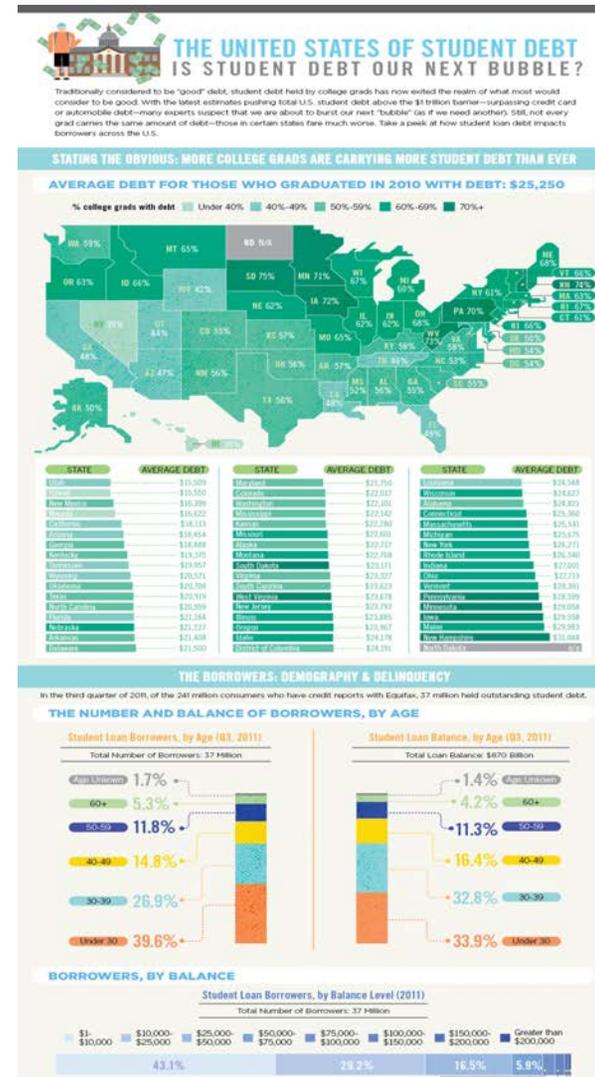
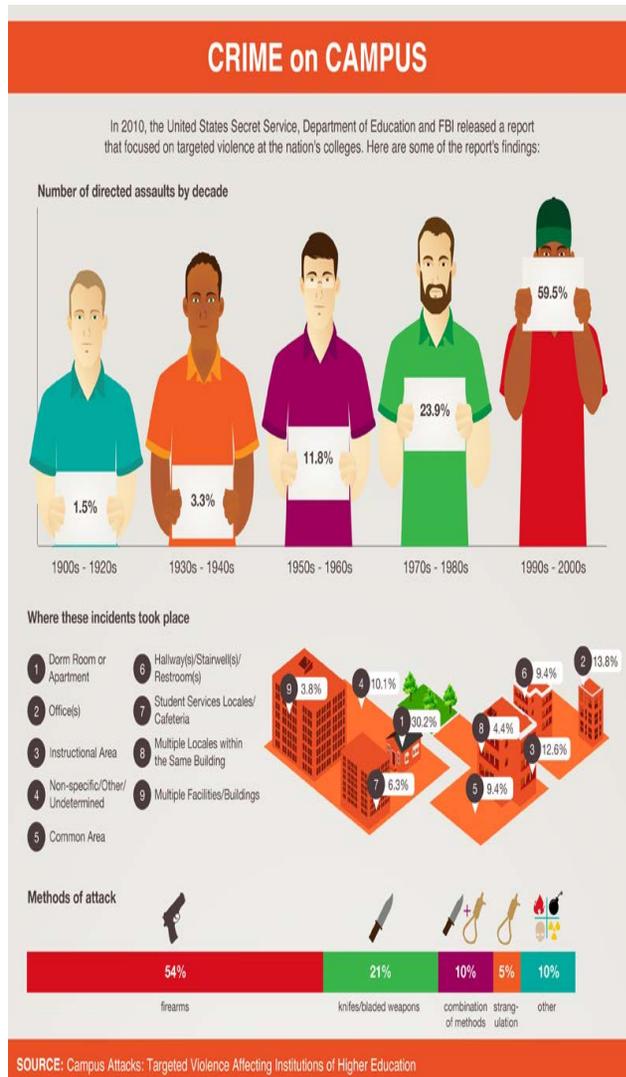
Examples from Higher Education: Relationships/Patterns of Behavior



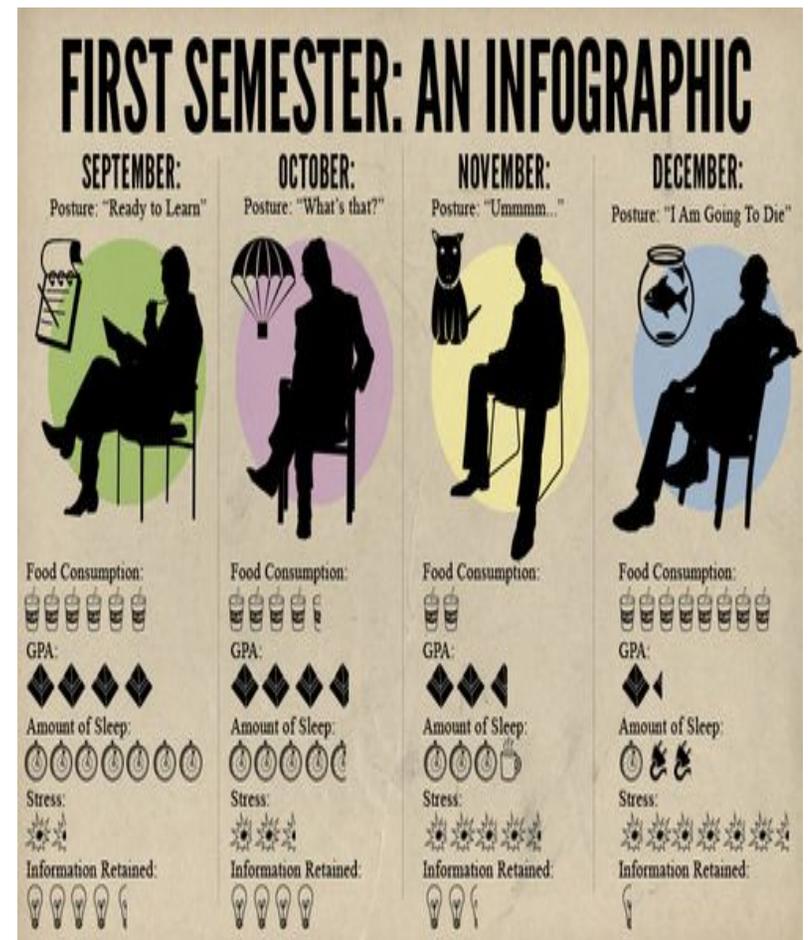
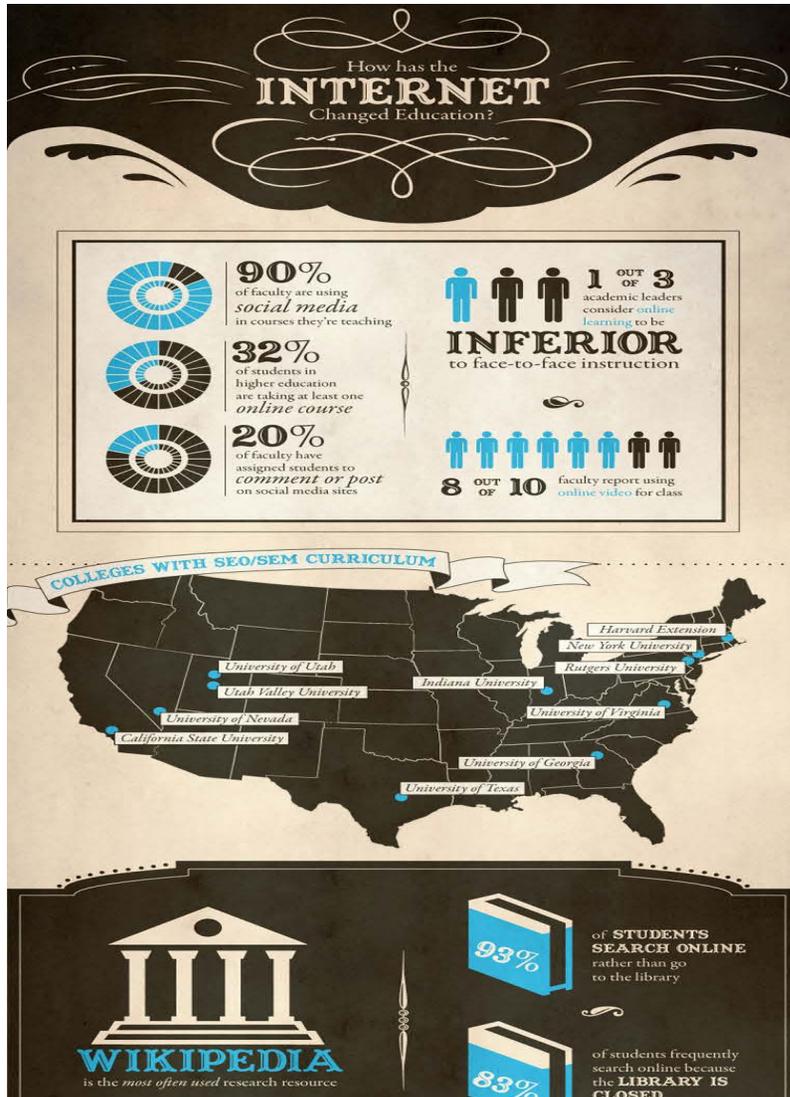
Examples from Higher Education: Student Profiles/Peer Comparisons



Examples from Higher Education: Geographical

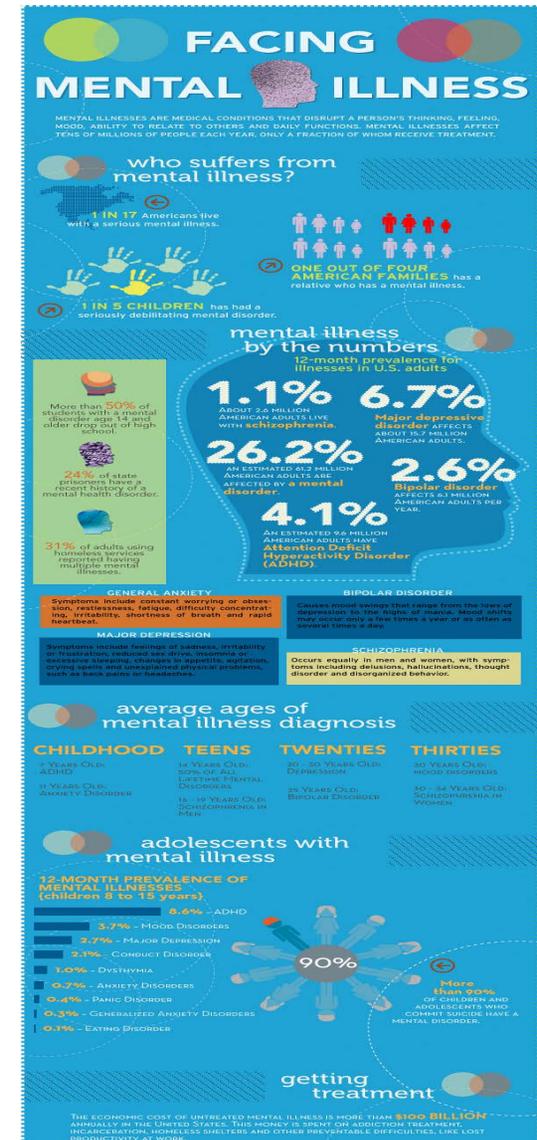
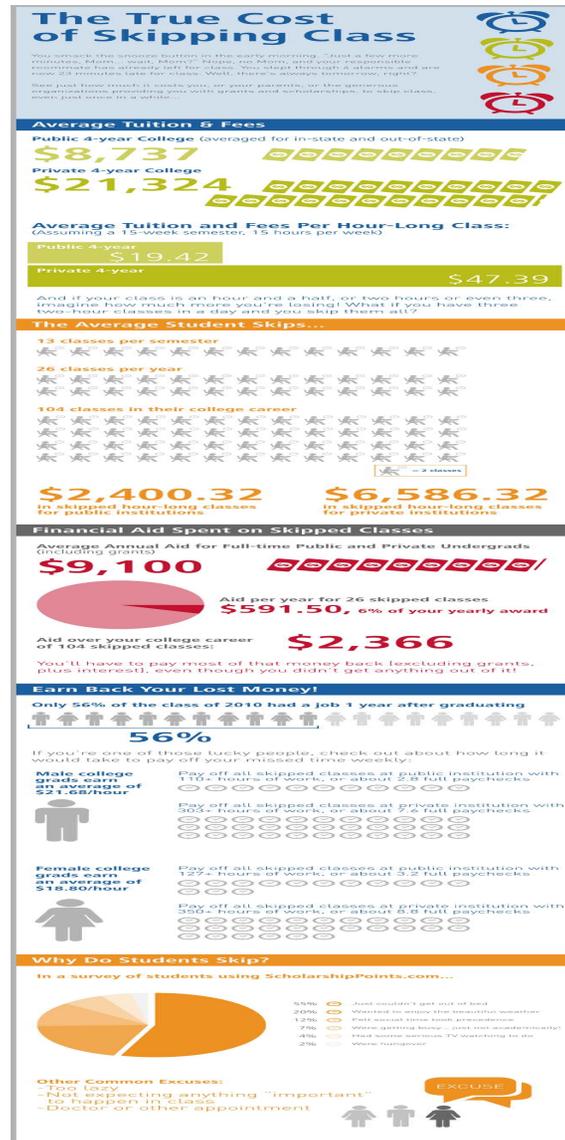
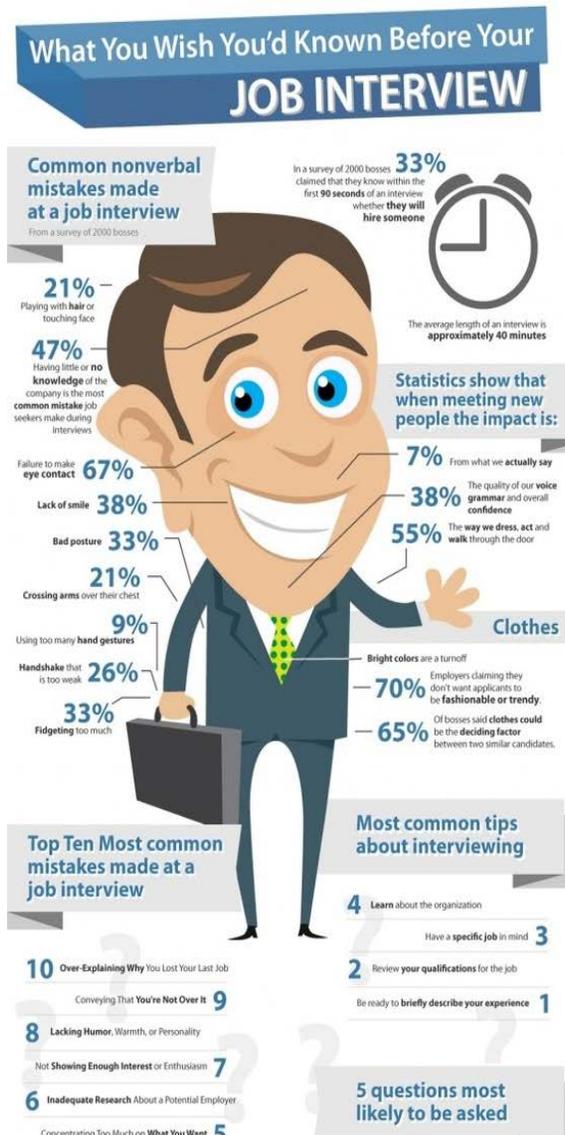


Examples from Higher Education: Chronology (History, Timeline, Schedules)



Examples from Higher Education:

Education



Just for Fun

Why Student Affairs Professionals are REALLY

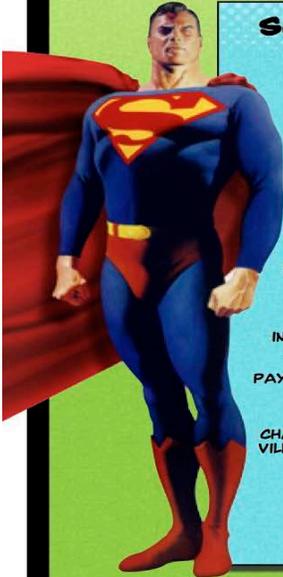
SUPERHEROES

ISSUE 1

1

OUR ORIGIN STORY BEGINS WITH A STUDENT HAVING ENORMOUS POTENTIAL. IN TIME & WITH MENTORSHIP THIS STUDENT WILL COME TO RECOGNIZE THEIR POWER. WITH GREAT POWER COMES GREAT RESPONSIBILITY, AND THIS, THE STUDENT AFFAIRS PROFESSIONAL WAS BORN...

IN DISGUISE!



SUPERHEROES

- DEDICATED TO CIVIC DEVELOPMENT
- USES REGULAR CLOTHES TO ESCAPE FROM HERO DUTIES
- WEAKENED BY KRYPTONITE OR SUPER VILLAIN
- BATTLES ARCHENEMY TO AVERT DISASTER
- CAN BE MISTAKEN AS A VIGILANTE DUE TO BROODY/MYSTERIOUS PERSONA
- IN TOUCH WITH MULTIPLE IDENTITIES
- PAYS MORE ATTENTION TO CRIME FIGHTING THAN LEGAL OUTCOMES
- CHALLENGES & SUPPORTS VILLAINS TO SEE A WORLD WITHOUT THEM
- ORIGIN OFTEN OTHERWORLDLY: KRYPTON OR RADIOACTIVE: SPIDERS

SA PROS

- DEDICATED TO STUDENT DEVELOPMENT
- USES DRESS CLOTHES TO NOT BE MISTAKEN AS A STUDENT
- WEAKENED BY DISMISSIVE FACULTY & HELICOPTER PARENTS
- BATTLES APATHY, ALCOHOL & ATTITUDES
- CAN BE MISTAKEN AS VIGILANTE DUE TO OVERZEALOUS ENFORCEMENT OF POLICY
- IN TOUCH WITH MULTIPLE IDENTITY THEORIES
- PAYS MORE ATTENTION TO PROGRAMMING THAN ASSESSMENT OUTCOMES
- CHALLENGES & SUPPORTS STUDENTS TO SEE A NEW WORLD VIEW
- ORIGIN OFTEN OTHERWORLDLY: CALIFORNIA, OR RADIOACTIVE: NEW JERSEY



Student Affairs Professionals ←

→ **IN ACTION**

THE SOUND OF "BREAKING THE ICE"



THE SOUND OF BROKEN DREAMS OF BECOMING A MILLIONAIRE



Why Infographics Work

- Convey a lot of information in a small space
- Easy to digest
- Shareable (and trackable)
- Aesthetically interesting

Why You Should Give It a Try

- Challenge yourself to engage with your data in new and different ways
- Learn new skills
- Identify new insights
- Set yourself apart from your peers

Getting Started: Plan Your Work

- **Identify your purpose**
 - What goals do you hope to achieve by visually communicating your data?
- **Identify and understand your audience**
 - Who are the infographics for? Parents? Students? Broader Community?
- **Identify your reporting objectives and outcomes**
 - What do you need to communicate?
 - How often, on what timeline?
 - What do you expect for your ROI?
 - How will you know you were effective?

Getting Started: Get Inspired

(But, be a critical consumer...not all you find will be good examples)

Pinterest: Infographic

Twitter: #infographic

Blogs/Websites:

- coolinfographics.com
- dailyinfographic.com
- edtechmagazine.com/higher
- flowingdata.com
- good.is/infogrphics
- chartporn.org
- infographicsshowcase.com
- pdviz.com/blog

Getting Started: Data Synthesis

- Understand your data
- Start simple
 - Think about ways that you can take existing charts and graphs to the next level
 - Add additional layers to explore your story
 - Adhere to the analytical design principles
- Record and distill your thoughts
- Synthesize, synthesize, synthesize
- Create a concept map (paper and pencil)

Getting Started: The Right Tools

Software

Excel, Google Analytics, Facebook Insights

Pages (Mac)

Photoshop

InDesign/Adobe Illustrator

Microsoft Publisher

Visualization tools:

Campus Labs – Baseline (campuslabs.com)

Chartle (chartle.net)

Tableau (tableausoftware.com)

Wordle (wordle.net)

Visual.ly (visual.ly)

The Noun Project (thenounproject.com)

Open Clipart (openclipart.org)

Getting Started: Try It Out

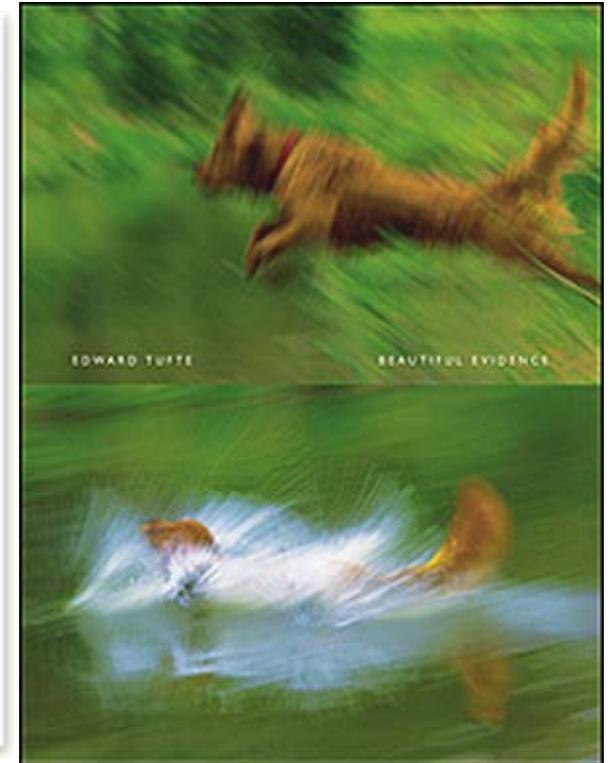
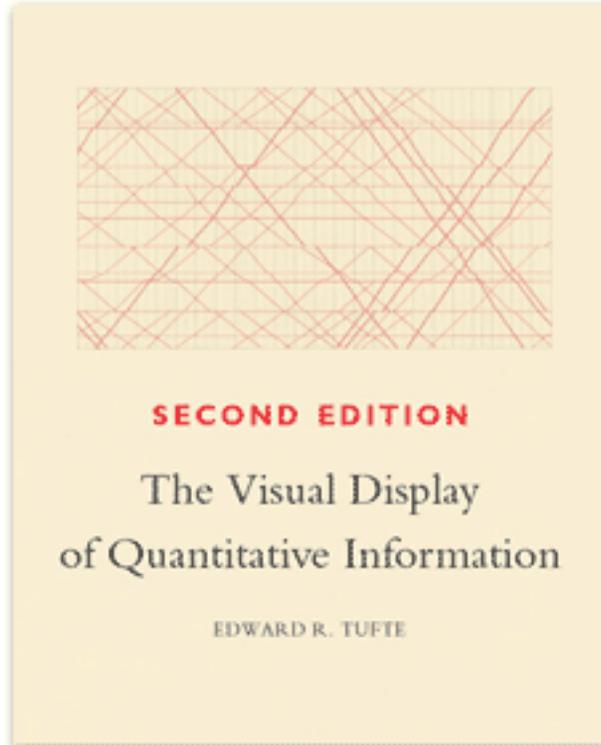


Additional Resources: Try a MOOC

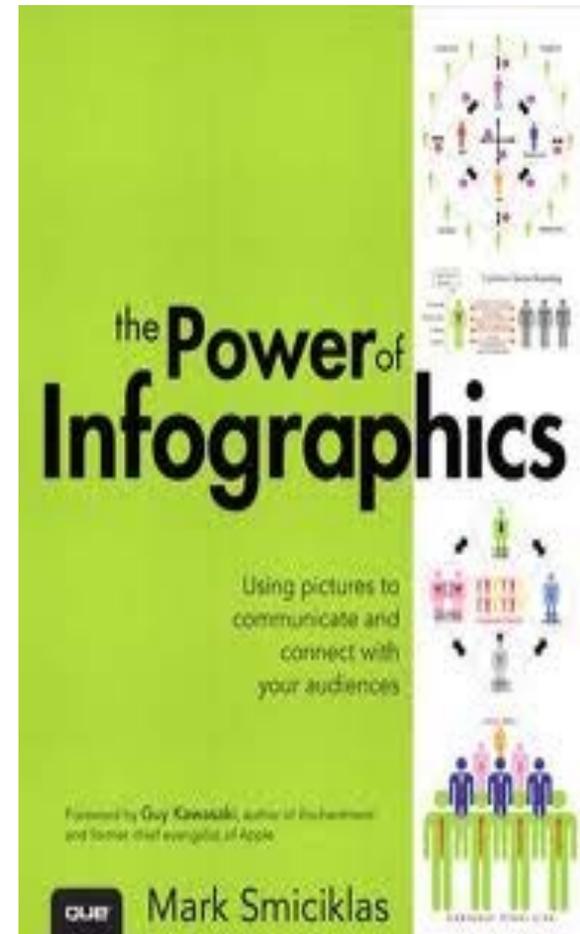
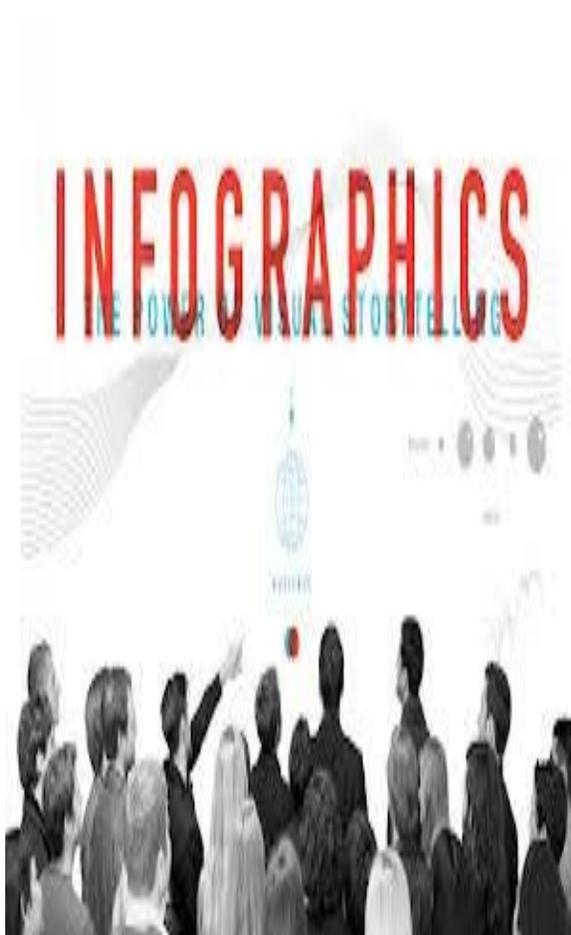
- Knight Center – Introduction to Infographics and Data Visualization

Additional Resources: Further Reading

Edward Tufte (www.edwardtufte.com)



Additional Resources: Further Reading



January 11, 2012

Want to learn more?

- We are thinking of creating a community of learners who are interested in developing knowledge/skills in this area. If you are interested, please contact:

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703-993-4081

References

Tufte, E.R. (2006). *Beautiful evidence*. Cheshire, CT: Graphics Press LLC.

Smiciklas, M. (2012). *The power of infographics: Using pictures to communicate and connect with your audience*. Indianapolis, IN: QUE.

Lankow, J., Ritchie, J., Crooks, R. (2012). *Infographics: The power of visual storytelling*. Hoboken, NJ: John Wiley & Sons, Inc.

Infographic Links

- Educated and Employed:
<http://www.edtechmagazine.com/higher/sites/edtechmagazine.com.higher/files/uploads/12.01.png>
- Creativity and Education:
http://media.dexigner.com/article/23057/Creativity_and_Education_Infographic.jpg
- Students and Technology:
<http://www.edtechmagazine.com/higher/article/2012/10/how-technology-powering-academic-success-infographic>
- The Flipped Classroom:
<http://www.edtechmagazine.com/higher/article/2012/07/can-flipped-classroom-model-work-higher-education-infographic>
- Gamification of Education:
<http://www.edtechmagazine.com/higher/article/2012/11/where-does-gamification-fit-higher-education-infographic>
- Social Media Crisis Management:
<http://www.business2community.com/social-media/social-media-crisis-management-infographics-worth-your-attention-0315203>
- Pathways in Nursing: <http://nursinglicensemap.com/pathways-in-nursing-infographic/>
- How Big Data is Personalizing the College Experience:
<http://www.edtechmagazine.com/higher/article/2012/09/how-big-data-personalizing-college-experience-infographic>
- Battle for Bandwidth: <http://www.onlinecolleges.net/2012/08/01/the-battle-for-bandwidth/>
- Analytics in Higher Education:
<http://www.edtechmagazine.com/higher/article/2012/11/evolving-role-analytics-higher-education-infographic/>

Infographic Links

- How Colleges are Using Social Media:
<http://www.edtechmagazine.com/higher/article/2012/10/how-schools-actually-use-social-media-infographic>
- Social Media Smackdown:
http://www.huffingtonpost.com/2012/06/08/infographic-college-students-twitter-use_n_1581344.html
- Online Education Revolution:
<http://www.edtechmagazine.com/higher/article/2012/08/online-education-revolution-infographic>
- Profile of an Online College Student:
<http://www.edtechmagazine.com/higher/article/2012/12/closer-look-online-college-student-infographic>
- Crime on Campus: <http://www.infographs.org/2012/06/crime-on-campus-infographic/>
- The United States of Student Debt:
<http://www.mint.com/blog/trends/infographic-the-united-states-of-student-debt-042012/>
- How the Internet Changed Education:
<http://www.coolinfographics.com/blog/2012/5/7/how-has-internet-changed-education.html>
- First Semester: <http://iwastesomuchtime.com/on/?i=16588>
- What You Wish You'd Known Before Your Job Interview:
<http://visual.ly/what-you-wish-you-d-known-your-job-interview>
- The True Cost of Skipping Class:
<http://www.studentscholarshipsearch.com/tips/cost-of-skipping-class.php>
- Facing Mental Illness: <http://msw.usc.edu/mswusc-blog/facing-mental-illness-infographic/>
- Student Affairs Superheroes:
<http://sawomentalktech.com/blog/2012/02/07/infographic-why-sapros-are-really-superheroes-in-disguise-saheroes/>