



## Inquiry and Integration in Education May-September 2017

### Course Outline

#### Aims

ThinQ views the purpose of education as collective well-being: personal, social, environmental. We believe that personal well-being is key to our ability to understand and change the world around us. So our starting point must be to appreciate and satisfy the individual's intellectual, emotional, social, and aesthetic needs. ThinQ's primary concern is **intellectual well-being**.

In order to achieve this goal, IIE-2017 aims to develop the abilities of inquiry, critical thinking, and integration; and if you are an educator, or are deeply interested in your own or others' education, develop the expertise needed to nurture these abilities in those around you.

#### Becoming an Inquirer and Critical Thinker with Deep Understanding

When we read an article claiming that drinking coffee causes heart attacks, and another article claiming that drinking coffee prevents heart attacks, how do we figure out which of them is more reliable? When a doctor diagnoses a disease, how do we know whether the diagnosis is accurate? Even if the diagnosis is accurate, how do we know if the treatment prescribed is going to be effective? Is it morally right to eat meat? Is it morally right to seek employment at a weapons manufacturing company? Who should we vote for? If somebody you love is terminally ill and in extreme pain, is it morally wrong to euthanize them (allow their life to be terminated)? What procedure should we use amongst a group of friends to decide which movie to watch? Should you quit a well-paying job to become a poet?

During this course, we will *not* be answering any of these questions.

However, we will provide you with the *thinking tools* to respond to situations where such questions arise. These tools will initially be illustrated in areas like elementary mathematics and basic natural sciences, areas where it is much easier to come to resolution than in the questions above. Once you have sharpened your thinking tools, we will gradually move towards questions like those above. Initially, it may not be easy to clearly see the connection between questions in mathematics and sciences, and the questions above. However, it will become more apparent as we proceed.

Don't worry if you are uncomfortable with mathematics or the natural sciences; given the experience of past participants, by the end of the course, you will feel very comfortable in areas that you thought you disliked, and possibly become uncomfortable in areas you thought you liked.

#### Education Oriented to Inquiry, Critical Thinking, and Integration

There are two central problems that we must deal with if we are concerned about education in India.

One has to do with *ethical considerations* such as social justice, equity, and access to good education. Some of you may be concerned with this and may be/have been involved in sustained efforts to make education accessible to all, to remove gender discrimination, and so on.

The second issue has to do with the **quality of education**. While ethical considerations are equally important, this course is dedicated to improving the quality of education provided in schools,

colleges, and other educational institutions. Quality of education includes several equally important dimensions, including the physical, emotional, intellectual, societal, material, ethical, aesthetic, and so on. Within this spectrum, our focus will be on the intellectual dimension.

It is important that school, college, and other curricula aim at:

- i) an understanding of the concepts and statements of knowledge; and
- ii) the ability to apply (i) to a range of familiar (and novel) problems and situations.

However, this is hardly sufficient. We believe that to qualify as ‘high quality’, curricula should go beyond (i) and (ii) to aim at:

- iii) an understanding of the evidence and arguments for or against established knowledge as well as controversial concepts and statements;
- iv) the ability to think critically about concepts and statements;
- v) the ability to engage in independent inquiry; and
- vi) the capacity for an integrated perspective on (i)-(v).

The aim of IIE-2017 is to help you become capable inquirers, critical thinkers, and integrators with deep understanding, along with the capability to nurture these traits in others.

## Strands of the Course

IIE has three strands: *Inquiry*, *Integration*, and *Deep Understanding*

### Inquiry

We know that teachers usually ask questions whose answers they already know; their purpose is to find out if students have learnt the answers. And when the students ask questions, they usually assume that the teacher knows the answer.

In contrast, in IIE, teachers ask questions whose answers they may not know for sure, but which would trigger the process of a collaborative search for answers. Often, teachers and students are co-learners. In this process, learners are nudged to arrive at answers through their own observation, thinking, reasoning, and judgment.

Inquiry is ‘rational’ when it is in accordance with reason. Rational inquiry is committed to accepting the conclusions that logic leads us to, even when they go against our intuitive sense. It also means constantly questioning ourselves, our peers, our teachers, our textbooks, and other authorities.

The process of inquiry often starts with an idea triggered by curiosity, or by a speculation based on experience, and crystallizes into a question during the process.

We then have to:

- identify and formulate the question;
- think through appropriate ways to look for answers;
- arrive at conclusions based on the answers;
- critically evaluate the conclusions: our own as well as other people’s; and
- justify the conclusions.

The journey of such inquiry may begin with an example from a given area, say biology, but would soon move to examples from across domains such as mathematics, sociology, or philosophy. We would explore the core ideas, whether classifying, defining, or reasoning, across the boundaries of these ‘subjects’ to help learners develop an appreciation of inquiry across disciplines.

## Integration

Ours is the age of specialization, in society and culture, and in education and research. Such specialization unfortunately results in fragmented knowledge, and prevents ideas from cross-pollinating. Thus, the walls between ‘science’ and ‘social science’ prevent an integrated perspective on consciousness in humans, chimpanzees, and fruit flies; and on social patterns in humans, ants, and bacteria. They also prevent the emergence of foundational trans-disciplinary theories, such as a theory of evolution that unifies physical, biological, and cultural evolutions. Countering fragmentation of knowledge into baskets such as ‘physics’, ‘chemistry’, ‘biology’, ‘sociology’ and ‘history’, needs a foundational trans-disciplinary perspective of knowledge and inquiry, one that cuts across the boundaries of subjects, disciplines, and discipline groups, and goes beyond both inter-disciplinary and multi-disciplinary approaches.

Take the concept of ‘structure’, for example. To explore it, we might deal with atomic structure (physics), molecular structure (chemistry), protein structure (molecular biology), sentence structure (linguistics), organizational structure (management studies), social structure (sociology), the structure of a sonnet (literary studies), and so on; we would also consider what is common to the idea of structure across these discipline-internal notions.

If we want to make connections across ideas, to move freely across disciplinary boundaries, if we want to be creative and innovative by drawing upon diverse domains of knowledge, then it is imperative that we adopt a trans-disciplinary approach to learning.

## Deep Understanding

We all know that familiarity with terminologies or facts does not count as understanding. Mechanically applying concepts and procedures to solve textbook problems may, at best, involve superficial understanding.

Deep understanding is typically an outcome of committed inquiry: it is a combination of conceptual understanding, critical understanding, and an integrated understanding.

**Conceptual understanding** is an understanding of the concepts and statements of ‘knowledge’. For example, given the initial position and velocity of a cannon ball, calculating its terminal position needs a rudimentary understanding of the theory. That’s all. In contrast, applying the concepts and statements of knowledge to unfamiliar problems calls for conceptual understanding.

**Critical understanding** is an understanding of the evidence and arguments for or against a given concept or statement. Critical understanding calls for an exploration of a question like: “Why should we believe that the earth revolves around the sun?” Critically evaluating knowledge claims requires deep understanding at this level.

**Integrated understanding** involves the integration of what is currently fragmented in different subjects and disciplines. Understanding at the deepest level is the result of a process of critical thinking, inquiry, and integration.

We have outlined above the key elements of our approach to the intellectual dimension of education. We will explore these fully during the carefully structured 4-month web course. We are sure that you would enjoy the course, and, armed with the newly acquired tools of rational reasoning, become a high caliber inquirer capable of working towards your own well-being and contributing to the well-being of Planet Earth in your unique way.