

Worcester Polytechnic Institute Interactive Qualifying Project



The 15-40 Connection Tutorial through ASSISTments: Use of Proactive Knowledge in Control VS Experiment

Interactive Qualifying Project Report Submitted to the Faculty of Worcester Polytechnic Institute
In Fulfillment of the Degree of the Bachelor of Science

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Submitted to:

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I. Abstract

A team of three students worked with 15-40 Connection to help the organization accomplish their mission of raising awareness about the advantages of early cancer detection. The purpose of this tutorial is to motivate individuals to take responsibility for their health because cancer rates have not shown improvements since 1975. Through the use of a Control vs. Experiment test a tutorial was created using the problem set software of ASSISTments to prove whether or not the introduction of being proactive towards one's health changed the responses the students gave for the final questions of the tutorial. The study focused on the awareness that comes with knowing how a person's body behaves and what health ailments could later develop into cancer, and what steps to take to help improve survival rates for teens and young adults. The results from the statistical analysis prove that the responses from the students in the experiment had higher averages of correct answers than those in the control group.

II. Acknowledgments

First and foremost, we would like to thank Neil Heffernan for advising this extraordinary project, allowing us to participate in a special and fulfilling IQP experience. We would also like to thank Cristina Heffernan and Korinn Ostrow for their assistance through ASISSTments process and meeting with us to make sure that the tutorial was completed and compatible with ASSISTments. We would also like to thank Sandy Foster, Tricia Laursen, and Brittany Geoffroy from 15-40 Connection for guiding us over the course of the project by providing us with a detailed clarification of the 15-40 Connection message and giving us guidance on the material they wanted included in this project.

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IV. Introduction

Cancer

Cancer is a broad term to describe many different types of diseases. Cancer is the rapid unregulated growth of cells in the body, which grow to form tumors and encompass or enter neighboring cells and tissues in the body. There are two major types of tumors, malignant and benign. The difference between the two is malignant tumors can spread into neighboring tissues and cells, while benign tumors do not spread throughout the body. The main issue with rapid cell growth is that when it is not monitored or noticed it can spread to both the lymphatic and circulatory systems as well as major organ groups and tissues. Many cancers are defined by their location and cell type in the body, for example leukemia is associated with the excess production of white blood cells, or leukocytes in the bone marrow. This is only one example of the hundreds of different types of cancers and uncontrolled cell growth found in people.

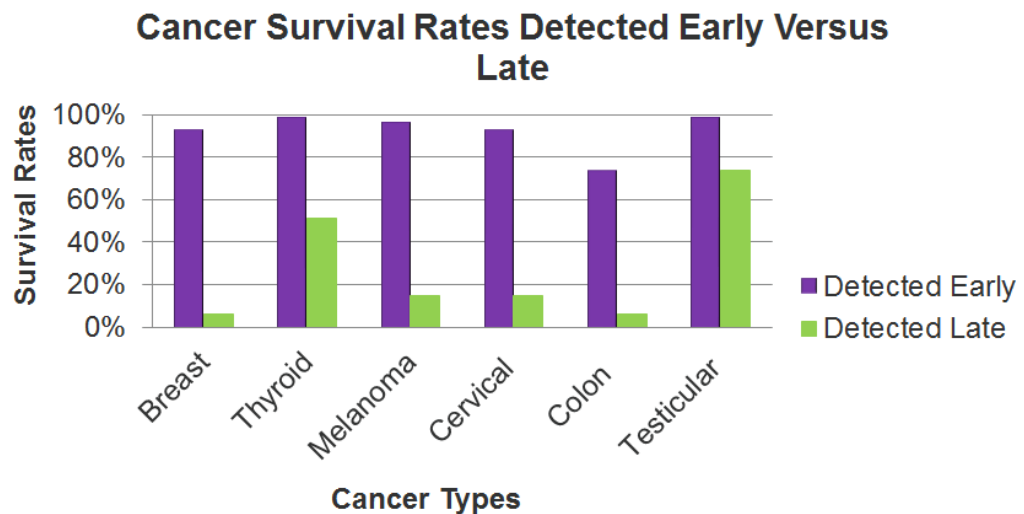


Figure 1: Survival Rates of Specific Forms of Cancer and how Detecting Early vs. Late Effects Survival Rates

source: 1.American Cancer Society. *Cancer Treatment & Survivorship Facts & Figures, p.7 2012-2013.* Atlanta: American Cancer Society; 2012.

Cancer is currently the leading cause of disease death in teens and young adults. In the United States alone nine teens and young adults are diagnosed with some form of cancer every hour.

Some of the more common types of cancer found in teens and young adults are, but not limited to lymphoma, melanoma, leukemia, testicular cancer, central nervous system tumors such as brain and spinal cord tumors, breast and cervical cancer in women, liver, pancreatic, and thyroid cancer. Although individuals who fall in the teen and young adult age range are 4.75 times more likely to be diagnosed with some form of cancer than pediatrics, children under the age of 12, the survival rates for teens and young adults have not been keeping pace with the younger and older age groups. The reasons behind the level of survival rates staying the same is the lack of early detection and diagnostics. Delays in diagnosis is one major reason cancer survival rates for teens and young adults have barely improved since 1975. There are several reasons for the lack of improvement in survival rates; the inability to conduct testing in clinical trials with active participation, the lack of proper treatment for the later stages of cancer development, and having an inadequate way to inform teens and young adults about the science and symptoms behind cancer. All of these factors are a few of many that contribute to the lack of improvement in survival rates. The main focus of this project is to emphasize the importance of cancer prevention and early diagnosis by empowering young individuals with the confidence to be proactive about their own health. The inability to recognize what a cancer symptom may look or feel like also greatly contributes to the issue of delayed diagnosis. 15-40 Connection's primary goal is to help improve the survival rate by promoting awareness of cancer symptoms, detecting them early and taking action promptly. Cancer is a process and at earlier stages it can be intervened through early detection of these subtle symptoms to help get a prognosis faster.

15-40 Connection

15-40 Connection is a non-profit organization raising awareness about the importance of early cancer detection for 15 to 40-year olds. Although those who fall in this age range are 4.75 times more likely to be diagnosed with cancer than pediatrics, there has been little improvement in survival rates since the 1970s. The main message that the national organization is raising awareness of is the importance of early detection. By providing educational resources and tools to the public and encouraging individuals to take responsibility and have some self advocacy for their health. 15-40 Connection is currently leading the movement of enhancing survival rates of cancer patients through education and awareness. Benchmarking normal health, recognizing cancer signs and/or symptoms, and taking immediate action when a persistent health change is noticed are some of the key topics the organization focuses on spreading. Overall, 15-40 Connection is looking to empower and raise awareness among teens and young adults, hoping to eventually lead to the improvement of survival rates as well as saving the lives of many through early cancer detection.

About Us

Mission Statement

About

Mission

Contact

Advisors

Join

There has been **LITTLE IMPROVEMENT** in **CANCER SURVIVAL** rates in the **15-40 AGE RANGE** in over 35 years.

The 15-40 Connection is an emerging national organization committed to raising awareness about the life-saving advantage of early cancer detection. We empower individuals to take personal responsibility for their health, check themselves for cancer and take assertive action in response to persistent health changes. 15 to 40 year olds are diagnosed with cancer eight times more frequently than young children. However since 1975, improvements in their survival rates have not kept pace with those for other age groups. We strive to improve cancer survival rates for this overlooked population by providing educational resources, tools and programming.

The 15-40 Connection is a 501(c)(3), not-for-profit organization.

Figure 2: 15-40 Connection About Us Mission Statement
source1. 15-40 Connection. *About Us Mission Statement*. 2013

ASSISTments

ASSISTments is an online platform, free of charge, that allows teachers to incorporate technology with education in a fun and easy way. ASSISTments gives educators the freedom to create custom problems through the use of existing problems and assign them to students in the form of a problem set. The problem sets are used to assess students, provide immediate feedback and useful tutoring, and supply instant results for teachers. There is a tutoring option that provides students who have selected an incorrect answer with a step by step process to direct them towards the correct answer, simultaneously including the student in understanding and correcting the error.

The primary users of ASSISTments are junior high and high school math teachers seeking a method of teaching allowing instantaneous tutoring and feedback on interactive homework assignments, quizzes or exams. ASSISTments makes grading easier by recording all the data from users and creating personal reports for each individual student for teachers use.


Using ASSISTments, the group members created a problem set geared towards the 15-40 Connection message to help build cancer awareness among the tutorial users in hopes to spread the information among current high school students. 15-40 Connection's fundamental message includes the empowerment of students by providing relatable and actionable knowledge with the recognition of cancer symptoms, what actions to take if a subtle and persistent change is noticed, and the acknowledgement of how cancer can happen to anyone at any age.


Using the data collected through ASSISTments, the project group focused on organizing and analyzing the data. After a number of students completed the tutorial, the group downloaded the raw data from the ASSISTments website. The data was organized into two major sections, the control and the experiment. After the organization was finalized, the group began the analyzation process. The analyzation of the data consisted of the following tests: standard deviation testing, Ttesting, averages, and medians.

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ASSISTments

Hear teachers explain why and how they use ASSISTments to help their students learn more effectively.



ASSISTments 

Formative Assessments That Assist.

[Get Started!](#)

“ My students are doing homework on ASSISTments every night now, beginning each class viewing reports with students. I wonder 'HOW did I do this before?’

Teachers Face A Dilemma

They are being asked to assess students more, but every minute of class time spent in testing is a minute of instructional time that is lost. ASSISTments solves this dilemma, by letting students get individual feedback while their learning progress is assessed. ASSISTments is a free online platform that allows teachers to write and select questions, students get immediate and useful tutoring, and teachers receive instant reports to help inform their classroom instruction.

Figure 3: ASSISTments HomePage
source1. ASSISTments.org

Last Year's Data

At the onset of the project the analysis of the data collected from the previous year's tutorial played a crucial role in familiarizing the group with 15-40 Connection's ambition to have useful data and statistics to back their company's greater goals. The tutorial created last year was sent out to different high schools in the surrounding Worcester County area. These high schools include Grafton High School, Saint Peter Marian, Worcester Academy, and Worcester Regional High School, which had both the control and experiment versions of the tutorial randomly distributed to them. From the time based data certain assumptions about whether a particular student answered or ignored specific sections and questions could be deduced. Also whether or not a student had completed certain parts of the tutorial, or watched the videos could also be concluded from the times given in the downloaded data from ASSISTments.

VIDEO 1	Y	N
Control	137	153
Experiment	96	161

VIDEO 2	Y	N
Control	6	195
Experiment	8	142

Table 1: Video 1 and Video 2: How many completed each video?

For the time based data of last year's tutorial it could be concluded that less than half of the students for both the control and the experiment did not finish watching the first video. This table also shows how less than 10% for both the control and the experiment did not watch the second video either. Although the two videos were of different lengths the majority of students did not finish watching either of the two videos. Over 60% of the students from last year's trial did not

watch one or both of the videos based off the times that were retrieved with the data.

The following table shows the relationship between the similar questions, question 4 from the pretest and question 64 from the Post test. Whether or not a student had a change in opinion between the two questions and whether or not they had a negative or positive outlook overall was calculated. The two questions dealt with the issue of “How likely would you be to go to the doctor if you noticed a change in your health?”

CONTROL	Negative	Positive
Students with change	46	66
Students without change	52	105

EXPERIMENT	Negative	Positive
Students with change	29	45
Students without change	48	87

Table 2: Relationship of pre and post test responses of “How likely would you be to go to the doctor if you noticed a change in your health?”

The following tables deal with the change in answer in another set of similar questions, question 7 from the pretest and question 62 from the Post test. The questions dealt with the topic “Do you think early warning signs of cancer are usually subtle, or something that will land you in the ER? “ The table is read by having the columns being responses from the pretest responses and the rows are from the Post test responses. These tables are also used to show the changes in comparison with whether a student was in the control group or in the experiment group. The tables show that more people in the experiment group got the message of subtle symptoms, which is the correct answer, than those in the control group.

CONTROL	Subtle Symptoms	ER visit	I'm not sure	Didn't Finish	Total
Subtle Symptoms	231	4	4	55	249
ER visit	7	11	1	8	27
I'm not sure	19	3	19	8	49

EXPERIMENT	Subtle Symptoms	ER Visit	I'm not sure	Didn't Finish	Total
Subtle Symptoms	180	5	4	92	281
ER visit	5	7	0	10	22
I'm not Sure	14	1	5	16	36

Table 3: Relationship of pre and post test responses of “Do you think early warning signs of cancer are usually subtle, or something that will land you in the ER? “

The following tables show the change in answer in question 8 from the pretest and question 63 from the Post test, and it compare the answers from the control and the experiment. The question asked was “What would you do if your left knee swelled up and didn’t get better for 16 days?” Again the columns are the responses from the pretest and the rows are the responses from the Post test. In the tables it can be seen that the control group actually had a higher number of students who responded correctly with “Get it Checked Out” than those in the experiment group. But in both groups the majority of the students got it correct in the Post test than in the pretest. These results show the improvement of information retention of the students over the course of the tutorial.

CONTROL	Get it checked	Put ice on it	Take pain meds	Tough it out	Wear a knee brace	Didn't Finish	Total
Get it checked	238	2	3	3	1	65	312
Put Ice on it	8	7	0	1	0	2	18
Take pain meds	4	0	4	1	0	3	11
Tough it out	3	1	3	9	0	3	20
Wear a knee brace	4	0	0	0	4	0	8
Total	257					73	369

Table 4: Relationship of pre and post test responses for control of “What would you do if your left knee swelled up and didn’t get better for 16 days?”

In the tables it can be seen that for the control group the number of students who got the answer correct increased from 257 to 312. The table below shows that the number of students who got the question correct from the pre to Post test increased from 203 to 296. These numbers conclude by the end of the tutorial the majority of students were able to answer questions about early detection and self advocacy.

EXPERIMENT	Get it checked	Put ice on it	Take pain meds	Tough it out	Wear a knee brace	Didn't Finish	Total
Get it checked out	185	3	0	2	3	103	296
Put ice on it	4	4	0	0	0	8	16
Take pain meds	4	0	1	0	0	5	10
Tough it out	6	0	0	3	0	1	10
Wear a knee brace	4	0	0	0	0	3	7
Total	203					120	339

Table 5: Relationship of pre and post test responses for experiment of “What would you do if your left knee swelled up and didn’t get better for 16 days?”

Project Goals

Below are the overall goals created by the group and the people from 15-40 Connection.

IQP Tutorial Goals:

1. **Analyze last year's data**
 - a. What worked and what didn't? What lessons have we learned?
Incorporate those into the new tutorial
2. **Measure**
 - a. Knowledge of cancer in age group, symptoms, what to do if you notice a subtle but persistent change in health – before completing tutorial and same measurement done after completing tutorial.
 - b. Have we empowered students with relatable, understandable and actionable knowledge?
 - c. Have we conveyed to students that they can look for cancer rather than just find it? Ask questions before and after completing the tutorial to measure.
3. **Test tactics to improve post tutorial knowledge/understanding**
 - a. (Video, question language, question placement...etc.)
4. **ID ways to measure retention of knowledge in a classroom environment**
 - a. **Bonus – develop ASSISTments tool to be deployed via social media with similar measurements built-in.

Figure 4: IQP group tutorial goals

Combined Team Goals

1. **Expand the tutorial demographic (only if we get to it)**
 - a. Include colleges and outreach programs
 - b. Survey monkey to on campus – Undergraduates (allowed 1 for IQP)
2. **Utilize findings to gauge questions for more accurate results**
 - a. Push/Poll Questions
 - b. AB Testing
 - c. Right/Wrong Questions
 - d. Multiple Choice
 - e. Multiple Option Questions
 - f. Open Response
 - g. Potential Immediate Feedback through ASSISTments
3. **Have finalized tutorial before December Break**
 - a. Start testing in January
 - b. Analyze New Data (C term)
4. **Developing on campus cancer video (only if we get to it)**
 - a. Release forms/participants

Figure 5: IQP combined team goals

V. Materials and Methods

Weekly Meetings

During the course of three terms, A through C, weekly meetings were held with the sponsor and ASSISTments Co-founder, Christina Heffernan; in addition to separate student group meetings. These meetings went over what was accomplished in the previous week and the goals for the upcoming week.

Our sponsor representatives from 15-40 Connection, Sandy Foster, Brittany Geoffroy, and Tricia Laursen, met every week for an hour with the student project group to review last years data, discuss progress and new objectives. This ensured that the current work was focused around 15-40 Connection's goal of raising awareness about the life-saving advantage of early cancer detection, being proactive with health, and being a supporter of self advocacy.

During the early portion of the project, meetings followed a specific agenda with topics and goals to be discussed in the allotted meeting time. Early on, 15-40 representatives started the agendas but eventually the task was passed on to the student project group to create the following weeks agenda. An example of a typical agenda is shown below.

Agenda & Notes for September 4, 2013

1. **Discuss the book “Switch”**
 - a. Bright Spots
 - b. Elephant and the Rider
 - c. One Percent VS Two Percent Milk – Milk Direction
2. **Discuss Impression/Understand of the 15-40 Connection after spending some time Researching our Organization**
3. **Describe how the data collection process went last year**
4. **Suggest methods for effective and efficient ways to analyze last year’s data**
5. **Discuss our overarching goals:**
 - a. Show evidence that we are building awareness of AYA cancer
 - b. Communicate to users some common cancer symptoms
 - c. Communicate to users the appropriate time to contact a doctor
6. **Describe the Push/Poll Theory**
7. **Action Items (What students should do for the next time):**
 - a. **Analyze the data from last year’s IQP**
 - b. **Brainstorm possible ways to apply the Push/Poll Theory to the tutorial**

Figure 6: Sample agenda and notes for IQP meetings with advisor and 15-40 Connection.

The agenda was designed using the 15-40 Connection shared Google Drive, in order to allow access to the representatives, Christina Heffernan, and the student group. The agenda usually consisted of discussion of readings, research, reviewing previous data, new ideas that were brought up in the individual student group meetings, and future goals. Group notes were added directly to the agenda during the meeting, as shown above, along with individual notes being logged in either Microsoft Word or written format in the Google Drive.

As the project developed, meetings focused more on analyzing last year’s data and defining the path of the present project, eventually being concentrated almost entirely on ASSISTments. Therefore agendas became less relevant to the whole group meetings and were no longer used to outline the goals. Meetings were completely driven by the group’s work, questions the sponsors had related to improvements, and future goals that needed to be achieved.

As mentioned previously, daily individual student group meetings were held in the library’s tech suits. These meetings mostly consisted of analyzing last years data using Microsoft Office

Excel, working with Google Drive PowerPoint to create Tutorial outlines, use of ASSISTments, and compiling the final report.

Software

The project group created two Google drives: 15-40 IQP 2013 and IQP Student Group. Google drive created a very simple and effective way for the student group, 15-40 Connection representatives, and Christina Heffernan to instantly organize, edit, and share information from any computer.

The 15-40 IQP 2013 Drive was shared between all three parties, whereas the IQP Student Group Drive was limited to just the student group. The 15-40 Drive's purpose was used to share 15-40 presentations, corporate slides, the tutorial, as well as agendas and group notes. The separate student drive consisted of similar information but also included research and the final report.

Multiple different software were used throughout the project to complete different tasks. Besides google drive, Microsoft Office Excel was used frequently in the beginning of the project. Excel was used to organize last year's data that was collected from numerous high schools in the region. The data was then easily sorted and could be viewed as a whole rather than separate schools.

Microsoft Office Powerpoint was also important in the completion of our project. The final tutorial was constructed in powerpoint in order to allow for complete control of the formatting and a consistent template for the questions. Microsoft application Snipping Tool was then used to snip each individual slide and paste it into ASSISTments.

ASSISTments

ASSISTments was used to create an online tutorial to help spread 15-40 Connection's message about the benefits of early cancer detection. The student group created a tutorial containing demographic questions, informational slides, real life stories, and various questions about cancer. Some topics covered when asking questions about cancer included normal health, early detection, self advocacy and what a cancer symptom looks like. The student group shared an ASSISTments account in order to collaboratively create, edit, and assemble various problem sets. The ASSISTments account for the project had a Username: rhpineda@wpi.edu and Password: 1540group used to make the final tutorial.

The problem set **PSAJZQQ - HS Final Tutorial** was finalized at the beginning of C term. The table below contains a list of the ASSISTments numbers, titles to the problem set, and the mode and/or tutoring used for each question.

The Pre and Post tests, not including demographic questions, consisted of similar questions in order to see if the student's responses changed by the end of the tutorial for the better. Both the Pre and Post tests were mostly multiple choice questions, yes or no questions, and choose all that apply questions. However, the last two problems of the Post test were open response questions, asking the student to 'tell us' something they learned from the tutorial, and then to mention a second thing they learned from the tutorial in the second open response question. The group and sponsors, agreed the open response questions would be an accurate way of determining if the students had retained and processed any of the information presented throughout the tutorial. These open responses were also a good way to judge if there was a difference in information retention between the Pre and Post tests. The difference between the control and experiment could be seen by the mention of being proactive with their health, since that was the information given to the experiment and not the control group.

Following the Pre test, students began completing the body portion of the tutorial. This portion of the tutorial contained general information in order to inform the students of 15-40 Connection's message about cancer. This general information was then followed by real life stories to relate actual people's experiences to those a student could sympathize with. These stories dealt with people who experienced small but persistent changes in their health but were proactive by getting these signs checked early instead of waiting until it was too late. This was mostly informational slides which simply allowed for the student to select "next" and continue with the tutorial after reading and thinking about the information presented.

Each student was also randomly assigned to either the experiment or control condition. This portion occurred once the student had completed roughly half of the tutorial. The purpose of this part of the tutorial is to conduct a scientific research on whether or not the introduction of proactive content effects on the overall results of the data. This was evident through the two final open response questions that asked the students to describe two things they learned from the tutorial. The experiment focused on how one could be proactive with their health and in their daily lives. While the control was asked general questions to gain information about their opinion of the tutorial and their personal experience with cancer. The conditions were both composed of short yes or no multiple choice questions in addition to one open response question. Both conditions consisted of the same number of questions in order to ensure both groups spend a similar time on the tutorial.

Below in Table 6 is the list of problem sets and a brief description of the title of the slide. In some cases the title of the slide is the question asked to the student for the corresponding problem number. Problems are either in test or tutor mode and they may or may not have tutoring, scaffolding, or feedback.

ASSISTment Number	ASSISTment Title	Mode	Tutoring
PRAV4YS - Problem #560929	Title Slide	Test	
PRAV4YT - Problem #560930	Demographic Info- Select your gender	Test	
PRAV4YU - Problem #560931	Demographic Info- Select your age range	Test	
PRAV4YV - Problem #560932	Demographic Info- What school do you attend?	Test	
PRAV4YW - Problem #560933	PRE TEST- At what age can a person develop cancer?	Test	
PRAV4YX - Problem #560934	PRE TEST- Early detection can greatly increase a person's chances of surviving cancer.	Test	
PRAV4YY - Problem #560935	PRE TEST- If you experienced a change in your health that persisted for two weeks you would...?	Test	
PRAV4YZ - Problem #560936	PRE TEST- How can you detect cancer early?	Test	
PRAV4Y2 - Problem #560937	PRE TEST- I know what my body feels like better than anyone else.	Test	
PRAV4Y3 - Problem #560938	PRE TEST- Would you recognize a cancer symptom?	Test	
PRAV4Y4 - Problem #560939	An early warning sign on cancer is usually so bad that you will need to go to the ER.	Test	
PRAV47R - Problem #561145	A cancer symptom will not usually send you to the ER	Test	Transition Slide
PRAV47S - Problem #561146	What is normal health?	Test	
PRAV47T - Problem #561147	So, what do we mean when we say change in your normal health?	Test	
PRAV47U - Problem #561148	Comic	Test	
PRAV473 - Problem #561155	So, why is understanding your normal health important?	Test	
PRAV474 - Problem #561156	Josh	Test	
PRAV475 - Problem #561157	Josh's Diagnosis	Test	
PRAV476 - Problem #561158	Laurel	Test	

PRAV477 - Problem #561159	Laurel's Diagnosis	Test	
PRAV478 - Problem #561160	How often do you think teens and young adults just like Josh & Laurel are diagnosed with cancer?	Test	
PRAWQ94 - Problem #579477	Improvements in cancer survival rates for 15-40 year-olds have lagged behind those of older and younger age groups.	Test	
PRAV479 - Problem #561161	Dave	Test	
PRAV48A - Problem #561162	Dave's Diagnosis	Test	
PRAV48B - Problem #561163	Cancer signs and symptoms	Test	
PRAV48C - Problem #561164	Based on the symptoms, who do you think was diagnosed with breast cancer?	Test	
PRAWRAK - Problem #579492	Even the same type of cancer can present itself with different symptoms	Test	
PRAV48D - Problem #561165	Have you ever...	Test	Experiment
PRAV48E - Problem #561166	In the size of a tweet, tell us a time you were proactive and it made a difference.	Test	Experiment
PRAV48F - Problem #561167	Did you know you can also be proactive about your health?	Test	Experiment
PRAV48G - Problem #561168	Here are some helpful tips to be proactive about <u>you</u> health	Test	Experiment
PRAV48H - Problem #561169	In the size of a tweet, what are your opinions about the real life stories that were presented earlier?	Test	Control
PRAV48J - Problem #561170	Do you know anyone who has been affected by cancer?	Test	Control
PRAV48K - Problem #561171	Would you pass this tutorial onto a friend?	Test	Control
PRAV48M - Problem #561172	Want to get involved?	Test	Control
PRAV48N - Problem #561173	If I notice a change in my health I should...?	Test	
PRAV48P - Problem #561174	Now that you know what a cancer symptom may look or feel like...	Test	
PRAV48Q - Problem #561175	When you go to the doctor...	Test	
PRAV48R - Problem #561176	...What would you do?	Test	
PRAV48S - Problem #561177	Meghan	Test	

PRAV48T - Problem #561178	Meghan's Diagnosis	Test	
PRAV48U - Problem #561179	The doctor's response could have been an obstacle for Meghan.	Test	
PRAV48V - Problem #561180	We are not invincible...	Test	
PRAV48W - Problem #561181	If you notice something 'off' from your norm, here are some steps that you can follow.	Test	
PRAWRBC - Problem #579516	Would you use the steps previously stated if you noticed something off about your normal health?		
PRAV48X - Problem #561182	Look at the advances we have seen in technology since 1975!	Test	
PRAV48Y - Problem #561183	Cancer survival rates for 15-40 year-olds have not improved since 1975.	Test	
PRAV48Z - Problem #561184	Early detection is key, but without knowing the symptoms it is hard to figure out what is wrong.	Test	
PRAV48J - Problem #561170	Do you know anyone who has been affected by cancer?	Test	
PRAV484 - Problem #561187	POST TEST- Teen and young adults can get cancer?	Tutor	Feedback
PRAV485 - Problem #561188	POST TEST- What is a major factor that can help improve cancer survival rates?	Tutor	Feedback
PRAV486 - Problem #561189	POST TEST- If you experienced a subtle and persistent change in your health that lasted more than 2 weeks you would...?	Tutor	Feedback
PRAV487 - Problem #561190	POST TEST- How can you detect cancer early?	Tutor	Scaffolding
PRAV488 - Problem #561191	POST TEST- The person who knows my body the best is...?	Tutor	Feedback
PRAV489 - Problem #561192	POST TEST- What do you think is the most important piece of information that you learned today?	Test	
PRAV49A - Problem #561193	POST TEST- Tell us something else that you learned today.	Test	
PRAV482 - Problem #561185	Pass on the message!	Test	
PRAV483 - Problem #561186	Get involved!	Test	

Table 6: ASSISTment problem set numbers, description, mode, and tutoring used for each individual question.

Tutorial Timing

The amount of time in which it took for the users to complete the tutorial played a large factor in creating and editing the finalized problem set. Based on last year's data collection, both the 15-40 Connection representatives and the IQP members agreed that the length should be short enough that the users would not lose interest. Assessing last year's data revealed that a total of 193 people did not complete the full tutorial, leaving a lot of sections of data incomplete. In an attempt to prevent this from happening, the group came up with an ideal completion time which was approximately 10 minutes. Upon finalizing the tutorial, the group members conducted a "Soft Launch." The Soft Launch consisted of 8 volunteers who were asked to complete the tutorial for feedback and timing purposes prior to the actual release of the tutorial to schools. The people who participated in the Soft Launch also answered four questions to give feedback on the length of the tutorial, the content, and the manner in which the questions were presented.

Reaching Out

During the final term of our project, Cristina Heffernan and our sponsors from 15-40 Connection reached out to high schools from last year as well as new contacts, including some new middle schools. The 2014 contact list can be found in Appendix V.

On February 3, 2014, Sandy Foster reached out to all the testers from last years tutorial as well as additional teachers with the following email.

15-40 Connection reaching out e-mail to new teachers:

Dear _____,

Happy 2014 from 15-40 Connection! This academic year 15-40 Connection has been working with WPI students on an online tutoring program called ASSISTments to build a tutorial designed to educate users on 15-40 Connection messaging. This tutorial promotes taking personal responsibility for one's health, teaches what a cancer symptoms can look or feel like and emphasizes the importance of taking assertive action in response to persistent health changes. We are hoping that this tutorial will complement our mission to improve cancer survival rates for teens and young adults by empowering students with knowledge of earlier cancer detection.

Please assign this tutorial to your students today and build awareness of what a cancer symptom can look or feel like to provide your students with the life-saving advantage of early cancer detection. This tutorial is designed to be implemented as class work, or as homework and should take no longer than 15 minutes. To assign this tutorial, please ask your students to take 2 minutes to set up an assistments account by following the [easy instructions](#) attached. The tutorial ID is PSAJZQQ.

Thank you, once again, for your participation! Please assign the tutorial by February 14th.

Gratefully,

*Sandy Foster
Education and Outreach Director
15-40 Connection
781-820-6996*

15-40 Connection reaching out e-mail to Last years teachers:

Dear _____,

Happy 2014 from 15-40 Connection! You may recall that last spring your students participated as early users of an innovative 15-40 Connection tutorial. This year, we have built an improved version that we'd like to invite you to share with your classes. The tutorial is built around the organization's mission, to improve cancer survival rates for teens and young adults by empowering them with knowledge that can provide them with the life-saving advantage of earlier cancer detection.

This version of the tutorial promotes taking personal responsibility for one's health,

teaches what a cancer symptom can look or feel like and emphasizes the importance of taking assertive action in response to persistent health changes.

Please follow the [easy instructions](#) attached. The tutorial ID is PSAJZQQ. It is designed to be implemented as class work or as homework.

Thank you, once again, for your participation! Please assign the tutorial by February 14th.

*Gratefully,
Sandy Foster
Education and Outreach Director
15-40 Connection
781-820-6996*

On February 6, 2014 Cristina Heffernan sent an e-mail to some of the contacts from Appendix V.

ASSISTments reaching out, e-mail :

Dear _____ ,

I am reaching out to high school teachers familiar with ASSISTments. I want to tell you about a new problem set tutorial we have built in conjunction with a non-profit organization called 15-40 Connection. The mission of 15-40 Connection is to improve cancer survival rates for teens and young adults by empowering them with knowledge that can provide them with the life-saving advantage of earlier cancer detection.

This year, with the help of students at WPI, 15-40 Connection has created a problem set/tutorial on the ASSISTments platform that promotes taking personal responsibility for one's health, teaches what a cancer symptom can look or feel like and emphasizes the importance of taking assertive action in response to persistent health changes.

The problem set ID is PSAJZQQ ([click here to see a preview](#)) . Please assign it to your students today and build awareness about early cancer detection. If it makes more sense to involve the health teacher at your school have him or her contact us and we will be in contact and work together to get the tutorial to the students.

Reply and tell me what you think. Please assign the tutorial by February 14th.

Cristina

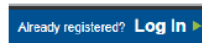
Creating an ASSISTments Account

The group created a set of instructions on how to make an ASSISTments account on a Google Drive. Instructions were attached to the reaching out e-mails to help make creating an account on ASSISTments as user friendly as possible. In nine easy steps and about 5 minutes, a student could create their own ASSISTments account. The instructions are shown below.

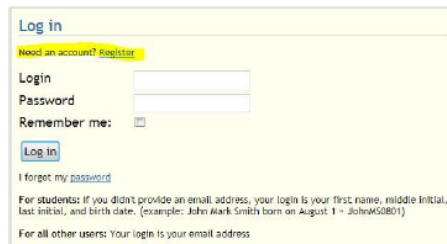
How to make an Assistments Account (student edition)

1. Visit: <https://www.assistments.org/>

2. Click Log In at top right corner



3. Click Register

A screenshot of the ASSISTments login page. At the top, it says "Log in". Below that, there is a link "Need an account? Register". The login form includes fields for "Login" and "Password", a "Remember me:" checkbox, and a "Log In" button. At the bottom, there is a link "I forgot my password". Below the form, there is a note: "For students: If you didn't provide an email address, your login is your first name, middle initial, last initial, and birth date. (example: JohnMark Smith born on August 1 - JohnKG801)" and "For all other users: Your login is your email address".

4. Select: **I am a student**

5. Fill out following information with **15-40 Connection** and personal demographic information as well as create password

I am a teacher, administrator, or parent and I have a registration code.
 I am a student.

Role: Student

State: Massachusetts Non-USA

District: 15-40 Connection

School: 15-40 Connection

* First Name:
Middle Name:
* Last Name:
* Birthdate: 2013 September 30
Grade: K
Time zone: US/Eastern
* Password:
* Confirm Password:
* Indicates a required field.

←

6. Click Enroll in a Class

7. Select Teacher: **15-40 Connection**
Select Class: **15-40 Connection**
Select Section: **Tutorial**
Select **Enroll!**

15-40 Connection 15-40 Connection Tutorial **Enroll!** Cancel

8. Select class

15-40 Connection: 15-40 Connection (Jan 22, 2014) - Period 1

9. Select Final Problem Set

15-40 Connection Assignments

1 - Would you Recognize a Cancer Symptom? Presented by 15-40 Connection. (Problem Set.P5AJZQQ)

10. Enjoy the Tutorial!! 😊

Figure 7: Instructions for “How to make an ASSISTment account”

Cristina Heffernan also reached out on Twitter from @assistments to get the message across about the tutorial to a broader audience. A screenshot of the actual tweet is shown below.



**Figure 8: Screenshot of tweet from @assistmnets
source1: twitter.com**

Due to the term winding down, and the deadline of February 14, 2014 that was designated for data to be collected, the group was unable to wait for all the responses from the contacts. Data was received from Boston Latin High School on February 12, 2014. Shortly after, more data was received from other students of Boston Latin on the 24th of February. However, no other data was collected due to the time constraint. But plans to analyze more incoming data has been made with the sponsors from 15-40 Connection, in order for them to have more useful data relevant to their messaging.

VI. Description of Study

Over the course of the three terms, the project group members worked in association with the 15-40 Connection to assemble a tutorial to help spread awareness of the importance of early cancer detection. The group members began the initial term by familiarizing themselves with ASSISTments and 15-40 Connection. While also beginning to organize and analyze the data collected from last year's project. By reviewing last years data, the group was able gain a better understanding of how ASSISTments works and learned more about what was successful from last year's tutorial. The analysis of last year's data familiarized the group with how the data results from the control and the experiment will differ, and what those differences represent. Reviewing of last years data consisted of uploading into excel and color coding the data into multiple sections and then sorting that data to better represent the statistical analysis to be completed. The data was separated into control, experiment, next questions, and Pre and Post tests, also deleting any students from the data who had not completed the tutorial. Times for each question were next to the problem set answer, these times had to be converted from milliseconds to seconds. Once the data was organized, more in depth numerical analysis was completed. The group examined the two videos, the relationship between question 4 and 65, and two different Pre test questions that had a similar Post test question. Through these analyses and finalization of last years data, see section Last Year's Data for a more thorough review. The group, advisor, and sponsors felt there was a new path this year's tutorial would take. Minimal questions were to be carried over to the new tutorial, with hopes of a fresh look to reflect the new objective of approaching the tutorial with proactive and self advocacy being the focal points of the control and experiment differences.

Moving on from last years data, the group started to brainstorm basic ideas to enhance the tutorial in hopes to improve the quality and quantity of the data collected. The project group began the process by doing background research of different cancer organizations both profit and non

profit. 15-40 Connection uploaded multiple powerpoints from corporate to high school presentations to help develop ideas for possible tutorial questions. The group compiled questions and information about cancer into a google document and created a flowchart to visualize the connections between these preliminary questions. The project group drafted and presented several different tutorial schemes to the 15-40 Connection representatives over the course of a few months. During the progression of the tutorial, the meetings focused on reviewing the tutorial drafts and continuously editing them and adding new question and pertinent information. Pre test questions were generated with the combination of demographic questions and simple questions to get a basic understanding of the users base knowledge of cancer and cancer symptoms in general. However, the project team agreed cancer questions were not to be asked about scientific information but instead questions that could help express 15-40 Connections message of early detection, subtle but persistent changes in health, proactive approach concerning health, and self advocacy. A control and experiment were eventually added to the tutorial to compare two separate groups to see if the overall responses would differ at the end of the tutorial. The experimental group had questions concerning proactive approaches to health and life, while the control had questions concerning the real life stories mentioned after the Pre test. the added element of proactiveness was used as a scientific study to show if this added knowledge had an affect on overall performance of the tutorial responses. Lastly, a Post test was added to the end of the tutorial that was similar to the questions in the Pre test. Multiple different tutorials were created on PowerPoint before agreeing upon one format. Edits continued through the final tutorial process until the group, advisor, and 15-40 Connection felt there were no more to be made.

The group then took screenshots of each PowerPoint slide to paste into ASSISTments so that the same background and formatting could be used for the tutorial. This formatting gave the tutorial a better aesthetic look. The final problem set consists of both informational slides

expressing the message of the 15-40 Connection as well as feedback questions to emphasize and reiterate the new information. Using ASSISTments, the group finalized the problem set for high schools which could easily be accessed by students through the ASSISTments website. Instructions were also created to go along with the tutorial to ensure ease of creating an account. The instructions included the class, teacher, and problem set number.

Upon finalizing the ASSISTments problem set the group organized a “Soft Launch” for assessment purposes. A total of eight volunteers were asked to complete the tutorial as well as answer a few questions about the tutorial to provide feedback to group. The volunteers were made up of high school and college students. The raw data gathered from the volunteers supplied the group with statistical information including the length of time each volunteer needed to complete every question as well as the total tutorial time. Using the feedback from the Soft Launch, the problem set was edited and sent out to schools.

With the inflow of information from high school students, the group compiled the raw data and completed a series of statistical analyzations. After the group downloaded the data, they then organized it into the two major sections: control and experiment. The data was then sorted based on whether the students completed the entire tutorial or not. This was done to take averages of the control and experiment in the Pre and Post tests and also with the final two open response questions. The analyzation process consisted of the following averaging, standard deviation testing, T-Testing with p values, and finding the medians of certain aspects of the data. The group analyzed the open response questions, comparing key topics with the main topics mentioned throughout the tutorial. These responses were then graded and then averaged to see how many pieces of important information the average student retained from the tutorial. The results and explanations concluded from the analyzations are in the following section: Results/Analysis of Data.

VII. Results/Analysis of Data

After having the data tested by students at Boston Latin School, a more cohesive analysis of the responses to the tutorial were calculated. Over 70 students attempted the 15-40 Connection tutorial through ASSISTments and about 50 of those students completed the tutorial all the way through. Through the programming of ASSISTments each student was randomly selected to either be a part of the Control or the Experiment. The control group had a series of three questions in the middle of the tutorial that related back to the individual stories of cancer survivors who had detected their symptoms early on. Respectively in the experimental group the students were asked questions concerning being proactive in their everyday lives, and how those proactive actions led to changes in their lives. Below is a checklist that was completed on the data in order to make sure all the points of the statistical analysis is completed.

Statistical Analysis Check List:

- Add Two Columns and then Sort The Data for Control vs. Experiment
- Add another Column and sort based on whether they finished the tutorial or not
- Add a Two columns to score the open response questions in the Post Test
- Add a column after Pre Test and fill in with how many Pre Test questions were answered correctly
- Add a column after Post Test and fill in with how many Post Test questions were answered correctly
- Find Averages and Standard Deviation of Pre and Post Test Questions answered Correctly for the Control and the Experiment
- Complete a Ttest for the Pre and Post Test Averages to see if experiment did better
- Find Average Score and Standard Deviation for Open Response 1 and 2 for the Control and the Experiment

The following tables show some responses from the students for the open ended question in

both the control and in the experiment. These responses are both profound and thought provoking, especially for high school aged students. The total number of students who completed the experimental set of questions in the tutorial was 28. The number of students randomly selected to completed the control set of tutorial questions was 30.

Control Response to: In the size of a tweet, what are your opinions about the real life stories presented to you earlier?
Cancer is sad and we need to make sure that we are aware of the symptoms and effects it can have on our lives. We need to research more and help diagnose early to save more lives
My opinion was that it was very sad and very informal. The stories were amazingly short. The stories were excruciating. They were enriching. I learned a lot from their loss. They were amazing. <u>Stats is</u> amazing.
Any symptoms that are abnormal and last for an extended period of time should be check out. These stories were good examples of subtle symptoms that worsened because of delays.
I think that is amazing that something so harmful as cancer being in a person's body can go unnoticed. I find it scary that the symptoms could be that subtle. I also think that EVERYONE needs to be more educated on the symptoms.
I think that the real life stories are moving. It shows that cancer can happen to anyone at any time and it is best to go to your doctor. People can learn a lot about cancer awareness by learning these stories.
I believe that individuals need to spend more time listening to their bodies and seeking medical help when something feels different or your health changes.

**Table 7: Control responses to open response question
“What are your opinions about the real life stories presented to you earlier?”**

Experimental Group Responses to: In the size of a tweet, tell us a time you were proactive and it made a difference.
I was proactive during a friend's depression and stopped her from committing suicide
Had a lump under my throat, had been feeling fatigue and anxious so I told my doctor turns out I had a hyperactive thyroid disease.
We made a difference by helping people and trying to make the environment and the world a better place to live.
I have checked my tests and quizzes for mistakes and have noticed obvious ones that I had unintentionally overlooked.
I hurt my ankle during my sport and I delayed for a few hours until the pain got so bad I needed to get it checked by a doctor.
I give myself daily checks for lumps, rashes, or other abnormal things when I get out of the shower
I felt tired a lot and i talked to my parents and they took me to the doctor and we found out i had mono
I had a fever, and I literally felt really hot and then really cold afterwards. I knew this wasn't just a normal fever, and soon I got it checked out. I had a serious case of pneumonia, and if I waited any longer I would've been extremely sick; more so than I already was. I was sick for roughly a week and a half, and the doctor told me I could've been in serious trouble if the pneumonia developed without me taking any prescribed medications.

**Table 8: Experiment responses to open response question
 “What are your opinions about the real life stories presented to you earlier?”**

Open Response Data

The following tables are given examples of open responses that some of the students from Boston Latin School provided in the tutorial. These responses were some of the best given, and all of these responses were then later scored and then included in the overall averages for both the control and experiment groups.

KEY WORDS/TOPICS	NUMBER OF TIMES MENTIONED IN OPEN RESPONSES	NUMBER OF TIMES MENTIONED IN TUTORIAL	PRE TEST	POST TEST	C	E
Early Detection/Increase Survival Rate	20	11	Y	Y	N	N
2 Weeks/Contacting Doctor with Any Changes/ Regular Checkups with Doctor	17	17	Y	Y	Y	N
I Know My Body Best(Instincts)/ Doctors Not Always Right/Get More Than One Opinion	18	8	Y	Y	N	N
Anyone Can Get Cancer/No Invincible	21	8	Y	Y	N	N
Self Checks/Monitoring Your Health/Family History	11	7	Y	Y	Y	N
Symptoms/Signs and Subtle but Persistent Changes in Health	18	19	Y	Y	N	N
Cancer is [adjective]	4	0	N	N	N	N
Being Proactive	2	4	N	N	Y	N

Table 9: Key words from the open responses which were provided from students from Boston Latin School

	Best OPR				
2	Early detection is important so I should trust my instincts and do regular self-exams.		1	Ages between 15-40 have the lowest detection rate.	Experiment
2	Keep an eye on my body and make sure if my health changes, to see a doctor after two weeks.		1	Cancer is also related to family history.	Experiment
2	Know how to detect cancer by self exams because you know your body best.		1	Even if a doctor says you are fine, for example a mole doesn't seem right to you, make sure you get a second opinion.	Experiment
1	I think that the most important piece of information that I learned today is that an early diagnosis can make all the difference in fighting and surviving cancer.		1	I also learned that if a symptom lasts for more than 2 weeks, you should get it checked by a doctor.	Experiment
2	The steps to prevent or potentially treat cancer in its early stages by early detection, and how it can affect all people of all ages.		2	What it means to be proactive, and how I can apply that skill later on in life.	Experiment

2	Early detection is the key to preventing deaths that cancer causes. Self exams and doctors appointments are important and need to be regular.	1	More people have been affected by cancer than I realized	Control
2	I learned that cancer can happen at any age and that I need to be aware of changes in my body.	1	I learned that early detection is the key to surviving cancer.	Control
3	Cancer can affect everyone, even young people. The key to better improvement in survival rates is early detection and early diagnosis. Listen to your body!	2	Cancer affects everyone; cancer symptoms first appear subtly and if they are still present after 2 weeks call your doctor.	Control
2	Learn the symptoms and don't ignore the signs	1	That two weeks is a solid amount of time to wait before contacting a doctor about ongoing issues	Control
2	The most important piece of information I have learned is that symptoms do not have to be big and sometimes something very subtle can be a very big warning sign in one's health.	3	I also learned that early detection can help save your life and if you feel as though something is wrong, even when doctors say otherwise, you must follow your instinct and seek all necessary medical attention.	Control

Table 10: Examples of open response question provided from Boston Latin School

Statistical Data Analysis of Pre and Post Test

In the Pre Test and Post Test there were a total of six questions, consisting of Yes or No, True or False, Multiple Choice, and Choose All that Apply types of questions. The average of the Pre and Post tests were calculated based on the number of correct answers they had out of the total six questions. Both the questions for the Pre and Post tests contain the same material, they are simply phrased differently and in a different order. The ttest compares the results from the Pre and Post Tests is such a small decimal number 0.0000000954573 and from this it can be concluded that these two data sets are in fact the same, since the null hypothesis is proven to be false. By stating the null hypothesis to be false the two sets of data between the Pre and Post tests have a direct correlation.

Pre and Post Test Results	
Pre Test Average of All Students	4.71831
Pre Test Standard Deviation of All Students	0.958915
Pre Test Median of all students	5
Post Test Average of All Students	5.56604
Post Test Standard Deviation of all students	0.604771
Post Test Median of all students	6
Ttest with Post Test Averages	9.54573E-08

Table 11: Pre and post test averages, standard deviations, and medians.

A standard deviation of 0.958915 for the average of 4.71831 shows the variation for each student is around 1 question, whether right or wrong, in regards to the average. The median shows a vast majority of the students got at least 5 out of the 6 question in the Pretest correct. The average was only taken for those students who completed both the Pre and Post tests in order to have a similar set of data with which to do a ttest on. The p value that is calculated from the ttest is significantly less than 0.05 which holds that the relationship between the Pre and Post tests is significantly different. This will be more evident when the ttest for the averages between control

and experiment are calculated later in this section on statistical analysis.

The average of the Post test is higher than the Pretest, with an average of 5.56604 and a standard deviation of 0.604771. The lower standard deviation shows fewer students deviated from the average in the Post test than in the Pretest. The median also increased from 5 to 6. The increase in median and average along with the decrease in standard deviation are the results of the students doing better at the end of the tutorial than in the beginning. It can be concluded that the students learned how to recognize a cancer symptom, keep an eye on changes in health for two weeks, and that they know their own body best. The statistical results of the students overall reflects the purpose of the tutorial and that the students are taking away valuable lessons from the information given to them.

Averages were then calculated for both the control and experiment for the Pre and Post tests to see if the proactive information affected the final results of the data.

Pre Test Results: Control vs. Experiment	
Average of the Control	4.9
Standard deviation of the Control	0.884736
Average of the Experiment	4.643
Standard Deviation of the Experiment	0.869835
Ttest of control vs. experiment	0.443545

Table 12: Pre test relationship between control and experiment

In the Pre test the students who were randomly assigned to the control did better with an average of 4.9 but a high standard deviation of 0.884736. This shows students in the control could have gotten more questions right than the average and vice versa. The students who were in the experimental group had a lower average at 4.643 and a lower standard deviation of 0.869835. With a slightly smaller standard deviation more students assigned to the experiment stayed closer to the average than those in the control group. The p value from the ttest is 0.443545 which is

significantly higher than 0.05, which shows that there is no real difference between the control and experiment concerning Pre test results.

Post Test Results: Control vs. Experiment	
Average of the Control	5.46667
Standard deviation of the Control	0.681145
Average of the Experiment	5.76191
Standard Deviation of the Experiment	0.455842
Ttest of control vs. experiment	0.126313

Table 13: Post test relationship between control and experiment

In the Post test, as expected, the experimental group had a higher average than the control group. Since the experimental group had information about being proactive with their health, and the control group had questions pertaining to 15-40 Connection itself. The averages for both the control and experiment in the Post test increased compared to the Pre test. This also proves both groups were able to retain some of the information presented to them and answer more of the questions correctly. The control also had a higher standard deviation in the Post test which shows that more students deviated from the average, but in the experiment the standard deviation is less than .5 which shows that the majority of the students in the experiment got at least 5 out of the 6 questions correct. The p value from this ttest is 0.126313 which is closer to 0.05 than the p value for the Pre test. This illustrates they are not significantly different, however, there is still a sense of the experimental group doing better than the control group, which is seen in the percent gain. The ttest shows the average results are in fact different because the standard deviations differ significantly. Therefore the students who were in the experimental group did take away more information from the tutorial than the control group. Since the experiment has a higher average and a lower standard deviation, it shows that the majority of students who were in the experimental group retained more material from the tutorial than those in the control based off of the higher average of the number of correct answers they go in the control. The smaller standard deviation

shows the majority of the students had a total number of correct answers that was close to either 5 or 6 since the average is above 5 and the standard deviation is less than 0.5. These results reflect the assumption that the students who were randomly selected to be in the experiment had a better overall grasp of the information than those in the control group, because they were exposed to the information about being proactive in their health.

Analysis of Percent Gain for Pre and Post Test	
Maximum Percent Gain	100%
Minimum Percent Gain	-33.333%
Average Percent Gain	20.75472%
Standard Deviation of Percent Gain	26.26209%
Median of Percent Gain	20%

Table 14: Analysis of percent gain for pre and post test

Percent gain was calculated by taking the change in the number of correct answers between the Pre and Post tests and then dividing them by the number the student got correct in the Pre test to determine the percentage of improvement or gain that the students showed. This is a numerical representation of the change in results between the Pre and Post tests answers. Since the results were calculated based on the number of questions the student got correct out of the six, the percent gain shows how each student improved from the Pre to Post tests. The questions in the Pre and Post tests were the same and therefore the gain calculated was accurate to represent the improvement, or lack thereof of each student. Some of the students had a negative gain, showing that they got more questions wrong in the Post test than they did in the Pretest.

Analysis of Percent Gain for Pre and Post Test	For Control vs. Experiment
Average Percent Gain for the Control	15.38889%
Standard Deviation in Percent Gain for the Control	26.5359%
Median for the Control	20%
Average Percent Gain for the Experiment	25.2381%
Standard Deviation in Percent Gain for the Experiment	22.60952%
Median for the Experiment	20%

Table 15: Analysis of percent gain for pre and post test of the control and experiment

The difference in improvement rate for the Pre and Post tests in the control and experiment can be calculated through the percent gain of each set of data. The difference in the Pre and Post tests is divided by the number of correct answers the students had in the Pre test in order to show the overall improvement rate. The average percent gain for the experiment is higher than that for the control by over 10%, which shows that the students who were randomly assigned to the experiment had a high improvement rate between the Pre and Post tests than the students who were in the control group. The higher gain in the experiment goes back to stating that the use of knowledge about being proactive with their health helped in getting 15-40 Connection's message across. The information about being proactive with their health helped the students to better retain the information throughout the tutorial, than those in the control who just had information about 15-40 Connection in general.

Statistical Data Analysis of Open Responses

Rubric: How Open Response Questions were Graded and Scored**

Score	Tell us something you learned	Score	Tell us something else	Control/ Experiment
0	I learned nothing this was useless	0	Still Learned Nothing	Control
1	I know my body best	1	Cancer can occur at any age	Control
2	Get something checked out if it lasts more than two weeks and being proactive about my health can help with early detection!	1	I know my body best	Experiment
2	A minor pain could turn out to be a symptom to something larger is it persists, and that a symptom could be something subtle and not as recognizable as other symptoms	2	Cancer can happen at any age and 2 weeks is a good length of time to get something checked out	Experiment
3	Cancer can affect anyone at any age, early detection is key in improving survival rates for teens and young adults and I know my body best!	2	It is important to have regular checkups with your doctor, but keep in mind that the doctor is not always right so get a second opinion too.	Control

Table 16: Rubric for open response

**This table was made using made up responses and not actual responses from the data. But student responses were graded on content and the number of points of information that they touched upon in their responses.

After the Post test, there were two open response questions both asked the students to write about the things they learned from the tutorial. Each of the open response questions were graded on a scale of 0 to 3 based on the number of pieces of information given, the quality of the response,

and the relevance to the tutorial. This scale was chosen because of a few students giving exceptional responses with a maximum of three pieces of information given.

First Open Response Question: Post Test	Tell us something you learned from this tutorial
Average of all the students	1.2
Standard deviation of all the students	0.755929
Median of the students	1
Ttest between First and Second Open Response Questions	0.16192928

Table 17: Analysis of first open response for post test

The average of all the students was 1.2 which reflects that the majority of the students answered the question literally and only provided one piece of information. The standard deviation is around .7559 and can reflect some students did score higher than the average and the median, and these results can concluded every student got at least one valuable piece of information from the tutorial.

Second Open Response Question: Post Test	Tell us another thing you learned
Average of all the students	1.02041
Standard deviation of all the students	0.47826927
Median of the students	1
Ttest between First and Second Open Response Questions	0.16192928

Table 18: Analysis of second open response for post test

Both of the Open Response Questions took the open ended responses of the students and scored them on a scale of 0 to 3 based on the number of points of information the student used in their answer. Examples of some key topic points covered were: 2 weeks is key, be proactive with your health, make a doctor’s appointment if health changes do not go away, etc. For the second

question the average and standard deviation were lower than the first open response. This reveals the majority of students put more effort into the first open response by giving the majority of the information they retained in their first response.

Average Open Response Scores	Control vs. Experiment
Average Response Experiment	2.04769
Average Response Control	2.23333
Ttest	0.55903075

Table 19: Average open response scores for control and experiment

Based off the sum of both scores the average response from each student in the control and in the experiment was calculated. The average for the control is slightly higher than in the experiment. This was surprising since it was thought the experiment would have retained more information since they were given questions on being proactive. One reason for this result could be that there were some students in the experiment who mentioned proactive in their open responses but did not go into great detail about this topic. Another reason could be the students in the control just gave in depth answers based on all the other material mentioned throughout the tutorial. The ttest shows that the two do not differ since the p value for the ttest is over 0.05.

VIII. Discussion

The overall objective of the 15-40 Connection Tutorial Through ASSISTments Interactive Qualifying Project was to create a user friendly tutorial which incorporates the cancer prevention and early detection messaging of 15-40 Connection with the ASSISTments problem set building software. The project group worked with representatives from both 15-40 Connection and ASSISTments over the course of three terms to construct and distribute the tutorial in order to collect and analyze data.

Before the final ASSISTments problem set was created, a number of preliminary drafts were created and eventually transformed into the final problem set. Originally, the group assembled a flowchart with approximately 20 possible questions that were organized by topic. Using the flowchart and information obtained through research, a PowerPoint based tutorial was constructed. After meeting with 15-40 Connection representatives, a finalized version of tutorial was completed and inserted into an ASSISTments problem set. The finalized problem set was then distributed to local high schools and data was collected. The group then performed a series of testing with the data in order determine whether it mattered if the students received the control or the experiment tutorial. The difference between the control and experiment tutorials consists of a series of four slides in the experiment and three slides in the control. The experimental tutorial slides that differed from the control are composed of information about being proactive about one's health. Based on the open response questions at the end, it was determined that these informational slides had little to no impact on the users that were randomly selected into the experimental group. However, the message about early detection, one of the emphasized points in 15-40 Connection's messaging had the largest impact upon all users, being mentioned the most in the ending open response questions.

The statistical analysis used by the group to go over the data that was collect from Boston Latin School reflected some of the thoughts the group had about how the messaging would come


across. The averages were taken for the Pre and Post tests but also with the differentiation of the control group versus the experiment group. These averages shows that the students who were in the experiment group had a better score for the number of questions correct in the Post test in comparison to the control group. The ttest that were calculated show that there was no real correlation to the control and experiment, and that the two differed enough to show the experiment group had overall better responses with only a few exceptions.

The possibility for the continuation of the 15-40 Connection Tutorial Through ASSISTments IQP would be through the continuation of helping the sponsors at 15-40 Connection analyze any incoming data statistically and pulling out the most important information. This tutorial could then be used as a tool at school presentations to help supplement the material presented or as its own tool that can be continuously given out to high school and out in social media to keep collecting data. This tutorial could also be used in another control vs. experiment project by sending it out in the early fall and then analyze the recorded data.

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X. Appendix I: ASSISTments Preliminary Tutorial Slides



15-40 connection
Know Your Body • Check Yourself • Act Early

PRE TEST
Click to add text

At what age can you develop cancer

- Any age

multiple choice OPR

15-40 year olds are diagnosed with cancer ___ times more frequently than young children.

A. 2 B. 4 C. 6 **D. 8**

Early detection can tremendously increase the chance of surviving cancer

- a. True
- b. False

If you experienced a change in your health that persisted for two weeks you would

- a. Tell a parent
- b. Make a mental note to keep an eye on it
- c. Schedule an appointment with your doctor right away

How can you detect cancer early? (select all that apply)

- a. Do self-exams
- b. Make sure to get annual checkups with my doctor to benchmark my normal health
- c. Be sure to know my family history
- d. There is no way to detect cancer early

There are times that I know my body better than my doctor does?

- a. True
- b. False

Would you recognize a cancer symptom?

- a. Yes
- b. No

What Cancer Symptoms look and feel like:
slide about cancer symptoms

Cancer symptoms are usually
Emergency Room symptoms.

- True
- False

Normal Health

inserting statement

basically how you feel normally,
normal: sleeping pattern, weight, appearance of skin,
how you feel normally,

have a statement about what if you recognize a change in
your norm

So, what do we mean by a change in your normal health?

what would it look or feel like?

1. pain or swelling that doesn't go away
2. sleepiness or intense fatigue that lasts more than **2 weeks**
3. change in appearance in a mole you have
4. a lump or bump that didn't used to be there and lasts more than **2 weeks**
5. drastic weight change
6. swollen throat, sore throat that lasts more than **2 weeks**..

Now let's look at some real world examples...(remember it's different for everyone)

Are these all of the cancer symptoms?

yes/no

this is important because

How many teens and young adults are diagnosed with cancer **EVER HOUR?**

Answer = 8

Jared B.

- At 31, a successful male happy with his life, began experiencing bad migraines, weight gain, and periodic skin rashes and sores.
- Doctor blamed the symptoms to allergies from his roommate's cat
- Relocating away from the cat- symptoms worsened along with an abdominal pain

If allergies from a cat weren't improving, what would you have done?

- More than 7 months from the initial symptoms, a biopsy showed it was lymphatic cancer



Laurel Ahearn

- Age 19, college student, athlete - started experiencing persistent and unusual knee pain
- Diagnosed as Runner's Knee since she was young and fit
- Worsening pain. Doctors recommended physical therapy which was excruciating! It's hard to speak up

What would you have done?

- Doctor told her if she'd waited much longer she would have lost her entire leg



Dave McGrath

- Age 14, started experiencing severe stomach pain and bleeding, but delayed getting checked
- Finally diagnosed with Crohn's disease. His delay resulted in needing major surgery to remove substantial portion of small intestine.
- At age 18 started experiencing double vision and headaches

At Age 18, what would you have done?

- Dave didn't delay this time. He knew subtle but persistent symptoms required action. This probably saved his life. He was diagnosed with early stage brain cancer.



Stephanie Corliss

- At the age of 14 was diagnosed with hypothyroidism after experiencing weight gain and constant exhaustion
- After meeting with numerous doctors and years of not feeling "right" Stephanie decided to see a specialist in her type of hypothyroidism

How long would you wait to get checked after not feeling "right"?

- Was diagnosed with Stage 4 Thyroid Cancer that had been in her body for over 10 years
 - Listen to your inner-voice that's telling you "this is not right" and seek out second, third, and even tenth opinions until you know your doctor is listening



Insert stories of Proactivity

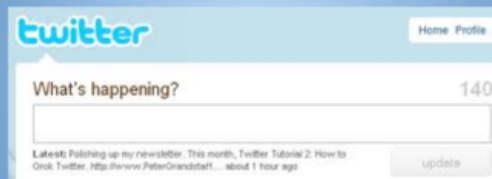
Think back to instances in your life when you have been proactive and it made a huge difference.

- You caught that grammatical error that you kept repeating throughout your entire English paper before handing in the final draft to your teacher.
- You almost sent a text to one of your best friends containing details of her surprise birthday party that you meant to send to the group of friends planning the party, but you caught your mistake right before you hit "send".
- You caught an error on your math test for one of those a-e questions that would have cost you 15 points off your final grade if you hadn't.

Have you ever...

- realized you were using the wrong equation on a test before you answered the question
- caught yourself before you said something that could hurt your best friend's feelings
- not sent that text message to your friend's crush telling them how your friend feels
- remember to print out that assignment before going to school in the morning

In the size of a tweet, tell us a time you were proactive and it made a huge difference...



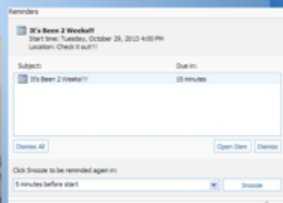
So what can you do? (Conveys that it is important to be proactive) (select all that apply)

- Do self-exams on a monthly basis to get familiar with what your body normally feels like
 - Go to your doctor on an annual basis to benchmark your normal health
 - Discuss your family history
- **Scaffolding. 5-10% of cancers are due to predisposing genetic factors

If I notice a change in my health I should (select all that apply)

- Take a picture daily to track any changes in appearance
- Put a reminder in my phone to call a doctor in two weeks if it is still bugging me
- Ask a friend to help you monitor the symptom and let you know if they notice it getting worse.
- talk to parents and let D know what's up

Selfie-->



Now that you know what a cancer symptom may look or feel like... What would you do?

You notice that lately you have been itching the same spot on your stomach. One day you take a look and notice that you have been itching a mole on your stomach. You remember having that mole, but know that it didn't used to be itchy. You decide to schedule an appointment with your doctor because the mole has changed which is weird. When you go to the doctor she is not worried and tells you are fine. Plus she reminds you that if you were to get the mole removed then you would be left with a nasty scar that wouldn't be pretty. Despite what the doctor says to ease your concern, the quiet voice inside of you still tells you that you should have it removed...What do you do?

...What would you do?

- Decide to listen to your doctor. They went to medical school after all so they know best.
- Make a mental note to go see another doctor for a second opinion within the next couple of months.
- Insist on getting the mole removed.

we all wanna be told we are ok, trust your instincts,
normalize obstacles that we face daily in terms of our health

Meghan Rothschild

- Sophomore in college and noticed a suspicious lesion on stomach that started to change and itch
- Doctor told her it was nothing because she was too young – and was reluctant to do a biopsy
- We all want to hear we are okay, don't we?
- Meghan insisted on running more tests and was diagnosed with Melanoma, the deadliest form of skin cancer



Obstacles: What can get in your way of detecting cancer early? (Please decide on an interesting and engaging way to present this information).

- Thinking cancer can't happen to you
- Not knowing what a cancer symptom can look or feel like
- Ignoring subtle health changes that don't go away after a couple of weeks
- Not going to the doctor
- Not being honest with your doctor
- Not trusting your instincts and questioning your doctor if necessary

potential scaffold: "Early Detection" means that I am paying attention to my normal health and take action if I notice a change in my normal that doesn't go away in 2 weeks.

Click to add title

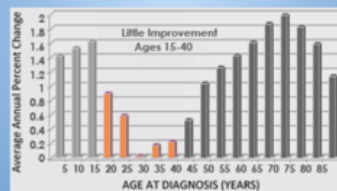
this feeling of invincibility isn't what it seems. from these stories you can see that anyone can develop cancer at any age, from a lump or bump to dramatic weight loss or just subtle changes

You notice something 'off' about your norm. What should you do?

- Talk to your parents, and let your doctor know what's up.
- If it has lasted over 2 weeks, SPEAK UP and BE HONEST. Talk to your doctor.
- Take a picture daily to track any changes in appearance
- Put a reminder in my phone to call a doctor in two weeks if it is still bugging me
- Ask a friend to help you monitor the symptom and let you know if they notice it getting worse.

Click to add title

use this graph when describing the 15-40 Connection



So, why are we talking about this with you?
(continue)

- **Insert statement: Cancer survival rates for 15-40 year olds have not improved since 1975.**
- Why?
 - Low numbers of clinical trials and poor participation
 - Delayed diagnosis of their cancers
 - Inadequate treatment practices
 - Poor understanding of the biology of cancers in teens and young adults
 - Limited access to care and insurance coverage for teens and young adults (changing)
 - Limited emphasis on prevention and early detection for teens and young adults
 - Unique psychosocial and supportive care needs

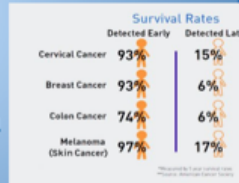
Show various pieces of technology (or whatever you think will resonate) from the 1970s and now. Think t.v, phone, record...etc.



Why haven't survival rates improved?

early detection is key, but without knowing the symptoms it is hard to figure out what is wrong

early detection does make a difference in survival



Feedback (before posttest)

Stay engaged and pay it forward

- Share the importance of early cancer detection with a friend- have them

Take this tutorial

- Like us on Facebook
- Follow us on Twitter
- Share our posts

How can I make a difference?

Click to add text



Did you know that...?

Cancer survival rates for 15-40-year-olds have BARELY improved since 1975!

Nine 15-40 year-olds in the US are diagnosed with cancer every hour?

Don't let your peers get left out of the cancer conversation. Share the life-saving advantage of early cancer detection.

Join the 15-40 Connection Clubs and make a change for our generation.



<http://clubs.15-40.org/>



Post Test

rephrase these questions for next time, think about changing the order, figure out which will give the optimal data response

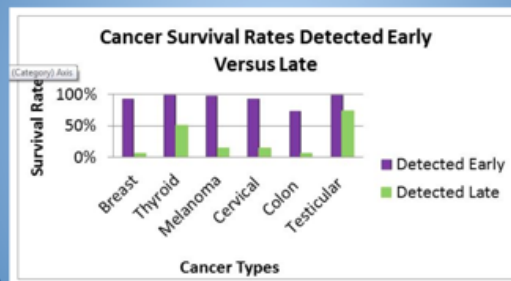
Teen and young adults can get cancer

- True
- false

What results in higher survival rates in cancer?

- Early detection of cancer
- ER visits
- Taking a daily vitamin
- frequent visits to your doctor

Survival Rates



If you experienced subtle and persistent change in your health that lasted for more than two weeks you would:

- tell your friend about it
- schedule an appointment to get checked by your doctor
- keep an eye on it to see if it continues for at least a month

What strategies could be helpful with early cancer detection?

- yearly checkups by your doctor
- make note of any unusual changes in your normal health and continue to keep an eye on them
- doing regular self exams
- There is no way to detect cancer early

XI. Appendix II: ASISSTments Final Tutorial Slides

1) Problem #PRAV4YS "PRAV4YS - Problem #560929"



15-40 connection

<http://www.15-40.org>



Next

2) Problem #PRAV4YT "PRAV4YT - Problem #560930"

Select your gender.



- Male
- Female

3) Problem #PRAV4YU "PRAV4YU - Problem #560931"

Select your age range.



- 15-18
- 19-24
- 25-30
- 31-35
- 36-40

4) Problem #PRAV4YV "PRAV4YV - Problem #560932"

What school do you attend?



5) Problem #PRAV4YW "PRAV4YW - Problem #560933"

At what age can a person develop cancer?



- 0-18
- 19-29
- 30-39
- 40+
- Any Age

6) Problem #PRAV4YX "PRAV4YX - Problem #560934"

Early detection can greatly increase a person's chances of surviving cancer.



- True
- False

9) Problem #PRAV4Y2 "PRAV4Y2 - Problem #560937"

I know what my body feels like better than anyone else.



- True
- False

10) Problem #PRAV4Y3 "PRAV4Y3 - Problem #560938"

Would you recognize a cancer symptom?



- Yes
- No

11) Problem #PRAV4Y4 "PRAV4Y4 - Problem #560939"

An early warning sign of cancer is usually so bad that you will need to go to the Emergency Room.



- True
- False

12) Problem #PRAV47R "PRAV47R - Problem #561145"

A cancer symptom will not usually send you to the Emergency Room.

- An early cancer symptom is usually a subtle and persistent change in your normal health.



What are some lifestyles choices that can help lower your risk of getting cancer? (Please select all that apply.)



- Drink plenty of water
- Eat healthy
- Exercise regularly
- Reduce stress

13) Problem #PRAV475 "PRAV475 - Problem #561146"

What is normal health?

- Basically, it is how you feel on a normal or regular basis. This includes:
 - Normal sleeping pattern
 - Typical weight
 - Normal appearance of skin (moles, rashes, etc.)
 - Normal energy level



What if you recognize a change in your normal health?



- I would monitor it for 2 weeks then make an appointment with my doctor
- I would brush it off thinking it was just stress induced
- I would tell my parents and then wait until it got better
- I would try and figure out what was the cause of the change

14) Problem #PRAV47T "PRAV47T - Problem #561147"

So, what do we mean when we say a CHANGE in your normal health?

- What would it look or feel like?
 - Pain or swelling that doesn't go away for **2 weeks**.
 - Sleepiness or intense fatigue that doesn't go away for **2 weeks**.
 - Change in appearance in a mole you have.
 - A lump or bump that wasn't there before and lasts for **2 weeks**.
 - Unexplained weight change (loss or gain) that doesn't return to a normal range.
 - Swollen glands, sore throat, loss of voice that lasts for **2 weeks**.

How long is a good time period to wait before getting checked by a doctor?



- The same day
- A couple of days
- 2 weeks
- A month
- 6 months
- Never

15) Problem #PRAV47U "PRAV47U - Problem #561148"



Next

16) Problem #PRAV473 "PRAV473 - Problem #561155"

So, why is understanding your normal health important?

- An early warning sign of cancer can be a subtle but persistent change in your normal health.
- You want to make sure you are prepared to take action if you become aware of a change that lasts for more than **2 weeks**.

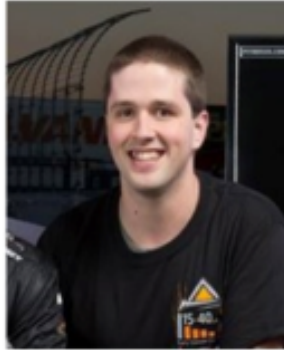


Next

17) Problem #PRAV474 "PRAV474 - Problem #561156"

Josh

- Senior in college and busier than ever trying to balance work, academics and a social life.
- Began experiencing fatigue and back pain, but brushed it off by attributing it to a busy schedule.
- One day, he began experiencing a radiating pain from his testicle that he could not ignore.



Would you think something was wrong if you felt more tired than normal?



- Yes
- No

18) Problem #PRAV475 "PRAV475 - Problem #561157"

Josh's Diagnosis

- Josh completed a self-check only to find a lump.
- Went to get it checked by the doctor two days later and was diagnosed not with testicular cancer, but with Stage II Leukemia.



- Next

19) Problem #PRAV476 "PRAV476 - Problem #561158"

Laurel

- Age 19, college student, athlete - started experiencing persistent and unusual knee pain.
- Diagnosed as Runner's Knee since she was young and fit.
- Worsening pain. Doctors recommended physical therapy which was excruciating! It's hard to speak up.



Would you think that pain from an athletic activity would potentially be a sign of cancer?



- Yes
- No

20) Problem #PRAV477 "PRAV477 - Problem #561159"

Laurel's Diagnosis

- Laurel listened to her body and demanded for an X-Ray.
- Results revealed she had developed Bone Cancer (Osteosarcoma).
- Doctors told her if she'd waited much longer she would have lost her entire leg.



- Next

21) Problem #PRAV478 "PRAV478 - Problem #561160"

How often do you think teens and young adults like Josh & Laurel are diagnosed with cancer?



- 3 every hour
- 7 every hour
- 9 every hour
- 14 every hour

22) Problem #PRAWQ94 "PRAWQ94 - Problem #579477"

Improvements in cancer survival rates for 15-40 year-olds have lagged behind those of older and younger age groups.

- What is the major culprit for this lack of improvement?

• **Delayed diagnosis.**



- What do you think are some other common obstacles that can get in between someone in our age group noticing a symptom/sign and not going to the doctor?

- Lack of awareness of what a symptom can look or feel like
- Feelings of invincibility
- A seemingly instinctual ability many have to minimize symptoms
- The hesitancy of medical professionals to consider a cancer diagnosis when a patient presents with vague symptoms
- Not being honest with medical professionals about symptoms...including embarrassing ones
- Feeling intimidated by medical professionals when one needs to trust their instincts and self-advocate

23) Problem #PRAV479 "PRAV479 - Problem #561161"

Dave

- At age 14, started experiencing severe stomach pain and bleeding, but delayed getting checked.
- Finally diagnosed with Crohn's disease. His delay resulted in needing surgery to remove substantial portion of small intestine.
- In high school he started experiencing double vision and intense headaches.



After seeing a number of different doctors, do you think they would notice cancer symptom before you?



- Yes
- No

24) Problem #PRAV48A "PRAV48A - Problem #561162"

Dave's Diagnosis

- Dave didn't delay this time. He knew subtle but persistent symptoms required actions. This probably saved his life.
- He was diagnosed with Early Stage Brain Cancer.



- Next

25) Problem #PRAV48B "PRAV48B - Problem #561163"

Cancer Signs & Symptoms

- Josh, Laurel, and Dave all experienced subtle but persistent changes in their health that turned out to be cancer.
- However, there is **no perfect checklist of cancer signs/symptoms**.



Next

26) Problem #PRAV48C "PRAV48C - Problem #561164"

Based on the symptoms, who do you think was diagnosed with breast cancer?

Sarah



- Abdominal pain, bloating, weird skin rashes.
- Major fatigue that would not go away

Justine



- Found a lump in her right breast by chance.



- Sarah
- Justine
- Both women
- Neither

27) Problem #PRAWRAK "PRAWRAK - Problem #579492"

Even the same type of cancer can present itself with different symptoms.

- Both women were diagnosed with breast cancer.
 - Sarah was diagnosed with Stage 2A Breast Cancer.
 - Justine was diagnosed with Stage 1 Breast Cancer.



○ Next

28) Problem #PRAV48D "PRAV48D - Problem #561165"

Have you ever...

- Put on a helmet before taking a bike ride?
- Buckled up before a long road trip?
- Double checked your answers before handing in an exam, finding several 'silly mistakes'?
- Gone for extra help before an exam?
- Checked with your teacher to confirm when your homework was due rather than waiting last minute.



○ Next

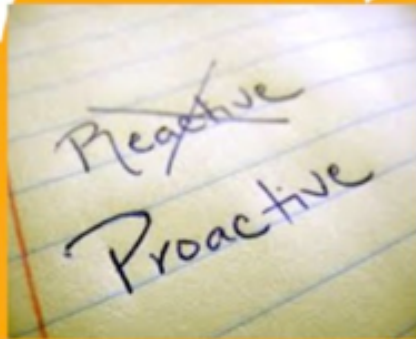
29) Problem #PRAV48E "PRAV48E - Problem #561166"

In the size of a tweet (140 characters), tell us a time you were proactive and it made a difference.



30) Problem #PRAV48F "PRAV48F - Problem #561167"

Did you know you can also be proactive about your health?



- Yes
- No

31) Problem #PRAV48G "PRAV48G - Problem #561168"

Here are some helpful tips to be proactive about your health:

- Do self-exams on a monthly basis to get familiar with what your body normally feels like.
- Go to your doctor on an annual basis to benchmark your normal health.
- Discuss your family's history.
 - Unfortunately, 5-10% of cancers are caused by genetics.



Next

32) Problem #PRAV48H "PRAV48H - Problem #561169"

In the size of a tweet (140 characters), what are your opinions about the real life stories that were presented earlier?

Compose new Tweet

What's happening?

#FF @Support

128 Tweet



33) Problem #PRAV48K "PRAV48K - Problem #561171"

Would you pass this tutorial onto a friend?



- Yes
- No

34) Problem #PRAV48M "PRAV48M - Problem #561172"

Want to get involved?

- Did you know students just like you are educating their own peers about the life-saving advantage of early cancer detection by forming clubs and building awareness through fun events?



- How many lives do you think they will change?
- Want to get involved? Visit <http://clubs.15-40.org/> to learn more!



- Next

35) Problem #PRAV48N "PRAV48N - Problem #561173"

If I notice a change in my health I should...? (Please select all that apply.)

Subject	Due In:
It's Been 2 Weeks!!!	15 minutes



- Take a picture daily to track any changes in my appearance.
- Put a reminder in my phone to call a doctor in two weeks if it is still bugging me.
- Ask a friend to help me monitor the symptom and let me know if they notice it getting worse.
- Talk to my parents and let my doctor know what's up.

36) Problem #PRAV48P "PRAV48P - Problem #561174"

Now that you know what a cancer symptom may look or feel like...

- You have been scratching a spot on your stomach and realize that it is actually a mole on your stomach which is very itchy. This mole have never been itchy before so it seems weird!
- You are concerned because you have been scratching it everyday. You decide to schedule an appointment with your doctor because the mole has changed and is no longer the same as it used to be.



Next

37) Problem #PRAV48Q "PRAV48Q - Problem #561175"



- When you go to the doctor, she is not worried and tells you that you are fine. Plus, she reminds you that removing the mole would leave a nasty scar that wouldn't look very pretty.
- Despite what the doctor says to ease your concern, the tiny voice inside you still tells you that you should have it removed...



○ Next

38) Problem #PRAV48R "PRAV48R - Problem #561176"

...What would you do?



- Decide to listen to your doctor. They went to medical school after all so they know best.
- Make a mental note to go see another doctor for a second opinion within the next couple of months.
- Insist on getting the mole removed.

Meghan

- Sophomore in college and had a very similar story as to what you just read.
- When she noticed a change in her mole, she insisted on the doctor running more tests although the doctor was reluctant.



We all want to hear we are okay, don't we?



○ Next

Meghan's Diagnosis

- Meghan listened to her instincts and took control of her health which lead to her diagnosis of Melanoma, the deadliest form of skin cancer.



○ Next

41) Problem #PRAV48U "PRAV48U - Problem #561179"

The doctor's response could have been an obstacle for Meghan.

- What other obstacles can get in your way of detecting cancer early?
 - Thinking "it won't/can't happen to me."
 - Not being able to identify what a cancer symptom can look/feel like.
 - Ignoring subtle health changes that have lasted longer than 2 weeks.
 - Not seeking your doctor's help.
 - Being dishonest with your doctor.
 - Not trusting your instincts.

Never say
"That won't happen to me".
Life has a funny way of
proving us wrong.



Next

42) Problem #PRAV48V "PRAV48V - Problem #561180"

We are not invincible...

- Cancer can happen at **ANY AGE!**



- True
- False

43) Problem #PRAV48W "PRAV48W - Problem #561181"

If you notice something 'off' from your norm, here are some steps that you can follow.

- Talk to your parents, and let your doctor know what's up.
- If it has lasted over 2 weeks, SPEAK UP and BE HONEST. Talk to your doctor.
- Take a picture daily to track any changes in appearance.
- Put a reminder in your phone to call your doctor in 2 weeks if it is still bugging you.
- Ask a friend to help you monitor the symptom and let you know if they notice it getting worse.



Next

44) Problem #PRAWRBC "PRAWRBC - Problem #579516"

Would you use the steps previously stated if you noticed something off about your normal health?



- I would tell my parents but wait until my next check up to inform my doctor.
- I would keep an eye on it myself but not mention it to anyone else.
- I'd put a reminder in my phone for 2 weeks and see if the change has continued.
- I would make an appointment to see my doctor.
- I would not do anything about it.

45) Problem #PRAV48X "PRAV48X - Problem #561182"

Look at the advances we have seen in technology since 1975!



Next

46) Problem #PRAV48Y "PRAV48Y - Problem #561183"

Cancer survival rates for 15-40 year-olds have not improved since 1975.

- Why? DELAYED DIAGNOSIS!
- Cancers are not being detected early enough.
 - Teens and young adults are not capable of identifying cancer symptoms.
 - 'Invincibility' mentality.
 - Limited emphasis on prevention and early detection for teens and young adults.



Next

47) Problem #PRAV48Z "PRAV48Z - Problem #561184"

Early detection is key, but without knowing the symptoms it is hard to figure out what is wrong.

- Early detection **DOES** make a difference in survival rates!



Next

48) Problem #PRAV48J "PRAV48J - Problem #561170"

Do you know anyone who has been affected by cancer?



- Yes
- No

49) Problem #PRAV484 "PRAV484 - Problem #561187"

Teen and young adults can get cancer.



- True
- False

50) Problem #PRAV485 "PRAV485 - Problem #561188"

What is a major factor that can help improve cancer survival rates?



- Early Detection
- Emergency Room Visits
- Taking a daily vitamin
- Frequent visits with your doctor
- Sleeping 7-8 hours a night

51) Problem #PRAV486 "PRAV486 - Problem #561189"

If you experienced a subtle and persistent change in your health that lasted more than 2 weeks you would...?



- Tell your friend about it.
- Schedule an appointment to get checked by your doctor.
- Keep an eye on it to see if it continues for at least a month.

52) Problem #PRAV487 "PRAV487 - Problem #561190"

**How can you detect cancer early?
(Please select all that apply.)**



- Get regular checkups by your doctor to benchmark your health.
- Note any changes in your health and call a doctor if they last for 2 weeks or more.
- Do regular self exams.
- You can't know what's going on inside your body so there's no way to catch cancer early.
- Learn about your family history.

53) Problem #PRAV488 "PRAV488 - Problem #561191"

The person who knows **MY BODY** the best is...?



- My parents/guardians
- My teachers
- My doctor
- Me
- My friends

54) Problem #PRAV489 "PRAV489 - Problem #561192"

What do you think is the most important piece of information that you learned today?



55) Problem #PRAV49A "PRAV49A - Problem #561193"

Tell us something else that you learned today.



56) Problem #PRAV482 "PRAV482 - Problem #561185"

Pass on the message!



- Tell your friends!
- Let's do what we can to make a difference and spread the message about early cancer detection!



Next

Get involved!

- Stay engaged and pay it forward!
 - Share the importance of early cancer detection with a friend -> have them take this tutorial.
- Like us on Facebook.
- Follow us on Twitter.
- Share our posts.

Tweet to 15-40 Connection

@1540Connection



Next

XII. Appendix III: Control VS Experiment Tutorial Slides

Experiment Group Slides:

28) Problem #PRAV48D "PRAV48D - Problem #561165"

Have you ever...

- Put on a helmet before taking a bike ride?
- Buckled up before a long road trip?
- Double checked your answers before handing in an exam, finding several 'silly mistakes'?
- Gone for extra help before an exam?
- Checked with your teacher to confirm when your homework was due rather than waiting last minute.



Next

29) Problem #PRAV48E "PRAV48E - Problem #561166"

In the size of a tweet (140 characters), tell us a time you were proactive and it made a difference.



Compose new Tweet

What's happening?

#FF @Support

128 Tweet



30) Problem #PRAV48F "PRAV48F - Problem #561167"

Did you know you can also be proactive about your health?



- Yes
- No

Here are some helpful tips to be proactive about your health:

- Do self-exams on a monthly basis to get familiar with what your body normally feels like.
- Go to your doctor on an annual basis to benchmark your normal health.
- Discuss your family's history.
 - Unfortunately, 5-10% of cancers are caused by genetics.



© Next

Control Group Slides:

32) Problem #PRAV4SH "PRAV4SH - Problem #561169"

In the size of a tweet (140 characters), what are your opinions about the real life stories that were presented earlier?



Compose new Tweet

What's happening?

#FF @Support

128 Tweet



33) Problem #PRAV4SK "PRAV4SK - Problem #561171"

Would you pass this tutorial onto a friend?



- Yes
- No

34) Problem #PRAV4SM "PRAV4SM - Problem #561172"

Want to get involved?

- Did you know students just like you are educating their own peers about the life-saving advantage of early cancer detection by forming clubs and building awareness through fun events?



- How many lives do you think they will change?
- Want to get involved? Visit <http://clubs.15-40.org/> to learn more!



- Next

XIII. Appendix IV: 15-40 Connection and ASISSTments Reaching Out Contact List

School	School Type	Tutorial Contact	ASSISTments Users	Info On User	Email Contacts
Littleton High	HS	15-40		Principal	John Harrington, jharrington@littletonps.org
Marlborough High	HS	15-40		Club advisor	Nancy Bouvier, mombo12@hotmail.com Donna Saucier :dsaucier@millburyschools.org
Millbury High School	HS	15-40/ cc our assist- ment user			
Monson					
Montachusett Regional Vocational Technical	HS	Cristina			
Nashoba Regional High School	HS	15-40		Club Advisor, can pass along to health teachers	Tracy Landry (librarian, club faculty advisor), Tlandry@nrsd.net
Natick			"starallo@millbury.k12.ma.us		
Nativity School of Worcester			msutphen@millburyschools.org		
Norfolk County Agricultural	HS	Cristina	jcronin@millburyschools.org		jsmith@norfolkaggie.org
North High	HS	15-40/ cc our assist- ment user	jhillier@millburyschools.org		Maureen Burke - Health; burkemoe@aol.com
Oxford	MS	Cristina	egradstreet@millburyschools.org		
Quabbin High	HS	15-40	mtarka@millburyschools.org	Health teacher	Chris Nosel, cnosel@qrsd.org
Salem High	HS	15-40	jyaskis@millburyschools.org	Health teacher	CKacie Fyrberg, kacie.fyrberg@nschi.org
Shrewsbury	HS	15-40	richtfanning@gmail.com	Biology teacher	Jill Carter- jill.linnea@gmail.com
St. John's	HS	15-40	tignor_donnalee@montytech.net	Gym/science teachers	Pat White, pwhite@stjohnshigh.org and Tom Danna, tdanna@stjohnshigh.org
St. Peter Marion	HS	15-40		Test site last year, staff changes, student leader can forward to health teachers	Cat Kearney- cat_kearney@aol.com
Stoughton	HS	Cristina	anorris@natickps.org		
Sudbury		Cristina	lstewart@nativityworcester.org		
Sutton	HS	Cristina			
Swansea			cased@worc.k12.ma.us		
Uxbridge			clooney@oxps.org		
Wachusett Regional	HS	15-40		Club advisor, health teacher, test	Lorraine Jewell, lorraine_jewell@wrsd.net

Watertown High	HS	15-40		Dir. Wellness	Donna Ruseckas donna.ruseckas@watertown.k12.ma.us
Wayland			jmjohnson@shrewsbury.k12.ma.us		
Webster	HS	Cristina			
West Springfield	HS	Cristina			
Westford			y_feng@stoughtonschools.org		
Wilbraham & Monson Academy	HS	15-40	julie_schoenfeld@sudbury.k12.ma.us	Club advisor	Marvina Lowry-Brook, mlowrybrook@wma.us
Woodstock Academy	HS	15-40	gamblec@suttonschools.net	Office staff - can forward to health teachers	Trish Welch, TWelch@woodstockacademy.org
Worcester Public Schools Overall	District	15-40	tirish@swanseaschools.org	She knows me and will be a good contact.	Colleen O'Brien - Health and Athletics- OBrienC@worc.k12.ma.us
Worcester Technical High School	HS	15-40	jclark@uxbridge.k12.ma.us	Junior High teachers	Carol Mendes MendesC@worc.k12.ma.us