SCIENCE RESEARCH PROJECT IDEAS

Science research and engineering projects can identify trends, look for correlations or cause and effect or solve problems.

Projects that model or repeat well known experiments or concepts are not acceptable.

Below are some ideas that may help students find inspiration:

To find a project that can have a useful purpose for the world, think about what problems we face and some potential solutions.

There are large scale problems such as overpopulation that lead to other issues such as need for:

- nutritious food
- clean and renewable energy sources
- clean air
- clean water
- clean soil
- efficient transportation-individual and mass
- better housing
- waste reduction/recycling
- biodiversity

Some newer technologies that may address some of these issues include:

- Acoustic cooling
- Aeroponics
- Aquaponics
- Hydroponics
- Bioremediation- using living organisms to clean waste or toxic spills. Here is an example of one using bacteria:
  http://www.popsci.com/technology/article/2011-11/fed-human-waste-luminous-bacteria-can-light-your-house
  using prickly pear cactus to clean water
  http://inhabitat.com/cactus-gum-can-purify-water-cheaply-and-effectively/
- Biofuels-using waste to generate ethanol or methane
  Look into duck weed, which can not only clean water but also be used for biofuel:
  http://www.isaaa.org/kc/cropbiotechupdate/article/default.asp?ID=4250
  Also look into using watermelon waste to generate biofuel:
  http://www.isaaa.org/kc/cropbiotechupdate/article/default.asp?ID=4251
- Pico hydro electricity-**Pico hydro** is a term used for hydroelectric power generation of under 5 kW. It is useful in small, remote communities that require only a small amount of electricity - for example, to power one or two fluorescent light bulbs and a TV or radio in 50 or so homes[1]. Even smaller turbines of 200-300W may power a single home in a developing country with a drop of only 1 meter. Pico-hydro setups typically are run-of-stream, meaning that dams are not used, but rather pipes divert some of the flow, drop this down a gradient, and through the turbine before being exhausted back to the stream.
- Piezoelectricity is the charge that accumulates in certain solid materials (notably crystals, certain ceramics, and biological matter such as bone, DNA and various proteins)[1] in response to applied mechanical stress. The word *piezoelectricity* means electricity resulting from pressure. It is derived from the Greek *piezo* or *piezein* (πιέζειν), which means to squeeze or press, and *electric* or *electron* (ήλεκτρον), which stands for amber, an ancient source of electric charge.

There are other issues at a more personal level, like how we interact with others and our environment.

Improving our ability to learn looking at things such as

- environment
- methods
- media.

Understanding the impact of things on people such as

- technology (TV, computers, personal listening and communication devices, video games, etc...)
- behaviors (sleeping, eating, light exposure, studying, friendships, etc...)
- food
    - Phosphates, Behavior and Learning. http://www.greenpasture.org/utility/showarticle/?objectID=8500
    - pesticides on fruits and vegetables

Understanding of how people interact with each other and with other organisms

- Students who looked at photos of adorable baby animals before a task were much more productive than those who looked at an adult animal or tempting food. http://www.popsci.com/science/article/2012-10/experiment-look-pictures-cute-baby-animals-improve-your-concentration

Some ideas to investigate regarding interactions include:

- Stroop effect
- McGurk Effect
- eyewitness reliability
- preconceived notions about people by dress or manner
- fear of things in different genders or age groups
- allergies

the influence of the following on behavior/mood/concentration:

- age
- gender
- color
- music
- smell - for example, look into Aromatherapy
- sound
- teacher attitude
- food
- pictures (japanese study indicates looking at pictures of cute baby animals before completing a task improves performance. see http://www.popsci.com/science/article/2012-10/experiment-look-pictures-cute-baby-animals-improve-your-concentration

Some specific local issues that could be addressed are:

- harnessing wind, rain or sun to produce energy.
- how to control pests such as japanese beetles or fruit flies
- impact of classroom lighting
- study of electromagnetic radiation from electronic devices.
- dust accumulation from electrostatic charge around computer screens
- how best to sanitize the computer keyboards and mouse

Online sources to spark ideas:

Journal of Emerging Investigators: https://emerginginvestigators.org/
Site with info on energy sources and batteries: http://www.mpoweruk.com/index.htm
Science Buddies website www.sciencebuddies.org
Science Daily website http://www.sciencedaily.com/
Science News website https://www.sciencenews.org/
Popular Science website http://www.popsci.com/tags/science
AAAS Science magazine http://news.sciencemag.org/
NASA Science News http://science.nasa.gov/science-news/
Society for Science and the Public https://www.societyforscience.org/
Science News for Students https://student.societyforscience.org/sciencenews-students
INTEL Science and Engineering Fair Project Database 2003- present
https://apps2.societyforscience.org/abstracts/index.asp
Gresham Barlow Regional Fair List of Ideas-
https://docs.google.com/viewer?a=v&pid=sites&srcid=Z3Jlc2hhbS5rMTIub3IudXN8Z3Jlc2hhbS1zY2llbmNlLWV4cG98Z3g6MzM2Y2MxODliZWU5MjQ4OA