Time to Engage

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PAULINE C HOW
CENTRAL PENNSYLVANIA’S COMMUNITY COLLEGE, HACC

TEXMATYC, Saturday, February 21, 2015
10:00-11:00 a.m.
http://tinyurl.com/kgmt56k
Overview – Engage students

- With real-life applications/relevance
- With habits of the mind
- With technology
Reasons for Non-succcess

- Deep fear of math
- Lack of focus/interest; boring
- Think “I can’t learn it.”/ Low confidence level
- Weakest subject since middle school
- Not a math person
More Reasons

- Can’t see relevance
- Word problems
- Frustrated with sign errors/mistakes
- No ability to retain what I have learned
- Can’t visualize it
- Hard time understanding it
What happens during Lecture?

Nothing!!

- Harvard Study by Eric Mazur
- Independent decision making part of our brain turns off when we listen to experts.
  (Source: How to use experts—and when not to, Noreena Hertz, http://ed.ted.com)
Relevant Examples

- Social Media/Internet Stats
- World Data – population, life expectancy, climate,…
- Careers – job growth/decline, earning potential
- Sports – salaries, stats, number of people participating
- Technology – computer storage, sales, cost of production, mobile data
College Information - majors, college degrees, cost, earnings
Current issues - gas, economy, transportation, environment
Pop culture - celebrity earnings, music, movies
Finance - savings, credit cards, stocks, consumer expenditures, sales
Health issues - BMI, BMR, calories burned, stats on illnesses
Welcome to WeUseMath.org!

The most common question students ask math teachers at every level is “When will I use math?” WeUseMath.org is a non-profit website that helps to answer this question. This website describes the importance of mathematics and many rewarding career opportunities available to students who study mathematics.
Example: Latte Factor
http://www.finishrich.com/lattefactor/

Enter an Expense

1. Choose a Category
   Latte/Coffee

2. Choose an Amount
   $5

Instant Latte Factor

This calculates the Latte Factor for the expense entered above.

At an annual interest rate of 6%

<table>
<thead>
<tr>
<th>$5 Daily</th>
<th>$5 Weekly</th>
<th>$5 Monthly</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1,034.50 in 1 year.</td>
<td>$275.60 in 1 year.</td>
<td>$63.60 in 1 year.</td>
</tr>
<tr>
<td>$3,085.07 in 2 years.</td>
<td>$567.74 in 2 years.</td>
<td>$131.02 in 2 years.</td>
</tr>
<tr>
<td>$5,158.87 in 3 years.</td>
<td>$877.40 in 3 years.</td>
<td>$202.48 in 3 years.</td>
</tr>
<tr>
<td>$8,462.69 in 4 years.</td>
<td>$1,205.64 in 4 years.</td>
<td>$278.23 in 4 years.</td>
</tr>
<tr>
<td>$10,904.96 in 5 years.</td>
<td>$1,553.58 in 5 years.</td>
<td>$358.52 in 5 years.</td>
</tr>
<tr>
<td>$13,648.25 in 10 years.</td>
<td>$3,052.63 in 10 years.</td>
<td>$838.30 in 10 years.</td>
</tr>
<tr>
<td>$25,027.36 in 15 years.</td>
<td>$4,414.80 in 15 years.</td>
<td>$1,480.35 in 15 years.</td>
</tr>
<tr>
<td>$71,161.73 in 20 years.</td>
<td>$10,138.11 in 20 years.</td>
<td>$2,339.50 in 20 years.</td>
</tr>
<tr>
<td>$152,938.00 in 30 years.</td>
<td>$21,788.44 in 30 years.</td>
<td>$5,028.10 in 30 years.</td>
</tr>
<tr>
<td>$299,387.02 in 40 years.</td>
<td>$42,652.40 in 40 years.</td>
<td>$9,842.88 in 40 years.</td>
</tr>
</tbody>
</table>
3,070,807,992  Internet Users in the world
1,213,754,374  Total number of Websites
1,477,204,095  Emails sent today
28,531,118    Google searches today
26,222        Blog posts written today
5,171,685     Tweets sent today
### World Population

<table>
<thead>
<tr>
<th>Data Point</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current World Population</td>
<td>7,296,407,805</td>
</tr>
<tr>
<td>Births this year</td>
<td>19,429,155</td>
</tr>
<tr>
<td>Births today</td>
<td>3,541</td>
</tr>
<tr>
<td>Deaths this year</td>
<td>8,016,703</td>
</tr>
<tr>
<td>Deaths today</td>
<td>1,461</td>
</tr>
<tr>
<td>Net population growth this year</td>
<td>11,412,453</td>
</tr>
<tr>
<td>Net population growth today</td>
<td>2,080</td>
</tr>
<tr>
<td>Country</td>
<td>Population</td>
</tr>
<tr>
<td>--------------</td>
<td>------------</td>
</tr>
<tr>
<td>United States</td>
<td>313,847,465</td>
</tr>
<tr>
<td>Mongolia</td>
<td>3,179,997</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>7,153,519</td>
</tr>
</tbody>
</table>
Wireless Facts

CTIA – The Wireless Association
Wireless subscriber connections
Wireless-only households
Annual minutes of use
Monthly text messages
Cell sites
Year-End U.S. Figures from CTIA's Annual Survey Report

Unless otherwise noted, facts are from CTIA-The Wireless Association, CTIA's Wireless Industry Summary Report, Year-End 2013 Results, 2014

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Wireless Subscriber Connections</td>
<td>335.65M</td>
<td>326.48M</td>
<td>270.3M</td>
<td>158.7M</td>
<td>69.2M</td>
</tr>
<tr>
<td>Equals # of active devices, including smartphones, feature phones, tablets, etc. Since users may have more than one wireless device, it is not equal to individual subscribers.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<p>| Wireless Penetration | 104.3% | 102.2% | 87.2% | 53.6% | 24.6% |
| Equals # of active units divided by the total U.S. and territorial population (Puerto Rico, Guam and the USVI) |</p>
<table>
<thead>
<tr>
<th>Year after 2001</th>
<th>Cell phone service</th>
<th>Residential phone services</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$210</td>
<td>$686</td>
</tr>
<tr>
<td>1</td>
<td>$294</td>
<td>$641</td>
</tr>
<tr>
<td>2</td>
<td>$316</td>
<td>$620</td>
</tr>
<tr>
<td>3</td>
<td>$378</td>
<td>$592</td>
</tr>
<tr>
<td>4</td>
<td>$455</td>
<td>$570</td>
</tr>
<tr>
<td>5</td>
<td>$524</td>
<td>$542</td>
</tr>
<tr>
<td>6</td>
<td>$608</td>
<td>$482</td>
</tr>
<tr>
<td>7</td>
<td>$643</td>
<td>$467</td>
</tr>
<tr>
<td>8</td>
<td>$712</td>
<td>$434</td>
</tr>
<tr>
<td>9</td>
<td>$760</td>
<td>$401</td>
</tr>
</tbody>
</table>

[Source: http://www.bls.gov/ops/pub/focus/volume2_number12/cex_2_12_chart1_data.htm]

Chart 1. Average annual expenditures on cell phone and residential phone services, 2001–2010

1) Plot the data for both the Average Annual Expenditures on Cell phone and Residential phone services on the same rectangular coordinate system, using the year as the input variable on the horizontal axis (x=0 for 2001, and x=10 for 2010), and Average Annual expenditures as the output on the vertical axis.

2) What trends do you observe from the scatter plot in part (1) for the Average Expenditures for residential phones? What about for cell phones? (Increasing/ decreasing, linear/ bended, etc.)

3) Find the equation of the line that best fits the scatter plot for residential phone expenditures by drawing a line that approximates the residential scatter plot; select two points on your line and estimate their coordinates. Using the estimates for the coordinates of your two points, find the equation of the line.

4) Repeat part (3) using the cell phone expenditures scatter plot.

5) Interpret the slope of the lines found in parts (3) and (4) in the context of the problem.

6) Evaluate and interpret the y-intercept for each of the two lines in the context of the problem.

7) Using the equations you obtained, evaluate the value of y (for both Residential and Cell phones) for the year 2007.

8) Are your results in part (7) above or below the values provided by the table for the year 2007?

9) Repeat question (7) for the year 2020. Would you recommend these results as “good” predictions for 2020? Explain your answer.

10) Write a short paragraph on what you have learned about average cell phone expenditures as compared to average residential expenditures.

11) Write a short paragraph on how each member of your team, including yourself, has contributed to this project.
Average Annual Expenditures of U.S. Consumers

- Linear (Residential phone services)
  - \( y = -31.133x + 683.6 \)
  - \( R^2 = 0.9915 \)

- Residential phone services
  - \( y = 62.242x + 209.91 \)
  - \( R^2 = 0.994 \)

- Cell phone services

Graph showing expenditures in dollars for different services.
Habits of the Mind: Retaining Material

- Deliberate practice - “Secrets of Greatness” Article
- Forgetting curve - University of Waterloo Counseling Services
Habits of the Mind

- Help students organize information
- Teach how to manage time and priorities
- Demonstrate level of accepted work
- Discuss habits which lead to success
- Help them differentiate problem types
<table>
<thead>
<tr>
<th><strong>FIXED MINDSET</strong></th>
<th><strong>GROWTH MINDSET</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Something you’re born with</td>
<td>• Skills</td>
</tr>
<tr>
<td>• Fixed</td>
<td>• Come from hard work.</td>
</tr>
<tr>
<td>• Something to avoid</td>
<td>• Can always improve</td>
</tr>
<tr>
<td>• Could reveal lack of skill</td>
<td>• Challenges</td>
</tr>
<tr>
<td>• Tend to give up easily</td>
<td>• Should be embraced</td>
</tr>
<tr>
<td>• Unnecessary</td>
<td>• An opportunity to grow.</td>
</tr>
<tr>
<td>• Something you do when you are not good enough</td>
<td>• More persistent</td>
</tr>
<tr>
<td>• Get defensive</td>
<td>• Effort</td>
</tr>
<tr>
<td>• Take it personal</td>
<td>• Essential</td>
</tr>
<tr>
<td>• Blame others</td>
<td>• A path to mastery</td>
</tr>
<tr>
<td>• Get discouraged</td>
<td>• Feedback</td>
</tr>
<tr>
<td></td>
<td>• Useful</td>
</tr>
<tr>
<td></td>
<td>• Something to learn from</td>
</tr>
<tr>
<td></td>
<td>• Identify areas to improve</td>
</tr>
<tr>
<td></td>
<td>• Setbacks</td>
</tr>
<tr>
<td></td>
<td>• Use as a wake-up call to work harder</td>
</tr>
<tr>
<td></td>
<td>next time.</td>
</tr>
</tbody>
</table>
Effective Apps/Online Tools

- Organization tools
- Time/Productivity tools
- Study tools
- Mathematical tools
- Interaction tools
Organization

- Evernote
- Dropbox, onedrive.live
- MyHomework App
- Trello
- Wunderlist
- Remember the Milk
- MyLifeOrganized
- Healing Charts
- Sandglaz
Time and Productivity

- Rescue Time
- Tomato.es – Pomodoro technique ® driven time tracker
- Alarmed App (iOS)
- YATA App (Yet Another Time App)
- Toodledo
- Mint.com (personal finances)
Studying

- Study Blue
- Study Stack
- gFlash (iOS)
- Evernote Peek (iPad)
- Groupboard (iOS) – collaborative whiteboard
Complementary Angles
Two angles whose sum is 90°.

Supplementary Angles
Angles whose measures add up to 180 degrees.

Vertical Angles
Angles that are opposite each other when two lines intersect.

integer operations

-3 + (-6)

Correct Cards (0)
Incorrect Cards (0)

Remaining Cards (61)
Mathematical Tools

- https://www.desmos.com/calculator
- http://www.mathscoop.com/
- http://www.meta-calculator.com/online/
- http://www.calculator.net/scientific-calculator.html
- http://www.wolframalpha.com/
- http://www.nctm.org/resources/content.aspx?id=32706
y = a(x - h)^2 + k

a = 1
h = -2
k = 2
Microsoft 4.0
AutoMath Photo Calculator
Interaction Tools

- Google Forms
- Socrative
- Geddit
- Infuse Learning
- The Answer Pad
- Poll Everywhere
- Quiz Revolution
- Teacher Desmos
Google Forms

http://tinyurl.com/lopxuhy
Questions & Comments

Thanks for Attending!
Contact Information

- Andrea Hendricks
  Andrea.hendricks@gpc.edu

- Pauline Chow
  opcchow@hacc.edu
Websites for Application Problems

Social Media - Facebook, Twitter, etc.
- http://mashable.com/2012/03/09/social-media-demographics/
- http://www.checkfacebook.com/
- http://blog.twitter.com/2011/03/numbers.html
- http://statisticbrain.com
World Data Sources

World data - population, life expectancy, climate, etc.

- http://www.gapminder.org/
- http://www.census.gov/
- http://www.worldometers.info/
- http://www.google.com/publicdata/directory
- http://www.worldmapper.org/
Career Data Sources

**Careers - job growth/decline, earning potential**

- http://www.retailmeansjobs.com/
- http://cew.georgetown.edu/resources/publications
- http://www.bls.gov/
- http://www.payscale.com/payscale-index/
- http://www.bls.gov/ooh/
Sports Data Sources

Sports - salaries, stats, number of people involved

- http://content.usatoday.com/sportsdata/baseball/mlb/salaries/team
- http://www.usatoday.com/sports/
- http://www.stats.com/
- http://www.nfhs.org/content.aspx?id=3282 (National Federation of State High School Associations)
Technology Data Sources

- http://www.ctia.org/media/industry_info/index.cfm/AID/10323
College Info Data Sources

College info - majors, college degrees, completion rates, cost, earnings

- http://www.completecollege.org
- http://nces.ed.gov/
- http://trends.collegeboard.org/
- http://www.collegemeasures.org/
- http://www.usnews.com/rankings
- http://cew.georgetown.edu
Current Issues Data Sources

Current issues - gas, economy, transportation, environment

- http://fueleconomy.gov/
- http://www.eia.gov/
- http://cdiac.ornl.gov/ (carbon dioxide emissions)
- http://www.ilsr.org/content-types/charts-graphs-resource-archive/
Pop Culture Data Sources

**Pop culture - celebrity earnings, music, movies**

- http://boxofficemojo.com/
- http://www.the-numbers.com
Finance Data Sources

Finance—savings, credit cards, stocks, consumer expenditures, sales

- http://www.google.com/finance?tab=we#
- Investor Relations (see company website)
Health Data Sources

Health issues - BMI, BMR, calories burned, stats on illnesses, half-life of drugs

- http://www.cdc.gov/
- http://www.world-nuclear.org/info/inf55.html
- http://www.radiochemistry.org/nuclearmedicine/radioisotopes/ex_iso_medicine.htm
- http://www.nutristrategy.com/caloriesburned.htm
Other Sources

- http://statisticbrain.com/
- http://mathforum.org/workshops/sum96/data.collections/dataiibrary/other.resources.html
- http://www.trade.gov/
- http://www.infoplease.com
- http://wolframalpha.com
- http://learnstuff.com