Summarize result (100%) What does it mean to think scientifically? We might label a preschooler's curious question, a high school student's answer on a physics exam, and scientists' progress in mapping the human genome as instances of scientific thinking. But if we are to classify such disparate phenomena under a single heading, it is essential that we specify what it is that they have in common. Alternatively, we might define scientific thinking narrowly, as a specific reasoning strategy (such as the control of variables strategy that has dominated research on the development of scientific thinking), or as the thinking characteristic of a narrow population (scientific thinking is what scientists do). But to do so is to seriously limit the interest and significance the phenomenon holds. This chapter begins, then, with an attempt to define scientific thinking in an inclusive way that encompasses not only the preceding examples, but numerous other instances of thinking, including many not typically associated with science. What is Scientific Thinking and Reasoning? There are two kinds of thinking we call "scientific." The first, and most obvious, is thinking about the content of science. People are engaged in scientific thinking when they are reasoning about such entities and processes as force, mass, energy, equilibrium, magnetism, atoms, photosynthesis, radiation, geology, or astrophysics (and, of course, cognitive psychology!). The second kind of scientific thinking includes the set of reasoning processes that permeate the field of science: induction, deduction, experimental design, causal reasoning, concept formation, hypothesis testing, and so on. Definition of Scientific Thinking Scientific thinking is the conscious synthesis of facts or data used to reach a meaningful term that produces something that makes sense. It focuses on answers to "why" and "how" questions. Productivity of something serves as a result of scientific thinking. All scientists are proof the mind is composed of scientific thinking. Scientific discoveries are the result of scientific thinking strategies. Production of information and communication, technology and machines are all examples that serve as outputs to scientific thinking. Galileo Galilei, Albert Einstein, Newton, C. V. Raman, and Aryabhata all became well-known scientists through their scientific thinking and restless experimenting approaches. The definition of scientific thinking adopted in this chapter is knowledge-seeking. This definition encompasses any instance of purposeful thinking that has the objective of enhancing the seeker's knowledge. One consequence that follows from this definition is that scientific thinking is something people do, not something they have. The latter we will refer to as scientific understanding. When conditions are favorable, the process of scientific thinking may lead to scientific understanding as its product. Indeed, it is the desire for scientific understanding -- for explanation -- that drives the process of scientific thinking. Scientific thinking is a type of knowledge seeking involving intentional information seeking, including asking questions, testing hypotheses, making observations, recognizing patterns, and making inferences. Much research indicates that children engage in this information-seeking process very early on through questioning behaviors and exploration. In fact, children are quite capable and effective in gathering needed information through their questions, and can reason about the effectiveness of questions, use probabilistic information to guide their questioning, and evaluate who they should question to get information, among other related skills. Although formal educational contexts typically give students questions to explore or steps to follow to "do science," young children's scientific thinking is driven by natural curiosity about the world around them, and the desire to understand it and generate their own questions about the world. Scientific thinking

refers to both thinking about the content of science and the set of reasoning processes that permeate the field of science: induction, deduction, experimental design, causal reasoning, concept formation, hypothesis testing, and so on. Here we cover both the history of research on scientific thinking and the different approaches that have been used, highlighting common themes that have emerged over the past 50 years of research. Future research will focus on the collaborative aspects of scientific thinking, on effective methods for teaching science, and on the neural underpinnings of the scientific mind. Scientific thinking is the higher-order thinking skills. It is the ability of individuals to seek knowledge in inductive and deductive reasoning to think of an answer or identify and to explore the scientific examination of the facts. It may be observed, experiments to test hypotheses and to find out why a conclusion, without bias or emotion Scientific thinking is often mistaken with scientific method, which is a completely different concept. Scientific method doesn't exist in the first place. Only scientific thinking or evaluation is feasible. It pertains to intelligently identifying a problem and making suitable decisions according to the same. It involves heavy critical thinking and systematic evaluation where each step should get you closer to the solution. The key role here is played by the mode of thinking and the knowledge domain of the individual thinker. The level of scientific thinking is aroused at different levels in children, adults and elderly people. It is known to be maximum in children and teens. Every child's existing theory is unique and one of a kind. Their individual theories must be developed to an understandable level such that the child is capable of thinking or reflecting upon the problem and coming up with a viable solution. An individual's interest helps them elevate their quality of thinking and the quality improves when people start taking charge of imposing intellectual standards upon themselves in order to improve themselves on their individual level of scientific thinking. It takes a set of reasoning processes that include concept formation, casual reasoning, experimentation, induction, deduction, hypothesis testing and so on. Phases of Scientific thinking: The following are some guidelines to train the learners to think scientifically with the fourth stages such as 1) The inquiry phase) 2) The analysis phase 3) The inference phase 4) The argument phase. 1) The Inquiry: when the learners face the new situation. Learners investigate the link between information and prior-knowledge, or the knowledge of existing theories. Classifying material about and how to use it. Learners also compare information between the data obtained with existing theories or prior knowledge. And the learners alsoaccess to information and the knowledge by using search engines and links. The students link case study to the situation with relevant theoretical principles. They find ways to solve the problem by comparing obtained data with the existing information. Some information is used and the rest is discarded. The learner continued to search for relevant information, until the situation can b We find that it is called the sublimation of the substance which changing from a solid to a gas, additionally to there are other substances that can be change. 2) The Analysis: when the learners' information from the investigation of the sources of the information in different steps. The learner take the information into consideration by comparing with empirical evidence on the issue, trying to make connections with existing knowledge of the changes in the observed phenomenon. The same thing "from the text shows that the learners can compare the empirical evidence of the situation with the theory set for discussing the phenomenon. The above information shows that students have tried to test or trial which has been linked to theories and

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