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REVIEW ARTICLE

Science for the benefits of all: The way from idea to product

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Abstract Science is a knowledge based on hypotheses, observations, and experiments. From its very beginning science has served the humanity and will continue to do so until the needs of human being are fulfilled. History is rich of many scientists who have contributed to different fields of science free of politics, religion, cast, and region. Every human being must have the right to use science and technology for beneficial purposes. Mutual coordination between academia and industries is extremely important for the growth of science. The spread of ideas is only possible with publication and distribution of information to all in the world. Unpublished new ideas will remain hidden. With no doubt, many of publications and products get the spirit from the very first ideas. It is necessary that all scientists share their ideas, opening new opportunities for others to work in the various aspects. We are of the view that, to find a solution to our problems or satisfy human needs, it is important to ponder new ways in science, generate new ideas and share with others, so the concept of ''science for the benefits of all'' remain alive forever.

Contents

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History of science

The history of science is comprised of multiple eras, from pre-historic times around 3500BC, to modern era of science. Babylonian astronomy was the first and highly successful evergreen struggle, giving a refined mathematical description of astronomical phenomena. Hundreds of achievements have been made so far in various fields of science like physics, biology, chemistry, medicine, mathematics, and so on. Mohammad ibn Zakaria al-Razi (864-930 AD) an Iranian scholar and physician, also known as Rhazes, was the first who isolated alcohol. Other early scientists from Muslim world, who have contributed to modern medical sciences, are Bu Ali Sina (Avicenna), al-Kindi, and Ibn al-Nafis [1,2]. The famous Greek scientist and Plato's student, Aristotle contributed remarkably to natural sciences like biology and chemistry [3]. Isaac Newton has remained a great philosopher, astronomist, mathematician, alchemist and physicist of his time. His contribution to physics and mathematics is priceless. One of the greatest names in history of science is Charles Darwin. His theories about nature and evolution played a landmark role in biology [4]. The brilliant theories of photoelectric effect offered by Albert Einstein, has significantly raised more and more ideas in this area. Thomas Edison is always remembered as the great inventor of the electric bulb [5]. Louis Pasteur will always be remembered for his contribution to medical sciences; the germ theory of diseases was put forward by him. He also reported that virus is not detectable by microscope and also developed the process of pasteurization [6,7]. Ibnul-Haitham, Bu Ali Sina (Avicenna), Jabir Ibn Hayyan, Al-Khwarizmi, Gregor Mendel, Marconi, and Faraday are all those who came up with brilliant novel ideas in various aspects of science, and left publications from themselves that have been pursued by other scientists.

Science either invents a new idea or disapproves old ones [8,9]. Novel discoveries are made in different disciplines, and scientists are enthusiastic to discover new ideas for the actual benefit of humanity [10]. In modern periods of science, the new area of genetic engineering, has revolutionized science and has opened many new windows of inconceivable possibilities.

Frontiers and future of science

Science should not be limited to a place, race, culture or region; in fact it should be regarded as the basic human right around the globe. Each innovation in science and technology should be transferred from one side of the universe to the other and from one generation to another generation whole-heartedly. Currently, some scientific inventions are critical, like treatment strategies for newly born diseases that unfortunately have no cure at the moment.

Scientific invention and discoveries have made many things possible, which were once thought impossible in the past and still more potential is expected in future: new techniques, new galaxies, new planets and perhaps existence of life on them, and so on. Science is the main tool to explore the hidden secret of world for the betterment of human life. The body of knowledge produced by science undergoes constant changes. Until the human's curiosity of satisfying needs remains present, scientific developments will yet continue. We should realize that today's theories might become outmoded ideas in future [11,12]. Thus, all scientists should share their ideas with generating publications and thus others will be inspired to work on different aspects of those. The first lesson is therefore to write and share the ideas.

Science and publications

Scientific researches are communicated in the form of publications or conferences, etc. Currently, assessment of ''scientists research quality'' is based on the number of publications, citation and impact factors of the journals in which the publications appear. These citations and impact factors might improve the career of individual researcher, but in long run, these parameters set so far, may not actually offer anything to the public life. One reason for the delayed contribution of science to the society could possibly be the fact that scientific findings need time to be proved realistic in the day to day life. Whenever a new idea or a novel hypothesis is developed, it undergoes a series of scientific reviews and extensive confirmatory studies before it becomes either a product or a service to the society. In the last decade, many researchers from all over the world have contributed to valuable publications. In this regard, Iran is a good example, which has shown amazing growth in publications, and some of those novel discoveries are moving towards productions [13]. However, it takes time to fulfill all aspects of the science chain [14] especially with all due limitations [15]. Therefore, the second lesson is that although the quantity of publications is important, it is necessary to promote and follow up those ideas and findings, in order to meet common benefits of society.

Role of business centers in science

At present, science has become a very large scale business enterprise. In order to maintain a high quality infrastructure, it requires a huge sum of financial resources. Collaborations between the academia and industries are necessary. This mutual bond will facilitate new researches and perhaps enabling novel inventions and discoveries based on the public demands. In addition to financial needs, scientists who gave the ideas, performed the studies and published their findings are not always capable of going further, due to their highly busy

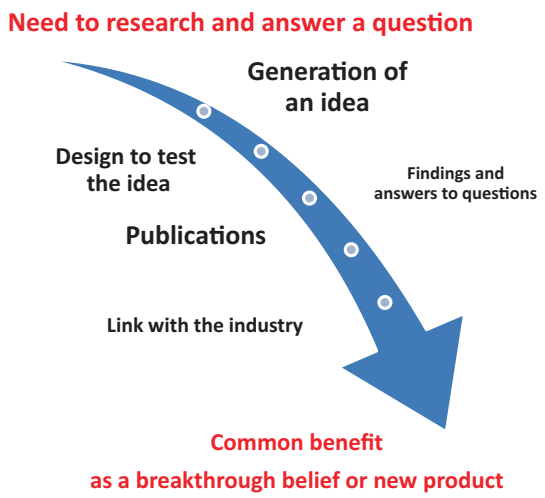

Fig. 1 Development of an idea to a breakthrough belief or finished product or.

academic schedule. Therefore, there is a substantial need to establish departments at the universities or research centers who make the links with industries. By thorough evaluation of the history of science, we learn that there exist published ideas and findings that remained unused for several reasons. However, this does not mean that scientific studies are not useful or there is no interest for industry in them. In the next section we have tried to address this issue by evaluating the world prestigious prizes in relation to new ideas. Thus, the third lesson is that there exists a serious need to establish business centers in all academic centers.

Noble laureates in a view

As from history between 1901 and 2012, the Nobel prize and the Economic Sciences award have been granted 555 times almost to 856 people and organizations. Noble prize cannot be shared among greater than three people. There are defined parameters for awarding a Noble prize. Some of those requirements may include advancing human knowledge, offering new solutions for universal problems, or shifting towards a novel idea. In chemistry, 105 prizes have been awarded to 166 Nobel laureates, and in medicine 104 prizes to 204 awardees, and in physics 107 prizes were given to 196 laureates (www.nobelprize.org). It is estimated that about 80% of Nobel laureates have given new ideas in chemistry, physics, and medicine. Some have used old ideas and modified them and came up with a solution for newly faced issues. A thorough study while looking on these ideas shows that up to 1960s almost all of ideas or researches offered by Nobel laureates have been converted or are serving humanity as in the form of products, and after 1960s more than half of ideas have been utilized in form of products and others are in process of reviewing, testing and analyzing to be used as products. We learn from history that outstanding discoveries affect the citations of related papers and for specific scientist; acknowledgement of old citations has also been raised. The fourth lesson is that time is needed to translate an idea to a product and this is only possible by teamwork.

Motivation for scientists

Scientists act as the backbone of our society. Science and scientific researches have evolved and progressed with an outstanding rate in the 19th century. What is the main stimulant for this hectic research activity? The answer may not be so straight forward. Curiosity, the desire to serve the community, and of course reputation, motivates scientists to elaborate more. Scientists motivated only by curiosity had shown less interest in publishing their findings. Darwin, a prominent scientist and the founder of evolution theory could not publish his manuscript "origin of species" for fourteen years because of rejection and offences from society [16]. Similarly another scientist Pavlov, a Nobel prize winner in physiology, was not interested in publication of his findings [17]. Human needs might serve as the best driving force for progress of science in future. The fifth lesson is that in order to fulfill the researches and present their outcomes and benefits to the society, scientists should get motivated to disseminate their idea and national and global policy makers should facilitate the environment to establish a positive connection between the public, industry and scientists (see Fig. 1).

Current status of world

At recent time, there is more and more interest and eager for new discoveries, either to serve the humanity, to compete for rewards, or to address unanswered questions. Without having such quest for research and discoveries, for instance it is impossible to combat against newly born diseases and problems. As time goes by, it is more realized that modern science is proved to be beneficial for universe. The sixth lesson is that scientific advancements should be for the benefits of all.

Conclusion

It is quite clear from the above discussion that at present time human life has become totally dependent on science and technology. Science has contributed to every aspects of our life and has become one of the basic human necessities for existence. We believe that, to satisfy all human physical needs, novel inventions will always get their ways to the future. Every new scientific idea, invention and product, deemed beneficial for humanity, must be communicated around the world irrespective of race, religion or region. Science should be free from politics and should not be the prerogative of specific class of society.

Therefore the followings should be paid attention by scientists, decision or policy makers, and all:

1- Publishing and sharing ideas with others.
2- Translating new findings to product.
3- Establishing business centers or departments in academia to make the links between scientists and industries.
4- Motivating scientists to understand the public need and be connected with policy makers at national and international levels.

Overview Box

First Question: What do we know already about the subject?

Science is collection of observations, hypothesis and experiments. After processing of all of the stages we get a new idea, which may become a product for the well-being of public then after going through series of reviews it becomes a theory or law. A new idea may generate many services and solutions for the present problems like infectious disease and unsolved hypothesis for the betterment of humans.

Second Question: What does your purposed theory add to the current knowledge available, and what benefits does it have?

Science is collection of ideas generated after experimental stages; but there is need to share the new ideas to others, for benefits of all. Noble Laureates that have won prize not only have given always a new idea, but most of them have used pre-existing ideas to solve human unsolved problems and issues. The need for promoting new work and ideas inside research institutes and universities can be fulfilled by having business centers inside the universities, to fulfill the financial cause as well as for focusing on current issues in public.

Third Question: Among numerous available studies, what special further study is proposed for testing the idea?

Establishing business centers in a suitable model in academic institutes must be accelerated to promote new ideas. The ways of implementing models of collaboration between those who produce science and those who are active in industry must be clarified.

Conflict of interest

The authors declare no conflict of interest.

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