CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Nadia Ansari

Project Number

J0701

Project Title

The Effect of Deep Breathing vs. Exercise on Stress Reduction and Test Performance

Abstract

Objectives/Goals

The objective of this study was to determine which technique: deep breathing or exercise lowers stress related to taking tests and improves performance on tests.

Methods/Materials

Heart rate variability (EMwave) ear sensor, HeartMath/EMwave Software on Laptop, Mental Math Test on iPad, Stopwatch, 4th and 5th grade student volunteers, Incentives (candy or stationary), Feathers to monitor deep breathing, Stress Questionnaire (Depression, Anxiety, Stress Scale).

Results

Over a two week period, 41 volunteers from 4th and 5th grade classes, were randomized into three different groups: control group, meditation/deep-breathing group, and exercise group. I had the 41 students complete a 21 question survey on their level of stress. I then measured all the students' heart rate variability using a ear sensor and EMwave software. I calculated the baseline level of reported stress on the questionnaire and physiologic stress using the ear sensor and heart rate variability software for each student. I then taught the 4-7-8 deep breathing technique to the meditation group. Then, every day for two weeks, I had the meditation group do deep breathing with me for 5 minutes, the exercise group ran with me for 5 minutes, and there was a control group, which had a regular school day during this time. Upon completion of the experiment, I measured heart rate variability while the students took a mental math test again. After two weeks of daily intervention, the group that did deep breathing every day, lowered their stress levels as measured by a significant improvement of 5.5% in heart rate variability ($p=.003$) and also increased their mental math test scores by a significant 12% ($p=.03$). The other two study groups had their stress levels stay the same or worsen during the same time period.

Conclusions/Discussion

No prior study has shown that just five minutes of simple deep breathing can result in statistically significant improvement of 12% in test performance. This improvement in test scores was correlated with statistically significant physiologic stress reduction measured by improvement in heart rate variability. The impact of these findings is that schools could teach a simple, but powerful breathing technique to help students improve test performance. Just five minutes of deep breathing before a stressful activity can result in big changes in test taking and other stressful situations.

Summary Statement

I showed that training students in deep breathing can improve their physiological stress and significantly improve their test scores.

Help Received

I designed and did all parts of the experiment myself, including teaching students deep breathing daily for two weeks as well as doing all subject testing. My teachers and the 4th and 5th grade teachers at my school gave me class time to perform the interventions. My mom helped me with the statistics.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Kennedy Avery; Rachel Culver

Project Number

J0702

Project Title

Healthy Food or Candy? Which Improves Memory?

Abstract

Objectives/Goals

Can the types of food we consume while studying and testing improve the outcome of the actual test scores? Which food type proves to improve overall test scores: candy (starburst and smarties) or healthy food (bananas and apples). Our main goal was to see what food or foods improved the memory of students. To measure the improvement in memory we used tests that were self generated.

Methods/Materials

We conducted our experiment in Junior high classrooms with roughly 18 students per testing group: candy, healthy, or control group. Permission slips were required first because the students were ingesting food. Students would receive either starburst or smarties (candy group), apples or bananas (healthy group), or nothing at all(control group pertaining to their group and a study guide and would then have 10 minutes to study their material. Two days later, this step would be repeated, but tests were handed out instead of study guides.

Results

The results of our investigation indicated that healthy food improves memory more than candy does. The test results in the healthy food group had an average score of 90%. However, the test scores of the candy test group had an average score of 51%.

Conclusions/Discussion

Many people know that healthy food is good for you, but many don#t know how effective it is and how it improves the function of our bodies. Because of the results drawn from our project, teachers can use fruits and vegetables in their classrooms when studying and testing.

Summary Statement

Our project tested whether healthy food (bananas & apples) or candy (smarties and starburst) improved the memory of students towards test scores.

Help Received

My partner and I received minimal help from our science teacher. We did much of our investigation on our own.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Kris Boris

Project Number
J0703

Project Title
Synesthesia and Creativity

Abstract

Objectives/Goals
The purpose of this experiment is to determine a correlation between synesthesia and creative ability.

Methods/Materials
Volunteer participants, 7 question synesthesia survey, additional 2 questions self reporting creativity, creativity test. Survey results were analyzed and creativity tests were scored using 16-point scoring rubric.

Results
Results were analyzed based on whether those who reported having synesthesia also self reported creativity and creative pursuits, as well as scored higher on the creativity test. On average, participants who reported having synesthesia also scored significantly higher on the creativity test than those who didn't. Participants who reported having synesthesia also averaged higher when "rating" their own creativity on a scale from 1 to 5. Those who reported having synesthesia also reported more frequently engaging in creative hobbies or activities such as art and music.

Conclusions/Discussion
The data support my hypothesis that people who report having synesthesia are more likely to score higher on measures of creativity than those who don't. A correlation between synesthesia and creativity suggests a possible neurological component to creativity.

Summary Statement
Using a questionnaire and creativity test, I determined a correlation between synesthetic experiences and creative ability.

Help Received
None. I designed and conducted the experiment myself.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Elizabeth A. Carlos

Project Number
J0704

Project Title
Highlight Your Memory

Abstract

Objectives/Goals
The objective of this study is to discern which color of highlighter enhances memorization.

Methods/Materials
For my project I typed out three paragraphs similar in length and content. I highlighted two words of each color (yellow, blue, and pink) in each paragraph. I gave each subject one minute to review typed material. I gave an additional minute for the information to absorb, then asked the subjects to write down as many words as they could recall. This information was then calculated and recorded.

Results
The results revealed that blue highlighted words were the most memorized, with 36 words, then yellow with 30, and the last was pink with 29 words.

Conclusions/Discussion
I found that most people remembered the words that were highlighted in blue. However, since I used two warm colors (yellow and pink) and one cool color (blue), it could have affected the results because color helps us to memorize by attracting our attention and if blue was the most unique color, it would attract the most attention.

Summary Statement
My project showed that an increase in attention level can help enhance memory.

Help Received

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Dante P. Cavaz

Project Number

J0705

Project Title

Tech Targeting: An Experiment Testing Whether Playing Combat Video Games Increases Real-life Shooting Accuracy

Abstract

Objectives/Goals

The purpose of this project was to see if an individual#s real-life target shooting accuracy would increase after playing a combat video game.

Methods/Materials

Colt M4A1 Airsoft gun, 0.20g Airsplat B.B.'s, 48 Birchwood Casey Shoot N-C Targets, Vizio 42# flat screen TV, PS4 console, Battlefield 4 for the PS4, PS4 controller. Tested the subjects' shooting accuracy before and after they played the video game for 10 minutes.

Results

In this experiment, when the subjects played a combat video game before shooting an airsoft gun, their overall accuracy increased. After the subjects played video games their average score was 39.67% as opposed to 31.67% before playing video games.

Conclusions/Discussion

After completing my project I concluded that when the subjects played combat video games before shooting an airsoft gun, on average, their accuracy increased. I also concluded that after playing video games and shooting airsoft guns each subject's hand-eye coordination and fine motor skills increased.

Summary Statement

My experiment showed that playing video games increases real-life shooting accuracy.

Help Received

None. I performed the experiment by myself.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Alexandra C. Christodoulou

Project Number
J0706

Project Title
Pharmacogenectics, Informatics, and Prescription Change

Abstract

Objectives/Goals
The objective of this to determine if phamacogenetics and informatics could help doctors to more accurately prescribe the correct medication and also help them determine the most effective dosage a patient needs.

Methods/Materials
I used data on the drug Carvedilol from the pharmacogenetics website PharmGKB(www.pharmgkb.org) and data results from Drug Metabolizing Enzyme(DME) Genotype Panels collected during a study done by Renaissance RX. I also did a great deal of research after obtaining the results to understand why so few doctors use phamacogenentics in their practice of medicine.

Results
My results from the data showed that 78% pf the patients in my experiment should change their medication or dosage. This dramatic result proves that doctors would greatly improve their prescribing accuracy if they used a simple DME Genotype mouth swab test and performed the analysis I did with each patient.

Conclusions/Discussion
With this data I was able to calculate and analyze which patients should remain on Carvedilol, which should not be on the drug, and which should change to another drug. The results of this study is extremely important for doctors to know as they can do a much better job when they prescribe a new drug to a patient. I also found that most doctors do not know enough about pharmacogenetics or are not using DME Genotype panels because they don't know enough about the subject. I would like to bring more awareness about this subject to doctors, their patients and the world. I am hopeful that one day soon all babies will receive phamacogenetic testing at birth and doctors will use the information obtained from this testing to provide personalized medicine to all of their patients.

Summary Statement
I showed that doctors could dramatically improve the accuracy of prescribing the correct medication and dosage if they take the time to practice personalized medicine by using pharmacogentetics.

Help Received
My father who is a Cardiologist let me use the data from a DME Genotype panel study that was done by Renaissance RX at his Office. He also answered questions regarding variations in drug response.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Sierra L. Courchesne

Project Number

J0707

Project Title

Studying with Music: Advantage or Not?

Abstract

Objectives/Goals

Many middle school students spend large quantities of time on electronic devices listening to music, sometimes even while completing homework or studying. The impact of this behavior is not clear. Some middle school students enjoy pop music but really dislike classical music. The goal of this study was to examine memory ability while exposed to various auditory conditions.

Methods/Materials

Twenty middle school students participated. Students were asked to memorize a list of 10 words while exposed to one of five auditory conditions (i.e., preferred music, disliked music, silence, classical music, and distracting noises). Subjects first rated music genres from 0 - 10 (0 being they hate it and 10 being they love it). In order to control for order effects, word lists were randomly paired with an experimental condition. A stop watch was used for precise timing of word exposure and memory testing.

Results

Out of the 5 different experimental conditions, the classical music condition helped subjects memorize the greatest number of words regardless of their preference in that genre (mean number of words correctly remembered = 5.25). The preferred condition proved to have the worst results (mean number of words correctly remembered = 4.15). The classical condition memory score is 26.5% better than the preferred condition memory score. This is a highly statistically significant difference. It is possible that scores plummeted in the preferred condition because subjects listened to their favorite song, and did not attend to the task at hand. Subjects also performed poorly in the silence and non- preferred music conditions (mean number of words correctly remembered = 4.45 for the silence condition and 4.45 for the non- preferred condition). Interestingly, the noise condition produced slightly better results than silence and preferred conditions (mean number of words correctly remembered = 4.750).

Conclusions/Discussion

The results of this experiment supported my hypothesis and made the unique discovery that classical music is the most appropriate setting for memorizing words and concentrating. This is interesting because some subjects rated classical music very poorly, indicating they did not enjoy this music type. The other conditions might have been distracting to subjects and suggest that middle school students should not study while listening to their favorite music.

Summary Statement

Studying with classical music can enhance short term memory performance when studying or completing homework compared to a neutral, quiet environment or preferred music.

Help Received

None. I designed and ran the experiment myself. My parents taught me how to use Excel and how to enter my data into a spreadsheet and how to import that into SPSS.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Oliver Crawford-Shelmadine; Eoin Cunningham

Project Number

J0708

Project Title

How Can You Improve Your Cognitive Performance? It Depends. Are You Male or Female?

Abstract

Objectives/Goals

The objective of this study is to determine which of four different ten minute activities will enhance cognitive performance.

Methods/Materials

Set up 4 cognitive performance assessments with Lumosity.com so that level and type of text is the same each time but each assessment itself is unique to control for learning bias. Complete consent forms. Each day, have subjects perform one activity in random order to control for learning bias. (sit quietly, listen to music, aerobic exercise, video games). Have subjects take 4 assessments and record results.

Results

The first trend for the entire population is that in four out of five tests, participants did better when the preceding activity was to sit quietly. No single activity produced consistently poor performance across the different assessments. The second trend was very surprising. We observed a distinct difference in the pattern of performance between males and females. For males, playing video games and sports resulted in higher scores in each assessment along with sitting quietly in 2 of 5 assessments. Whereas with females, sitting quietly and listening to music were the highest scoring activities in 4 of 5 assessments. Conversely, males did worse when the activity performed was listening to music or sitting quietly. For females, playing sports resulted in lower performance. There was one exception. Assessment three was the only test where the male and female trends have similar results in that sitting quietly resulted in the worse performance and all the others activities are relatively the same.

Conclusions/Discussion

When we started this experiment, we believed that aerobic exercise would increase cognitive performance. Our hypothesis stated that if people engage in aerobic activities before taking cognitive performance tests, they will have better results than when listening to music, playing video games, or just sitting quietly. We disproved our hypothesis. We found that interactive brain activities, such as sports and video games, tended to benefit males and disadvantage females whereas passive activities, such as sitting quietly or listening to music, tended to benefit females and disadvantage males.

Summary Statement

Our study suggests that males perform better on cognitive tests if preceded by interactive activities (video games/sports) whereas females perform better on the same tests if preceded by passive activities (sit quietly/listening to music).

Help Received

My dad helped explain Standard Deviation and %RSD and how that applied to our data.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Carly R. Fiskness

Project Number

J0709

Project Title

Impact of the Power of Suggestion on Recall

Abstract

Objectives/Goals

I have wondered about the power of suggestion ever since I began hearing about cases in which people were convicted of a crime they did not commit due to #eye witness# testimony. I decided to test students in grades four through eight to see how well they could remember images, and if they might #recall# something they did not see. Based upon my research, I predicted that most test subjects would provide more accurate recall of the visual images on a short-term memory test, since the images would be fresh in their minds. For a long term recall test given 48 hours later, I believed the test subjects would exhibit less accurate recall since the images that were only suggested in the survey might become implanted in their memory. I also hypothesized that female test subjects would exhibit better recall than males and that the older test subjects would perform better than younger subjects.

Methods/Materials

I tested 170 students in grades four through eight. I had the subjects provide their grade, gender, and age. I created a PowerPoint of ten images and loaded it onto the Smartboard at the front of the class of students. Each image was different, with no relation to each other. After viewing the images, the subjects completed a multiple-choice survey which included extraneous items that were not shown in the PowerPoint. 48 hours later I had the same test subjects complete the same survey as the long-term recall test. I analyzed the 340 test results by short term versus long term, grade level, age, and gender.

Results

Of the 170 test subjects, on the short term memory test, 32% of the female test subjects believed they recalled something in the images that was not present, compared to 68% of the male test subjects who recalled items not present in the visuals. For the long-term memory test, 40% of the female test subjects recalled items not present in the images and 60% of the male test subjects recalled items not present in the visuals. I did find during my testing process, that based on my results, age was not correlated to any significant differences.

Conclusions/Discussion

My results showed that males were perhaps less likely to recall the visual images and more open to suggestion. Age did not appear to be a factor in the impact of suggestion against recall.

Summary Statement

I tested students in grades fourth through eighth to see how well they could remember images and if they may "recall" something they did not see.

Help Received

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Adishree S. Ghatare

Project Number

J0710

Project Title

A Software Application as a Learning Platform for Increasing Memory Retention of Definitions of Words

Abstract

Objectives/Goals

Vocabulary is essential part of education and facilitates effective communication. Many learn vocabulary by memorizing definitions without understanding and never use them. Understanding is more effective than memorization and existing methods focused on repeated testing. My goal is to make a software learning platform that increases retention of definitions of words by utilizing how human memory works and facilitation of research.

Methods/Materials

Some techniques increase memory retention. Association with prior cognizance strengthens neural connections. Motivation means that a person tends to retain ideas they care about. Attributing visuals increases retention. Prospective memory is remembered by cues. I created an iOS app that implements these into four methods. First my app allows users to learn a word from its Google search result. In the first method, story, user depicts dialogue conversation. Making stories uses passionate experiences and prior knowledge, increasing retention more than impersonal definitions. Etymology, second method, is derivation of words from roots. On screen, a Google search result of etymology of words facilitates research. User can recreate etymology in drawing space. The meanings of parts of the word serve as cues for prospective memory. Image, third method, allows users to illustrate the word to aid recall. Image method utilizes motivation and association. Visual aspects and colors add depth. Word connections, fourth method, is for words with meanings that can be associated with short phrases. It utilizes prospective memory by offering cues to the definition. Formatting can be selected to capture more associated emotion. To test effectiveness of my app, I gave test subjects six unfamiliar words to learn with a method of their choice and six unfamiliar words to learn with my app. I tested recall on study day and three days later.

Results

On study day, mean score increase with my app over preferred method is 35%. Three days after study, mean score increase using my app over preferred method is 58%. Three days after study, mean score with my app was 5.6 and with preferred method was 2.3.

Conclusions/Discussion

Test subjects showed better scores and understanding of context using my app over preferred method. Memory of words studied with preferred method deteriorated but strengthened when studied with my app.

Summary Statement

I made a software learning platform that aids learning vocabulary and increases retention by applying how human memory works and assisting user research.

Help Received

Science teacher, Mrs. Basu, reviewed project planning and drafts; my parents taught Unix environment and debugging Swift in Xcode; Mrs. Hsiao, Girls Who Code instructor, introduced web views; Mr. Robert Zeidman and Mr. Benjamin Kimes helped me with patent application; test participants

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Ashwin M. Gupta

Project Number

J0711

Project Title

For Those About to Rock: A Study of Human Perception of Sound Quality

Abstract

Objectives/Goals

The objective of this experiment is to see if people can hear different levels of quality for music subjected to audio compression and different playback devices. There are two types of audio compression: Lossy and Lossless. Lossy compression (MP3) works by removing "unnecessary" information. This creates a smaller, but lower quality, audio file. Lossless compression (FLAC, ALAC) removes repetitive data in a file, preserving audio quality but resulting in a larger file.

Methods/Materials

Windows computer with commercial audio compression software and audio editing software, CD with music, high quality audio chain (Sonos music system, Receiver, Sennheiser headphones), low quality audio chain (iPhone 5s, Apple earbuds). Compressed music sample from CD into lossless, medium and high quality lossy, loaded samples onto iPhone and Sonos server, randomly labeled each sample, and asked listeners to rank from highest to lowest quality.

Results

Listeners were able to reliably distinguish Lossless as better than Lossy on both playback chains, but actually did slightly better distinguishing between samples on the low quality chain. On the low quality chain listeners had an average 89% success rate while those on the high quality chain had only a 55% chance. On both audio chains, users had little success distinguishing between the two MP3 compression levels.

Conclusions/Discussion

The results mostly disproved my hypothesis that people would be better able to distinguish between music compression levels on a better audio chain. Listeners were able to reliably distinguish lossless from lossy on both audio chains, but actually did slightly better on the low quality chain. One possible reason is that people are now used to low quality devices like earbuds since this is what we normally use. The two levels of lossy compression (MP3 192 vs 96) were hard to distinguish on either playback chain probably because the file sizes/quality are extremely similar. The results show that listeners who enjoy music quality should use lossless compression.

Summary Statement

My project demonstrates that listeners can reliably distinguish music compressed at different sound quality levels even on a low quality playback device.

Help Received

I designed and preformed my experiment myself. My dad helped my decide which file formats and software to use for each device.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Sergio M. Haro

Project Number
J0712

Project Title
Shaping Your Thoughts

Abstract

Objectives/Goals
My project is to determine if shape words can interfere with the simple task of naming shapes, I would also be looking for any crucial differences between ages and genders in the given results.

Methods/Materials
Four sheets each containing a different test, test one having shapes with matching shape words, test two having shapes with non-matching shape words, test three only containing shapes, and test four containing only shape words. Each test was given in random order to each volunteer from all ages and genders. All volunteers were timed until they completed each test.

Results
Most of the volunteers completed test four in the least amount of time, with test two being the longest test in average, while there were no crucial differences between genders and ages.

Conclusions/Discussion
My conclusion is that shape words inside the shapes showed a clear interference with the task of naming shapes.

Summary Statement
Demonstration of the Stroop Effect

Help Received
Mom helped with decorations on board

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Kaila M. Hogan

Project Number
J0713

Project Title
Effects of Age on Reaction Time: Adolescents vs. Pre-Adolescents

Abstract

Objectives/Goals
I am a gymnast, and I I wondered if as an adolescent gymnast, I might have an easier time learning a new skill due to reaction time when compared to a preadolescent gymnast. The goal of this project was to try to determine which age group might have a faster reaction time, preadolescents, (fourth graders) or adolescents (seventh and eighth graders). I believed adolescents would have a faster reaction time because the brain is more developed at this age.

Methods/Materials
I preformed a total of 490 tests on 70 test subjects, who each took a series of tests. In the experiment I used an iPad, a calculator, and one survey for each test subject. I found an app that would test reaction time accurately. Then for each test subject, I placed the iPad in front of each test subject and had them take the test seven times. I discarded the highest and lowest values and averaged the remaining five scores. I recorded the results and averaged and compared the data.

Results
I analyzed the data and tried to evaluate whether age made a significant difference. The adolescent test subjects had a 12.77% faster reaction time on average than the preadolescent test subjects. The adolescent test subjects had an average reaction time of 359ms compared to the preadolescents who had an average reaction time of 408ms.

Conclusions/Discussion
I hypothesized the adolescent test subjects might have a quicker reaction time than the preadolescents, and the results appeared to support the hypothesis. This experiment should be repeated more times to confirm the findings. I would also recommend testing across more groups. I would use the same testing methods because the method measured the reaction times with great accuracy.

Summary Statement
The purpose of my project was to compare the reaction time of pre-adolescents (fourth graders) to adolescents (seventh and eighth graders) in milliseconds.

Help Received
None. I designed and preformed all tests independently.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Jenna S. Houle

Project Number
J0714

Project Title
Techniques to Help Kids Improve Their Memory, Lower Their Anxiety, and Improve Their Attitude about School

Abstract

Objectives/Goals
The objective of this study is to determine the difference in students ability to memorize a list of random words, lower their anxiety, and improve their attitudes about learning after 1.5 hours of instruction in a memory palace technique, an anchoring technique from Neuro-Linguistic Programming, and a presentation about brain science and growth and fixed mindsets.

Methods/Materials
This study was conducted using presentations and questionnaires created based on research on the techniques. Students were divided into control and experimental groups. Both groups received questionnaires, only the experimental group received training. For all three techniques, there was a pretest, training (experimental group) and a post test.

Results
T tests of the results showed that 25 min of mindset training had a statistically significant effect ($p = 0.0018$) on the participants# ability to view failure and learning in a way that promotes growth. A a single 15 minute session on anxiety training resulted in participants indicating a statistically significant lower level of anxiety ($p = .0011$). Although students expressed a strong interest in learning techniques to improve their memory in the pre-test questionnaire, the 25 min memory training did not result in a statistically significant improvement in students ability to recall a list of random words.

Conclusions/Discussion
15 to 25 minute presentations developed specifically for a 7th grade audience were capable of creating a significant change in students ability to more positively view failure and learning as well as lower their anxiety related to tests and quizzes. The memory training did not result in significant improvement in students ability to memorize a list of random words.

Summary Statement
This project investigated the effectiveness of techniques to help 7th grade STEM students improve their memory, manage and lower their anxiety, and improve their attitude about learning.

Help Received
I planned and designed the experiment myself but received general help from my teacher and father in understanding the statistics I used in the analysis.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Simran Khanna

Project Number
J0715

Project Title
Can You Enhance Your Hearing by Turning Off Your Vision?

Abstract

Objectives/Goals
The objective of this experiment was to see whether or not people could improve their hearing ability by turning off their vision and if so, to see if the improvement had a permanent affect on their hearing sense or not.

Methods/Materials
I used a clock, human participants, blindfolds, and a hearing test website called audioclinic.com. I tested each participant with the online test three times with a ten minute gap in between each test. After the first test, the participant wore a blindfold and took the second test, with the blindfold still on, and after the second test, they took off their blindfold and took the third test.

Results
There were two main outcomes of this project. Six out of the eighteen people I tested decreased their original result on the second test however either improved or went back to the original in the third test. Seven people improved on their second test but in the third went either back to their original result or did worse than the original. The remaining five people got varying results.

Conclusions/Discussion
After experimenting, I have found out that there is no solid result. The two big outcomes almost have the same number of participants which is why there is no one result. However, this project has shown that people may improve their hearing using this technique and that it probably does have a long-lasting effect. With the information of this project, people with poor hearing may improve that sense but more testing is required to be absolutely certain.

Summary Statement
I found out that using a blindfold to improve one's hearing is a possibility.

Help Received
My parents influenced the idea of this project by making me wear a blindfold to appreciate my eyesight. My teacher answered all my questions about the project.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Alexandria C. Kinney

Project Number

J0716

Project Title

Are You Too Old to Turn It Around and Flip Flop? A Study of Age and Ocular Agility

Abstract

Objectives/Goals

The purpose behind this experiment was twofold. The first objective was to determine whether reading print inverted text was a universal trait. Secondly, if so, is this trait affected by age. My hypothesis is that it is a universal trait however, the ability to do so decreases as age increases.

Methods/Materials

Two types of print inverted text were used for this project. The first was text that was inverted 180 degrees; the second was text written from right to left as opposed to the conventional left to right orientation. Four groups, with 5 subjects per group, were tested with different ages. The test subjects were made to read the two different paragraphs & the time it took for them to complete the reading was recorded. The data was collected in a table & analyzed using bar graphs.

Results

The bar graphs showed that reading both the print inverted & backward text took, on average, about the same time for the first three age groups. The only group that took a significantly harder time reading either text was the 51+ age group. An additional piece of information that was gathered from these plots was that for all 4 groups, reading the print inverted text proved more difficult when compared to the backwards texts. The data proved the proposed hypothesis to be only partially correct. It was proven that successfully reading inverted text was indeed a universal trait however the age dependency did not begin until after 51+ ages.

Conclusions/Discussion

In conclusion, the data shows that reading both print inverted text and backward text is a universal trait. However, there does appear to be a difference between age groups. Age groups 10‐16, 17‐30, 31‐ 50 all had about the same average time in reading both inverted and backward text. It is evident after analyzing the data that the inverted text was much more difficult of a test than reading the backwards text. Additionally, the data suggests that the 51+ age group took the longest time in completing the test. It is my reasoning that the 51+ age group took longer with both tests due to both declining health of the eye when compared to the other 3 age groups and decreased brain processes. The data is conclusive with the hypothesis that I set forth.

Summary Statement

I was able to conclude that ocular agility is a universal trait and is age dependent, but only after the age of 51.

Help Received

I designed the experiment on my own by deciding how many test subjects per age group I should have and what text the subjects should be tested on. My teacher, Salma Baig, mentored the project by reviewing my data set and analysis of the research to ensure it was being interpreted correctly. Lastly, I

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Rhea A. Kommerell

Project Number

J0717

Project Title

Focus: The Effect of Media Multitasking on Memory

Abstract

Objectives/Goals

The objective of this project was to find out how receiving and sending text messages while studying affects a person's ability to recall the studied material. My hypothesis was that such multitasking would negatively impact memory.

Methods/Materials

I tested 56 elementary school students individually. I gave each student a list of 15 word pairs to memorize for 5 minutes. During this time, each student received and answered 5 text messages, half of the students at the beginning of the study session, the other half at random intervals during the session. I then gave each student a test to determine how many word pairs he or she could correctly match.

Results

The group that was interrupted scored significantly lower on the test than the group that was not interrupted, with a p-value lower than 0.05.

Conclusions/Discussion

My hypothesis was supported because multitasking, or, in effect, switching frequently between tasks, impaired a participant's memory to a significant degree. This knowledge can be applied to students struggling to balance their social lives with their academic work.

Summary Statement

I found that receiving and sending text messages impairs performance on a memorization task.

Help Received

I interviewed Prof. Barry Giesbrecht and Prof. Richard Mayer, both Psychological & Brain Sciences at UC Santa Barbara, for advice on project design and statistical analysis.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Ethan R. McMullen

Project Number
J0718

Project Title
The Effectiveness of Eyewitness Reports in a Crime Scenario

Abstract

Objectives/Goals
The objective of this study is to determine if witnesses to a crime can accurately describe what they saw while their attention has been diverted elsewhere.

Methods/Materials
A recording device, 9 actors, Laptop computer with iMovie software, YouTube website, SurveyMonkey website. I recorded two videos of a crime scene, one distracted viewers attention away from the crime, the other had no distraction. I posted both videos on YouTube, then had fifty individuals watch each video and take a survey to determine accuracy of their recollections.

Results
Viewers answered questions incorrectly after watching the distracting video 55% of the time. The number of incorrect answers by viewers was reduced to 50% when the sound in the video was illuminated. Conclusions of this project indicate that if distractions are reduced recall improves slightly.

Conclusions/Discussion
Based on the results of this experiment, a distracted witness is not as reliable as a less distracted witness. However, a less distracted witness recalls information only 5% more accurately.

Summary Statement
I found that people could not accurately recall a crime scene occuring within their field of vision when their attention was focused on something else in the same field of vision.

Help Received
The only assistance I received was from friends and family who participated in helping me film and participate in the videos and in taking the online survey.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Ana E. Mejia

Project Number
J0719

Project Title
Which Will You See First: Blue, Red, or Pink?

Abstract

Objectives/Goals
My project was to determine which colored square could be seen at the lowest angle put of the volunteers side vision. I believe at the pink colored square would be seen at the lowest angle, because it is the brightest out of the red and blue squares.

Methods/Materials
One vision protractor will be placed at the volunteers nose. I will have three colored squares: a 1x1 red square, a 1x1 blue square, and a 1x1 pink square. Once the vision protractor is in place, stand to the side and move each colored square, one at a time for each side.

Results
The results in this experiment show that the pink was seen at the lowest angle. The red colored square was seen at the highest angle. Lastly the blue colored square was seen at the second lowest angle.

Conclusions/Discussion
My project was made to answer, hoe does changing the color of a 1x1 square affect the angle which the square comes into the volunteers peripheral vision. I wanted to answer this question, because i wanted to see if they had tunnel vision. The results show that pink was shown at the lowest angle. Red was seen at the highest angle. Lastly, blue was seen at the second lowest angle. Somethings that messed up my data is the glasses some of the volunteers are wearing. I think the pink square was seen at the lowest angle because it is the lightest color out of all of them.

Summary Statement
Testing peripheral vision.

Help Received
Mrs. Davidson, siblings, family members, friends and science buddies.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Kate A. Oberlander

Project Number

J0720

Project Title

Synesthesia: Predominant Grapheme-Color Associations and the Effects of Age and Gender

Abstract

Objectives/Goals

The purpose of this experiment was to determine the extent of grapheme-color association synesthesia exhibited by participants and the effects of age and gender.

Methods/Materials

I created a survey with rows of letters repeated in the basic colors of the rainbow, in addition to gray, black, and brown. Instructions indicated to circle each letter of the alphabet in the one color that fits it best. If the letter had no color, the participant was instructed to leave the row blank. I handed out the surveys to third and eighth graders who had turned in signed permission slips, as well as adults who wished to participate.

Results

The majority of participants shared common grapheme-color associations. Some letters in particular had very strong associations. Letters that begin commonly known colors, such as R for red, were generally associated with that color. Third graders had more associations than eighth graders. Eighth graders had more associations than adults. Males tended to chose black more often than females at a ratio of 4:1.

Conclusions/Discussion

My experiment indicated intriguing grapheme-color synesthetic associations, which were influenced by age and gender. More people than expected seem to have synesthetic associations, and it appears to gradually fade as age increases. This experiment additionally expands our knowledge of synesthesia, because most studies focus on people who are aware of their synesthesia. However, in this study, all participants were included, regardless of whether they thought they had synesthesia.

Summary Statement

My experiment determined the extent of grapheme-color association synesthesia exhibited by participants, specifically the colors most commonly associated with each letter of the alphabet and the effects of gender and age on the results.

Help Received

Ms. Skiles for her excellent instruction on the scientific method. The sixty people who graciously completed my survey.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Angelica M. Osorio

Project Number

J0721

Project Title

Auditory Memory vs. Visual Memory

Abstract

Objectives/Goals

The objective of this study is based on auditory memory and visual memory, questioning which is superior over the other. My goal is to test a group of ten 7th graders on these two types of memory, and find out if the majority of them will have stronger visual or auditory memory capabilities.

Methods/Materials

I gathered ten 7th grade students willing to participate in two memory tests. The materials include the student participants, two flashcards and a black marker. I used the two flashcards to write one sequence on each. Each of the two card sequences were six characters long (3 letters 3 numbers). To test their visual memory I showed each participant one of the two flashcards (6ZJ8FN) for ten seconds, timing it with a stopwatch, then took it out of sight. To block their working memory I asked them to say the alphabet aloud. Finally I asked them to try to recall all the characters they had seen and recorded their response. I followed the same process for the auditory memory test but they listened to me read them the other sequence (A2HT73) two times slowly and at the end asked them to recall what they had heard. Lastly, I compared all of the participants test scores checking the amount of people that got better scores on their visual memory test, better score on their auditory test, or an equal score.

Results

The test scores showed my hypothesis was correct. The majority of the subjects showed stronger visual memory based on the comparison of the two test scores. Six out of the ten subjects had stronger visual memory, two showed stronger auditory memory, and the remaining two had an equal score on their two tests.

Conclusions/Discussion

While some people in this test may have stronger auditory memory or equal strengthened memory, most people can remember something better when it was presented to them visually. With this I can also imply that most students are better visual learners since memory is applied when learning, but there are also a few auditory learners. I can conclude that the way information is presented to a student does affect the clearness of their memory and information is usually memorized better when it's presented for them visually.

Summary Statement

I found through the testing of auditory and visual memory, the majority of students possess clearer memory when information was presented visually.

Help Received

None. I designed my board, and created and conducted the tests needed in the experiment myself.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Hannah G. Phillips

Project Number

J0722

Project Title

Determining How a Person's Intuition Affects Their Ability to Thin-slice

Abstract

Objectives/Goals

This experiment was orchestrated to answer the following question: How does a person's intuition affect their ability to thin-slice? Thin-slicing is defined as the ability to use knowledge the brain can gather about a situation and come to a conclusion in a few seconds of time.

Methods/Materials

In this experiment, the measurements collected were from two different tests. The First, the REI-40, is a test that calculated whether the subject was more intuitive or rational. The second, the IGT, calculated how fast a subject could thin-slice, by counting the number of cards it took the participant to understand the game. The scientist instructed the participant to complete the REI-40 survey and the Iowa Gambling Task (IGT). The REI was used to test rational versus intuitive ability, and the IGT was used to test the person's ability to thin-slice.

Results

The scientist accepted the null hypothesis. There was not a strong correlation between a person's intuition and their ability to thin-slice as tested through the REI-40 and the IGT. Also, highly rational or highly intuitive people were much slower at being able to figure out what was going on in the gambling game than those who equally utilize intuition and rationalization. Thus meaning, that those who are more balanced rational and intuitive, thin-slice at a higher level.

Conclusions/Discussion

The scientist discovered a few additional things in the process of the experiment. The first discovery was that the majority of male participants would continue choosing from the less advantageous decks even after discovering the advantageous strategy. The scientist believes that this might be because males' prefrontal cortexes, which is the part of the brain that is used for decision making, doesn't develop fully until age 25 when females' develop much faster. There was also a strong correlation between highly rational or highly intuitive people and higher scores on the IGT. This proves that highly rational or intuitive people were much slower at being able to figure out what was going on in the game. This newfound data can be applied to many different jobs and real life situations that require split-second judgment. According to this data, we now know that people with equal parts intuitive and rational type brains are most fit to make these split-second decisions.

Summary Statement

As a result of this experiment, I was able to conclude that those individuals who are more balanced in their rational and intuitive thought are able to thin-slice at a higher level.

Help Received

Dr. Jeneen Graham, Academic Dean at St. Margaret's Episcopal School (Project Mentor) helped me refine my hypothesis. Kevin Phillips, Director of Organizational Effectiveness & Learning at UC Irvine Health System helped me understand correlation analysis.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Alison M. Poon

Project Number
J0723

Project Title
Color Me Forgetful: Does Color Affect Memory?

Abstract

Objectives/Goals
The objective is to determine if color affects memory. More specifically, will highlighting help retain information.

Methods/Materials
Tested effectiveness of color on memory through 2 experiments using 5 word lists, 42 subjects, a package of Sharpie Tank Highlighters, and a clock. In both experiments several test subjects were asked to review different lists of words that were highlighted in different colors to see which color would help the subjects remember the words on the lists. Repeated trials were run to determine if the subjects preferred different colors.

Results
In both the experiments the results for pink was slightly higher than the other colors tested.

Conclusions/Discussion
Repeated trials with multiple colored lists revealed no significant difference in either of the two conducted experiments. However the pink did ever-so slightly better. It is concluded that the color of the highlighter is not a very strong factor when it comes to learning in everyday life.

Summary Statement
I showed that highlighting has a small impact on memory.

Help Received
I designed and developed this experiment with my mother. I preformed this experiment myself, and recieved mentoring help from my science teacher.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Joshua L. Richland

Project Number
J0724

Project Title
Memories Under the Influence

Abstract

Objectives/Goals
The objective of this project was to find out the effects of the power of suggestion on one#s memory.

Methods/Materials
After viewing a video of people interacting, participants were given a set of five pictures and either asked #do you see the women who crossed the street last?" or "which one of these women crossed the street last?" None of the photos were of people in the video. Five males and five females were tested with each question.

Results
The results showed that people#s memories can be influenced by the power of suggestion. All ten subjects in the #Which One# group, the group tested with the influence of the power of suggestion, incorrectly thought that the woman who crossed the street last was among the presented pictures.

Conclusions/Discussion
In conclusion, the hypothesis was proven to be correct, and it was found that the power of suggestion can have an effect on people's memories. The experiment was a good test of the hypothesis but there could be a couple of improvements. Firstly, there could be a much enlarged sample size. The additional subjects could provide more accurate results, as there would be more data to analyze. A future change would be to inform the participants that they will be asked to identify one of the individuals subsequent to the video. Another addition that could possibly improve the experiment would be to emphasize for the #do you see# group, that the woman may not be amongst the pictures shown.

Summary Statement
The project determined if the power of suggestion has an effect on people's memories.

Help Received
My mother helped me make the board and edit documents. My father helped by buying all the materials needed. Mr. Hartung, my teacher, helped edit the documents and answer my countless questions. Thank you to all the subjects that participated in my experiment.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Kevin Salazar

Project Number
J0725

Project Title
The Effect of Emotion on Memory

Abstract

Objectives/Goals
The objective was to examine how different emotions influence memory; after some research, it became clear that joy and sadness would prove quite influential in assessing memory retention. The experiment designed tested how emotion effects memory . The testing explored the interaction of emotions and the key role they play on retaining human memories. The experiment also established a common link of affect between different age groups so as to prove memory capacity is not just age related.

Methods/Materials
Subjects were asked to memorize a list of words%numbers and watch two videos. The subjects were then asked to write down memorized words and numbers. A research group covered 3 age groups. Each participant completed multiple exercises in order to elicit data during different emotional states. It was necessary to break the data collection results into two (2) specific emotional states:Joy and Sadness. The test group yielded 70-100 results as each participant conducted independent data production in multiple emotional states.

Results
Data collection supports the following statistics: Young people 9-14 when happy preformed at 56% efficiency rate and when sad preformed at a 20% efficiency level thereby dropping efficiency by 36%;Young adults 20-26 when happy preformed at an 88% efficiency rate and when sad preformed at a 46% efficiency level thereby dropping efficiency by 42%; Mid-life adults when happy preformed at a 64% efficiency rate and when sad preformed at a 29% efficiency thereby dropping efficiency by 35%.

Conclusions/Discussion
The conclusion from this expansive data and research is that when any age group experiences intense emotional sadness/compassion it proves a distraction to efficiency and creates an effect of lower route memorization production within an individual's brain. In other words when we are free from stress and worry our brain is free to function in a more efficient manner when it comes to day to day tasks.
Given the complexity of the human brain as well as the stressful fast paced world of todays students, teachers, workers and families it would do us all a world of good to note we must work towards creating an environment rich in rewards and joy in order to maintain or brain's health both in the short term or for a more lasting and memorable life.

Summary Statement
I tested the effect strong emotions (joy/sadness) have on the brain's ability to remember data and concluded that memory is better in a joyous state than when less pleasurable emotions such as sadness are present,

Help Received
None, I reviewed/refined the video clips myself, administered the testing and tabulated the results. I would note that the inspiration was the result of many life influences.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

William D. Thornton

Project Number

J0726

Project Title

Did You See What You Heard? How Musical Tones Affect Visual Perception

Abstract

Objectives/Goals

The objective of this experiment is to change viewers' perceptions of events in a video scene by changing the soundtrack from atonal to melodic tones.

Methods/Materials

This experiment tested 32 (16 male and 16 female) subject's perceptions of events in a video scene using either an atonal or a melodic soundtrack. After viewing the video, the subjects filled out a questionnaire indicating whether various statements about the actors were true or false. A computer showing a video of two actors interacting with exaggerated facial expressions and paper were used.

Results

There is a clear correlation between the tonality of the soundtrack and the subjects' perceptions of what the actors are doing on the screen. Differences in answers to the true/false questionnaire ranged from 12.5% to 65%. For instance, 75% of the subjects who listened to a melodic soundtrack thought the actors in the video were friends. However, only 19% of the subjects who listened to an atonal soundtrack thought the actors were friends. 56% of the subjects who listened to melodic music said that the actors had not seen each other for a long time and were thrilled to find each other, whereas only 19% of subjects who listened to atonal music thought the same.

Conclusions/Discussion

Music has been considered a mood enhancer for a long time, but this experiment shows that it can actually change people's perceptions of what they see happening. A melodic soundtrack will change a viewer's perceptions of actions in the scene for the positive, whereas an atonal soundtrack will affect the viewer's perceptions of actions in the same scene towards the negative.

Interestingly, there were some disparities based on gender which may provide areas for further research. Females showed less correlation than males between perceiving positive actions with a melodic soundtrack. Females generally thought the actors were enemies regardless of the music. Conducting further studies examining gender differences regarding atonal vs. melodic soundtracks could possibly yield positive results.

Summary Statement

Melodic or atonal soundtracks significantly change viewers' perceptions of what is actually happening in a video scene.

Help Received

I developed the project idea, found the video sample, music clips, and designed the questionnaire myself, my science teacher assisted in setting up the data tables, my mother assisted in proofreading my paper.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Emily J. Valdez

Project Number
J0727

Project Title
Do Different Genres of Music Affect Cognitive Performance?

Abstract

Objectives/Goals
The purpose of my project was to determine whether different genres of music affected cognitive performance.

Methods/Materials
Materials

Quantity	Description
	electronic device
1	electronic game
1	ear phones
3	genre of music
63	test subject
1	timer

Procedures
The experiments involved different genres of music, a test subject, a electronic game, and a electronic device. The test was performed by having the test subject listen to music while play the electronic game on a mobile device. The test subject put in earphones and listened to music while playing the game on a mobile device.

Results
The results of the experiments, were that classical music did better than pop music at improving scores.

Conclusions/Discussion
As stated in my hypothesis, I believed that pop music would work better than classical music. However, the results did not support my hypothesis. Rather, the results showed that classical music did better than pop music. I believe I got these results because the classical music might have calmed the test subject down, and it was easier to focus on the game.
The information gained from this project could be used by students in America who want the best work. The information from this project could also be used by anyone who needs to concentrate on a certain task that involves cognitive performance. A question that was raised when the experiment was conducted, wouldn#t the test subjects continuously get better at the game.
If I were to do this experiment again, I would use different genres of music while they played the game.

Summary Statement
The purpose of my project was to determine whether different genres of music affected cognitive performance.

Help Received
My Mom helped me by purchasing supplies. My sixty participants made this project possible.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Lindsay D. Yang

Project Number
J0728

Project Title
A Comparison of Online Learning and Traditional Lectures

Abstract

Objectives/Goals
My objective was to determine if online learning or traditional learning was more effective.

Methods/Materials
A videogame made with RPG Maker, a powerpoint software, a classroom with desktop computers, and a quiz. I tested two classrooms from fourth, fifth and six grades. One half was tested with the powerpoint and then given a quiz. The other half was tested with the videogame and then given a quiz.

Results
Six classes were tested with the same quiz, but were taught through different methods. The students who were tested with the powerpoint scored signifcantly higher than those who were tested with the videogame. Age did not affect the scores of the students, as all the students in their respective test scored similarly.

Conclusions/Discussion
The results of the tests conclude that students who learn using a powerpoint method recieve higher scores than students who learn using a video game. This shows that the more traditional methods are more effective.

Summary Statement
I found that students who learn using traditional methods score higher on a quiz than students who learn using a videogame.

Help Received
None. I created and performed the tests myself.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Aleksey Yevmenkin

Project Number
J0729

Project Title
Processing Patterns: Does Age Make a Difference?

Abstract

Objectives/Goals
The objective of the study is to determine if the age related differences in the neurological structures of the adults' and children's brains affect the way they see and process patterns. Specifically, to ascertain whether the more chaotic structure of adolescent brain will process asymmetrical patterns better that more organized adult brain.

Methods/Materials
4 cards and one set of cubes from the game Q Bitz, 20 people (10 children and 10 adults), stopwatch.

Results
80 sets of data were recorded and analyzed (4 sets per subject) with the objective to establish causal relationship between age of the test subject and time required to complete various types of patterns.

Conclusions/Discussion
The lowest time of both adults and the kids was for symmetrical pattern at 51.5 seconds for adults and 69 seconds for kids. My hypothesis was null. The data showed the kids did the best on symmetrical patterns but my hypothesis stated otherwise. For the adults though, they did best on symmetrical which lines up with my hypothesis. Some uncontrolled variables were the job of the adults, the age of the test subjects.

Summary Statement
As indicated by the test data, there is no correlation between age related changes in neurological structure of the brain and ability to process asymmetrical patterns.

Help Received
Ms. Bonita Hamilton, the science teacher, helped organize the project paper.

CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

Lily Amaturo; Abigael Forgue

Project Number

J0799

Project Title

The Teaching Style Files

Abstract

Objectives/Goals

The purpose of our experiment was to find out which teaching method would be most useful in teaching a new skill.

Methods/Materials

Our method was to give each student a pretest before dividing them into groups. We taught each of these groups the same lesson using different methods: video game, video. teacher to student, and active game. Then we gave them a post test. The materials we needed were those required to give the lessons using these methods

Results

The average percents of increase for each group were as follows: video game: 36.16%, active game: 21.5%, video: 17.44%, and teacher to student: 12.89%

Conclusions/Discussion

From the data above, we can conclude that the video game group was the most effective method to teach students a new skill, followed active game, video, and finally, teacher to student. Our results did not support our hypothesis, but it did answer our question. The video game group had the highest percent of increase, at 36.16%. This project could lead to many experiments such as pairing learning style with teaching method and which teaching method works best to teach specific skills such as languages.

Summary Statement

Through our experiment, we found that a video game works best to teach students vocabulary words because it had the highest percent of increase.

Help Received

We recieved help from our science teacher, Carrie Smith, and our friends Nina vanHoorn, Chauncey Maus, and Lauren Amaturo. Our parents (Paul and Laura Forgue and Susan and Lawrence Amaturo) also helped organize meeting times.