

www.printandread.com

Roberto Vacca

**HOW TO
LEARN MORE
THINGS AND
LIVE BETTER**



2002

«There are one hundred stairs for going up to Paradise: ninety-nine are for intelligent people - and one is for all the others.»

Arabian saying attributed to the Prophet Mohammed

Cover: Roberto Vacca learning more things in 1971

HOW TO LEARN MORE THINGS AND LIVE BETTER

by Roberto VACCA

C O N T E N T S

Chapter	Page
1. Is the world really a maze? or: Why can this book help you to learn more - live better?	5
2. Think straight or do good?	13
3. Know another language - double your own manpower	19
4. The knowledge of the physical world	31
5. Mathematics or - rather - the quantitative approach -	43
Binary Arithmetic or Base 2 Number System	48
Boolean algebra	53
Appendix to Chapter 5: The Curious Genesis of a Theorem	62
6. An efficient use of time	65
7. Knowledge from books	69
Knowledge from the WorldWide Web	75
8. Technical training and learning on the job	77
Difficulties in modeling and schematization	79
Practical specialization	81
When theoretical knowledge does not solve design problems	82
How not to mix up the real world with an ideal world made of numbers and paper	84
Common sense as a substitute for overdesign	85
9. Systems thinking	97
Systems and Evil Doers	104
10. Manufacturing	105
11. Administration and Management	111
12. How to make money	121
13. Learning to write - Communication with words	125
14. Learning to speak in public	135
15. Memorizing and remembering	145
16. How not to show off knowledge you don't have	151
17. How to prevent despair and depression	155
18. Political ideas	161
19. The ultimate truths and beliefs - a Gentile's apology	165
20. Forecasting future events	169
Index of names	175

CHAPTER 1

WHY THIS BOOK CAN HELP YOU TO LEARN MORE - LIVE BETTER

Perhaps they were Babylonians and they wrote wedge shaped characters on clay tablets. Perhaps they were Chinese and they wrote ideograms on tortoise shells. We do not know who were the first men to invent writing. They used their invention to avoid raw deals in business: but they learnt also many other things. How to measure land and how to compute. How to tell planets from stars. How to write letters. How to describe the world for the benefit of their children. How to write and to read history. How to write stories and poetry and laws. They also noticed that learning is not just useful: it gives pleasure.

With this book I want to broadcast an old message: to know more is useful to everybody and it is fun. This much we all know or we think we do. I have also a new message to broadcast: whoever tries to learn something - anything - can always succeed. Only a few of us are aware of it. There are so few of us that it appears to be a secret. How did I discover that one always succeeds in learning? I just tried, and I have learnt quite a few things: half a dozen languages, physics, mathematics, management, systems engineering. I have learnt to write readably, to memorize information and so on.

Before going on, I have to make a statement. I am not a super-brain in the class of those who in the whole world could be counted on the fingers of one hand. I have gone through some testing and my intelligence quotient came out to be around 145. Now: intelligence cannot certainly be measured accurately, but this means that in the world there are at least 100 million people who are as intelligent as I am - or more. Quite a number. In this book I try to tell how it happened that I have learnt several things in a number of different fields. In a sense this book is my own educational autobiography. Why - and to whom - can it be interesting? I think it can be interesting to anyone who has not learnt a lot so far, because of young age or because of lack of opportunity or lack of incitement.

Often we do not succeed in learning because we are depressed. We are blocked by despair. In Chapter 17 I suggest how you can avoid

depression and despair. That is the chapter you should read first, if you have this kind of problem.

This book should not be read necessarily from cover to cover. Just as so many other books - of which I speak in Chapter 7 - it can be read in bits and pieces, jumping from one chapter to another, from one subject to the next.

Someone could ask me:

"What are your credentials? What are your qualifications? Why are you so sure you can teach us how we should learn?"

My answer is: "It is true: I am not a famous scientist nor a famous educator. However I have taught for a few years an engineering course in electronic computers and I have a fairly wide experience of popularizing science, technology and economics on radio and television and in newspaper articles."

I have been trained as an electrical engineer and I have worked as an electronics and as a mechanical engineer. I have carried out research in computers and some of my papers have been published by professional magazines. I have done research in mathematics and in thermodynamics. For about fifteen years I have worked in industry: I was at the same time technical manager and general manager of a company which designed and built electronic control systems. I have taken care of planning and administration for a 1,000 acres farm (with 350 heads of cattle and a yearly production of 400 tons of wheat).

I have published eight novels, a few dozen short stories and a few hundred newspaper articles - which is meant to imply that I can write acceptable prose.

I have published five essays on large technological systems, on the socio-economic future of contemporary society. One of these - "The Coming Dark Age" - was published also in Italian, French, Spanish and Japanese. It was taken seriously by many specialists and acquired modest fame with the general public. I published a handbook on Total Quality Management.

As a consequence of my work and of my ideas on global systems, I was called to be a member of the Club of Rome, a group founded in 1968 by Aurelio Peccei. The Club of Rome has 100 members in all the world, who have in common the goal of trying to contribute to the solution of threatening problems which loom so large as to be relevant for our entire planet. (I resigned from the Club of Rome in 1981 because I considered they were too lax in controlling the quality of the reports and documents they published with great fanfare).

I cannot say there is any field in which I excel. I just learned to cope with quite a number of different jobs and fields of knowledge.

Then, again, someone might ask:

"Wouldn't we do better to learn how to learn from the intellectual autobiography of Einstein or of some other famous and excellent scientist or thinker?"

There is an easy answer to that. If we take just the scientific autobiography of Albert Einstein, we find that it is a book written for professional physicists. The layman will find it too difficult: he will not succeed in reading it and, therefore, he will not be able to learn from it.

What about the autobiographies of other top flight scientists? Another good example is "Unended Quest", the intellectual autobiography of Karl Popper. It is a good book. I think Popper was one of the most lucid and relevant contemporary philosophers. His scholarly life was not punctuated by very dramatic events - except his timely flight to London, when the Nazis invaded Austria in 1938. The thrills are all intellectual.

Popper describes at length how he reached his important points of view in epistemology. (Epistemology is the science that studies how we form our opinions and how we should form them so they can be true and close to reality.) "Unended Quest" is a difficult book. It mirrors the operation of a first on rate mind. Just because he has a first rate mind, Popper wastes no time to tell you how he managed to learn about well known truths. Anybody can tell you about those. He concentrates on the stuff that he was the first to find. The effect is that the book is factually difficult to digest. Unless you want to choose philosophy of science as your main interest in life, you will find yourself in trouble.

This is the snag with books in which great scientists tell how they reached their lofty levels. Normally they are too difficult. If you succeed, though, you are made to feel too inferior. The proposed models appear unattainable. Instead of inciting us to learn more, they have the opposite effect: they block us. It is as if they were telling us:

"Don't even try to compete with us. Stay as you are. It will be best for you."

I hope, then, that readers will find my own educational autobiography more modest and less de-motivating. I never reached very high peaks in any field. You have to trust me, then, when I say that anybody can learn the same things I learnt - and, possibly, many more.

No one can learn too many things at the same time and you have to start some place. Therefore this book can be useful to people who are interested in many different subjects: I have studied quite a few. I have devoted one chapter to each subject.

I did not decide suddenly - for a whim - to learn about all these things. It was not an original idea with me. As I will explain later, my mother and my father were living examples of how many things one can learn. They read books of all kinds. They knew foreign languages. They met people from many countries: historians, scientists, artists, diplomats, writers.

I only had to look around and I saw someone who had learnt a lot or was still learning. I heard interesting discussions. I heard cultured and uncommon words. I received continuous proof that learning is possible - and normal. To start and learn several different things was the easiest path I could follow.

I think, then, that I have been exceptionally favored by chance. But someone could tell me:

"What do I care to know how or what you have learnt - since you have been favored so outrageously? I need to know how and what I can learn, not having had the same examples, books, opportunities."

My answer is that I have written this book just to present credible and authentic examples to people who have not been favored in the same way I have been.

We should never cry too much over our own fate. In any case, if you feel that your lot has been particularly bad - and it may well be so - then, perhaps, this book can be your chance.

Each of us would benefit from a better knowledge of medicine. Now and then we realize that we would be better off, if we knew so many other things For example:

- on how household appliances work
- on real political problems and their relationships with ideologies and political doctrines
- on forecasting the weather
- on the law and what we should do in order to avoid unnecessary trouble
- foreign languages
- how to memorize concepts and items
- why we exist and why the world exists.

We know, however, that there are not many people who possess such a diversified knowledge. We often explain why it is that we don't have it. We say:

"If I just had had a chance, I would have learnt a lot more than I did!"

What is a chance? You can say that one needs time and money in order to exploit the chances to learn. This is at least partly true. Often people learn in schools and going to school takes time and money. But a lot of people who had both money and time, never learnt a thing. Quite a few of them, incidentally, ended up losing all their money.

There are also very poor people who had to carve the time for learning out of every day's chores and who still succeeded in learning a lot. They had two other assets, then: motivation and exposure.

Motivation is simply a strong enough decision to do something, to accomplish something. You cannot get motivation to learn, though, unless you know what are the things to be learnt. This is why we need exposure - that is: easy access to people who have seen, done and learnt more than we did, or to books, or to any other device for storing and broadcasting information.

Only if we live in a desert, we can say that we never had a chance. But very few people live in deserts nowadays. There are many ways in

which we may come to know what the world contains and what other people think and say about it. We can be exposed to radio and television programs. We can go and listen to public lectures. We can learn by looking on as other people perform their jobs. We can learn a lot more by doing something practical. In fact we don't just learn with our eyes and with our brains: we also learn with our hands.

We can get motivation and exposure at the same time if we find a person, whom we can take as a model. Motivation, then, can take the form:

"I would like to be like him, or her."

Exposure consists in listening to the person taken as a model and in watching him operate. In this way we come to know of the existence of things and places, of possibilities and ways to be that we had ignored. If you watch a person who mends a machine, makes a tool, solves a problem, speaks a foreign language, conceives a new idea - you get a concrete and immediate proof that his achievements are, indeed, possible. If another human can do something, you stand a pretty good chance of being able to do the same or perhaps better.

It is true that we are very different one from the other. We don't even know how much of our abilities comes from our inborn genetic endowment (the way the body is made, the way the brain is wired) and how much comes from our environment, from experience, from exposure. There is no doubt, however, that a lot comes from the environment.

This is what this book is all about: how we can improve our performance and our whole person, looking at the world - instead of looking only inside ourselves or at our immediate surroundings. This book can be your chance to motivation and exposure.

The snag is that there are very many new things to know and to understand. You may feel that there are too many. The world may appear to you too difficult to understand - it may appear to you as a maze. As you move inside this maze, new alternative paths are offered to your choice. You do not know which paths are good - nor whether there are any good paths.

The world is becoming continuously more of a maze and less of a vague mystery, because scientists have answered some important questions. In many other cases they have not given final answers, but they have shown what type of answer can be eventually provided. A question - however vital or awesome - to which we can imagine the answer, is not a Mystery any more: it becomes a problem not solved yet.

There is another reason why the world goes on becoming more of a maze: the artificial man-made part of the world continues to grow. It is all of the environment for the growing portion of the world population living in cities.

The world is becoming a more and more complicated maze not only to illiterates. Even the wise men - whose trade is to learn - manage to increase the portion of available knowledge that they do know only during a short period of time in their lives. This is because the knowledge available

does not stand still. It grows continuously due to the efforts of scientists, thinkers and technicians and it outpaces even the learning ability of the very people who make it grow - at least outside of their immediate specialty.

One could ask then: "If trying to keep up to date is a hopeless task, why bother - why try to know more?"

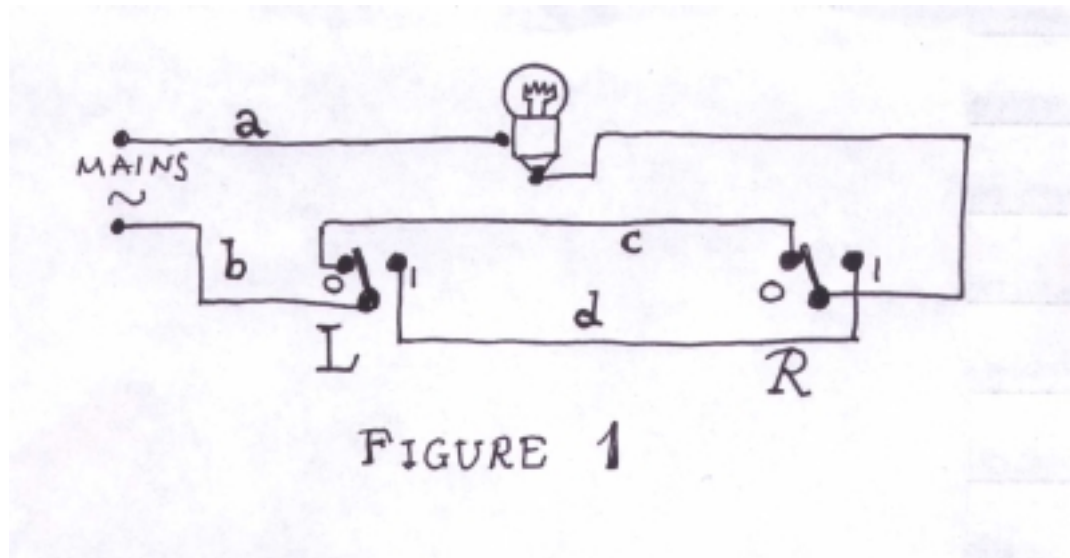
There are three answers. The first is an axiom - an article of faith: hopefully the only one I put in this book. The axiom is that in the long run to know more is better than to know less - to know is better than not to know. Here "better" means: more satisfactory in itself apart from concrete advantages, something that makes you feel better.

The second answer is that **just** our attempts of keeping up to date with **all** of human knowledge are hopeless. Each of us, though, can acquire enough knowledge in a number of fields to grasp the basics.

The third answer is: the more knowledge we have, the more advantages we can secure. These can range from sheer survival to better living conditions. We can improve our mental health or have more money, or more power and so on. But, at this point, I had better present concrete example.

Let us start with a couple of money advantages granted by knowledge. Suppose a builder has carried out some repairs to your house. When he gives you his bill, if you know what the repair work had to involve in terms of materials and labor, you can check the bill and avoid being overcharged. If you work for a salary and you know both existing labor laws and regulations and the terms of your contract concerning fringe benefits, rates and sums to be withheld, then you can analyze your paycheck and make sure you are getting all you are entitled to.

Let me show now that a knowledge of electricity may simply save your life. Suppose that you live in a wooden house. There is a large room in the house which is lit by a large lamp. The two doors leading into the room are quite distant one from the other so that there is a light switch near to each. You can switch the light on and off from each switch, even if the last time the light had been switched off or on from the other switch. Then one day you realize that you cannot switch off the light completely neither from the first, nor from the second switch. From either switch you can have the light full on in one position, but, bringing the switch to the other possible position, you just manage to dim somewhat the light - not to extinguish it. What has happened? Do you run any risk - apart from paying for the electricity used for providing light you don't need or from burning your fingers to unscrew the bulbs in order to put them off? If you have studied some electricity, then you know that the circuit with two switches and one lamp has to be wired like in the diagram of Fig.1. Even, if you have not memorized the circuit, it is easy enough to reconstruct on the basis of mere



common sense. It is very easy to understand how the circuit works normally. The left hand switch L and the right hand switch R can each make contact to the left (in the position marked as 0) or to the right (in the position marked as 1). When both switches are in the 0 position, current from the mains goes through wire b, then through wire c, then through the lamp and back through wire a. The lamp obviously is on. The lamp is also on, if both switches are in the 1 position and then the current goes through wires b, d and a. The lamp should be off when one of the two switches is in the 0 position and the other is in the 1 position.

But now you have realized that the lamp is not off but just dimmed, when the two switches are in this condition (one on 0 and the other on 1). What can it mean? It is enough to look at the diagram of the circuit to understand that the only reason for this behavior can be a not very good electrical connection between wire c and wire d. This connection should not exist at all normally. If it does exist - because the two wires run very near to each other and their insulation is damaged - then there is no way in which the circuit bringing the current to the lamp can be broken.

When the switches are on opposite positions, the lamp still gets current from the mains through the resistance which connects wire c and wire d. In this condition, with the lamp dimmed, but not off, if you touch the wires c and d, you will find a warm spot and you can be sure that your fault in the insulation is there. This connection between two wires is called a short circuit. In this case the fault is not very dangerous, because the current going from c to d may not grow too much: it is limited because it must go through the lamp too.

This is exactly what happened to me - and I was in a wooden house. So - once I found the warm spot on wires c and d - I eliminated the cause of the short circuit. It was a nail with which the two-pole conductor used for wires c and d had been attached to the wooden wall - and which had cut through the insulation of both wires. Once the nail was removed, everything became normal again and it was possible to switch the light on and off both from L and from R. The way in which the two-pole conductors

had been fastened to the wooden wall - which is represented in Fig. 2 - was obviously inherently unsafe. It would have been dangerous, indeed, if a short circuit had developed between wire a and wire b, because there the current would not go through the lamp and possibly would reach very high values. This would mean production of much heat and eventually a fire. When I went to look, sure enough the nails had damaged the insulation at least on one wire in many points. I rewired the whole house to much stricter safety standards and - perhaps - avoided a fire and saved my own life and the life of others.

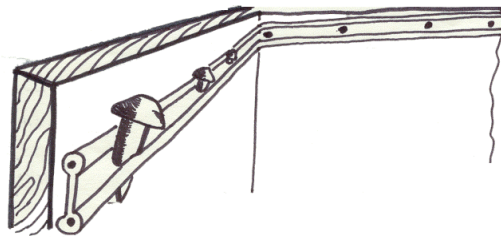


Fig. 2

I will show in Chapter 8 that a special kind of mathematics called Boolean algebra, applied in a very simple way, permits to pinpoint instantly the trouble in the circuit of Fig. 1.

Of course I should not have had any trouble in solving the trivial problem of an undue electrical contact between two wires, since I was trained, and worked for many years, as an electrical engineer. What about non engineers? Should we accept that they have to run risks that engineers don't run? This may be so in very complicated and unlikely situations. It need not be so in simpler situations, provided the non engineer takes care to understand at least a few basic facts and mechanisms.

Even someone who is not at all technically inclined, will understand at once the schematics of Figure 1 - provided he looks at it attentively and without any undue fear. On the contrary: many readers have probably found my explanation to be too lengthy and detailed. What do I want to prove with this statement? Simply that you have no need to be an engineer in order to understand at least some technical problems. In fact you don't need any diploma.

No one should accept being intimidated by degrees or diplomas. I am not saying that degrees serve no purpose, nor that people who have a degree don't know anything. Even laymen, though, can understand a lot of important things in the technical field, and also in the fields of biology, economics, industrial organization, politics. It is obvious that all of us would benefit from some knowledge in each of those fields. In this book I will try to tell how you can get it.