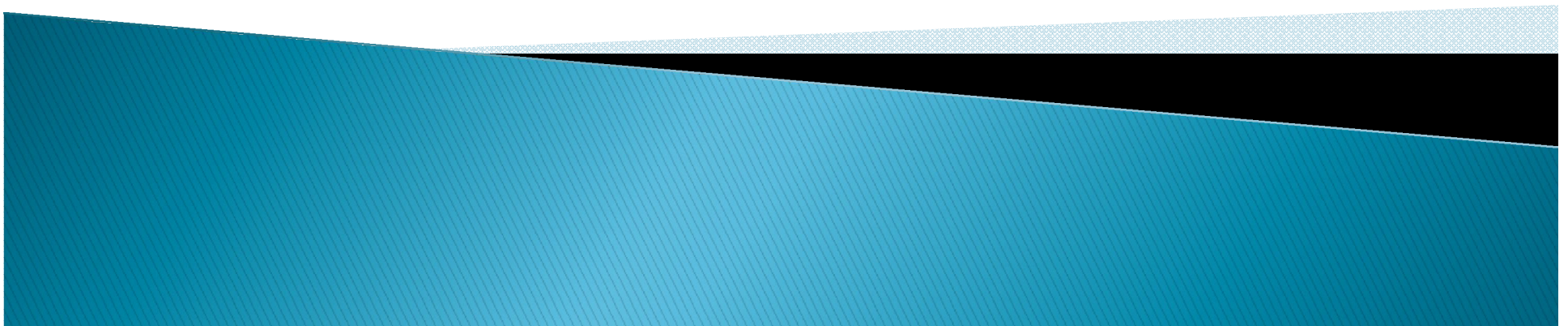


Pure and Applied Science for Vision 2030

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Abstract

Pure and applied science, in its broadest sense, means much more than simply being able to read, understand and write about pure and applied science and technology, however important these are. This also includes the ability to apply scientific and technological concepts and process skills to the life, work and culture of one's own society. This paper aims at simplifying the concepts pure and applied science for utility by the population towards technological development benefits and challenges. The understanding of the concepts will lead to policies that reinforce investment and motivation in enrolment in pure science courses at various levels of Education. Training in pure and applied sciences gives a strong foundation to enhance literacy in technological advancement. This will enhance developing of career and skills relevant to the attainment of Kenya Vision, 2030. A literate population will manage its destiny better and harness resources at their disposal in a highly technological world. Understanding of basic scientific principles and laws will lead to respecting simple protocol processes e.g. curing in construction, basic health principles, etc. The population equipped with knowledge of pure and applied science will be sensitive to cause of accidents, wastage, efficiency, and conflicts with nature, technology and self. In bringing out the differences between pure and applied science in research and development, a few of the scientist and their discoveries will be discussed. A discussion on applied science and Technology to eliminate confusion of concepts is worth venturing into.

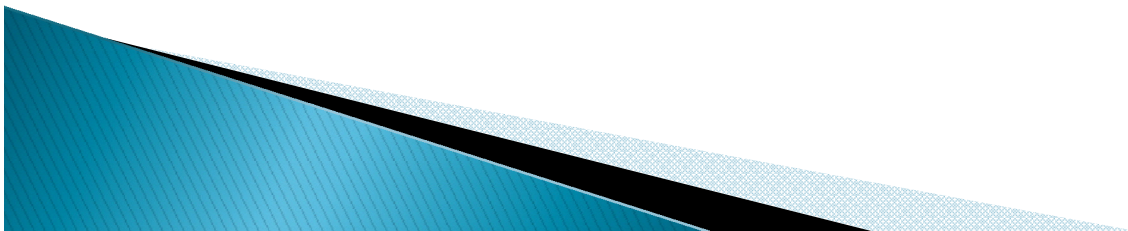
- ▶ Key words: **Pure and applied science, Utility, Enrolment, Literacy, Scientific principle, Technology.**

Introduction

- ▶ We live in an age of constant scientific discovery — a world shaped by revolutionary new technologies.
 - ▶ Just look at your favourite newspaper. The chances are pretty good that in the next few days you'll see a headline about global warming, cloning, fossils in meteorites, or genetically engineered food.
 - ▶ Other stories featuring exotic materials, medical advances, DNA evidence, and new drugs all deal with issues that directly affect your life.
 - ▶ As a consumer, as a business professional, and as a citizen, you will have to form opinions about these and other science-based issues if you are to participate fully in modern society.
 - ▶ Scientific literacy helps us understand the issues.
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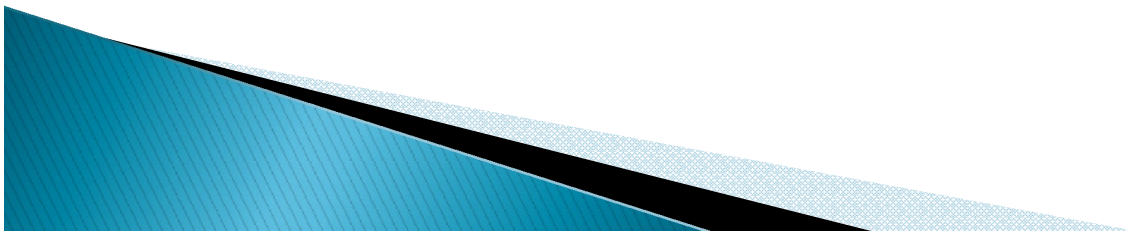
Introduction

- ▶ The world is increasingly becoming technologically and scientifically oriented with each passing day.
- ▶ Science plays a very prominent role in society that economic, political, and personal decisions can hardly be made without some consideration of the science and technology involved.
- ▶ Science education in most curricular is thus mostly designed to help teachers meet the tremendous challenge of preparing individuals to become scientifically literate.
- ▶ One of the main concerns in the teaching of science is to provide a well-balanced curriculum that stresses both pure and applied scientific enterprise as well as the relationship of science to technology and society.



Difference between Pure and Applied Science

- ▶ The difference between pure science and applied science is sometimes hard to discern.
- ▶ Pure science is not geared toward solving problems or creating new products, but answers basic questions.
- ▶ Applied science aims to solve specific problems, such as curing a disease or creating a new product.




Difference between Pure and Applied Science


- ▶ Pure science tends to be theoretical.
- ▶ Applied science tends to be experimental.
- ▶ The pure scientist pursues knowledge strictly for its own sake.
- ▶ The applied scientist uses known principles to solve practical problems.
- ▶ Applied science uses the scientific method to find a solution to a particular real-world problem (e.g., a cure for cancer)
- ▶ Pure science is science done in a laboratory; it is also called natural science.
- ▶ Applied science is also called technology or engineering. It is done outside.



What is scientific literacy?

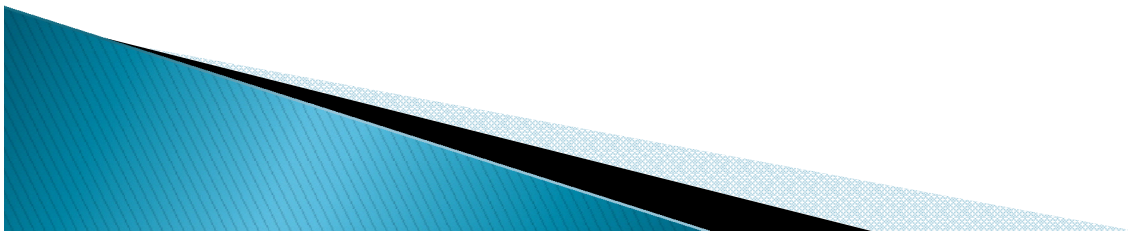
- ▶ Scientific literacy is a mix of concepts, history, and philosophy that help you understand the scientific issues of our time.
 - ▶ Scientific literacy means a broad understanding of basic concepts.
 - ▶ Scientific literacy is not the specialized, jargon-filled esoteric lingo of the experts.
 - ▶ Scientific literacy is rooted in the most general scientific principles and broad knowledge of science
 - ▶ The scientifically literate citizen possesses facts and vocabulary sufficient to comprehend the context of the daily news.
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What is scientific literacy?

- ▶ *Using* science, not *doing* science, is the core of scientific literacy.
 - ▶ Some academics argue that science education should expose students to mathematical rigor and complex vocabulary.
 - ▶ They want everyone to experience this taste of “real” science.
 - ▶ However, *doing* science is obviously distinct from *using* science; and scientific literacy concerns only the latter.
 - ▶ Surprisingly, intense study of a particular field of science does not necessarily make one scientifically literate.
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What scientific literacy is not

- ▶ Scientific literacy is often confused with technological literacy — the ability to deal with everyday devices such as computers and VCRs.
- ▶ Technological literacy is important to many pursuits in modern society, but it is distinct from the definition of scientific literacy in this paper.



Attributes of scientific literacy

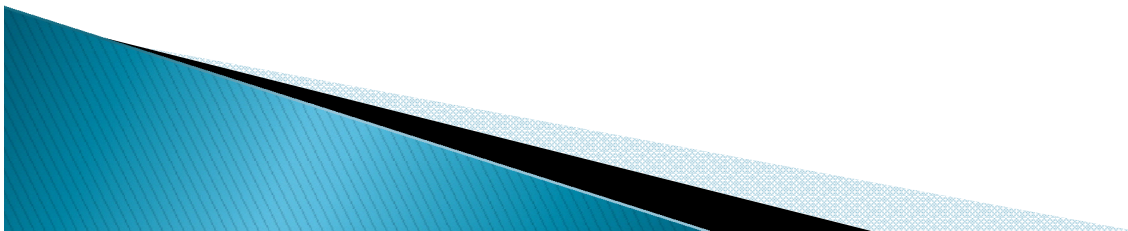
According to Collette and Chiappetta (1989), a scientifically literate person should possess the following attributes:

- i. A substantial science background knowledge of the facts, concepts and theories of science and the ability to apply them
 - ii. A clear understanding of the scientific enterprise and the nature of science
 - ii. A positive attitude towards the value of science and technology
 - iv. An appreciation of the value of science and technology in society and knowledge of how science, technology, and society influence one another
 - v. The ability to use the processes of science to solve problems and to make daily decisions
 - vi. The ability to make value judgments and decisions on science-based societal issues
 - vii. Science process skills that permit the individual to function in work, in leisure, and in society in general
 - viii. A better view and understanding of the environment as a result of science instruction.
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Importance of scientific literacy

Being scientifically literate can help one to:

- ▶ understand issues that you come across daily in news stories and government debates
- ▶ appreciate how the natural laws of science influence your life
- ▶ gain perspective on the intellectual climate of our time
- ▶ Science literacy strengthens opinions and decisions about science-based issues.



Importance of scientific literacy

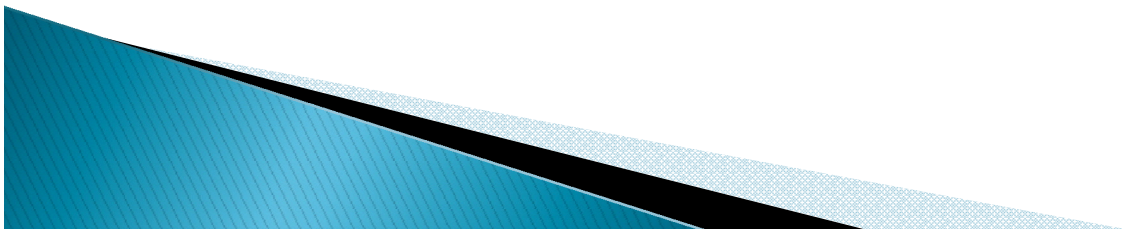
- ▶ The need to have a basic understanding of scientific concepts is becoming of increasing importance
- ▶ Scientific knowledge is increasing exponentially with the development of a global knowledge economy which is closely tied to the increasing prominence of communication technologies.
- ▶ A certain level of scientific literacy is required if citizens are to be able to effectively engage in media and political discussions of the societal implications of new technologies.
- ▶ Without a firm grounding in the sciences, the ability of a nation's citizens to make informed decisions surrounding civics and their personal health and wellbeing will be greatly reduced.



Scientific and technological literacy

According to UNESCO (2000) scientific and technological literacy implies:

- ▶ the development of scientific and technological attitudes, approaches and skills which are necessary to cope with a rapidly changing environment and which are useful for problem - solving and decision-making in daily life
- ▶ an appreciation of the nature of science and technology, and development of positive attitudes and values relating to basic science and technology to other areas of human activity
- ▶ exposure to effective teaching strategies and relevant examples of science and technology
- ▶ familiarization with the processes of accessing and communicating science and technology information and a willingness to use it to meet personal, local or global requirements.



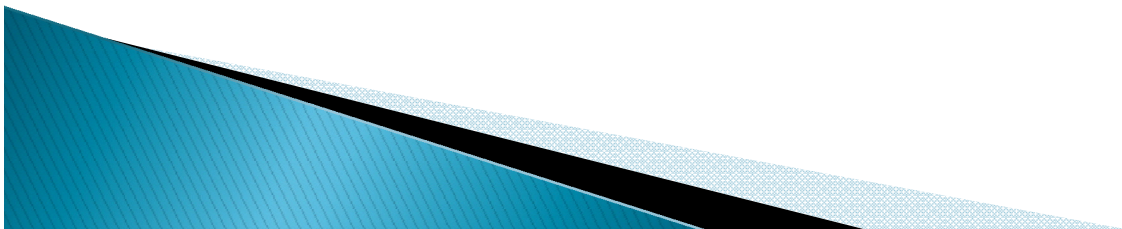
Issues of Concern

- ▶ The goal of contemporary science education is to raise the scientific literacy of students.
- ▶ A history of science education shows that societal pressures, conditions, and technological advancements have influenced the goals and directions of science
- ▶ However, studies show that students are becoming less interested in science as a school subject (Garner, 1994).
- ▶ In addition, research has shown that most people have a limited conception of "technology."



Scientific literacy and Vision 2030

- ▶ Vision 2030 proposes intensified application of science, technology and innovation to raise productivity and efficiency levels across the three pillars of the vision, i.e. social, economic and political.
- ▶ It recognizes the critical role played by research and development (R&D) in accelerating economic development in all the newly industrializing countries of the world.
- ▶ The Vision proposes devoting more resources to scientific research, technical capabilities of the workforce, and in raising the quality of teaching mathematics, science and technology in schools, polytechnics and universities.
- ▶ The vision also proposes the revising of the curriculum for universities and technical institutes to include more science and technology



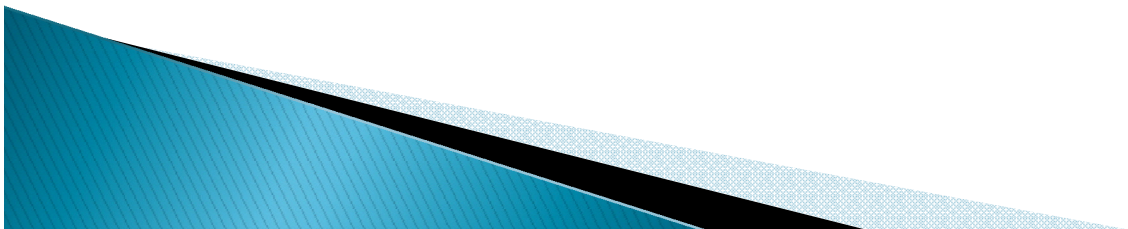
Scientific literacy and Vision 2030

- ▶ The Kenya government recognizes the strategic importance of education in poverty reduction and economic growth.
- ▶ Due attention needs to be placed on the development of the human resource capital through education and training, by promoting technical and vocational training as well as the teaching of sciences and information technology.
- ▶ However, Kenya's Ministry of Education admits that practical education offered in very little doses may not assist the learner to acquire adequate skills to fully participate in the world of work.
- ▶ Studies on science and technology training in teacher education in Africa have also pointed out shortcomings in science teacher education in Kenya.



The challenges

- ▶ Many science teachers deal only with the facts, concepts, and theories of science and neglect the other important aspects of scientific literacy in their teaching
- ▶ Scientific literacy should encompass both knowledge of science and knowledge about science itself.
- ▶ The former includes understanding fundamental scientific concepts; the latter includes understanding inquiry and the nature of science.



Conclusion

- ▶ Scientific literacy will be key to attainment of Vision 2030
- ▶ Kenya's education will need to be redesigned to be more practical orientated other than theory oriented.
- ▶ The declining interest and low enrolment in science based courses has to be controlled.

