Engaging Youth in Science

The Go Figure! website engages youth-ages 8-19-in online science, technology, and math experiences. Users follow jean trends, calculate their average Frisbee throw, and track how much water they use. Youth collect measurements, input numbers into a database, use online calculators, and compare their results with those of other teens-a matter of intense interest at this age.

Additional activities include Pedal Power that demonstrates how product design influences human performance and teaches how to properly fit a bicycle and Super Smoothies which shows how nutrition labels change with different ingredients. A future activity, Who's Average, engages youth in the science of anthropometry and the technology of the 3D body scanner to debunk body image stereotypes.

- New York State 4-H youth have collected data for activity databases and evaluated online youth activities as part of the Go Figure! website.
- Youth at Cornell summer campus programs and 4-H events have participated in Go Figure!
- Teens in Pennsylvania collected data for the online program.
- Twenty New York State 4-H educators recruited teens to assist with data collection and evaluation of the Go Figure! website.
- More than 5,000 youth in 12 states have provided data.

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Sustainable 'Green' Composites

Composites are often referred to as reinforced plastic. They are stronger and lighter in weight than other materials used in similar applications. Common composites include helicopter blades, luggage frames, shower stalls, satellite dishes, prosthetics, auto fenders, and protective sports and military helmets.

Current composites are based on fibers such as aramids and glass, and resins such as epoxy and polypropylene. They have excellent mechanical properties. However, most of these fibers and resins are petroleum based—a non-renewable resource that takes large amounts of energy to produce and is nondegradable under normal environmental conditions for several decades. In addition, since composites contain two dissimilar materials, they cannot be easily recycled or reused. At the end of their life, most of them end up in landfills, making that land unusable for several decades.

At present there are increased efforts to develop environment-friendly and fully sustainable 'green' composites. Green composites made using currently available resins do not have the mechanical, physical, and thermal properties and moisture resistance necessary for a broad range of applications. Research in the College of Human Ecology is exploring ways that soy protein can be used as resin, and plant-based fibers such as hemp, ramie, and flax can be used for reinforcement. Science and engineering methods are making progress in achieving this seemingly self-contradictory goal of durability and degradation.

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Behavioral Neuroscience

Researchers in Human Ecology's Emotion and Cognition Laboratory seek to understand the relationship between thinking and feeling—that is, cognition and emotion. They study memory to find emotional material, the role of emotion in attention and decision making, and the changes in these phenomena in later life.

The research is conducted on multiple levels. Neuroimaging, using fMRI, is combined with behavioral and life-span studies to focus on how emotion interfaces with cognitive processes such as working memory and selective attention—changes in emotion-cognition interactions across the life span. The ultimate hope is to discover practical means by which subjective and objective quality of life can be enhanced across the life span.

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Passive Textile Systems for Indoor Air Quality Improvement

Passive textile systems for indoor air quality improvement is a research topic being explored in the College of Human Ecology. The benefits:

- a system that can continuously remove and diminish indoor air pollutants using existing air circulation systems,
- can do so without requiring additional energy input, and
- can 'operate' without human intervention.

The starting point is fibers whose surfaces are charged to capture fine particulates such as antimicrobial agents capable of killing molds, viruses, and bacteria. The fibers are assembled into textiles that are suitable for wall coverings, window coverings, flooring, and roofing—all of which have large surface areas. These textiles are used in the 'built' environment such as buildings, ships, vehicles, and shelters.

There are challenges to this system. It is necessary to refine fiber production methods to increase the activity of catalysts and antimicrobial substances on the surface of the fibers. Methods need to be developed to maintain the activity of the surface agents and reactivate them over time. It is also difficult to measure their effectiveness in decreasing air pollutants both quantitatively and qualitatively. However, preliminary findings are showing enough benefits to pursue a larger grant for continuing research.

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