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The Course: Inquiry and Integration in Education

What the Course Can Empower You to Do

In our daily life, whether personal, professional, or public, we often do the following:

- critically evaluate assertions in newspaper articles,
- engage in debates on issues of public interest (e.g., the death penalty, democracy, climate change, genetically modified foods, the existence of 'soul', and so on),
- make rational-ethical decisions on issues such as who we should vote for,
- think about questions like, "What is the difference between terrorists and freedom fighters?" "Do plants have consciousness?" "Do humans have free will?",
- try to understand the evidence and arguments relevant to questions like: "Why do we believe that the earth revolves around the sun?" "Why should we accept that all life forms on earth evolved from unicellular ancestors?"
- wonder about how we might test the claims of homeopathy, of reiki, of the existence of auras, and the efficacy of detox programs.

If you think it important to engage with such issues, then you will enjoy IIE, and benefit from it. If you invest enough time and energy in the course, then by the end of it, your thinking will be stronger, sharper, more agile; and you will be on a path to greater mental capacities.

Types, or Levels, of Learning

Level 1: Memory, Recall, and High Speed Performance; No Thinking

In tests and exams with a 100 questions to answer in two hours, the time is spent in reading the questions and writing the 'correct' answers (or ticking the 'correct' options). To do well, one has to either come prepared with answers to questions the examiner is likely to ask (e.g., "What is the molecular formula for glucose?") or calculate the answer at high speed (e.g., "Solve the following simultaneous equation…"). This form of learning, characterized by *memorization and mechanical application, without thinking*, is what a learner needs in order to do well in most exams and tests the world over.

Level 2: Understanding and Thoughtful Application

Occasionally, an examiner might ask a question that calls for understanding and thoughtful application. Take this question: "Suppose the axis of the rotation of the earth were at right angles to the plane of its revolution around the sun, what do we expect day and night, and the seasons, to be like?" To answer this, we need an understanding of the theory of the solar system, and thoughtful inference of the consequences of the theory. Another question that calls for *deep understanding and thoughtfulness* would be: "Suppose we define a 'period' in human history as 'a stretch of time marked by the origin and evolution of some practice, institution, or system (e.g., printing; the fast food industry; the education system).' How does this concept of period differ from the traditional concept of 'periodization' in history studies?"

Level 3: Self-Directed Independent Learning

In most school programs the world over, a Board of Studies at the state, national, or international level (e.g., Maharashtra State Board; CBSE; or IGCSE) decides *what students should learn*, specifies it in a *syllabus*, and conducts *examinations* to find out if they have learnt what they are expected to learn. Teachers help children learn what the board wants them to learn. In the case of some universities, the teacher ('professor') might decide the syllabus and set the exam questions.

Now, imagine a university that offers learning opportunities, but with no exams, credits, and certification. The teachers and students jointly decide what courses should be offered by the university (e.g., on parenting? mental health? how to engage in public debate?). Teachers conduct class sessions where attendance is not 'required', and which anyone can attend. Students attend only those class sessions that they think are relevant for what they want to learn. They also have access to the downloadable videos, audio podcasts, and pdf files available at the course website. This would be an example of *Self-Directed Learning*. Needless to say, such a system presupposes the students' capacity for such learning.

Closely related to self-directed learning is the capacity for *Independent Learning*: the ability to learn from documented sources of learning, without having to depend on teachers or courses. Suppose a computer scientist (with a Masters degree) gets an attractive job offer from Indonesia; she wants a broad overview of Indonesian history. Or a biologist wants to learn elements of formal logic. Given the capacity for independent learning, they can achieve their goals by consulting books, pdf files on the internet, or YouTube videos, without registering for a course or attending classes in history or logic.

Level 4: Critical Understanding

Now, while learning on one's own by reading, watching videos, or listening to audio podcasts is a valuable capability, its value really depends on the ability to distinguish between reliable documents on the one hand and ignorant statements, propaganda, dogma, and attempts at indoctrination on the other. The internet, for instance, is a place where anyone can post anything: you will find extensive write-ups telling you that the world is flat (http://marksargent.com/); that the world was created by a Creator in a week; that there is a 'science' called phrenology that allows you to tell a person's character from the shape of their skull (http://www.historyofphrenology.org.uk/overview.htm); that there is a science called graphology (which claims that a person's character can be inferred from their handwriting), and that its applied branch, grapho-therapy, can heal physical and mental illnesses; that the holocaust never took place (goo.gl/V1JVJm); that statements about global warming are just false propaganda; and so on. How would one distinguish such claims from what we can judge to be 'knowledge'?

To do this, we need to understand the reasons in support of or against 'knowledge claims'. When someone tells us that something is true, we need to ask, "Why should I believe it is true? " To this category belong the following questions:

> Though we experience the earth to be stationary, our teachers and textbooks tell us that the earth revolves around the sun and rotates on an axis tilted to the plane of revolution. Why should we accept this conclusion?
>
> Both ancient Greeks and ancient Indians believed that air is an element. Why should we reject this position, and accept the conclusion that air is a mixture?
>
> Aristotle believed that matter can be divided infinitely, without end. Democritus, in contrast, believed that the process of dividing matter comes to an end when we get to indivisible particles of matter that he called 'atomos'. Modern science rejects Aristotle's position and accepts Democritus' position. Why should we do the same?

Darwin claims that all existing and extinct life forms on earth evolved from unicellular ancestor species. What is the evidence for us to accept this claim?

Why should we believe that the sum of angles in a triangle is two right angles?

Why should we believe that the sum of n consecutive integers is divisible by *n* if and only if *n* is an odd number?

To answer such questions, we need to understand the evidence and arguments for and against such claims. We refer to such understanding as *Critical Understanding*.

Level 5: Capacity for Critical Thinking

Critical understanding is not sufficient: we also need the capacity to critically evaluate the evidence and arguments. This comes under critical thinking.

For anyone who is interested with matters of public concern, 'fake news' can be dangerous. Fake news, according to Wikipedia, "… is a type of hoax or deliberate spread of misinformation, be it via the traditional news media or via social media, with the intent to mislead in order to gain financially or politically. It often employs eye-catching headlines or entirely fabricated news-stories … regardless of the veracity of the published stories." (https://en.wikipedia.org/wiki/Fake_news) Developing the capacity for critical thinking would protect us from the traps of fake news.

We may define *critical thinking* as a set of *mental processes that go into the evaluation of the merit of something*. 'Merit' here could be the *truth* of a statement (e.g., the statement that the earth is round is true), the *usefulness* of a product, action, or policy to achieve a given goal (e.g., death penalty is an effective deterrent to crime), the *beauty* of a work of art (e.g., Mona Lisa is one of Leonardo da Vinci's greatest paintings), or the *value* of something that we (ought to) strive for (e.g., we ought to liberate ourselves from anger and hatred).

Level 6: Capacity for Independent Inquiry

Imagine a teacher preparing questions for a midterm test. One of the questions she asks is: "What is the tilt of the earth?" She allocates two minutes for this question.

The teacher would have discussed the 'answer' to the question in a previous class session. So the question really means: "I have told you what the tilt of the earth is. Now tell me what I told you." Students who come to the exam prepared with a readymade answer to the question would score well in such exams.

Questions of this kind are supposed to assess the students' *memory of the answer* and *the speed of recall* (level 1). Hence it would be inconceivable for the teacher to allow students to bring their textbooks and class notes to the exam, to be consult when needed.

Now consider an assignment with the following instruction:

> "Textbooks tell us that the axis of the earth's rotation is not perpendicular to the plane of its revolution around the sun. Why should we believe this? Consult whatever resources you can find on the internet (videos, print materials, and so on), and summarize in two pages the relevant evidence and arguments for this claim."

This assignment is designed to develop the capacity for independent learning (level 3) and critical understanding (level 4).

Proceeding further, consider another assignment:

"Read this article (distributed to the class), and answer the following questions:

1) What is the central claim of the article?
2) What is the justification (evidence, arguments) the article gives to support the claim?
3) Is the justification sound? Are the grounds acceptable? Is the reasoning valid?
4) Can you think of other considerations that are relevant to the claim, but are not presented in the article?
5) Based on your answers to questions (1)-(4), would you accept the claim, reject it, or set it aside for further scrutiny?"

This assignment is designed to develop the capacity for critical reading, which is the application of critical thinking to reading (level 5).

Critical thinking is an attribute of an intelligent consumer of knowledge. A producer of knowledge requires a yet higher form of learning, namely, the capacity for independent inquiry. It allows us to:

- come up with interesting and worthwhile questions to investigate,
- identify appropriate strategies to investigate them,
- use these strategies to arrive at answers and conclusions,
- justify the conclusions to the satisfaction of the community of inquirers, and
- critically evaluate one's own and other people's conclusions.

These abilities are also needed in research, which aims to make a contribution to the collective pool of knowledge.

Unlike research proper, inquiry does not require specialized subject knowledge: we don't expect a contribution to specialized knowledge in molecular biology from a non-biologist, say, a professional lawyer. But it is possible and desirable for even a secondary school student to engage in independent inquiry to address some of the questions we posed earlier (under 'Critical Understanding').

Independent inquiry, for which critical thinking (level 5) is a prerequisite, which in turn requires critical understanding (level 4), allows us to move from being a consumer of knowledge to a producer of knowledge, much like moving from the passenger's seat to the driver's seat.

Level 7: Capacity for Integration

The world of academia is carved into disciplines and discipline groups, often with non-osmotic boundaries. This results in textbooks and syllabi presenting fragments of unconnected information divided into subjects like mathematics, physics, chemistry, botany, zoology, sociology, and economics, under discipline groups like 'science', 'social science', and 'humanities'. Such fragmentation discourages questions like the following:

- What is consciousness, such that we can investigate human consciousness studied under 'neuroscience' as a 'science', 'psychology' as a 'social science', and 'philosophy' as humanities, and consciousness of chimps studied under biology?
- The structure of atoms and the structure of crystals is studied under physics; the structure of molecules under chemistry; the structure of cells, organs, and organisms in biology; the structure of organizations in management; the structure of poems in literary studies; the structure of proofs in mathematics; and structure of an argument in philosophy. What is 'structure', such that we can understand all of its different guises?
- What is evolution such that we can talk about the origin and evolution of the physical universe, of life on earth, and of institutions and practices in the human species?
- What is a theory such that we can understand the structure of mathematical theories, of scientific theories, and of philosophical theories?
- Mathematics talks of conjectures and theorems, and science of hypotheses and predictions. Is 'conjecture' the same as 'hypothesis'? Is 'theorem' the same as 'prediction'?

Pursuit of questions of this kind takes us to the next level of learning — that of the integration of knowledge and inquiry within and across disciplinary boundaries: discipline-internal integration, and what we call ***trans-disciplinary*** integration. They form an important ingredient of meaningful learning.

We have talked above of three forms of understanding: just 'understanding' (level 2), 'critical understanding' (level 4), and 'integrated understanding' (level 7). We use the term ***deep understanding*** to include critical and integrated understanding, together with 'conceptual understanding' (which we haven't talked about here).

IIE and Types of Learning

The goal of IIE is to help the participants develop the capacity for learning at levels 4 to 7. Needless to say, this pursuit will develop learning at levels 1-3 as a desirable side-product; levels 1-3, however, are not part of our explicit focus.

Inquiry and Integration in Education

The world today calls for individuals with broad capabilities that are not specific to particular careers. They include the capacity for problem solving, decision making, independent learning, critical thinking, and creativity.

ThinQ views the ultimate purpose of education to be ***wellbeing***:

> *the wellbeing of the individual and of the planet with all its inhabitants including humans*: *wellbeing that education should empower the individual to work towards*.

Take physical wellbeing: it includes ***health***, with the absence of illness as its base line, and ***fitness***, with strength, stamina, flexibility, agility, speed, and so on as valuable physical traits that go beyond health. Extending this idea of wellbeing to other dimensions, we view the purpose of education as:

> *physical, emotional, intellectual, material, pragmatic, societal, aesthetic, ethical, and spiritual health and fitness*.

Within ThinQ's broad vision of education, IIE takes as its central commitment the nurturing of the intellectual component — a three-part component made up of ***inquiry, integration***, and ***deep understanding.*** IIE is designed to help students develop these capacities, and educators to develop the capacity to help students develop these capacities. These in turn play an important role in problem solving, decision making, independent learning, critical thinking, and creativity.