

The importance of Scientific literacy in our Society

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Abstract:

Scientific literacy in our society has entered a period of serious decline. Contrary to our perception, the interest of lay people for the sciences has not grown in parallel with the advances that science has brought to society. Advanced communities are starting to feel the shortage of bright scientists. In what follows I will try to examine the situation and raise a number of questions relevant to the problem outlined here.

1 Introduction

Traditionally, education has been associated with the classics. The huge progress that Science has achieved has not prevented the formation of a divide between a fraction of society that has been educated in the classics and that trained in the sciences. There are indeed important exceptions, however the division is clearly perceptible in our society.

Is this feature ingrained in human nature? The question stems from the fact that the Classical intellectuals from Greece and Rome were versed in both natural philosophy and letters. With the passage of time, however, the “Letters” aspect of our Classics had reached a relatively wide audience, certainly much wider than that of the scientific legacy of the classical age. In the Middle Ages the only whisper of culture cultivated or maintained in monasteries was mostly related to letters. This was not so much the case for the Arabic golden age. Indeed, important scientists developed medicine, mathematics and the natural sciences, and were excellent keepers of the classical legacy in both letters and the sciences.

Nowadays, science is all around us. Modern life can't be conceived without science, yet, scientific literacy in our society is far from adequate. Many educated people do not have an interest in becoming even minimally educated in science, not to mention the uneducated population...

2 Modern life paradoxes

2.1 A rejection of the industrial revolution?

The XVIII century was a harvesting one. In the XVIII century famous physicists, chemists, and natural philosophers in general, made impressive contributions to science, based on the legacy,

left during the previous two centuries, which started in the glorious Renaissance. The XVIII century witnessed the Industrial Revolution in the UK and other European advanced countries. The Industrial revolution brought the vapour machine, new textiles, new construction materials, etc. Products elaborated through processes involving new laws of Physics and Chemistry, as well as new Mathematics put forwards by eminent scientists.

It is true that the Industrial Revolution also brought hard conditions for workers throughout Europe. The benefits of the Industrial Revolution did not seem to reach out to the workers and lower classes of society. On the contrary, these poor people felt exploited by the harsh working conditions in many industries.

The XIX century intellectuals, unimpressed by the Industrial Revolution, took pride in rejecting technology and by extension everything related to Science. In addition to this, Science was instrumental in the invention of new and more destructive weapons.

Intellectuals were thus clearly uninterested in Science, and in many cases openly opposed to teaching and learning sciences. It is perhaps in this century where the great division between the sciences and the Classics become notorious.

In more recent times, nuclear weapons, nuclear waste, greenhouse effects, environmental disasters, etc have added to the unfavourable perception of Science that many people have in our society.

2.2 A question of pedagogy?

Or it is perhaps a problem made and cultivated by scientists? Science seems to be perceived as obscure, difficult, strange, etc., by many people. Other more friendly souls would claim that Science is for the smartest, or even for crazy people.

Perhaps we scientists have not been smart at showing our good side to society. Perhaps we scientist have been so busy in our wonderful world that we have forgotten to share our excitement with the rest of society. Perhaps, in a rapidly changing world, we scientists, important players in bringing out that change, have not been alert enough to catch the fears of society. We scientist have not noticed the need to build bridges with other groups and types of peoples.

2.3 So Science is irrelevant!

Yes, or so it seems! Common people are not interested in Science. Few people show some curiosity, but even these are a minority. So let's now turn our attention to the upper classes in society.

I could say that wealthy people are no more interested in Science than less wealthy ones. There are exceptions, there are philanthropists, but most wealthy people tend to be unaware of Science.

How about politicians? Most politicians do not have scientific backgrounds. Besides, they try to respond to the interests of their constituencies. So, the fact that they themselves do not have a particular interest in Science, combined with a population whose interests are not science related, leads to a society where Science is not in the agenda.

3 But Science is important for Society

Indeed it is! Even if society does not realise it. But let us not fall into the old position of scientists fully convinced of the relevance of their work to society, in a society where their scientific work seems to be irrelevant.

Few people would contest that Science has brought many advances to society. Moreover, modern life could not be imagined without Science. In every activity, in every field, Science is present. Technology is driven by Science. Both Science and Technology have changed the shape of mankind. In communications, medicine, transport, the automotive industry, in pharmacy and cosmetics, in computing. Science and technology are everywhere. Also, unfortunately, in the weapon industry.

And very importantly, Science has a place in Mankind cultural heritage. Science is part of Mankind's history.

3.1 Economical impact of Science

The Economy is also part of Mankind's history. Economy is indeed important for society, and indeed Science should appreciate it. Science should also show its economical aspect, and as such there should be ways to measure both its cost to society and the economical benefits derived from the scientific activity.

Although not often publicised, there have been numerous econometrics studies trying to describe the scientific activity in term of standards economical parameters. I will refer to two studies carried out by the Committee on Economic Development and the Science Committee of the U.S. Congress, which conclude that the economic return of investments in Science has been of the order of 30% per year, consistently over the last 50 years. This is to be compared with the return of investments in more traditional activities, which is of the order of 10% per year when the economy is in a period of growth.

The above figures are not very well know, although economic journals and magazines, such as The Financial Times, are well aware of it. The numbers given should made us all want invest more in Science. However. It is true that investments in Science have to be faced in the long term.

One more example come in handy. While eliminating the ever high US deficit, currently running at about M\$500000, would add to the US Gross Domestic Product (GDP) a mere 0.1% annually for the next 10 years, investing in Science has been adding at least a 30% increase to the US GDP for the last 50 years.

Many more examples could be given. For instance, the GPS navigation system. The GPS system would not be possible without both an understanding of the General Theory of Relativity, and the discovery of Atomic Clocks. By 1995 the GPS market amounted to M\$2300 and employed more than 100000 people. Today these figures have skyrocketed.

It is therefore hard to believe that both governments and companies are not more interested in investing in Science. Governments mostly in Basic Science to provide the atmosphere for discovery, the opportunities for advancing in many diverse fields of research. Companies should in turn be alert to benefit from the research done at Universities and research centres to bring the new results closer to products that can be marketed.

If the above scenario is correct, it is hard to believe that when the economy is growing there are no more investments in Science. Moreover, it is also hard to believe that even when the economy is stalled, there is no more funds flowing to Science, as it is Science that ensures a steady and firm economic growth.

4 Why is then Society not more interested in Science?

There may be many answers to this question. There may not be any simple answer. And if we can't find simple answers perhaps we will not be able to find solutions.

The only hope I see is Education. Education is important at all ages. Science education should be part of the school curricula from the very early ages. Science is fun, and as such teachers should find no difficulties in conveying the excitements of Science.

In this respect, astronomy has an important role to play. Astronomy is a science that is close to society. This has always been so from the very earliest times, and is still so. Astronomers should endeavour to use astronomy to entice the society into a better and fuller scientific education. Moreover, this should be done from very early in the educational system. Astronomy is ideal for teaching young children about numbers, or the day-night cycle. Later on in their career, astronomy will show student the importance of mathematics, physics, chemistry, geology, engineering, or even biology and medicine. If this is done from the early stages of education, on a par with education in the humanities, we will have a future society where scientists will be valued as key figures not only for their economic impact but also for the wider aspects of cultural life of society.

Indeed Astronomy should not be the only subject, but Astronomy is a good anchor, students will subsequently follow other scientific careers, but they would have been attracted to them by Astronomy.

5 Conclusions

Science is an important part of human activity. Science is also important for its economic return. However, Science is often avoided by people as difficult, or even obscure.

People should understand the important value of Science, both for its cultural implications as well as for its economical impact. It is important to scientifically educate the general population, so that Science is welcome in our lives as an exciting activity. It is also important that young bright people decide to follow scientific careers.

Astronomy can help attracting people to the Sciences as it is a subject that has interested Mankind since the very ancient times.