

The Symbiotic Relationship Between Nanotechnology and Creativity

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Pairing Creativity, Innovation and Invention

Scientists have long known that the left and right hemispheres of our brain process information differently. The left hemisphere handles sequence, literalness, and analysis, while the right takes care of context, emotional expression, and synthesis. Although we tend to process information using our dominant side, the learning and thinking process is enhanced when both sides of the brain participate in a balanced manner. Although popularly associated with art and literature, creativity is also an essential part of innovation and invention^[1].

It is this symbiotic relationship that is defining the newest contours of our times. We have entered a conceptual age where creative forces are producing new businesses and technologies, most remarkably in nanotechnology. Nanotechnology is deemed the human race's greatest scientific achievement yet, while completely changing every aspect of the way we live^[2].

A Brief Definition of Nanotechnology

Nanotechnology is generally described as a broad field of applied science and technology focused on controlling and exploiting the structure of matter on a scale below 100 nm. Nanotechnology can be more genuinely defined as the scientific field encompassing mastery of understanding and manipulating atomic and molecular matter and interactions between them as the prerequisite for the optimization of existing products and the creation of new ones.

Nanotechnology is an ideal example of the intersection between science and art. It's the perfect "scientific storm" in a place where all natural sciences congregate and intersect each other at the nanoscale. It is ubiquitous and those who participate are inherently successful when they engage their creativity^[3].

The Promise of Nanotechnology

Nanotechnology succinctly demonstrates the leap of imagination into a world that is different from the apparent world^[4]. This nanoworld melds art and science, creating new materials and a new reality. The chemists, physicists, material scientists, biomedical researchers, engineers, and other researchers who are active at the frontiers of this diverse and multidisciplinary field are the artists^[4]. In the twenty-first century, nanotechnology will replace the natural sciences in taking us from the industrial age into the nanotechnical age where there is virtually no limit to the shape and size of the objects and devices that can be made.

The Nanotechnical Age

In moving beyond simple materials, the nanotechnical age brings nano-scale devices that do something of interest and importance^[5]. Such devices can, for example, sense the environment, process information, or convert energy from one form to another. They include nanoscale sensors, which exploit the huge surface area of carbon nanotubes and other nano-structured materials to detect environmental contaminants or biochemical^[6]. Other products of evolutionary nanotechnology are semiconductor nanostructures such as quantum dots and quantum wells that are being used to build better solid-state lasers. Additionally, sophisticated ways of encapsulating molecules and delivering them on demand for targeted drug delivery are being developed^[7].

Examining the molecular world is much like experiencing any other physical art form. There is a relationship of size, shape, strength, force, and motion. Just as artists create meaningful new forms, so do nanotechnologists- both revealing a new world of the profound and the unexpected^[8].

Incorporating Arts and Sciences Equally

In order to sustain the Nanotechnical Age, arts and sciences will require an equal footing. Society must be adroit enough to adapt to the new technologies. By collaborating and sharing experiences in the innovation process and revealing connections between creative activities, links can be forged. Innovation will move beyond disciplinary boundaries.

Collaboration and shared experiences, however, do not occur by happenstance. Specific geographic regions hold all the ingredients for such perfect orchestrations. According to economist, researcher, and author, Richard Florida, they are the communities that harbour a high degree of the "3 T's: technology, talent, and tolerance." These "3 T's" are the characteristics of a

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region that attract the young, educated and creative people who will contribute directly to the area's economic growth and cultivate the advancement of the Nanotechnical Age^[9].

The new economy's demand for creativity has manifested itself in the emergence of what Florida has termed the "creative class." Using a broad definition of the term, the creative class is anyone whose work function is to produce new ideas, new technology, new creative content, or some combination thereof^[10].

The Symbiotic Relationship between Nanotechnology and Creativity

As a result, I believe that the relationship between nanotechnology and creativity is symbiotic. Both nanotechnology and creativity foment ingenious activity and need bold regional ecosystems for nurture and support. These elements, in turn, facilitate business formation and economic growth, resulting in strong socioeconomic effects by raising and sustaining standards of living.

The links between creativity and nanotechnology have become intrinsically intertwined and the links are molecularly precise. Fully integrating science with art in nanotechnology has opened a huge range of opportunities^[11]. Nanotechnology will catalyse the unification of processes from the living to the non-living worlds. New techniques will be discovered to organize, characterize, and manipulate individual nanoscale elements. Insights will be developed into self-organizing principles of nanoelements. New nanoscale architectures will be implemented with new microscopic and macroscopic functions.

Nanotechnology is the world's freshest expression of human creativity.

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