



5-E CLASSROOM STEM ACTIVITY:
HEALTH INFORMATICS – mHEALTH APPS AND PATIENT-GENERATED DATA

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WHAT IS HEALTH INFORMATICS?

THIS RAPIDLY GROWING FIELD MEANS NEW JOBS FOR PEOPLE LIKE YOU!

BY STEPHANIE PETIT



Hmmm ... What's a four-letter word for "the main stalk of a plant"?

The health care industry is always looking for ways to improve the quality of health care while also reducing the high costs. Health informatics can be defined as the application of computers and information technology to solve problems in the field of health care. This includes how health data is collected, stored and communicated, as well as how technology can be used to help make health decisions. It combines computer technologies, information science, clinical practice and business management to create better health care.

Initiatives like Electronic Health Records help ensure a patient's

health history is recorded, saved and accessible, and professionals are needed to create and maintain these systems. CareerBuilder.com ranks health informatics as the No. 1 job opportunity in an emerging industry. If you're interested in technology and health care, it might be the job for you!

According to the American Medical Informatics Association, there are now more than 70 advanced degree programs in the field of health informatics. Most programs combine technical instruction, medical classes and hands-on experience so students are fully emerged in the field. Students

learn to identify what information and data are needed by doctors, patients and other health care professionals, and how they are used in order to make effective health care decisions.

Graduates from a degree program in health informatics can work in a variety of environments such as hospitals, medical research laboratories, health insurance companies or consulting organizations. Salaries for graduates are typically between \$40,000 and \$45,000, with some positions offering up to \$75,000.

See? You don't have to be an emergency room doctor to save lives! ☑

5-E CLASSROOM STEM ACTIVITY: HEALTH INFORMATICS

Here are some ideas for how high school teachers could use this story as a launching point for integrated STEM learning. Our activities follow the 5-E Learning Cycle Model, and the activity below is intended to last three to four 1-hour class periods (although portions of the activity could be used in shorter time periods).



Part 1: Engage

- ① Read the STEM JobsSM article “What is Health Informatics & Why Should You Care?”
- ② Ask students: Do any of you use an app or a website to track your exercise or eating? Do any of you use a wearable device for this like a Fitbit? Do you know anyone who does?
- ③ What kind of data do these devices collect? What kinds of charts/graphs do they display?
- ④ Watch a video about the Fitbit (youtube.com/watch?v=p8f78gpOrNQ) and show some examples of the statistics, charts and graphs that the Fitbit produces (e.g., androidtapp.com/fitbit, keepingupwithkristie.blogspot.com/2014/03/more-fitbit-charts-for-visual-person.html).
- ⑤ Ask students: What are the quantities being tracked? What are the independent/dependent quantities? How is data summarized (change over time, average, difference, max/min)? How might this data be useful to people? Does the way the data is displayed impact how useful it is?



Part 2: Explore

Place the students in groups of 4. Construct the groups such that there is one student in each group who is comfortable sharing their health data with the group and eventually the class.

Although Fitbits are popular right now, they can be a little costly, so this week we’re going to be investigating health data using a free app/website tracker – myfitnesspal.com.

- 1) One person in your group should create an account on myfitnesspal.com – they’ll use the website to track their eating and exercise for 4 days. Other group members can create accounts and track themselves as well, but they do not need to share this data if they do not wish to. The person whose data is being used should commit to exercising for the days he or she is being tracked, such that the data will be more interesting.
- 2) For 4 days, the chosen person should log all food they eat in their food diary, and all exercise they do into their exercise diary on MyFitnessPal. The goal is not to lose weight; it’s simply to track what the exercise and eating activities look like over 4 days.
- 3) While one group member is tracking their food and exercise, the other group members should conduct research on nutrition (e.g., balancing calories from carbs, fats and proteins: ghc.org/healthAndWellness/?item=/common/healthAndWellness/conditions/diabetes/foodBalancing.html) and exercise (e.g., how different exercise intensities burn calories differently: whatscookingamerica.net/Information/CalorieBurnChart.htm or guidelines for exercise amount: cdc.gov/physicalactivity/everyone/guidelines/children.html). The purpose of this research will be to understand how the data on MyFitnessPal can be made most useful and actionable to users of the app.
- 4) At the end of the 4 days, all information from the exercise and food diary should be shared with the group, as should the findings from the research other group members conducted.
- 5) **Your group’s task: You are designing a new mHealth app that takes the raw data like the data collected by MyFitnessPal, and displays it to the user in novel and helpful ways. Take the raw data from the food and exercise diaries, and display portions of the data in at least 4 useful ways. At least two of these ways must involve a visual like a chart or graph that is constructed using a computer program like Excel.**



Part 3: Explain

- ① Groups should have constructed their four data displays during Part 2 above. Tell students that their next task is to create a 5-minute marketing pitch where they show their data displays to the class and describe why the data displays provide useful information for the user about their health. They should be specific about how someone could use a display to make a good decision about some particular aspect of their health.
- ② Some questions to ask groups about their charts as they present: What kind of data are charts useful for displaying? How does showing this data in chart format allow people to take action? Can charts be made to be misleading? How did you decide which quantity went on the x-axis and which quantity went on the y-axis? What trends do you notice in your chart over time? When are different types of charts (pie, line, bar) useful and appropriate? How do the trends in this chart look similar or different from the charts that other groups presented that utilized the same type of data?
- ③ Some questions to ask groups about other summary data statistics (e.g., means, max, min) as they present: When is mean a good measure to give a user? What actionable information can a user get from a mean? What does a mean leave out? Can a mean be misleading? When tracking health day-by-day, do we care about the amount of variation or spread? About the range? Why or why not?



Part 4: Elaborate

- ① Have half of the class read this article on mHealth apps: healthcare-informatics.com/article/mhealth-app-market-primarily-useless-now and the other half of the class read this article on patient-generated data: healthcare-informatics.com/blogs/david-raths/patient-generated-data-glass-half-empty-or-half-full.
- ② Discuss with class: Both of these articles are very negative about the potential of health-tracking wearables like the FitBit and mobile health apps like MyFitnessPal. Do you agree with the arguments in these articles, or do you disagree? Why?
- ③ In groups, discuss the following question: Do you think it's important for teens to be conscious of the decisions they make regarding food and exercise? Do some research online and use scientific evidence to support your claims, and be prepared to present your argument to the class (note: Here students could research issues like obesity, diabetes, heart disease, etc.)



Part 5: Evaluate

Have students work on the following task individually:

Use word processing software to create a 1-page poster that encourages teens to use apps or wearable trackers to be aware of their diet and exercise decisions. Describe the advantages of using these tools, and describe and show an example of the easy-to-use data they will provide.

Next Generation Science Standards:

Common Core Math Standards:

CCSS.Math.Content.HSS.ID.A. Summarize, represent, and interpret data on a single count or measurement variable.

CCSS.Math.Content.HSS.ID.B. Summarize, represent, and interpret data on two categorical and quantitative variables.