Report on the Workshop

Module1 - Critical Thinking Skill and

Collaborative Problem-Solving Skills

(To Explore and Evaluate approaches to content, method and tools)

17th October 2020

2.30 pm to 6.30 pm [India Standard Time]

organized under the 21st Teach Skills Project

by

SYMBIOSIS INTERNATIONAL (DEEMED UNIVERSITY)

SYMBIOSIS LAW SCHOOL, PUNE (SLS-P)
SYMBIOSIS CENTRE FOR EUROPEAN STUDIES (SCES)
SYMBIOSIS TEACHING AND LEARNING RESOURCE CENTRE (STLRC)

CONTENTS OF THE REPORT

OBJECTIVES OF THE WORKSHOP

The workshop was organised with the primary aim to explore and evaluate various approaches to content, method and tools related to the Module 1 titled "Critical Thinking Skill and Collaborative Problem-Solving Skills" prepared by Symbiosis Law School, Pune under the project - Teacher training with specialization on life and information technology skills / 21stTS project on October 17, 2020 from 2:30pm to 6:30pm IST.

21st TS project aims at developing a student-centric learning environment, which will cover the needs of a growing diverse population of children in China, India and Cambodia with a variety of multi-cultural, multi-linguistics and multi-ability needs and respond to the gap in skills set in the labour market and society, shortage of qualified teachers and poor level of student learning. Further this project aims at transferring knowledge, best practices and experience on skills such as Critical Thinking, collaborative problem-solving, innovative and ICT-based teaching methodology on 21st skills acquisition from HEIs in Programme Countries to the HEIs of Partner Countries that will be benefitted directly from this project. The module 1 developed by Symbiosis Law School, Pune, SIU aims at developing an educational programme which will focus on the most important transversal skills that needs to be acquired, such as critical thinking, problem-solving and collaborative working. The project involves diverse pedagogical methods and assessments that include creativity and role learning. In this way, teachers and educators will acquire skills that will help them to align technologies and 21st century skills with content and pedagogy of subjects that they teach. The instructions of educational standards will embody 21st century knowledge and skills, and will use a range of strategies to reach diverse students and to create an environment for the support of differentiated teaching and learning. Finally, the educational programme will use a variety of assessment strategies to evaluate student's performance and will guide educators to act as mentors and as peer coaches with fellow educators.

TABLE PROGRAMME AT A GLANCE

Session	Time	Topic	Speaker(s)
	2.30 pm to 2.35	Introduction to SLS Pune Team members and Experts	Dr. Rupal Rautdesai
1	2:35 pm to 3:00 pm	Introductory Remarks - Overview of the Module, Standards, diversity, uniformity and Context (National Education Policy 2020 and Digital Intelligence Quotient)	Dr. Shashikala Gurpur
	3:00 pm to 3:05 pm	Question and Answers	All Partners
2		**Plenary Session 1:** Critical Thinking Skills – Inculcating the skills in Teachers (teaching various STEM and Non-STEM subjects)	
	3:05 pm to 3:35 pm	Content: Perspectives on Critical Thinking Skills and Sample Learning Tasks	Dr. K P Mohanan Ms. Rashmi Jejurikar Ms. Aditi Ahuja
	3:35 pm to 3:50 pm	Process: Critical Thinking and Socratic Questioning- Mind Mapping	Dr. Urvashi Rathod
	3.50 pm to 4.00 pm	Break	
	4:00 pm to 4:30 pm	1. How Teachers can Design Activities and 2. How teachers can design Assessments for Students to enable them to use such activities for students to exercise Critical Thinking Skills	Dr. Madan and Mrs. Nambiar
	4:35pm to 4:45 pm	Question and Answers	All Partners
3		**Plenary Session 2:** Collaborative Problem-Solving Skills: Process of inculcating the skills in Teachers	

	4:45 pm to 5:15 pm	Collaborative Problem-Solving Skills: How Teachers can design Activities and How Teachers can design Assessments

STEM and STEAM example | Devika Kulkarni and Nikita Johnson |
		Inculcating Collaborative Problem-Solving Skills by doing	Dr. Sophia Gaikwad
	5:15 pm to 5:20 pm	Question and Answers	All Partners
	5:20 pm to 5:30 pm	Break	
4		**Parallel Break Away Sessions**	
	5:30 pm to 6:00 pm	Group A: Critical Thinking Skills	Group A Moderators: Dr. Shashikala Gurpur and Dr.Mohanan, Mrs. Pushpaja Nambiar

Participants: At least one representative from each project partner |
| | | Group B: Collaborative Problem-Solving Skills | Group B Moderators: Dr. Bindu Ronald and Dr.Madan

Participants: At least one representative from each project partner |
5	6:00 pm to 6:10 pm	Suggestions of Group A (5 Mins)	Dr. Shashikala Gurpur
		Suggestions of Group B (5 Mins)	Dr. Bindu Ronald
	6.10 pm to 6.15 pm	Conclusions and Summary on Curriculum	Dr. Madan Mohan
6	6:15 pm to 6:25 pm	Concluding Remarks of Coordinating Partner University	Dr. Katerina Plakitsi, University of Ioannina, Greece
7	6:25 pm to 6:30	Vote of Thanks	Dr. Bindu Ronald

INTRODUCTORY SESSION OF THE WORKSHOP

Introduction to SLS Pune Team members and Experts [2.30 pm – 2.40 pm]

The workshop started with an introduction of all the partner countries with their respective teams. Prof. Dr. Shashikala Gurpur, Director, Symbiosis Law School, Pune welcomed all the participants. Prof. Dr. Rupal Rautdesai introduced the team of Symbiosis Law School, Pune and experts from ThinQ, Pune and Symbiosis International School, Pune who contributed towards development of Module 1- Critical Thinking Skill and Collaborative Problem-Solving Skills.

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21st Teach Skills Project
Workshop on
Module 1 - Critical Thinking Skills & Collaborative Problem Solving Skills
October 17, 2020

Introduction of Symbiosis Law School Pune Team

Dr. Shashikala Gurpur

Director, SLS, Pune
Dean, Faculty of Law, SIU

Project Manager, SIU
21st Teach Skills Project

Dr. Bindu Ronald
Deputy Director,
Symbiosis Law
School, Pune

Dr. Rupal Rautdesai
Professor,
Symbiosis Law
School, Pune

Dr. Aparajita Mohanty
Associate
Professor
Symbiosis Law
School, Pune

Prof. Raj Varma
Assistant
Professor,
Symbiosis Law
School, Pune

Prof. Ujwal Nandekar
Research
Assistant,
Symbiosis Law
School, Pune

Introduction to Experts / Resource Persons

Welcome Address & Introduction to Experts & Contributors

Dr. K. P Mohanan
- co-founder of ThinQ
- PhD in Linguistics from Massachusetts Institute of Technology
- Taught at the University of Texas at Austin; MIT; Stanford University; and at the National University of Singapore (NUS)
- has made significant contributions to linguistic theory
- co-designed with Tara Mohanan an Inquiry-Oriented undergraduate program in Linguistics at NUS
- has worked extensively with the nature of academic knowledge and inquiry, against the backdrop of human beliefs
- He joined the IISER-Pune Faculty in 2011, where he continued his work till he retired at the end of 2016.

Other Team Members from ThinQ

- **Ms. Rashmi Jejurikar** - *MSc Biotechnology, University of Pune*

- Rashmi works as a curriculum and program developer at Agastya International Foundation, an NGO working in the space of hands on science education for underprivileged children in rural India.

- **Ms. Aditi Ahuja** - *Pursuing a degree in Master's in Elementary Education (Ongoing at TISS, Mumbai)*

Welcome Address & Introduction to Experts & Contributors

Dr. Sophia Gaikwad
- Head at Symbiosis Teaching Learning Resource Centre, Symbiosis International University
- PhD is in the field of Educational Psychology, and her research work is on the theory of Multiple Intelligences.
- She has authored two books on 'Teaching Methodology'
- Research papers to her credit which have been published in SCOPUS indexed journals.

Dr. Urvashi Rathod
- Director, Symbiosis Centre for Research and Innovation, SIU
- Ph.D. from Birla Institute of Technology and Science
- Broad spectrum of experience ranging from a developer to an entrepreneur (for about 7 years) to a researcher and a teacher.
- Specialized in the discipline of software engineering and project management, keen and disciplined researcher.

Welcome Address & Introduction to Experts & Contributors

Dr. M. Madan Mohan
- Vice Principal, Symbiosis International School, Viman Nagar
- Trains, Guides and motivates his team of teachers in new teaching pedagogies and methods including informational skills
- Member, School Advisory Board, Symbiosis
- Member, Faculty Academic Integrity Panel, Faculty of Law, SIU

Mrs. Pushpaja Nambiar
- ToK (Theory of Knowledge) Coordinator, Symbiosis International School
- An educator for the past 20 years both national and international
- IB Examiner for ToK
- Skilled in Non-profit Organizations, Secondary Education, Educational Consulting, Lesson Planning, and Educational Technology.
- Masters and Bachelor of Education focused in Education, Biology, English
- **Other Members from SIS – 1. Devika Kulkarni   2. Nikita Johnson**

Introductory Remarks - Overview of the Module, Standards, diversity, uniformity and Context (National Education Policy 2020 and Digital Intelligence Quotient) [2.40 pm – 3.15 pm]

Prof. Dr. Shashikala Gurpur presented an 'Overview of the Module and Context in the light of National Education Policy 2020 and Digital Intelligence Quotient' along with the Symbiosis Law School, Pune Team.

Introduction to Module 1 – Critical Thinking Skills and Collaborative Problem Solving Skills

STRUCTURE

- **Credits/ hours** - 10ECTS (260 hours labor)
- **Course Content** (brief introduction provided in the module)
- **Learning Objectives** (aligned with the modules delivery based on OBE)

  For example – Unit Title 7 is Suggested Activities for Critical Thinking Skills, then the learning objective is "to design the best suited activities for developing critical thinking skills in students"
- **Target group** - Pre-service teachers, in-service teachers, bachelor students and master's students
- **Topics (consisting of Units and sub-units)** – Proposed 15 Units in next slide
- **Characteristics of Class Meetings -** Lectures, directed reading and practical work. (The module can be also delivered through online platform and E-tools)
  - Lectures -40
  - Practical classes and workshops -100
  - Guided independent study - 120
  - Total hours by term & for Module -260.00

CONTENTS

- Unit I: Concept of Inquiry and its element
- Unit II: Critical Thinking -Concept, Characteristics and Elements
- Unit III: Process of Critical Thinking
- Unit IV: Strategies to develop Critical Thinking Skills
- Unit V: Methods and Tools to develop Critical Thinking Skills
- Unit VI: Role of a Teacher to promote Critical Thinking Skills
- Unit VII: Suggested Activities for Critical Thinking Skills
- Unit VIII: Assessment of Critical Thinking Skills
- UNIT IX: Skill of Understanding transdisciplinary problem
- Unit X: Collaborative Problem -Solving Skills -Concept, Characteristics and Elements
- Unit XI: Methods and Tools to develop Collaborative Problem-Solving Skills
- Unit XII: Role of a Teacher to promote Collaborative Problem-Solving Skills
- Unit XIII: Suggested Activities for Collaborative Problem-Solving Skills
- Unit XIV: Assessing student's Collaborative Problem-Solving Skills
- Unit XV: Digital Intelligence Quotient

STRUCTURE

Learning Activities –
- Collaborative - work in groups, discussion, team project
- Interdisciplinary problem-solving exercises,
- Learning by doing,
- Projects (Community / interdisciplinary),
- Models / Apps / Software,
- Directed Reading, Videos,
- Quiz, Story-telling,
- case analysis,
- individual project/ Assignment
- creative workshops, guest lecturer (practitioner) lecture,
- practical tasks,
- problem-based training,
- Seminar,
- virtual teaching/learning environment (Moodle, Google class, video conference, meeting room, etc.)

STRUCTURE
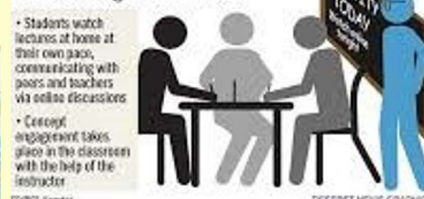
Teaching Methods
- Lectures,
- Self-learning,
- Synchronous and Asynchronous online sessions,
- workshops, group work,
- field work,
- Website Analysis,
- Flipped classroom,
- Collaborative Online International Learning
- demonstrations,
- discussions,
- tutorials and
- collaborative problem-solving activities

STRUCTURE

Equipments –
- Virtual Interface,
- Smart Boards,
- Classroom Response System,
- Lecture Capture Tools, Video Projector

- Course Management Tools,
- Video Conferencing system,
- 3 Doodlers Pro,
- Computer/ Laptop / Tablet

STRUCTURE

This module consists of 100 points. –The proposed assessments are :

1. Assignment based on Inquiry (10 points)
2. Quiz(es) (20 points)
3. Learning Logs (10 points)
4. Research Paper (based on critical thinking skills) (30 points)
5. Inter-disciplinary Collaborative Project (field/community based) (30 points)

CONTEXT OF NATIONAL EDUCATION POLICY (NEP) 2020 INDIA

Existing Academic Structure

2 Years (Age 16-18)

10 Years (Ages 6-16)

New Academic Structure

4 Years (Class 9 to 12) (Age 14-18) — Secondary

3 Years (Class 6 to 8) (Age 11-14) — Middle

3 Years (Class 3 to 5) (Age 8-11) — Preparatory

2 years (Class 1 & 2) (Ages 6-8) — Foundational

3 years (Anganwadi/ pre-school/Balvatika) (Ages 3-6)

New pedagogical and curricular structure of school education (5+3+3+4): 3 years in Anganwadi/pre-school and 12 years in school

- **Secondary Stage(4)** multidisciplinary study, greater critical thinking, flexibility and student choice of subjects

- **Middle Stage (3)** experiential learning in the sciences, mathematics, arts, social sciences, and humanities

- **Preparatory Stage (3)** play, discovery, and activity-based and interactive classroom learning

- **Foundational stage (5)** multilevel, play/activity-based learning

HIGHLIGHTS OF NEP 2020

✓**Student Centric**

✓**Skills Centric**

✓**Teacher is the Facilitator**

✓**Recognizes SDG 4 – Quality Education – inclusive and equitable**

✓Importance to regional language

✓Vocational Education from Class 6 with internships

✓Multiple exit options in Higher Education

✓**Promotion of Research Culture**

✓Many foundational and structural changes

✓children not only learn, but more importantly learn how to learn

✓**Focus less on content but more on critical thinking and problem solving**

✓**creative and multidisciplinary**

SCHOOL EDUCATION
• Universalisation from age 3 to Class 10 by 2030
• Mission to ensure literacy and numeracy skills by 2025
• Mother tongue as medium of instruction till Class 5 wherever possible
• New curriculum to include 21st century skills like coding and vocational integration from Class 6
• Board exams to be easier, redesigned

HIGHER EDUCATION
• New umbrella regulator for all higher education except medical, legal courses
• Flexible, holistic, multi-disciplinary UG degrees of 3-4 years' duration
• 1 to 2 year PG programmes, no M.Phil
• College affiliation system to be phased out in 15 years

Context of DQ (Digital Intelligence Quotient)
Global Standards Report 2019
Common Framework for Digital Literacy, Skills and Readiness

Digital Intelligence (DQ) is a comprehensive set of technical, cognitive, meta-cognitive, and socio-emotional competencies that are grounded in universal moral values and that enable individuals to face the challenges and harness the opportunities of digital life.

DQ has three levels, eight areas, and 24 competencies composed of knowledge, skills, attitudes, and values.

Acknowledgments:
Author - Dr. Yuhyun Park, DQ Institute
Reference provided by - Dr. M. Madan Mohan

Values (personal, local, societal, global)

Skills (Cognitive, Social, Emotional, practical, physical)

Knowledge (Disciplinary, Epistemic & Procedural)
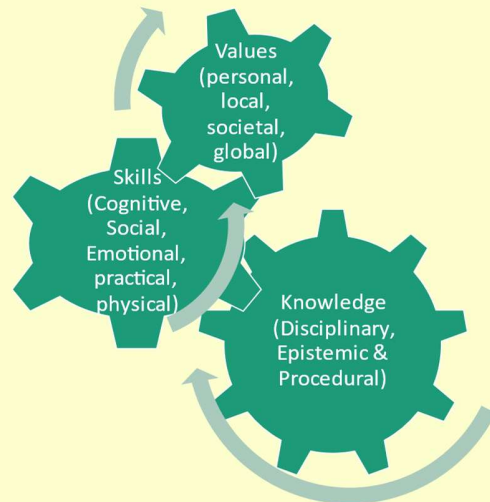
Guidelines given to experts for this workshop

Aligning the module to the Project Requirements (BV)

- Exhaustive Reading / Reference material, Suggested / Further Readings

- Self-Assessment Questions with model answers after every sub-unit (to play the role of remedial teaching)

- Unit End Questions (these type of questions may be asked in an assignment or the final exam)

- Matching educational needs of different kinds of learners

- Alternative methods of meeting objectives (e.g. Online mode)

Checklist (Maintaining Standardization, Diversity and Unity)

- ✓ Learning to Learn, Approaches to Learning (The Yin and Yang of subject and approach/theory)
- ✓ Following Blooms Taxonomy (Unity)
- ✓ Outcome based education format (Unity)
- ✓ Mapping objectives with outcomes (Standardization, Theme, content activity outcome reflection)
- ✓ Global benchmarking of the module with regards to the content and process (Research and innovation)
- ✓ Inculcating global best practices, Peer learning with differential ability in collaboration (Diversity)
- ✓ Learning by doing
- ✓ Designing Activities
- ✓ Designing Assessments
- ✓ Indigenization of the module (Cultural elements, cultural memory)
- ✓ Module to be structured in a manner to train teachers who will be delivering it to students (Direct, Hybrid and Online)

Evaluation of proposed Module 1 Critical Thinking Skills with Oxford IB Diploma Program Book on ToK published by OUP

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Difference between the Module developed and Oxford Book on Theory of Knowledge Only Critical Thinking Units have been included for Comparison

Serial No.	Units in the Module Proposed	Oxford Book on Theory of Knowledge
1	Inquiry	Inquiry as a form of learning is covered as an aspect of each chapter. No Dedicated Module in Oxford Book for Inquiry
2	Critical Thinking- Concept	Critical Thinking as a method is mentioned in each specific chapter in the OUP book and not exclusively deal with.
3	Process of Critical Thinking	Process of Critical Thinking is mentioned in each specific chapter in the OUP book and not exclusively deal with.
4	Strategies for Critical Thinking	Not covered in the book as a separate chapter.
5	Methods and Tools	Not covered in the book as a separate chapter. However, various discussion activities are mentioned in each subunit

Difference between the Module and Oxford Book on Theory of Knowledge Only Critical Thinking Units have been included for Comparison

Serial No.	Units in the Module Proposed	Oxford Book on Theory of Knowledge
6	Role of Teachers to promote Critical Thinking Skills	Not covered in the book as a separate chapter.
7	Suggested Activities for Critical Thinking	Not covered in the book as a separate chapter. However, various discussion activities are mentioned in each subunit
8	Assessment of Critical Thinking Skills	Assessment is covered under book. Specific assessment criteria , rubrics, How to do a good presentation, steps of presentation, approaches to finding a topic, how to write a really good TOK essay and rubrics, assessment of discussion activities are mentioned.
9	Skill of Understanding transdisciplinary problem	Covered under different chapters as various areas. Each STEM/ STEAM discipline is covered as a separate chapter

1. Specific sub-units on different types of perspectives like cultural and political, international mindedness etc.

2. Specific module on thinking critically: fallacies of arguments
   Fallacies are divided into different chapters, there are fallacies mentioned in the chapters of:
       a. Reason as a way of knowing
       b. Language as a way of knowing
       c. Emotion as a way of knowing

3. There are dedicated chapters for STEM / STEAM disciplines. Each of these chapters has specific units on Critical Thinking.

4. Separate chapter as memory as a way of knowing: kinds of memory, eye witness testimony, intuition and cognitive bias, emotions, collective memory and history. And overview of subjectivity and objectivity.

Question and Answer [3.15 pm – 3.25 pm]

A short question and answer session was conducted after the overview, and all the participants contributed towards it in the discussion. Dr. Katerina congratulated the organisers for the presentation and efforts by the Team. Dr. Ajay Surana asked some additional information about the identified and used references of the module. Mr. Srun Sovila congratulated the team on the presentation and acknowledged the well drafted, designed curriculum on Critical Thinking Skill and Collaborative Problem-Solving Skills. He raised the concern about delivery of the module considering various sets of the students, so that the same can be implemented for Cambodian students as well. Ms. Eleni Kolokouri appreciated the presentation and asked about Design and structure of 21st Century Lab, whether Covid-19 has affected the design of the lab. All queries were satisfactorily answered by Prof. Dr. Shashikala Gurpur.

PLENARY SESSION 1: CRITICAL THINKING SKILLS – INCULCATING THE SKILLS IN TEACHERS (TEACHING VARIOUS STEM AND NON-STEM SUBJECTS) [3.25 PM – 5.00 PM]

Content: Perspectives on Critical Thinking Skills and Sample Learning Tasks – By Dr. K P Mohanan, Ms. Rashmi Jejurikar & Ms. Aditi Ahuja

Plenary Session 1 on Critical Thinking Skills – Process of inculcating the skills in Teachers (teaching various STEM and Non-STEM subjects) started with introduction to the team ThinQ, Pune comprising of Dr. K P Mohanan, Founder, ThinQ, Pune, Ms. Rashmi Jejurikar, Core Committee member, ThinQ, Pune and Ms. Aditi Ahuja, Core Committee Member, ThinQ, Pune.

Ms. Rashmi Jejurikar and Ms. Aditi Ahuja under the guidance and in a conversation with Dr. K.P. Mohanan presented on 'Inquiry and Critical Thinking' with the help of various case studies and examples.

Ms. Rashmi began the conversation and asked Dr. Mohanan to share the objective as to what was the motivation to expand critical thinking to also inquiry?

Dr.Mohanan said that "Inquiry and Critical Thinking cannot be separated. Inquiry means that we have a question to investigate and we have ways for looking at the question. Finding an answer and coming up with a conclusion, justifying the conclusion and communicating the conclusion, that's what inquiry is about and research is inquiry that aims to make a contribution to the collective pool of knowledge. Critical thinking is the other part mainly when somebody presents a conclusion, you ask why should I accept that and when the person given justification for the conclusion you ask is it a valid justification?. In terms of research, you could say, inquiry is when the person as the researcher/writer does that is sends article for publication, and critical thinking is what the reviewer does. And you have to do this side by side, as every inquirer is a critical thinker and every critical thinker is an inquirer. You cannot separate the two. The best training for critical thinking is through inquiry. That's why we said inquiry and critical thinking in the academic context."

Ms. Aditi said "Just to add to this, Critical Thinking and Inquiry don't just apply in the academic context, as we use them much more broadly, and the same skills that we use in Inquiry and Critical

Thinking within a classroom within an academic context allow us to take them outside. So, when we say that, we are talking of them in an academic context, we are talking about that with the purpose of taking it beyond the classroom to evaluate something like a news article, or evaluate someone's election manifesto, or evaluate doctor's advice. These are things that affect us in our everyday life. And that is one of the reasons we see inquiry and critical thinking as, one being the process of finding out answer to the question versus the other evaluating someone else's answer to the question, two very inter-connected processes inside the classroom and outside it.

Ms. Rashmi said that "Right, so what you are saying is that it becomes a part of us and not just something that you learn and you leave it there. But something that becomes a part of our very being and the goal of this entire project is to empower teachers to help their students develop this capacity such that this spirit becomes a part of them. So, what would we need to achieve this goal?

Dr. Mohanan answering the question posed by Ms. Rashmi said: "So we need to begin by constructing a course for students, learning materials for students, from which students can learn how to engage in critical thinking and inquiry. So this is like saying, if you want to introduce a course on Neuro-Science, the first thing to do is to create learning materials, a text book, exercises and so on for Neuro-science from which the students should be able to learn. And then we have to empower the teachers to use those materials to help their students learn the capacity for inquiry into the critical thinking. And the third is assessment. So, these are the 3 steps – first the learning materials, teacher empowerment and assessment. But the most important part is creating learning materials, expositions, exercises, tasks etc."

Ms. Aditi following Dr. Mohanan said "One important thing we need to do in order to create learning materials is to explore the details of the questions – What is Critical Thinking? What are the specific tools, strategies, sub-concepts which go into being a critical thinker? So, for creating the learning materials that is useful and for all the creators of the learning material to work in synchrony it is important to have shared understanding of it means to think critically."

Dr. K. P. Mohanan
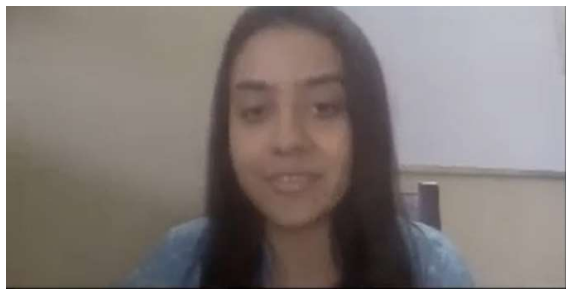
Ms. Aditi Ahuja

Ms. Rashmi further led the discussion by asking: "What are the sub-concepts of critical thinking?"

Dr. Mohanan explained "Critical thinking we can define as a set of mental processes that go into evaluation of something. That something could be a knowledge stream, could be a policy, could be a proposal, it could be an activity, various things. But today, we are going to focus on knowledge component, critically thinking about knowledge trends. When someone comes up with a mathematical theorem, then you ask the question what is the justification for that, why you claim it is a theorem? When somebody comes up with scientific theory, you ask a question why should I accept that theory? So essentially that is the first question that you ask. Doubting and questioning the conclusions the people have arrived at including your own conclusions and the sub-strands will include intellectual reasoning, looking for logical contradictions, looking for assumptions that are not obviously taken, evaluating the assumptions, looking for connectedness, there are a large number of things that go into the process of inquiry and critical thinking."

Ms. Rashmi added "So it is not just an ability but an attitude one needs to develop, an attitude of openness and humility"

Dr. Mohanan added "One could say that critical thinking begins with the awareness that human knowledge is fallible and uncertain"

Example in Mathematics

Can a straight-angled triangle exist?

"Suppose you have a line BC and somewhere on that line you have a point A, is that a triangle? Can you imagine that?"

Diagrammatic representation was shown to explain the possibility when the point A in the triangle is pulled down towards the bottom-line BC:
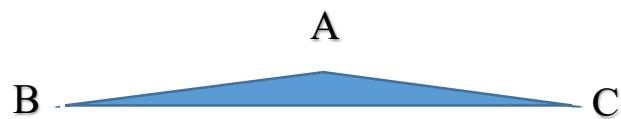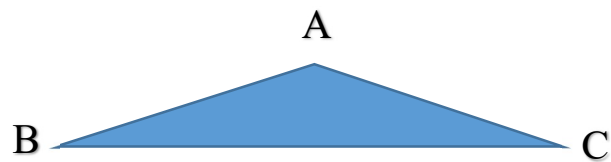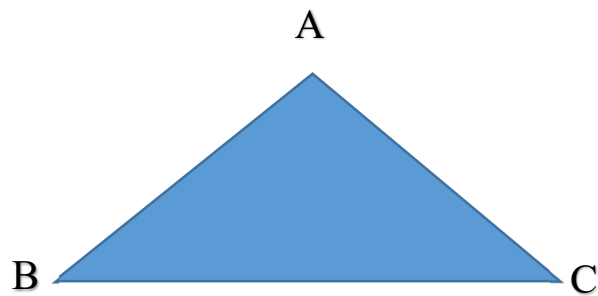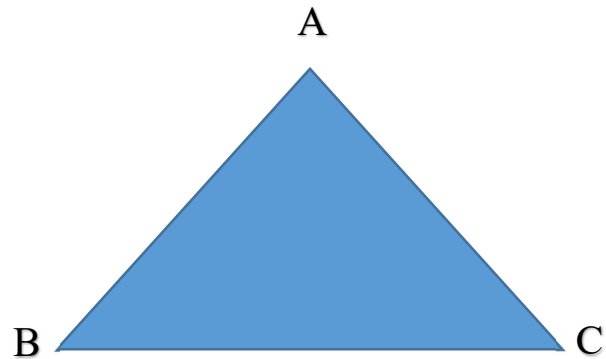
Why the above cannot be a triangle then? As a triangle simply must have 3 vertices and 3 straight lines.

Suppose you define a triangle as 3 vertices that are non-collinear and connect it through 3 straight lines.

So here is a way or mode of thinking that is characteristic of mathematics. Mathematics is a body of knowledge that comes from assumptions, axioms and definitions and whether something is true or not depends on the assumptions we make. And when I say assumptions I made, it means axioms and definitions. If you change the axioms, if you change the definitions, truth changes. So, whether a theorem is true or not depends upon what definition and axioms you have. And what I have illustrated here is one such case. So definition dependent knowledge is an important characteristic of Mathematics.

These kinds of exercises have been done by the team with 8th Graders and 6th Graders.

<u>Example in Social Sciences</u>

What does it mean to be truly democratic?

Democracy and the definition of democracy is something that is usually given in one sentence in textbooks but has a lot of scope for exploration. So, for instance we give the students this example

"Imagine a school where teachers and students have equal voting rights.

For every 10 students, there is one teacher. The class decides what they want to do on a day in school by voting. Children mostly get what the want – holidays, food, movies, picnics.

If the teacher decides that something is valuable for the students, and the children are not interested, the teacher can easily be outvoted. The students can also have the teacher fired.

Is this system Democratic?

Usually, we arrive at a few different definitions of democracy.

How would you choose between the following definitions of democracy?

Definition - 1	**Definition - 2**
Democracy is a system in which citizens of a country vote to elect its rulers	**Democracy is a system in which those affected by a decision can influence the decision**

Definition 1 – Looks at Democracy at the level of country where there are citizens and a nation

But in the example of where students had the voting rights in a school, it does not have the aspects about citizens or nation, so in that case how can democracy be defined. May be then it can be defined in a way it is given in Definition – 2 above.

Thus, a curriculum in critical thinking will allow the students to make a judgment about this scenario and also allow them to make a choice between such definitions. Later, ask them how would you go about making such a choice? what are the different things that you will consider when you make a choice between two alternative definitions or options? in any scenario.

Another Example

We ask questions like: suppose you have a country where there are two mafia families and each mafia family puts up a president for election and then a list of 10-12 ministers and the people have the right to vote and they have to select and choose between these two mafia families, is there democracy in that country?

By one definition, there is democracy because people vote to elect their rulers but by other sense that is not democracy that is where we see a counter definition.

That leads to critical thinking

Presenting counter examples that forces to re-evaluate their own judgements and their own ideas something like democracy, the definition of a triangle or definition of a solid – leads to thinking critically and evaluating what they came across in their academic domains.

Some of these concepts also yield emotional responses like democracy – where you have a certain notion of it in your mind, but the definition contradicts that, but you still want to believe that is democracy. The whole idea of contradictory definitions makes you to re think.

This also leads one to think and question: why is it difficult for me to abandon something/ some ideas. This process makes one a critical thinker and an open inquirer.

Example from Ethics

"This is an example from an ethics class of 6th grade class room:

We gave various examples regarding ethics and students came up with the axiom that 'KILLING PEOPLE IS MORALLY BAD'. I wrote it on the whiteboard and asked the students whether everybody accepts that, they said yes. But one of the students raised the hand and said, killing enemies is okay. Then others supported him and said "killing enemies is okay but not others". One more student said, "You must kill enemy". So, I wrote down that also on the whiteboard that it is important to kill your enemies. And everybody else accepted that.

Then I asked (K.P Mohanan) who are your enemies?

Are there any one in your classroom? They said NO

Are there any one in the school? They said NO

Are there any one outside school? The answer was NO.

Any enemies in Pune? NO

Any enemies in Maharashtra? NO

Then where are the enemies, you don't seem to have any enemy.

So, they said enemies are in Pakistan.

So, I asked, are all Pakistanis your enemies?

They said yes.

Then I said, there is a school in Pakistan, and all students are 6th graders, let us go and kill them?

Now the answer was on no we cannot do that.

Then I said, you only said that all Pakistanis are enemies, so these 6th graders are also Pakistanis, so why not go and kill them.

So, they said, you cannot kill children and children are not enemies.

So, I said, let's go and kill their parents.

They said: No, you cannot kill the parents of those children.

So, I asked, who do we kill then. They said: soldiers.

So, I said okay, let's go and kill the soldiers who might have children and parents as well.

The answer was again no.

I told them that look again you don't really have any enemies at all. Who are your enemies? And the students were in deep trouble. Because emotionally they were unable to say that you can kill children/ parents and soldiers.

Finally, they came up with a conclusion that 'Enemies are the people who want to kill others and it has nothing to do with nationality nothing to do with religion'

THIS WAS A GREAT MOMENT OF CRITICAL THINKING. Of course, to say 'one must kill those who want to kill someone' comes with a logical contradiction but since these were 6th Grade students, I did not go beyond that session.

Developing the ability to critical thinking and inquiry through such instances/tasks and then providing them with exposition to give them some explanation of what it means to give logical contradiction. What it means to say classificatory system? What it means to say reasoning? What it means to have reasoning.? What are the different types of reasoning?"

Dr. Rupal Rautdesai thanked and appreciated the discussion put forth by the ThinQ team. Dr. Shashikala Gurpur also appreciated saying that "it was very simple, communicative and gave examples from different disciplines, most important dimension of ethics which is very much over looked. Probably even the Digital Quotient concept can be brought in here as well in terms of passing off Pakistan as Enemy Character".

Process: Critical Thinking and Socratic Questioning- Mind Mapping – By Dr. Urvashi Rathod

For the plenary session 1, Dr. Urvashi Rathod, Director at Symbiosis Centre for Research and Innovation Pune, was the next resource person who presented on Socratic Question and Mind Map.

Dr. Urvashi Rathod

Following are the slides she presented and the transcription of Dr. Urvashi Rathod's presentation to the best possible manner:

All teachers are first learners and from that perspective every day we keep learning. Whenever I interact with other teachers and PhD students, a few things that I try to convey to them and especially with the post-graduate students the whole approach gets very different. I will tell you the reason also.

Background

- Reflective Thinking: Active, persistent, and careful consideration of a belief or supposed form of knowledge in the light of the grounds which support it and the further conclusion to which it tends. Dewey, J. (1910) How We Think, Boston, MA: D.C. Heath and Co.

- Critical thinking calls for a persistent effort to examine any belief supposed form of knowledge in the light of the evidence which support it and the further conclusion to which it tends. Glaser, E.. (1941) An Experiment in the Development of Critical Thinking New York: Teachers College, Columbia University in Critical Thinking: An Introduction by Alec Fisher, Cambridge University Press, 2001

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I will just give you a background:

Critical Thinking was introduced by Dewey in 1910 as reflective thinking. So, the term used back then was very different. But the meaning later adopted in 1940's was critical thinking. And if you see the meaning that was propagated by Dewey that had important words, that I consider to be as the key words as they are highly indicative

➔ Active – You have to be alert all the time

➔ Persistent – unless you are satisfied you are not going to quit

➔ Careful consideration – One has to be very careful, there has to be certain rules, that are better to be followed. And to see how correct whatever is communicated, how correct is whatever that is conveyed, how true it is, what is the evidence of it, what is the reason behind this.

➔ Evaluating something on the basis of the fact that is what critical thinking is or reflective thinking was proposed to be.

➔ What is interesting is: the conclusion to which it tends.

➔ Whatever you are accepting, that is on the basis of some facts or some evidence is actually what it is leading to.

➔ Glaser (1941) refined the definition and said Critical thinking is not just persistent consideration but referred to it as **persistent effort** to **examine** any belief supposed form of knowledge in the light of the **evidence** which support it and **further conclusion** to which it tends.

➔ So basic elements of Dewey's definition were retained but certain emphasis had been given and clearly mentioned examination

So, there are 4 major aspects, when I look at the meaning of critical thinking:

1. Persistent effort
2. Examination
3. Evidence

4. conclusion

➔ A critical thinker has to be critical enough, has to be persistent enough, has to be actively looking into the flaws, if there are any

➔ A continuous Examination ➔ a continuous evaluation of whatever has been given for evaluation.

➔ A stimulus that has been given for acceptance.

➔ Evidence ➔ a fact, a doc, a demonstration

➔ Conclusion: what it is leading to

These four aspects have to be addressed by us as teachers when we are interacting with the learners, or as learners when we are interacting in a learning situation.

We have to be always active to examine something, ask for the right kind of evidences and when you are examining something, how unbiased the process of examining something is. If you are looking at some evidences, how dependable those evidences are. When you are looking at the conclusion, and its implications, in what direction are these inferences taking us to.

Critical Thinking

• The examination and test of propositions of any kind which are offered for acceptance, in order to find out whether they correspond to reality or not (The Critical Thinking Community 2004).

Davies, W.M. (2008). 'Not quite right': helping students to make better arguments, *Teaching in Higher Education*, Vol. 13, No. 3, 327-340.

• Critical thinking is skilled and active interpretation and evaluation of observations and communications, information and argumentation.

Paul, R., Fisher, A., and Nosich, G. (1993). *Workshop on Critical Thinking Strategies*. CA: Foundation for Critical Thinking, Sonoma State University as mentioned in Critical Thinking: An Introduction by Alec Fisher, Cambridge University Press, 2001

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2004 a more pragmatic definition emerged: "The examination and test of proposition of any kind which are offered for acceptance, in order to find out whether they correspond to reality or not" (The critical thinking community 2004) Davis, W.M. (2008)

Reality depends on evidence and evidence has its strength. So, we have to be very careful when we are looking at the evidence and that evidence represents the reality and if its strength is low, we may not reach at the right conclusions.

Critical Thinking is skilled and active interpretation and evaluation of observations, and communications, information and argumentations. (Fisher 1993) – 1:20:42

A skill that can be developed by us.

A skill where you can understand it correctly, then only go for evaluation of observations and communications, information and argumentations.

All these can serve as stimuli, that helps us to react.

Definitions of Critical Thinking: HOW IT IS BEING LOOKED AT IN PHILOSOPHY, PSYCHOLOGY, AND EDUCATION.

But I will focus on critical thinking in Education.

- **In Philosophy**
  - Purposeful, self-regulatory judgement which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological or criteriological considerations upon which that judgement is based. Facione, P. A. (2000). The disposition toward critical thinking: Its character, measurement, and relationship to critical thinking skill. Informal logic, 20(1), 61-84.

- **In Psychology**
  - Seeing both sides of an issue, being open to new evidence that disconfirms your ideas, reasoning dispassionately, demanding that claims be backed by evidence, deducing and inferring conclusions from available facts, solving problems, and so forth. Willingham, D. T. (2008). Critical thinking: Why is it so hard to teach? Arts Education Policy Review, 109(4), 21-32.

- **In Education**
  - The propensity and skills to engage in activity with reflective skepticism focused on deciding what to believe or do. Halonen, J. S. (1995). Demystifying critical thinking. Teaching of psychology, 22(1), 75-81.

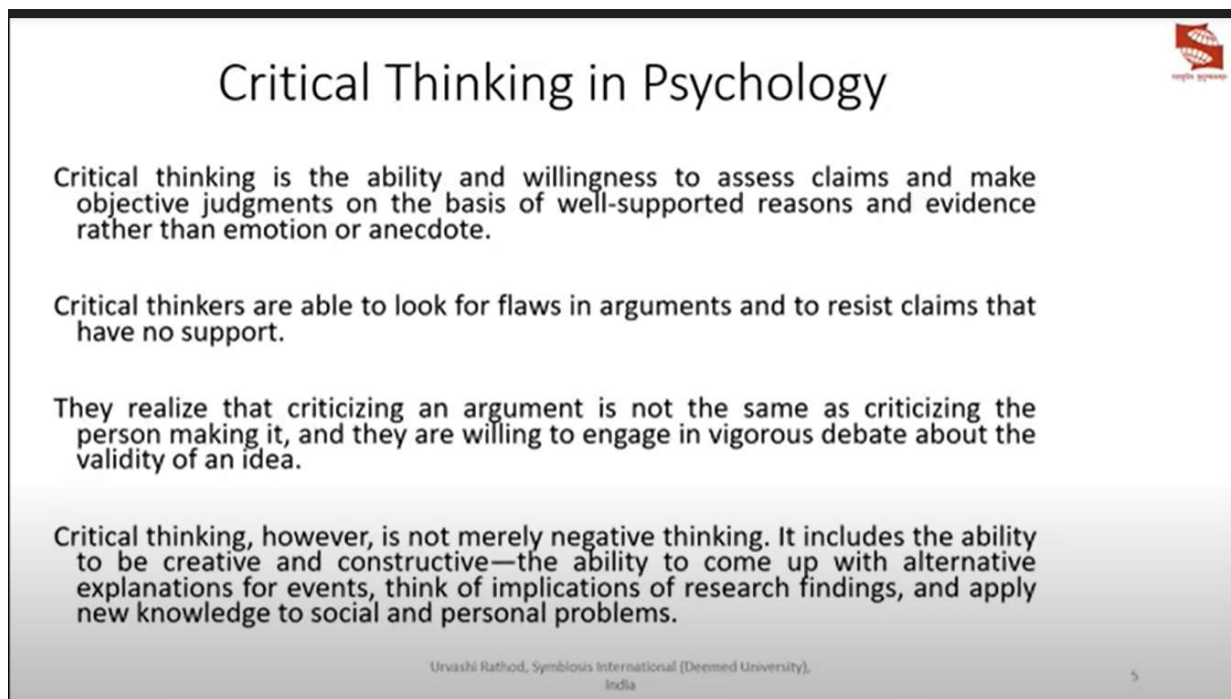Urvashi Rathod, Symbiosis International (Deemed University), India

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Critical Thinking in Education

The propensity and skills to engage in activity with reflective skepticism focused on deciding what to believe or do (Halonen, J.S. 1995)

So, I think that all professors who are considered to be a bit skeptical, they are supposed to be like that.

Whether we should believe in something or not, there should always be an objection.

Aristotle said, a wise person may not be accepting any stimulus without resistance. And this is what is required from a critical thinker.

Critical Thinking in Psychology

Critical thinking is the ability and willingness to assess claims and make objective judgments on the basis of well-supported reasons and evidence rather than emotion or anecdote.

Critical thinkers are able to look for flaws in arguments and to resist claims that have no support.

They realize that criticizing an argument is not the same as criticizing the person making it, and they are willing to engage in vigorous debate about the validity of an idea.

Critical thinking, however, is not merely negative thinking. It includes the ability to be creative and constructive—the ability to come up with alternative explanations for events, think of implications of research findings, and apply new knowledge to social and personal problems.

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A few things that are important, especially if you see the second paragraph of the above slide

"Able to look for flaws in arguments and to resist claims that have no support"

Criticizing an argument is not same as criticizing a person making it. Especially in academia, the ability to accept the criticism of the academic content which are being communicated, that is very important. And they are willing to engage in vigorous debate about the validity of an idea.

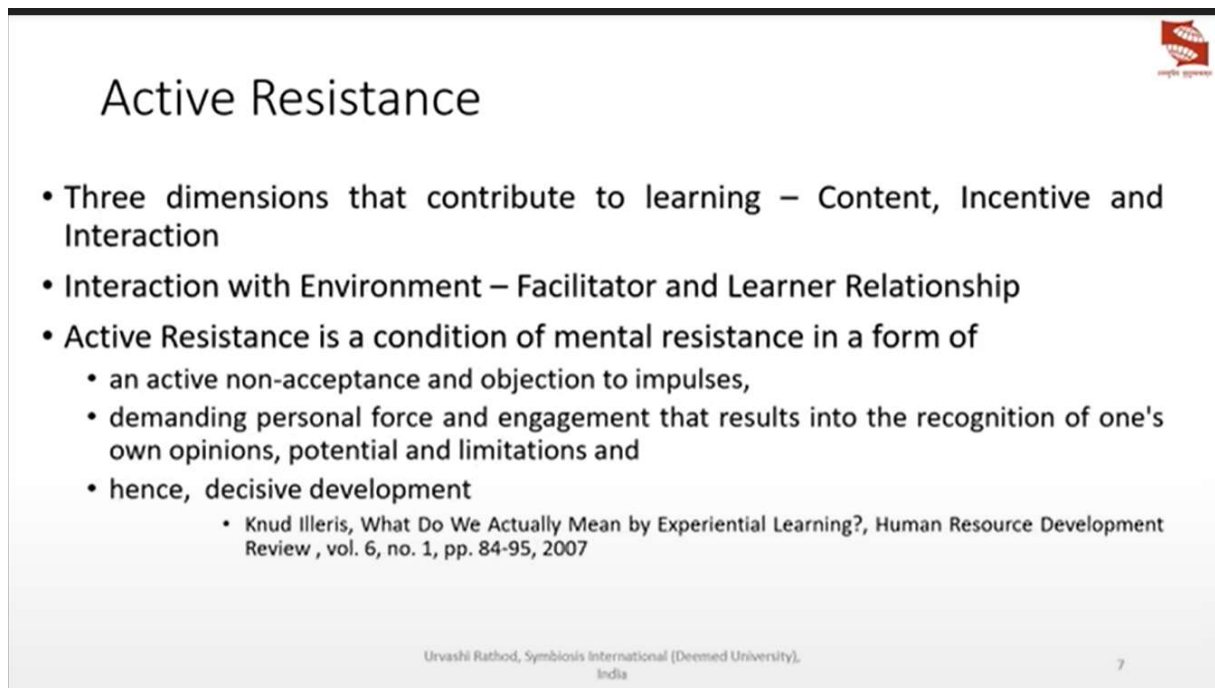It is very necessary to debate and discuss on various ideas.

Critical thinking, however, is not merely negative thinking. It includes the ability to be creative and constructive feedback is expected to be out of whatever flaw you have found after the evaluation of whatever stimulus you have received.

How to develop critical thinking?

All these things started happening 15-16 years back when I read one very interesting paper by Knud Illeris. I think many of our European friends must be aware about him. Knud Illeris is the Director of Lifelong Learning Centre in Denmark and he had written an interesting research paper.

Knud Illeris, What actually do we mean by Experiential Learning?, Human Resource Development Review, vol 6, no.1, pp- 4-95, 2007.

In that paper "What do we mean by experiential learning?" he mentioned about active resistance

Active Resistance

- Three dimensions that contribute to learning – Content, Incentive and Interaction
- Interaction with Environment – Facilitator and Learner Relationship
- Active Resistance is a condition of mental resistance in a form of
  - an active non-acceptance and objection to impulses,
  - demanding personal force and engagement that results into the recognition of one's own opinions, potential and limitations and
  - hence, decisive development
    - Knud Illeris, What Do We Actually Mean by Experiential Learning?, Human Resource Development Review , vol. 6, no. 1, pp. 84-95, 2007

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Here at this point during the presentation Dr. Urvashi lost her internet connection.

Therefore Dr. Rupal and Dr. Shashikala Gurpur asked the participants to ask questions if any in the meanwhile.

Question & Answer

Dr. Katerina had a comment to share. She said "Critical thinking is a very old term, thus so in time now in the time of crisis."

Dr. Gurpur responding to that comment stated "It acts as a bullwork against negative forces by examining assumptions"

Srun Sovila one of the participants appreciated Dr. Mohanan's example of the enemy and further asked "Have you ever designed something to make students do it or apply in real life? It would be great if you can share that kind of example"

Dr. Mohanan explained the answer to the above question "I think the very first step would be to help students develop an ethical consciousness. So, what we do first is, in the class room, we get the students to construct their own ethical theory, and then we get the whole class together to put together all ethical theories to form a collective ethical theory, so that they can form a clear judgement on what constitutes ethically right and what is ethically wrong. In the course of these examples, we take their own ethical dilemmas and try to deal with that and this takes quite some time. By the time they have completed this course, they become fairly sophisticated, sensitive, emphatic, passionate ethical thinkers. They have no problems in going out into the world and engaging with actual actions.

Aditi added "The manner in which we guide the discussion in the classroom is by asking them what they believe and why they believe. And when they watch us do that in the classroom, they turn to do that by themselves in the classroom. Whenever they face any other ethical dilemmas and question in their life. That is how they develop their ability to think ethically or make ethical decisions but also evaluate ethical claims as they move forward."

Continuation of address by Dr. Urvashi

Dr. Urvashi madam joined and then continued her part of the discussion on Active Resistance.

Active resistance

Learning happens when there is an incentive for that. There has to be some motivation, interaction with the environment, and thirdly the content and the cognitive part comes there.

So, while talking about the barriers to learning, he (Knud Illeris) quoted several research studies, not only from biology but also from neuro-cognitive-science and what he mentioned was "Active resistance is a useful barrier when it comes to learning." This is because it is a condition of mental resistance in the form of an active non- acceptance and objection to impulses. Whenever there is an active resistance to whatever is given to us, when we start arguing on something, all faculties of our brain are focused on to that argument. Although active thinking is open, focused thinking also goes on, but diffusive thinking that goes on at the back of the brain starts giving us all the inputs required and in this process of getting those inputs, we find out that where our arguments are weak and where they are stronger. And this is the best way of self-learning.

Thus, active resistance is a condition of mental resistance in a form of

a. an active non-acceptance and objection to impulse

b. demanding personal force and engagement that results into the recognition of one's own opinions, potential and limitations and

c. hence, decisive development

From here we go to the basics of **Socratic questioning,**

Socratic Questioning
- Question is a sentence meant for eliciting information, initiating discussion and subsequently attaining resolution
- Socratic Questioning in the pursuit of meaning and truth is
  - Systematic (step by step)
  - Disciplined (focused and regulated)
  - Deep (detailed and connected)
- Purpose:
  - To focus on basics
  - To uncover assumptions
  - To reason through complex issues
  - To analyse concepts and the line of reasoning
  - To make learners realize that what they know and what they do not know
  - To develop learners' ability to make questioning strategies and ask Socratic questions

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➔ We use questions for eliciting information, initiating any discussion and subsequently attaining resolution

➔ Socratic questioning is a bit different from in general different types of questions if we consider because, Socratic questioning is

a. Systematic that is step-by-step, one by one questions are asked

b. Disciplined – there are certain rules to be followed, no deviation from the topic, also should not be personalized (focused and regulated)

c. Deep (detailed and connected) – so all questions are inter-connected and detailed

And the purpose should be:

a. To focus on basics

b. To uncover assumptions

c. To reason through complex issues

d. To analyse concepts and the line of reasoning

e. To make learners realize that what they know and what they do not know – so multiple questions when we ask one after another, somewhere at certain point of time active resistance is happening from both the sides, there is self-understanding

f. To develop learners' ability to make questioning strategies and ask Socratic questions.

Sample questions in Socratic dialogues includes:

a. What data has been provided?

b. Is the data dependable? How can we justify?

c. Is some data missed out?

So, number of these questions are inter-connected and as you can see their relevance to inquiry.

Sample Questions in Socratic Dialogues

- What data has been provided?
- Is the data dependable? How can you justify?
- Is some data missed out?
- What are the sources of data? How dependable are they?
- What is taken granted? Can we state the assumptions clearly?
- What is the line of reasoning and why so?
- Can we reason it differently?
- How have we reached this conclusion?
- What are the implications of this conclusion?

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Tools for preparation

As a teacher, I have used mind maps frequently for preparation. And how I use these mind maps and I believe that it is going to be useful to many others also because many of my colleagues we kept discussing about this and they used and found it very useful.

So how this mechanism helps:

Mind Maps

- Diagrammatic representation of connected questions and expected answers that helps in developing systematic, discipline and deep questioning

- This mechanism of questioning helps learners develop their ability to
  - Understand (interpret) the observation/communication,
  - Ask relevant questions to know more,
  - Relate with other relevant aspects (analyse),
  - Ask for evidence/reasons,
  - Evaluate the stimulus,
  - Infer based on the evaluation
  - Explain the inference and its implications
  - Regulate the deliberation to the relevance

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First of all, it is a tool for the preparation for the teachers and it is helpful in understanding the observation of communication. Now I will give you one simple example from physics, it is about Scalar and Vector Quantities. How do they differ? So, all the coloured nodes in the slide below are answers which you can expect from students.
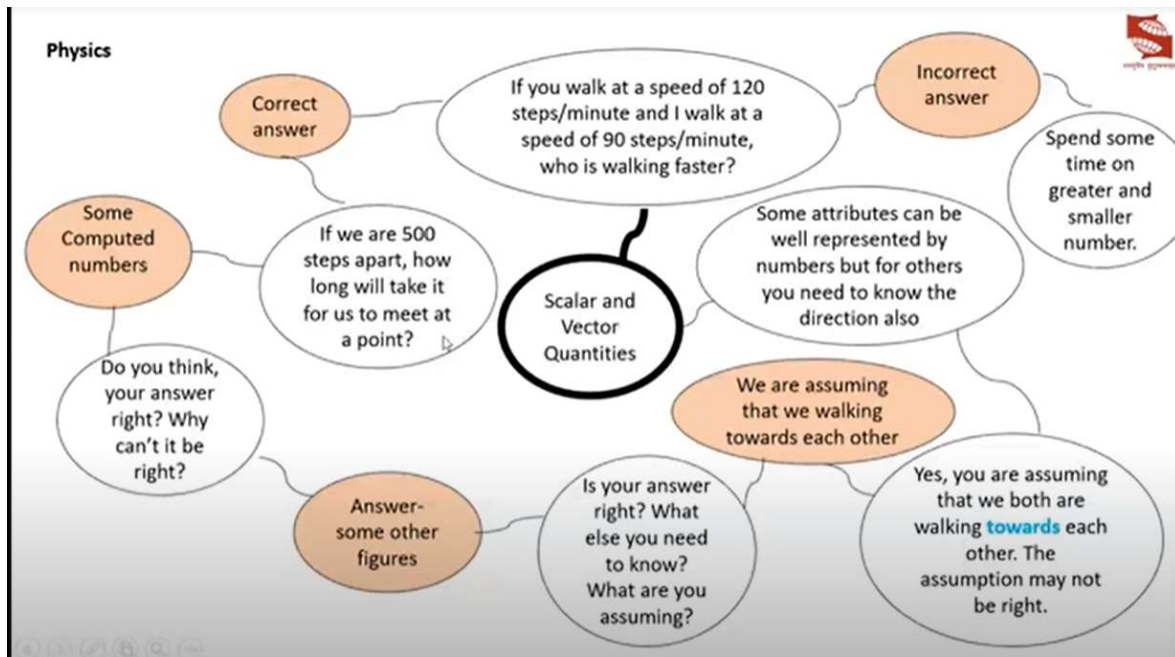
I am talking about, when I am preparing, how to go about it in interactive mode asking questions and finding out what are the possible answers.

For example, if you <u>walk</u> at a certain speed say 120 steps/minute and if I walk at speed of 90 steps/ minute Who is walking faster? Now by any chance you do not get any correct answer that means there is a problem. Then you have to expend some time on greater and smaller number. But mostly you will get correct answer. Then I ask, if we are 500 steps apart, how long will it take for us to meet at a point? Then there will be some computation done by the students and they will come back to you. Then you ask them "Do you think your answer is right? Just think over. Then they come up with other number. They are a bit confused. Here comes the dis-equilibrium what we call in constructivism. That they are in trouble now. Then you keep asking. Is your answer, right? What else you need to know? What are you assuming? Then one of the students may come up that we are assuming that we are walking towards each. And there as a teacher I get an opportunity, to tell them that yes only numbers, only magnitude that so many steps per minute if I am walking, that is

not sufficient to know. I also need to know that in what direction I am walking. If I am walking towards you, then only this computation is possible. Otherwise without knowing the direction I cannot say anything.

So as a teacher what I have achieved, one is that I have just made it very open to them that if they are assuming and they are not noticing their assumptions then they may be reaching wrong conclusions.

That is where I tell them that there are some attributes where only numbers are sufficient but there are others, where direction is also required. And this is the difference between scalar and vector quantity. So, this is not only arriving at the right learning but also learning the method of thinking critically. How to go about it. Am I missing out something; is this data sufficient; am I assuming something; if this is my assumption, then is this assumption correct? These are the take aways.

Taking another example from Philosophy of Research. This is about epistemology, generally while teaching PhD students I use this mechanism. So, we start with why do we do research, and they come up with many answers. The blank coloured circles in the following slide show that those answers may not be relevant also.
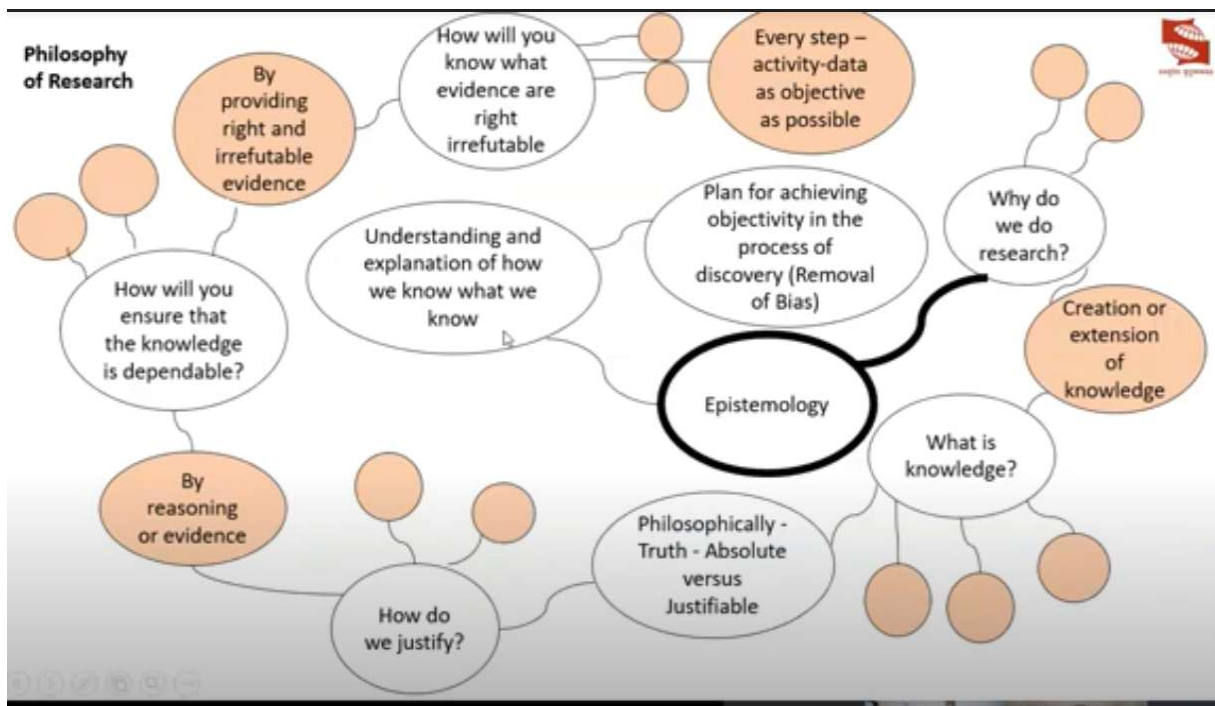
Although I use whiteboard and write down all the answers. One of the answers may be creation and extension of knowledge. So, the next question I ask is what is knowledge? This is how we use mind maps for devising Socratic questioning. So that critical thinking abilities can be developed.

You will recall how you were inspired to think critically and to question without fear, to seek out radically different solutions and to voice them without reprisal, to read widely and deeply, and to examine without end and grow intellectually...

What I ask is this: pass it on.

- Admiral Mike Mullen, 11 June, 2009

Urvashi Rathod, Symbiosis International (Deemed University), India

With the above slide Dr. Urvashi Rathod, closed her address.

Question and Answer

Dr. Rupal asked Ms. Eleni to put forth her question.

Eleni said that she would like to ask Prof. Mohanan and she said "Thank you Prof. Mohanan for a very interesting presentation. I would like to ask if you make with your students any interconnections between science, democracy and ethics, and if you do so, how do they respond to all these. For example, how democratic is science and decision ethics, decision about science and things like that and how do they respond on that."

Dr. Mohanan responded "It takes some time to develop these integrative abilities. One of the components as educationist is the integration through transdisciplinary thinking and transdisciplinary concepts. Concepts that cut cross across disciplinary boundaries. As part of their

course, they learn things such as structures not of a particular discipline but across chemistry, physics, mathematics, poetry, ethics and so on. They learn things like classification, and so on. Once they get those trans-disciplinary concepts, that cut across disciplinary boundaries, they begin to see that scientific inquiry is in fact a very democratic inquiry. The norms of scientific inquiry, I don't mean the scientific establishment. The norms are such that you cannot say such and such thing is true because somebody said so, there are no authorities or norms in science. So any high school child can question Einstein. This is not possible outside the academia. Of course, it is possible in Mathematics and science. And students start questioning Einstein, they challenge the teachers, and this is an important part of critical thinking, that students do not accept whatever the teacher says as the truth. So, one of the things that we talk to them about is that there are no correct answers. That it is only for exams for getting marks. What we have are good answers and not so good answers and evidence/justifications for answers. Any answer can be wrong as there is no correct answer. Once they get that I think, the question that you raised will be understood."

Dr. Gurpur told Eleni to old on till other presentations also are conducted as it was a good question, but the answer was not done yet.

After this there was a 5 minutes break announced.

How Teachers can Design Activities and Assessments - to enable the trainee teachers to use such activities for students to exercise Critical Thinking Skills – by Dr. M Madan and his Team

The team of Symbiosis International School, Pune, Dr. M. Madan, Ms. Pushpaja Nambiar, Ms. Nikita Johnson Mahajan, Ms. Devika Kulkarni and Ms. Geetanjali Pillai presented their views and sample activities on 'How Teachers can design Activities and Assessments for Students to enable them to use such activities for students to exercise Critical Thinking Skills'.

| **Dr. M. Madan Mohan** | **Mrs. Pushpaja Nambiar** |

Dr. Madan said that there were three things that his team was going to present:

1. Activity for critical thinking skills
2. Activity for collaborative problem-solving skills
3. A blend of both

Ms. Pushpaja Nambiar then began the discussion.

She said "For us critical thinking in the IB curriculum, we actually teach our children learning the process of learning, in fact they are unlearning to learn. The main talent is that we have is how do we know what we know. And when we teach them that we do have certain concepts. We explore the similarities, and the differences between academic disciplines, themes and areas of knowledge. So, the theoretical part there are a lot many, but I would like to jump in straight to the activity."

Exercise/ Activity 1 – Based on 12 Angry Men Video

Video snippet from - 12 Angry Men video shown to the participants. The same video can be watched on YouTube link address: https://youtu.be/_13J_9B5jEk

Following is the **12 Angry Men Viewing Guide** prepared by the Symbiosis International School Team:

Twelve Angry Men

As you watch the film, pay attention to the actions, attitudes and decisions of the various different jury members who are forced to make a final decision in the case. Complete the following chart paying special attention to what type of people are on the jury and how they made their decision.

(WAYS OF KNOWING): Language, Sense Perception, Emotion, Reason, Imagination, Faith, Intuition, Memory).

JUR OR	ACTOR	"IDENTITY" Describe using Adjectives	W.O.K	How do they know what is correct and true?
1	Martin Balsam			

2	John Fiedler			
3	Lee J. Cobb			
4	E.G. Marshall			
5	Jack Klugman			
6	Edward Binns			
7	Jack Warden			
8	Henry Fonda			
9	Joseph Sweeney			
10	Ed Begley			
11	George Voskovec			

12	Robert Webber			

Labels around image: 6, 4, 2, 8, 10, 12, 11, 1, 9, 7, 5

Answer boxes: 1, 12, 2, 11, 3, 10, 4, 9, 5, 8, 6, 7

3
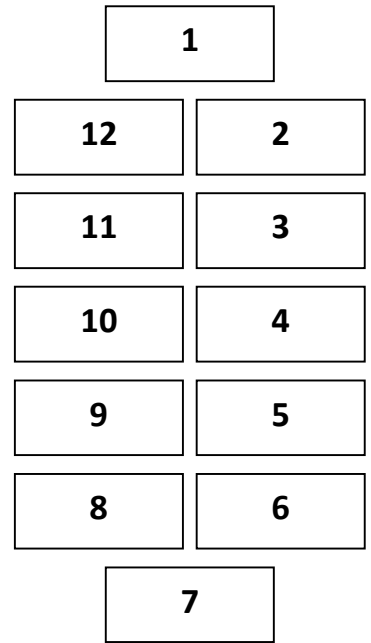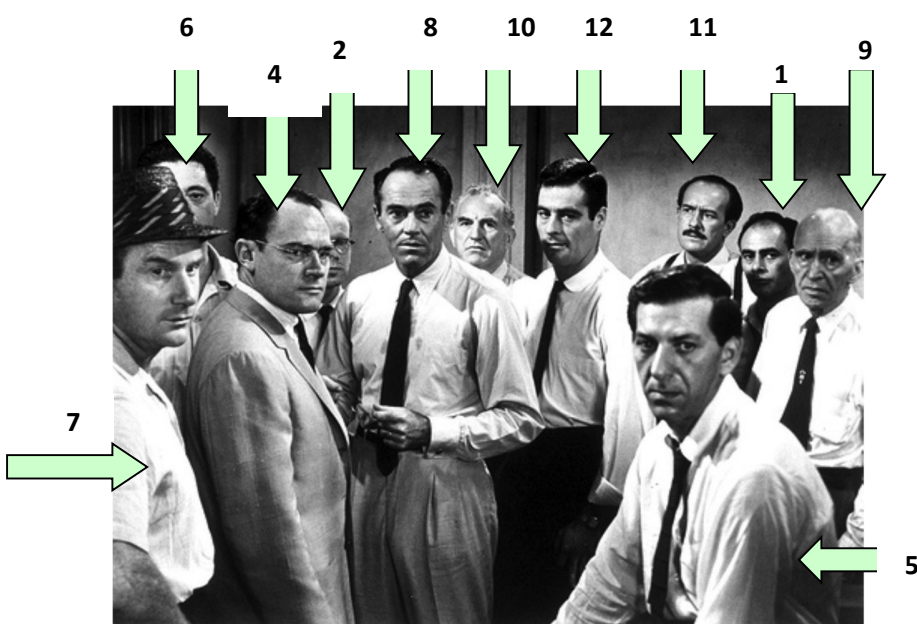
Following the film, please respond to the following questions in your books.

1. What role do different Ways of Knowing have in our attempts to discover truth.

2. Is the standard of reasonable doubt sufficient to determine guilt or innocence?"

3. *How does the film address the following:*
   a. *Self-Knowledge*
   b. *Sources of Knowledge*
   c. *Truth*
   d. *Conflict or cooperation between*

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OTHER SIMILAR RESOURCE:
Movie-Rashomon

Quote from the movie: It's human to lie. Most of the time, we can't even be honest with ourselves -Rashomon (1950)
For further ethical argumentative analysis……

PLENARY SESSION 2: COLLABORATIVE PROBLEM-SOLVING SKILLS: PROCESS OF INCULCATING THE SKILLS IN TEACHERS

Collaborative Problem-Solving Skills: How Teachers can design Activities and How Teachers can design Assessments - STEM and STEAM example

Plenary Session 2 on Collaborative Problem-Solving Skills: Process of inculcating the skills in Teachers started with the presentation on 'Collaborative Problem-Solving Skills: How Teachers can design Activities and How Teachers can design Assessments STEM and STEAM example' by Dr. Madan, Mrs. Nambiar, Ms. Nikita Johnson Mahajan, Ms. Devika Kulkarni and Ms. Geetanjali Pillai from Symbiosis International School, Pune.

As discussed by Dr. Madan earlier the second exercise given below was discussed in relation to collaborative-problem solving skill.

Exercise / Activity 2 – Fairy Tale Conflict

Fairy Tale Conflict

Objectives:
Students will:
    Identify the feelings and needs behind conflicts
    Generate creative solutions for resolving conflicts cooperatively

Materials:
    Fairy tales (print or Internet versions)
    Fairy Tale Conflict handout (available at:
    KidsHealth.org/classroom/3to5/personal/growing/conflict_resolution_ handout1.pdf)

Class Time:
60 minutes

Activity:
Fairy tales are loaded with conflict. Think about it: You have Goldilocks breaking into the bears' house, the Big Bad Wolf destroying the pigs' property, and Cinderella being treated unfairly by her stepmother. It's about time that someone helps these characters resolve their conflicts in a healthier way! Choose a fairy tale to examine, and read it over as you think about the conflict in the story. Answer the following questions using the Fairy Tale Conflict handout:

What is the conflict in the story?
How do the main characters feel about the conflict?
What does each of the characters want or need?

Then imagine you could convince the characters to work together solve their problem. List three possible solutions that would benefit everyone. Remember, we're talking about fairy tales, so be as creative as you can!

Extensions:
Select your favourite solution to the fairy tale characters' problem and rewrite the ending of the fairy tale, showing how the characters work together to resolve their conflict. Share your version with your class, and compare the solutions created by your classmates. Which solution is the most creative? Which would be the most likely to work? Which solution would make the characters the happiest?

Fairy tale characters aren't the only ones who get angry and get into arguments! Think about what you do when someone makes you angry. Then come up with one way that you could deal with your anger in a healthier way. Make a goal for yourself of controlling your anger better the next time it happens. How will you know if you've met your goal?

Name: _____   Date: _____

Fairy Tale Conflict

Instructions: Fairy tales are loaded with conflict. You have Goldilocks breaking into the bears' house, the Big Bad Wolf destroying the pigs' property, and Cinderella being treated unfairly by her stepmother. Someone needs to help these characters resolve their conflicts in a healthier way! Choose a fairy tale to examine, and answer the following questions:

1. What is the conflict in the story?
2. How do the main characters feel about the conflict?
3. What does each of the characters want or need?
4. You may choose to fracture the story to enact the resolution.

Then imagine you could convince the characters to work together to solve their problem. List three possible solutions that would benefit all of the characters.
(Remember, we're talking about fairy tales, so you can be as creative as you want!)
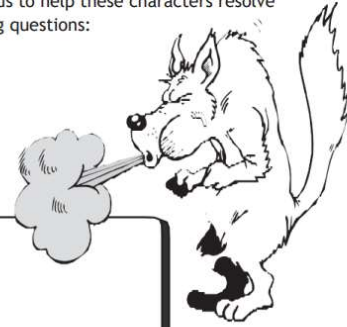
What's the Conflict?

Characters:	Feelings About Conflict:	Wants and Needs:

Possible Solutions:
1.

2.

3.

<u>**Exercise / Activity 3 – The Volkswagen Emissions Scandal Case**</u>
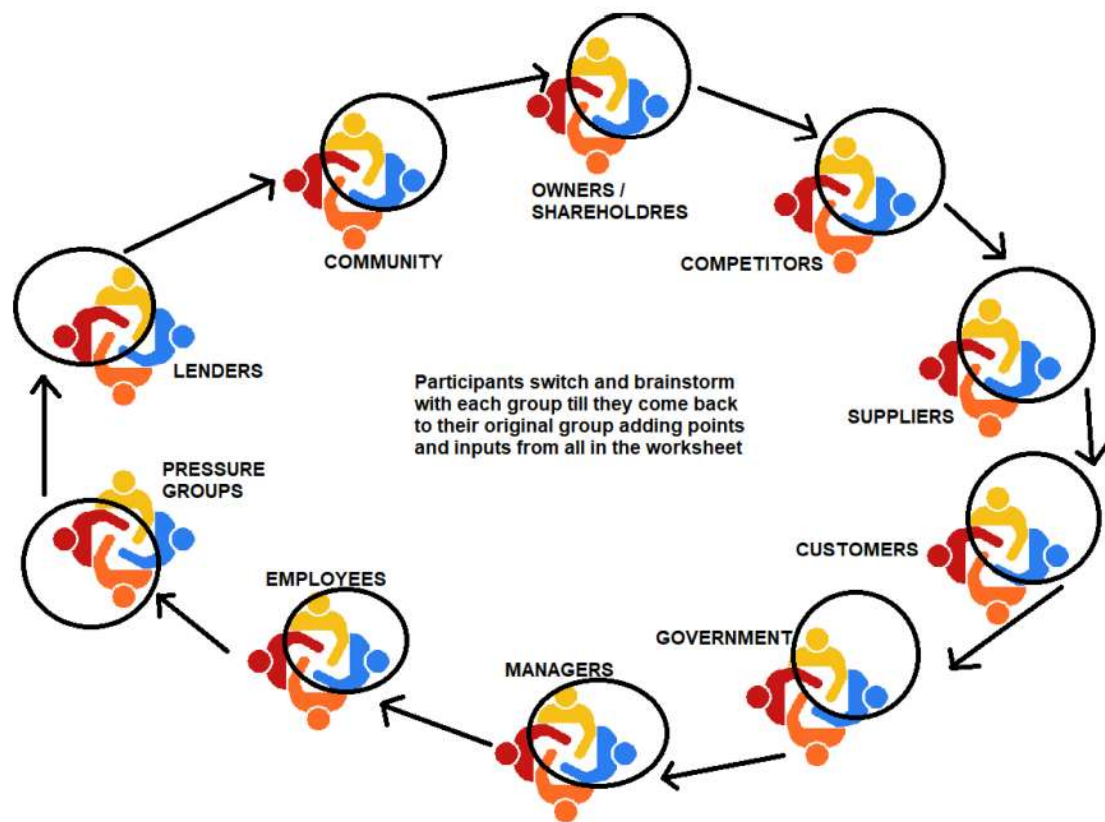
Collaborative problem-solving and Critical thinking activity

Teacher briefing worksheet

Method:	Real life based case study on Volkswagen scandal 2015, interaction, collaborative group discussion, chart paper for mind map.
Skills developed:	Research, reading, application, analysis, evaluation, collaborative problem solving, critical thinking, peer learning, recommendation with effective judgement
Collaboration of subjects:	Business Management, Environmental Management, Economics
Concepts covered:	**BM:** Ethics, Profitability, Corporate Social Responsibility, Stakeholder objectives and conflict, stakeholder mapping **EM:** Emissions, types and harm to the environment **Economics:** Externalities, Market failure, Government intervention, carbon tax, tradable permits

Activity steps:

1. Give the case study to the class and give them 5 minutes to read the case study and individually allow them to identify the problem in the case study. The learners must answer the following questions:
   - What is the problem in the case study?
   - Why did it occur?
2. The learners are briefed by the teacher on the concepts mentioned above. There can be a collaboration of all three teachers – BM, EM and Economics to explain the case study.
3. Divide the learners into groups of four – this may vary depending upon the number of learners in class. Each group will be given a tag of a stakeholder.

OWNERS / SHAREHOLDRES

COMMUNITY

COMPETITORS

LENDERS

SUPPLIERS

Participants switch and brainstorm with each group till they come back to their original group adding points and inputs from all in the worksheet

PRESSURE GROUPS

CUSTOMERS

EMPLOYEES

GOVERNMENT

MANAGERS

4. The learners must think from the perspective of the respective stakeholder and identify its objective and conflict related to the case study. They must write this in the worksheet provided.

5. Two learners are asked to shuffle after every 5 minutes to the next stakeholder group and take inputs from each group and add it to their worksheet.

6. They must shuffle till they come back to their original group.

7. The learners will then present their findings to the class, group wise.

8. Teacher asks the following **questions to develop critical thinking –**

  • To what extent the study of Business Management tends to steer people towards ethical or self-centered decision making? Does this matter?

  • Using any 'TWO' ways of knowing, discuss how it is possible to 'know' what is right for the managers to do.

  • Discuss whether it is possible to 'know' which stakeholder group is the most important to an organization. What knowledge issues would be made in such a case?

- Is it unethical if a business chooses to ignore the demands (or needs) of one particular stakeholder group?
- Are the values and beliefs of some stakeholders more superior than those of others?
- To what extent do emotions and reasons influence decision making business organizations?
- To what extent does the awareness and knowledge of ethics bring about an obligation for business to behave morally?

9. Then the learners must find **probable solutions to the problem** – in this case study it must be related to the Volkswagen scandal and what the firm must do next. The learners may come up with solutions like –
   - Rebranding – entire new name
   - Merge with another business
   - Shutdown
   - Recall the cars and apologize to the Government and community
   - Possible ways to tackle each stakeholder conflict.
   - Change the 4 Ps of marketing strategy – new product, pricing, place and promotion strategies.

10. They must now weigh **the pros and cons** of the **probable solutions** and present it on a chart paper – **mind map** of the entire activity can be drawn.

The Volkswagen emissions scandal explained
Student Worksheet

SOURCE: https://www.bbc.com/news/business-34324772

https://www.theguardian.com/business/ng-interactive/2015/sep/23/volkswagen-emissions-scandal-explained-diesel-cars

What has VW done?

Volkswagen has been cheating in emission tests by making its cars appear far less polluting than they are. The US Environmental Protection Agency discovered that 482,000 VW diesel cars on American roads were emitting up to 40 times more toxic fumes than permitted - and VW has since admitted the cheat affects 11m cars worldwide. It's been dubbed the "diesel dupe". In September, **the Environmental Protection Agency (EPA) found** that many VW cars being sold in America had a "defeat device" - or software - in diesel engines that could detect when they were being tested, changing the performance accordingly to improve results. The German car giant has since admitted cheating emissions tests in the US.

VW has had a major push to sell diesel cars in the US, backed by a huge marketing campaign trumpeting its cars' low emissions. The EPA's findings cover 482,000 cars in the US only, including the VW-manufactured Audi A3, and the VW models Jetta, Beetle, Golf and Passat. But VW has admitted that about 11 million cars worldwide, including eight million in Europe, are fitted with the so-called "defeat device".

The company has also been accused by the EPA of modifying software on the 3 litre diesel engines fitted to some Porsche and Audi as well as VW models. VW has denied the claims, which affect at least 10,000 vehicles.

In November, VW said it had found "irregularities" in tests to measure **carbon dioxide emissions levels** that could affect about 800,000 cars in Europe - including petrol vehicles. However, in December it said that following investigations, it had established that this only affected about 36,000 of the cars it produces each year.

The EPA says US Volkswagen vehicles emitted between 10,392 and 41,571 of NOx each year if they were all being judged against the 2016 model emissions standards

11m cars are affected globally, so assuming mileages worldwide are similar to US mileages, VW's defective vehicles could be responsible for between 237,161 and 948,691 tonnes of NOx emissions each year

What does it mean for the environment?

It means far more harmful NOx emissions, including nitrogen dioxide, have been pumped into the air than was thought – on one analysis, between 250,000 to 1m extra tonnes every

year. The hidden damage from these VW vehicles could equate to all of the UK's NOx emissions from all power stations, vehicles, industry and agriculture.

How did they do it?

VW's "defeat device" is not a physical device but a programme in the engine software that lets the car perceive if it is being driven under test conditions - and only then pull out all the anti-pollution stops. "Clean diesel" engines cut emissions through techniques such as adjusting air-fuel ratios and exhaust flows, and in some (though not most VWs) injecting a urea-based solution to render NOx harmless. When running normally, requiring greater performance, VW's controls would not operate in the same way.

How does the defeat device know it's being tested?

The EPA tests have known practices and profiles. In many cases, the test vehicles are put on rollers and run at a certain speed for a certain time, then at another known speed for another known period. The car's central computer can detect whether inputs match those expected in test conditions.

What does the defeat device do if it detects test conditions?
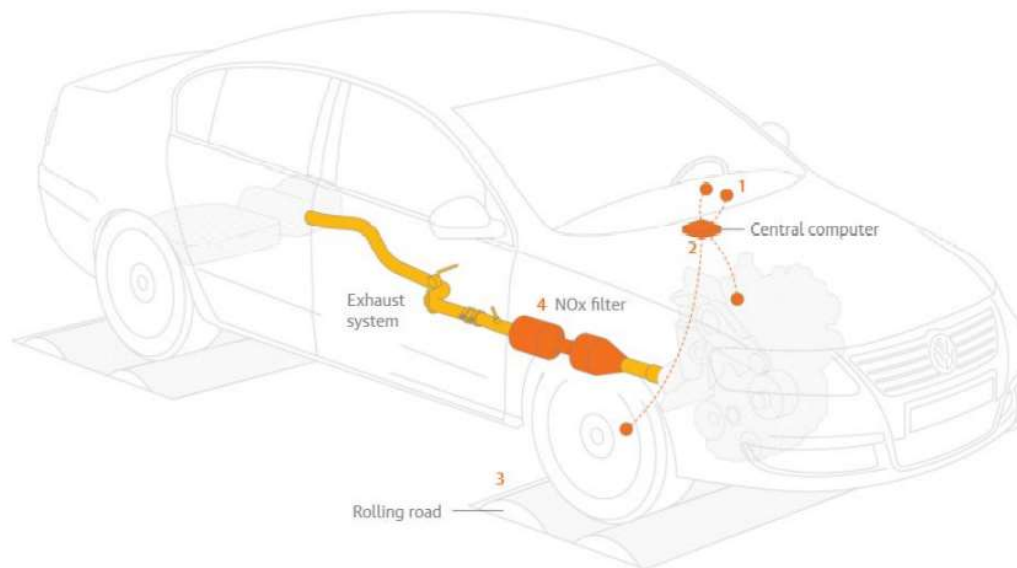
| 1	2	3	4
Speedometer, steering wheel sensors and air pressure sensors send data to central computer	Computer recognises that it is under test conditions and switches on a 'dyno calibration', which alters the working of the engine to minimise emissions	If road, rather than rolling road, conditions are detected the computer uses a 'road calibration', which bypasses the emissions reduction mechanisms to favour engine performance and efficiency	The EPA says it was the NOx filter whose behaviour was changing in the different calibrations

How were VW found out?

An NGO, the International Council on Clean Transportation (ICCT), performed independent – and crucially on-road – emissions tests, on the VW Passat, the VW Jetta, and a BMW X5. These tests followed five routes on similar lines to the EPA simulations: highway, urban, suburban and rural up/downhill driving. The emissions performance of the Volkswagen, but not the BMW, cars was so much worse than expectations that the ICCT ran further tests on a dynamometer. In these circumstances, the cars passed with flying colours. It was at this point that the ICCT contacted the EPA.

Average NOx emissions as deviation ratio
Key | Highway | Urban | Rural-up/downhill | Under lab conditions | NOx Government limit
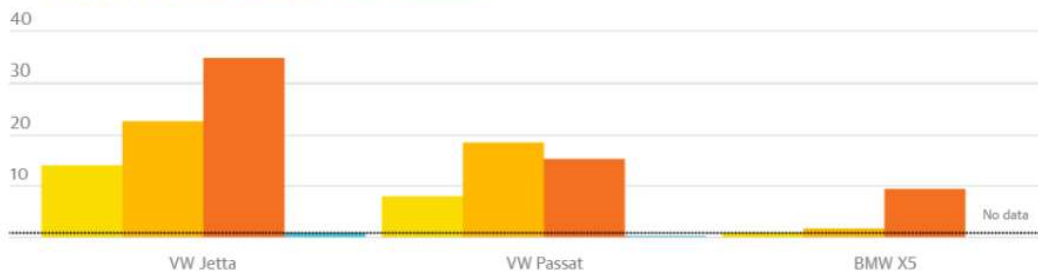
Source: theicct.org

What does it mean for your health?

The fumes can cause inflammation of the airways and worsen breathing for anyone. But NOx emissions can also react with other compounds to cause more serious respiratory conditions and aggravate heart problems. Long-term exposure to the pollution hastens death: research this year linked high levels of NOx to 9,500 premature deaths annually in London alone.

Mortality burden of air pollution in London

Range of life years lost as a result of equivalent deaths in 2010
Key | Pm2.5* | NO2**

9,287   98,648

51,629   121,918

*Particles smaller than 2.5 micrometers in diameter. **30% overlap with PM2.5   Source: King's College London

What does it mean for VW and its customers?

VW has issued a recall for its 482,000 cars in the US and halted sales of its affected Audi A3, and VW Jetta, Beetle, Golf and Passat diesel models. No action has been announced elsewhere, however. The corporation faces investigation in the US, a possible $18bn fine, and expects to spend €6.5bn (£4.7bn) on fixes and compensation. Criminal charges and civil actions could follow.

Audi A3, 2009 - 2015

Beetle, 2009 - 2015

Golf, 2009 - 2015

Passat, 2014-2015

Jetta, 2009 - 2015

What does it mean for the car industry?

Consumers and governments will want to see all manufacturers' claims reviewed. This particular cheat may be unique to VW but the scandal highlights how few test results match real-life emissions. Concerns about diesel may see more stringent limits, but some believe really clean engines will be too expensive to produce and sell.

STUDENT WORKSHEET

Identify the problem in the case study and probable solution

Individual thinking:

Collaborative thinking:

Collaborative activity-

Stakeholder	Stakeholder objective	Stakeholder conflict/Impact	Probable action of the stakeholder
Owners and shareholders			
Managers			
Employees			
Customers			
Community			
Government			
Suppliers			
Competitors			
Lenders			
Pressure groups			

Theory of knowledge

1. Does the study of Business Management tend to steer people towards ethical or self-centered decision making? Does this matter?

2. Using any 'TWO' ways of knowing, discuss how it is possible to 'know' what is right for the managers to do.

3. Discuss whether it is possible to 'know' which stakeholder group is the most important to an organization. What knowledge issues would be made in such a case?

4. Is it unethical if a business chooses to ignore the demands (or needs) of one particular stakeholder group?

5. Are the values and beliefs of some stakeholders more superior than those of others?

6. To what extent do emotions and reasons influence decision making business organizations?

7. Does the awareness and knowledge of ethics bring about an obligation for business to behave morally?

Probable solution from different groups:

Weighing pros and cons of the solutions:

Solution	Pros	Cons

Inculcating Collaborative Problem-Solving Skills by doing – By Dr. Sophia Gaikwad

Following were the slides used by Dr. Sophia Gaikwad when she delivered her talk on 'Inculcating Collaborative Problem Solving Skills by doing'.

Inculcating Collaborative Problem Solving Skills

DR. SOPHIA SANDEEP   GAIKWAD

The transition...

STEM → STEAM

CPSS

PISA 2015 defines collaborative problem solving competency as

'The capacity of an individual to effectively engage in a process whereby two or more agents attempt to solve a problem by sharing the understanding and effort required to come to a solution and pooling their knowledge, skills and efforts to reach that solution".

https://www.oecd-ilibrary.org

An essential 21st Century Skills

The Process

Establishing and maintaining shared understanding	Taking appropriate action to solve the problem	Establishing and maintaining team organization

Collaboration

Collaboration can be defined at two levels/ Collaboration can have two aspects:

1. Collaboration amongst students: Collaboration means:-
- o the action of working with someone to produce something.
- o to work jointly with others or together especially in an intellectual endeavor

Taking into consideration the above meanings given by the dictionary, Collaboration amongst students may be defined as an act where learners come together setting aside their diversities or celebrating their diversity for better and effective learning.

2. Collaboration between student and teacher:
- o Professional and personal relationship

Attributes

- o Empathy
- o Helpfulness
- o Believing in sharing
- o Co-operation
- o Mutual respect
- o Adhering the timelines
- o Negotiating and convincing skills
- o Analysis of Strengths and Weaknesses

Activities

o Co-operative learning techniques

o Developing strong critical arguments

o Problem based Learning

o Project based Learning

o Models of teaching such as Advanced Organizers, Concept attainment model

o Games

o Team work

o Focused group discussion

o Field work

o Team teaching

o Use of ICT

Lets think together

https://padlet.com/head_stlrc/nlldsd6fv2eixffp

Dr. Sophia Gaikwad demonstrated the use of the tool of padlet for collaborative learning in an online environment which can be used during these times in COVID-19 situation where physical meeting is not possible for collaborative work.

CONCLUDING SESSIONS & VOTE OF THANKS

Parallel Break Away Sessions

After the training workshop towards the end all the experts and participants were to deliberate on the module in two break-away groups. However, on request of participants the organisers did not pursue the break-away groups and all participants and experts deliberated together on the contents of the Module 1 of Critical Thinking Skills and Collaborative Problem-Solving Skills. The contents of the module were appreciated by all.

Concluding Remarks of Coordinating Partner University

Concluding Remarks were given Dr. Katerina Plakitsi, University of Ioannina, Greece congratulating the successful organisation of the Workshop. Dr. Katerina also provided her suggestions regarding module development to other participants.
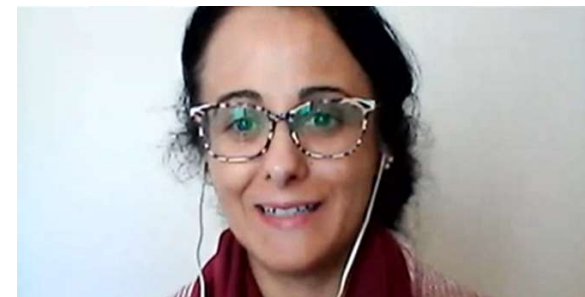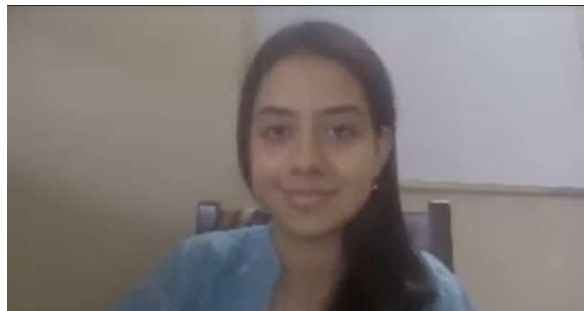
Vote of Thanks

Prof. Dr. Bindu Ronald thanked all the participants for attending and actively participating in the Workshop on Module 1 on Critical Thinking Skill and Collaborative Problem-Solving Skills organised by Symbiosis Law School, Pune.
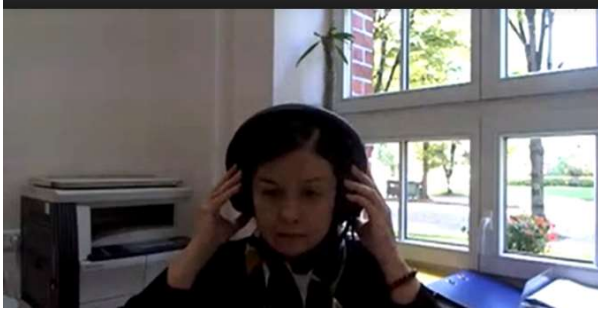
As a workshop outcome, Symbiosis Law School, Pune restructured the units of the module based on the salience on each of the themes. Critical Thinking and Collaborative problem solving are not disjointed but are complimentary to one another. All units will integrate Critical Thinking and Collaborative Problem-Solving Skills. Pre-Service and In-Service Teachers would then be applying the content while they deliver the module. The way they apply it so as to teach the students would be their brainstorming. There will be a domino effect during training of teachers.

LIST OF PARTICIPANTS/ ATTENDEES

1. Dr. Shashikala Gurpur – Present
2. Dr. Katerina Plakitsi – Present
3. Dr. Bindu Ronald – Present
4. Dr. Rupal Rautdesai – Present
5. Pushpaja Nambiar – Present
6. Dr. Madan M. – Present
7. Dr. KP Mohanan– Present
8. Dr. Urvashi Rathod – Present
9. Dr. Aparajita Mohanty- Present
10. Raj Varma– Present
11. Ujwal Nandekar– Present
12. Devika Kulkarni – Present
13. Dr.Ajay Surana – Present
14. Gražina Šmitienė – Present
15. Μαριανθη Ναστου – Present
16. Dr. Sophia Gaikwad – Present
17. Sam Rany – Present
18. Nikita Johnson Mahajan – Present
19. ΜΑΡΙΑΝΘΗ ΝΑΣΤΟΥ – Present
20. Eleni Kolokouri – Present
21. Gitanjali Pillai – Present
22. Aditi Ahuja – Present
23. Reda Vismantienė – Present
24. Sovila Srun – Present
25. Hak Yoeng – Present
26. George Efthimiou – Present
27. Athina Kornelaki – Present
28. Sokchea Kor – Present
29. George Efthimiou – Present
30. Sapna Sharma – Present
31. Neeti Trivedi – Present
32. Sambocheyea- Present
33. IT Symbiosis Law School, Pune- Mr. Amit Jatale- Present

PHOTOGRAPHS OF THE SOME OF THE RESOURCE PERSONS AND PARTICIPANTS

Photos taken of attendees