

TO COMPUTE IS NOT TO THINK

A.J. Buers
Department of Physics
University of Nairobi

ABSTRACT

Do you need some information? Push a button and the machine will answer! Amendments to this ridiculous way of thinking are proposed. The roles of adaptation and positive information utility in building a self-organizing technological society are investigated. A royal road for the derailed Africa's Science Culture is sort.

INTRODUCTION

There is no path to development that does not require thought. Apparently, the ability or inability to think constructively seem to be dependent on early life attitudes, prejudices and experiences. The development of a nation being dependent on its people may be a victim of such attitudes, especially of culture.

A society that aspires for self-reliance has to maintain engineering as culture, with a firm belief in the importance of individual effort. Engineering being both a science as well as an art requires discipline, patience and talent. It is a continuous process involving people fully aware at the time that neither they nor their children will be able to enjoy it at its fullest maturity. Indeed in every age, engineers and scientists are always time-honoured to improve on work that has already been done. And we are no exception. Our only limitation will be our range of imagination to which we must never allow external interference.

"Imagination is more important than knowledge"

ALBERT EINSTEIN

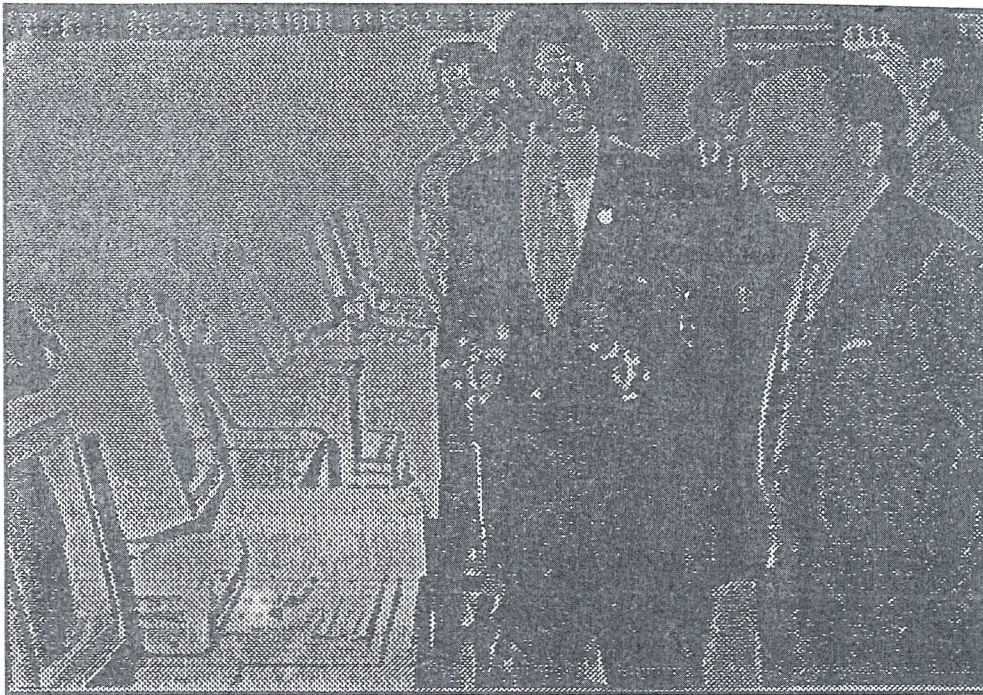
THE IMAGE OF ENGINEERING

The function of the Engineer is to provide what life does not. Nature is the Engineer's inexhaustible source of inspiration. And from time to time, among all these Engineers one manages to achieve more. He/her leaves the usual narrow path and his/her thoughts are outside the prescribed course. He/she creates movements, development; he/she supplies small, sometimes large, but constantly always new impulses. He/she creates whole new concepts, unparalleled things which in turn become parallel for other things. At every stage his/her freedom is essential for the choice of a research topic and for the experimental method to be used. No calculating machine can make these choice, which require reflection and a real perspicacity on the part of the engineer.¹

Unfortunately, too many laymen picture engineering as a sheer accumulation of practical facts, and take a scientist for a living encyclopedia. They think it possible to solve every problem by means of a giant machine which might register all human knowledge in their enormous magnetic memories. They would ask you. Do you need some information? push a button and the machine will answer! This is ridiculous and stems from the poorest science fiction. More important, it proves that the role of the scientist is too often completely misunderstood. The machine is a tool, an auxiliary, nothing more. And to compute as an end to itself is certainly not to think. I do believe that this is precisely the point where our present way thinking does need to amended.

Our first and most important asset is a belief in ourselves. We have the capacity to succeed in the development and use of technological products. But success depends on our ability to uphold a careful consideration of work that has already been done, coupled with a readiness for original thought and for action based on that thought. Indeed this would constitute the appropriate and hitherto wanting Science Culture for the underdeveloped world. A culture that would encourage clarity of thought and a readiness to act as well as to think.

This culture would tear down the enforced technology behaviour that prevents the development of existing indigenous technology, but encourages the adoption of alien ones. The barrier that keeps the self declared computer professor in front of the screen but without the slightest idea on the electronics behind the scenes. Until that time when computers will be opened up and modified locally, the often celebrated donations in the name of technology transfer will remain not only political and imaginary but worse; a plot to bar the underdeveloped from thinking! As Ayn Rand once wrote *"if you want to finish a man, just take all burdens and all goals away from him"*



Technology transfer will remain only political

Then, what is the philosophy behind foreign aid? Is it to protect an endangered species, to liberate a helpless people or to maintain current economic domination? For how long will we face this humiliating phenomenon of technology transfer as if our engineers and scientists are incapable of delivering anything within their respective disciplines? If we do not act now, then this practice may in long run irreparably damage not only the image of our engineers, but also the image of the capacity of the engineers.

EXAMINATIONS - AN ENEMY OF ENGINEERING

Kali as it stands today is an institution that is largely open to energy but almost completely closed to information and control. The lack of tangible data and information indicating preferred activities for development remains the greatest hinderance to Jua Kali and most policy makers. Unfortunately, as we fight illiteracy to attain the power of recording, the idea is not at home in many countries where the importance of literacy appear to end at school; thus defeating the purpose of learning. Is this a reflection of some hidden variables or omissions hitherto undetected within our education system? What, for example, is the philosophy behind 2 or 3 hours examinations in our institutions of learning? Do examination results really give the assumed divine expression of a student's potential abilities? This is an issue still open to research, but I believe in general that exams tend to discourage more than encourage the students their ability to think and participate in development, especially in the contentious subjects. No need to mention, a majority of our youths having fallen out of school on failing examinations, carry a life long stigma of a demotivated mind and a discouraged conscience. This has had a negative impact on our industrial development and needs an urgent redress.

INFORMATION FOR DEVELOPMENT

It is important to note that under competitive conditions the discovery of new sources of information are vital. The net value of the information is directly related to the selective advantage that information (used optimally) will give to the competing system.²

With these solutions in the tool box, the society is then ready for a technological self-organization. This would be a self-reflective society that displays subjectivity of its own. It would not only reflect individual organization but also exhibit a reflection of the process of reflection in the individual mind. And the height of this is self-awareness.

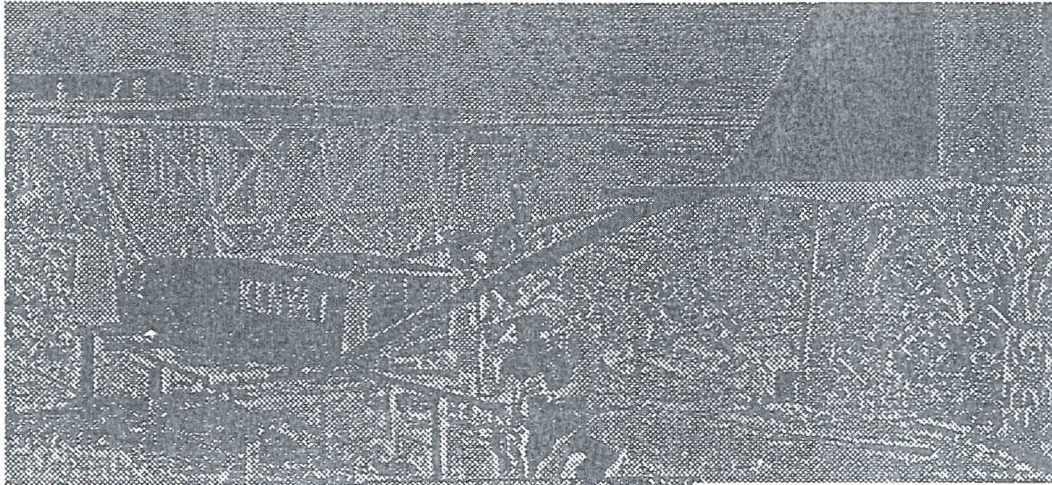
Recently, scientists and technologists in research and development institutions as well as Universities have achieved a measure of success and have produced very valuable information. Unfortunately, most of such information is documented in scientific and technical papers and journals whose language is beyond the understanding of the ordinary person. As a result, research findings have not been fully utilized.

Factors responsible for the inability to benefit fully from the research efforts include inadequate resource allocation for research and development, the lack of consistent science and technology policies and the unwillingness by decision makers to accord priority and commitment to science and technology. Another factor equally important but often ignored is the gap between the research community,

policy makers and users of research findings. Why does there seem to be no definitive mechanism for the transfer and use of the findings made by research institutions?

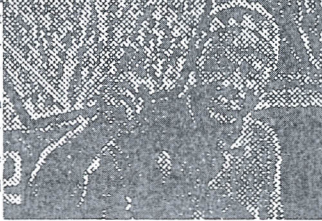
Most research work done in Africa are even irrelevant to the continent. It is at this point that our qualified Engineers owe our industrialization process a duty. It is a challenge to our engineers to alleviate this continent especially the Jua Kali from the yoke of inefficient, labour-intensive and time consuming traditional technologies as well as expensive and sometimes inappropriate imported technologies. For those who may feel this as too big a challenge, let us return to the source of inspiration, the search for simplicity.

Mechanic still determined to fly a local built aeroplane



"Although Kenyans have a lot of talent, most lack the financial resources to back up their projects. Research alone requires a lot of money"

He says people should not expect too much from investors especially when there is no money to back up their work. "This is one area the Government and other relevant institution should think about very seriously."



'Kenya One No. 2' under construction. Gachamba "I wont give up."

Some readers may remember him - the fellow who built a rudimentary plane he called "Kenya One" and flew it for about eight kilometers. That was in 1969

ADAPTATION AS A STRATEGY

Science, technology, research and development are vital cogs in wheels of any country's social and economic development. In terms of agricultural production, housing, transport energy, medical science, environmental management, indeed all aspects of human development - science and technology are the prime movers. Unfortunately over the years, African nations have been saddled with the difficult choice of either adopting foreign technologies to meet local needs with all the attendant problem or improving upon their own traditional technologies and eventually coming out with something to be proud of as home-made, appropriate, affordable and sustainable. The inability to make a clear choice has hampered development and led to a situation where some of the industrialized nations have taken undue advantage to turn Africa into a dumping ground for all sorts of items. This situation needs to be reversed urgently.

Already we have the sight of an achievement in the Jua Kali. But these developments must carry in then up-dated labour-saving ideas having evolved in response to changing needs and perceptions, and bearing the inprint of the environment. The transformation of muscle energy into items and shape must be complimented by a transformation of thought and meaning into energy as well. With the onslaught of these hard times and necessity, we have only one goal; to win. It does not matter whether we are in the 3rd World or not.

Let us insist: it is an irresponsible exaggeration to speak of the developed and the underdeveloped countries or the 1st and 3rd Worlds as if these did exist in the absence of man. Such a childish point of view may have been accepted in old times, but modern scientists and engineers have to abandon it for many serious reasons. First the complexity of nature makes it impossible for our minds to embrace it in its totality. We must germinate out of this artificial shell, a shell politically designed to degenerate our self esteem and hence convince us that we neither can invent, nor participate, nor even think! Our only way out is ADAPTATION, not technology transfer. Adaptation of our traditional technology in the spirit of modernity. This would enable a scientific treatment and subsequent solutions of classic traditional problems that bear relevance to the African society. These problems are tough. There does not seem to be a royal road or a simple method which at one stroke will solve them. But a single small step by one person will be a giant leap for the destiny of our continent.

By sharing our resources we can achieve a new vision and a new perspective, we will become a great people. But we must embrace new ideas without losing our identity. I do not believe that any people can be strong unless they remember and keep in touch with all their past.

We must devise new strategies for the reorganization and popularization of science education in our schools and communities. An education whose evaluation process would not be a 2 hour exam but a life time of initiative, production, development, innovation and new ideas. Such an education system would produce people who by force of personality, intellectual rigor and sheer commitment to work would drag Africa out of oblivion.

Students would be guided and encouraged on objects which most involve their interest, because such objects go deep into their experience therefore command their closest attention, yielding the most meaningful conceptions. From these early aspirations would develop an inexhaustible thirst for knowledge, understanding and a zeal for work - a life attitude that few have so far mastered, but to which almost everyone aspires. This would be the foundation for Africa's Science Culture. A culture which would encourage people to see in a lump of formless clay, the possibility of a finished pot. A people whose minds would be less on form with age, than on-forming.

SCIENCE CULTURE AS A FASHION

In this time of growing affluence with technology and fashion gaining an increasingly important role, and most engineers primarily contented with changes and shock effects, we should create a fashion (Science Culture) that would not yield to fashions. A creation that would account for an ever changing social-cultural reality. And it has to account for another key reality: that of quality manufacturing. Products produced without regard to quality and craftsmanship are quickly copied and even more quickly forgotten. We must only attract attention with ever better quality, a creation that thinks more highly of lasting value than of short-term publicity.

Fashion is a way of describing the world in which we live. It is a cultural and aesthetic expression of our time, but is also a matter of intimacy and personal identity, a matter of being and not a matter of looking.³ Unfortunately the engineering of our current fashions have so little of our inprint if any. While we enjoy the sophisticated pleasures of our urban centre, we are at best only troubled by the knowledge of a great and underdeveloped rural. We will only move forward when we finally decide to make our statements by our work. When our engineers will not only be engineers but engineering personified.

We must realize that engineering is a war, those who appreciate your inventions are the ones you defeat. In our case self-conquest will be the greatest of all victories. The current prejudice on our own goods should be replaced with a greater appreciation and a readiness to modify and improve on them. We may be without the comfort and security of century-old technological traditions but our survival will depend upon initiative and new ideas. At the centre would be the value of the concept and the work involved, not the value of the expression of the materials.

In this time in history the ground is much better prepared for the realization of such ideals than most engineers and scientist may have thought in the past. We know there will be many years of hand work between the first penstroke and the finished product, but when we finally look at the product, we will easily see why (Good things take time to grow).