Analytical Thinking?

One of the main objectives of higher education is to impart problem solving skills to students. **Critical and Analytical Skills** are constituents of problem solving skills and it is essential that the students learn these skills to develop **problem solving skills**. The importance of critical thinking skills has been emphasised in the previous write up (**Critical Skills and Its Importance**), here, let me deal with **Analytical Thinking Skills.**

In 1999, Richards J. Heuer Jr., explained that: "Thinking analytically is a skill like carpentry or driving a car. It can be taught, it can be learned, and it can improve with practice. But like many other skills, such as riding a bike, it is not learned by sitting in a classroom and being told how to do it. Analysts learn by doing."[ISBN 1 929 667-00-0]

Let me give an example to create an idea about Analytical Thinking. Let me consider a simple engineering example of a column of a multi-story building. Assume that, Mr. A is a civil engineer and has been given the task of designing a column for a multi-storey building. Mr. A would design the column as per the latest civil engineering design principles and codes that are available. Design involves determining geometric sizes, column materials selection and connection the column should have with other interacting elements etc., to withstand defined loads. Now he would like to ensure, whether his design works satisfactorily in real life situations as described in the design brief. One way of answering his questions would be to create a test model, instrument it, test and obtain answers to the questions, which is obviously very expensive and time consuming process. Another way of doing it is, to create a mathematical representation of the column based on the physics principles and call it a mathematical or analytical model of the column and solve the model to obtain desired results. To solve this model, one needs to have an idea of: material properties, laws of physics governing the materials behaviour, geometric constraints of the column and set appropriate mathematical algorithms and any other requirements that are necessary to solve the mathematical model. After solving, the solution can be post processed to find answers to various questions like whether the column can take required load without buckling, will it be stable under unforeseen dynamic conditions like heavy wind loads that come due to hurricanes, earthquake loads and if there is a flood what happens and all such questions. This method of problem solving and answering what if questions, we call it as engineering analysis and the engineer who performs this is called an analyst. This kind of problem solving is prevalent in many fields of education and popularly known as simulation studies. "Simulation studies have created a revolution in understanding why and how things work". Hence analytical thinking plays an important role in problem solving and I suggest students to learn such skills during their education.

To perform analysis, an analyst needs to understand: what problem he/she needs to solve; what kind of answers he/she is trying to find by solving the problem; present information available about the problem; sources of information; reliability of information; interrelationships- the rules/laws governing the problem; problem formulation, complexity of the problem; problem solving methodologies and complexities, and representation of solutions to find answers to the questions posed earlier etc. Thus, it is obvious that, an analyst must have good knowledge and understanding of basic sciences and mathematical sciences and should have the ability to gather data, model data, use of modern tools and techniques to solve the model, represent data, analyse data and draw conclusions with evidences.

In summary,

- Analytical skills are the ability to visualise, gather information, articulate, analyse, solve complex problems, and make decisions
- Analytical skills are essential in the workplace to ensure necessary problem solving occurs to keep productivity and other areas of the workforce functioning smoothly
- It helps you assess where you stand in your business and where you want to be in the future
- To find out a solution to a problem and guide the organisation towards growth and success
- Through this analytical and decision-making skills, a manager can develop a plan of action towards a problem and likewise gather information on how to effectively solve the crisis
- Analytical skills also ensures understanding of benefits, costs and risks factors associated with each decision a person makes at his life/workplace

I advise you to read the article described in the following link to get an idea about analytical thinking, modelling and analysis.
http://www.b-eye-network.com/blogs/eckerson/archives/2011/11/part_vi_-_craft.php

At, M.S. Ramaiah University of Applied Sciences greater emphasis is being given to development of Analytical Thinking among its students by way of making them solve problems of real life like situations created out of industrial, business and societal context. Students are trained to formulate the problems, collect data, validate data, model the data using appropriate tools and techniques, solve models, represents solutions as results, analyse results and draw conclusions. As the students proceed from undergraduate to postgraduate studies at the University, the rigour of treatment ramps up and they start applying the analytical thinking and tools during their undergraduate and postgraduate project/theses stages.

Let me emphasise the importance of analytical thinking by the following quote

A point of view can be a dangerous luxury when substituted for insight and understanding.
Marshall McLuhan, Canadian Communications Professor

Rather than blindly following the most popular or loudest opinion, you should use data to question, inform, and shape your perspective. While you don't always have to agree with the data, your understanding will be increased and enhanced by it.

Prof. S.R. Shankapal