

# An Elucidative Examination of the Relationships between Fundamental Science and Life Quality

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**Abstract:** *This study explores the intricate connections between fundamental scientific research and life quality, aiming to elucidate how advancements in fields such as physics, chemistry, biology, and their applications contribute to human well-being. Earth science and other disciplines are potent tools for transforming and improving life. In development contexts, basic science has also given us tools to investigate and maintain the environment. "Individuals' perception of their position in life in the context of the culture and value systems in which they live, and in relation to their goals, expectations, standards, and concern," is how the World Health Organization defined quality of life. The objectives of basic science have an impact on issues related to general well-being, including physical, mental, and financial health and quality of life. Innovations and discoveries in the fields of security, healthcare, medicine, environmental sustainability, engineering, education, the economy, social services, transportation, technology, knowledge, and health pandemic management, among others, have enhanced life. The recent creation of the Covid 19 vaccination serves as evidence of the efficacy of basic science. The goal of the study was to refute the worries and assumptions of those who reject basic science as a revolutionary tool. The basis of this study is an explanation of the boundaries of the relationship between basic science and life quality, with the aim of extending this relationship to quantifiable societal consequences. The study employs historical and documentary analysis to provide a more comprehensive description of the dynamics linkages and underscore the crucial role of foundational science in shaping modern lifestyles, fostering innovation, and addressing global challenges.*

**Keywords:** Revolutionary tool, Quality of life, Basic science, WHO, Covid 19, Vaccination

## 1. Introduction

It is impossible to overstate the benefits of basic research to the advancement of society and humanity. From human impact contexts, the discipline's multiplier effect has grown to unthinkable levels. As a phenomena filled with values, basic science is driven by curiosity, represents a vital tool for human progress and sustainability, and continues to spur previously unheard - of societal changes and the advancement of life. Sustainable development is facilitated by the discipline's numerous applications in the fields of health, energy transition and life in general. Basic science is, both theoretically and practically, closely related to human survival and perpetuation. Natural resource transformation has significantly raised people's standard of living generally and promoted sustainable development. The research is further motivated by the work done in 1872 by German philosopher and physicist Christof Lichtenberg, who wrote in his diary that finding a permanent cure for toothaches that would eliminate them instantly might be more valuable than finding a new planet, but he was unsure of how to begin this year's diary with a more significant topic than the discovery of a new planet.

The government, as well as individuals and professionals, are paying more attention to basic science since it is fundamental to growth. In order to secure funding and gain social acceptance, scientists frequently use these and similar arguments to justify their work. These arguments are currently linked to personal health and longer life expectancies, technological advancement, economic profits, and/or sustainability. The impact of basic science on health and economic prosperity, and how this translates into

improved quality of life, will be investigated for the purposes of this study. Regardless of how long and expensive these discoveries and innovations took; basic science is the reason we have computers today and why we have managed to contain COVID - 19. It is believed that applications of basic science have their own limitations and difficulties, which frequently forces scientists to defend the role of basic sciences and their applications. It is no longer news that, with the exception of the developed world, funding for basic science research has not increased significantly worldwide.

### 1.1 Justification

Though the relationship between the two has not been widely acknowledged, basic research has greatly increased cumulative quality of life and accelerated the speed of social development through a variety of multifaceted applications. The relationship between life quality and basic science is still not well understood. It is unparalleled in terms of quality that so many countries have used the applications of basic science to improve the quality of life for their populations. Since life would be more difficult without basic research, it is necessary to raise awareness of these benefits and emphasize how important they are to society. In order to promote scientific discoveries, basic science scientists must also receive the proper financing, policy support, and enabling. It is critical that scientists operate in environments that call for care, consideration, and support.

## 1.2 Working Definitions

For the purposes of this work, the basic sciences are defined as the scientific fields of mathematics, physics, chemistry, and biology that provide a fundamental understanding of natural phenomena and the processes that transform natural resources. These fields are focused on the connections between systems and the principles of life. Conversely, quality of life would include overall feelings about life, happiness, optimism, self - assurance, meeting needs and expectations, a sense of worth, bodily and mental safety, and a sense of contentment with both the economic and social components of life. One definition of Quality of Life (QOL) provided by the World Health Organization (WHO) is "A person's perception of their position in life within the context of their culture and in relation to their goals, expectations, standards, and concerns. "

The phrase "quality of life" will be used in the study to refer to the following objectives and traits: They cover all aspects of human life, including the variety of jobs, families, homes, and communities that people lead. They make reference to goals that are significant beyond their worth in money. They speak as much about how we do science and use technology as they do about the subjects covered in science or the functionalities of technology.

## 1.3 Objectives of Study

The following are the study's objectives. (1). To draw attention to the particular ways that basic research has enhanced people's quality of life and overall sense of fulfillment. (2). To improve comprehension of the relationship between living quality and fundamental science. (3). To examine and outline how basic science improves people's quality of life, (4). To extrapolate how advances in basic science and scientific discoveries affect people's quality of life and general well - being.

The following are the study's objectives. (1). To extrapolate how advances in basic science and scientific discoveries affect people's quality of life and general well - being. (2). To examine and outline how basic science improves people's quality of life.

## 1.4 Research Questions

Four research questions were presented in the study. (1). Has basic science changed society and made a significant contribution to living quality? (2). Has basic science made any positive impact on society? (3). Will the world be a better place without basic science's contributions? (4). How might basic science's contributions to the advancement of life on Earth be reinforced and maintained?

## 1.5 Methodology

The approach taken by the study to improve knowledge of the connection between fundamental science and quality of life is historical and documentary analysis. Journals, books, review papers, publications, and institutional documents that touch on basic science contributions and quality of life in the domains of health, technology, biotechnology, environment,

and economic challenges are among the library materials included in this documentary source collection. The causal relationship between basic science and life quality is the main topic of discussion. Materials that would be included in or omitted from the review had criteria established. Materials that emphasize basic science discoveries and quality - of - life results are included for examination, while those that do not fit this criteria were eliminated in accordance with the study's objectives.

## 2. Review of Literature

In the last few years, science has made a great deal of astonishing discoveries and technologies that have extended human lifespans and increased quality of life. This is well stated by Hanson, Akerson, and Macdonald (2006), who emphasized that research depends on empirical evidence for its survival. Basic science has given society evidence - based value. This study aims to establish a connection between basic science and quality of life by examining and evaluating reports, textbooks, materials, policy research papers, journals, and publications from major libraries. Additionally, online resources that emphasize the role of basic science in achieving individual and societal goals are also included. We also consulted materials that questioned advances and discoveries in basic science. A thorough search of the literature was conducted to find the most recent articles on basic science and economic or health - related quality of life. Multidisciplinary materials were examined in accordance with the study's goals. The purpose of a review of the literature is to offer data that will be useful in achieving the key goals. J. J. Thomson, the discoverer of the electron, brilliantly summed up the distinction between basic, or pure, and applied science in a 1916 speech. He said that research in pure science is defined as that which is done purely with the intention of expanding our understanding of the Laws of Nature, with no thought given to how it might be applied to industrial issues. This supports the claim that the story of life has been altered by basic science and its applications. The fundamental change in medical practice that embodied the spirit of his speech and the presumptions that advances in fundamental science are profitable, advantageous, and deserving of support was the use of X - rays in surgery. Faraday's laws of induction from several decades ago showed that electromagnetic waves were discovered to improve communication. Hertz discovered them, emphasizing the elegance of physics and basing his research on Maxwell's theoretical ideas. I believe that when it comes to creating new information that advances our planet, basic science is the best option by far.

According to well reported research by Mansfield from 1991, public funding for basic science yields a 28% return. Mansfield figure was derived from a sample of 75 major American firms in seven manufacturing industries (information processing, electrical equipment, chemicals, instruments, pharmaceuticals, metals and oil). He obtained the information from company R&D executives. The products and processes commercialized in 1975 - 85 that, according to them, could not have been developed (at least not without substantial delay) in the absence of academic research carried out within fifteen years of the first introduction of the innovation. Mansfield work clearly

demonstrates that there are large quantifiable returns even though sceptics would dispute some of the assumptions. It is also noted that the invention of steam power, metallurgical processes, and textile mills—which propelled the industrial revolution in England—were founded on pre - 17th - century scientific knowledge and mechanical engineering principles; they had nothing to do with the scientific revolution of the 17th century (which produced Newtonian mechanics, calculus, and other such concepts). This is accurate, however many subsequent industrial advancements most definitely do not fit the bill. According to Klaus Jaffe, the paper's lead author and coordinator of Simón Bolívar University in Venezuela's Center for Strategic Studies, SciDev. Net reports that there is a link between scientific production and economic growth. When examining what kind of investment yields the highest returns, Douglas Gollin, a professor of development economics at the University of Oxford in the United Kingdom, discovered that basic science yields a higher return on investment than agriculture.

Conversely, basic science is credited with being a key engine of innovation and economic progress through knowledge transfer across nations. While less substantiated scientific knowledge is tentative and vulnerable to change, some scientific knowledge is generally robust and durable (Hanson & Ackerson, 2006; Sadler, 2004). Hurd (2002) made the highly contested statement that, despite the fundamental changes occurring in the contexts of science and technology, not much has changed.

### 3. Results

The descriptive analysis showed that although basic science has improved people's quality of life, it has also greatly improved people's overall quality of life and had an impact on people's health and economic conditions, which has directly benefited populations all over the world. In many respects, examination of the available evidence has demonstrated beyond a shadow of a doubt how fundamental science has altered the story of life and improved quality of life throughout societies, implying that life would be worse without contributions to and advancements in basic research.

It is impossible to overstate the importance of basic science, whether in developed or poor nations. The examined records unequivocally demonstrated that basic sciences and life quality are positively correlated, with basic sciences improving lives on a qualitative level. According to the reviewed sources, widespread improvements in quality of life continue to be the result of discipline breakthroughs and basic science discoveries. The analysis of relevant literature bolsters the claim that fundamental research has improved people's quality of life and emphasizes the idea that life would be worse for people without basic science's contributions. All things considered; the evaluated literature supports the study's goals. Findings from the literature are interpreted with the understanding that fundamental science is the cornerstone of civilization and continues to be at the forefront of the search for sustainable human solutions. The results confirm what UNESCO has noted, namely that basic science should be honoured for its contribution to sustainable development goals.

### 4. Discussion

The purpose of the study was to explain how advances in the biological sciences, chemistry, physics, medical research, earth sciences, biotechnology, and pharmaceuticals have affected quality of life and to investigate the relationship between basic science in broader contexts. The literature evaluation provided credence to the idea that efforts in basic research to address societal demands naturally lead to enhanced quality of life. Reviewed literature supported the general view that Basic science is a strategic tool for advancement of knowledge and quality of life. The study answered the following research questions, (1) Has Basic science contributed to Quality of life, (2) Has Basic science contributed to betterment of society (3) Would the World be better without the contributions of Basic science and (4) How can the contributions of basic science be sustained and strengthened in advancement of life.

The reviewed materials suggest that scientific discoveries and breakthroughs in basic science are still the key drivers of widespread improvements in quality of life. 2020 saw a global health catastrophe brought on by Covid - 19 infections, which resulted in fear and the tragic loss of many lives. Even though a solution was discovered within a few months, basic science's contributions would not have prevented the problem from getting worse. We are aware that a virus caused the sickness, but basic science has not yet revealed the virus's appearance or genetic makeup. The COVID - 19 pandemic serves as a stark reminder of how essential it is for the basic sciences to continue to advance if the world is to progress in a way that is equitable, sustainable, and inclusive. Remember that in 2020, a medical discovery by Pfizer and Johnson & Johnson prevented humanity from facing certain death and financial ruin. Society has benefited financially from advances in science and technology, mostly in developed and emerging nations. Artificial photosynthesis, which divides water (H<sub>2</sub>O) into hydrogen and oxygen molecules, has the potential to be a "green" technique for generating hydrogen energy. It is noteworthy to note that an increasing proportion of homes are choosing wood pellet, geothermal, and solar heating alternatives over oil or gas heating. Floating mangrove technology can provide biomass, which could be an alternative to unlawfully felling existing mangrove trees to produce wood pellets for the creation of charcoal.

### 5. Conclusions

Findings from reviewed material strongly lend credence to the argument that basic science has made significant contributions to life and has improved quality of life. The fact is basic science impacts all sectors in one way or the other and not limited to one sector. This study concludes that indeed strong relationship exists between basic science and quality of life and goes to establish that the goal of basic science to advance life, improve health and economic conditions of the population through knowledge and scientific discoveries. Contrary to the beliefs of basic science skeptics, the study provided very compelling evidence that breakthroughs in basic science have positively benefited society rather than negatively transforming it.

The study calls for deeper reflection and a greater understanding of the contribution of basic science to human and societal development. The positive impact of basic science on quality of life is enormous and incalculable in the context of how advancements in the transformation of natural resources have led to improvements in our homes, workplaces, public health, and economic systems. As a result, basic research protects the sustainability of our world and has demonstrated a dedication to advancing the causes of wellness, disease prevention, environmental enhancement, and economic growth. Basic science's knowledge gains and effects span generations and will always have an impact on societal outcomes including addressing people's needs and improving quality of life. It is common known that knowledge is becoming a more valuable resource in our society and that knowledge production plays a major role in promoting democracy, good governance, innovation, and national competitiveness in the global economy.

Fundamentally, basic science has not received enough credit for its significance. Since every basic science achievement is specifically designed to meet the demands of society, basic science must continue to advance in order to improve society as a whole. Basic science keeps improving research by assisting in the understanding of biological systems and processes. Improved methods for illness prediction, prevention, diagnosis, and treatment result from this understanding. The fast advancement of science and technology between the end of the 19th and the beginning of the 20th centuries gave rise to new industries such as the electrical and chemical sectors, as well as the car and aviation industries. These industries have led to an expansion of economic activity.

## 6. Recommendations

The following recommendations are made. (1) There should be robust international and national policies on advancement of Basic science and Governments should provide adequate funding for Basic science research and teaching. The needs of scientific researchers including equipment's and institutional support should be met to ensure greater commitment to the field for scientific advances. (2). There should be increased awareness about the contributions of Basic science to quality of life and other vital aspects of human lives and systems. (3). For the long - term benefit of society, basic science research should be continued and strengthened, and basic science education should be promoted in schools. (4) Finally, basic science research must have a worldwide agenda and priority.

## References

- [1] Chalmers, Alan F. *What is This Thing Called Science? An Assessment of the Nature and Status of Science and Its Methods*. Hackett Publishing Company, 1999.
- [2] Anna Agbidye (2015) challenges and prospects in the teaching of basic science, basic level education, *Journal of Qualitative Education*, Volume 11 No.1 December, 2015: ISSN 0331 - 4790
- [3] Seinfeld, J. H., & Pandis, S. N. *Atmospheric Chemistry and Physics: From Air Pollution to Climate Change*. John Wiley & Sons, 2016
- [4] Aderounmu, A. O. (2006). Status of Human and material resources for Nigerian science and technical colleges: issues and challenges for STM education. In U. Nzewi (ed.) *STAN proceeding of the 47<sup>th</sup> Annual Conference*. 8 – 13.
- [5] *Age of Uncertainty*. Cambridge: Polity Press, 2003
- [6] Carnegie Commission on Science Technology and Government
- [7] National Research Council (US) Committee on the Human Dimensions of Global Change. *Understanding Risk: Informing Decisions in a Democratic Society*. National Academies Press (US); 1996.
- [8] Department of Health and Human Services Public Health Service, "Healthy People 2000, " conference edition.1990
- [9] Eyles, C. (2009). The vital importance of science education in today's world; Honors integrated science program. National policy on education (4th Edition). Lagos. NERDC Press.
- [10] Nowotny, H, P Scott, and M Gibbons, Re - Thinking Science: Knowledge and the Public in an
- [11] Future: Linking Science and Technology to Societal Goals. Washington, DC, September; 1999 within an elementary science program. *International Journal of Technology and Design Education*, 9 (1), 37–55
- [12] R L Schalock (2004) *The Concept of Quality of Life: What We Know*
- [13] Rowell, P., Gustafson, B., & Guilbert, S. (1997). Problem - solving through technology: An interpretive dilemma. *Alberta Journal of Educational Research*
- [14] Rowell, P., Gustafson, B., & Guilbert, S. (1999). Characterization of technology
- [15] Schneider, R., Krajcik, J., & Blumenfeld, P. (2005). *Enacting reform - based science materials:*
- [16] Susan E Cozzens (2010) *Quality of Life Aspects of Treatment, Care and Rehabilitation - Journal of the International Society of Quality - of - Life Research*
- [17] Sandoval, W., & Reiser, B. (2004). *Explanation - driven inquiry: Integrating conceptual and epistemic scaffolds for scientific inquiry.*
- [18] National Research Council (US) Committee on the Science of Climate Change. *Climate Change Science: An Analysis of Some Key Questions*. National Academies Press (US); 2001.
- [19] Sandoval, W., & Reiser, B. (2004). A critical review of research. *Research in Science Teaching*, 41 (5), 513–536
- [20] Starr P. *The Social Transformation of American Medicine*. New York: Basic Books; 1982
- [21] Diamond, J. *M. Guns, Germs, and Steel: The Fates of Human Societies*. W. W. Norton & Company, 1997.
- [22] WHO Science council report 2021, 2022. Accelerating access to genomics for global; health promotion, implementation, collaboration.