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Chapter 1

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Abstract. *Restructuring education after COVID-19 is the need of the hour. We propose a scheme based on four pillars and a binder. The four pillars are (i) flexibility (online plus public laboratories for experimentation), (ii) Cognitive, Social and Spiritual intelligence, (iii) resilience (bouncing back despite failures) and (iv) creative thinking & design thinking. The binder is lifelong learning. The binder strengthens all pillars with passing time making the system self-correcting which is innate instinct of every life form on earth. A structure based on biological intelligence can only face the real world and sustain the life experiences of all living beings. Libraries will become online repositories. Virtual laboratories play a big role in incremental understanding of subject matter. Humans have the most complex brain and the best ability to learn. Learning in humans continues since the birth to death. COVID-19 is a challenge we all must face and live in its presence. This challenge is inviting us to utilize all our creative abilities to survive and thrive.*

Keywords. Education; Flexibility; Resilience; Lifelong learning; Cognitive Intelligence; Emotional Intelligence; Spiritual Intelligence; Creative Thinking; Design Thinking.

1. Introduction

The current disruption due to COVID-19 is the longest break for formal education institutes across the world. It has provided an opportunity to restructure education system as a blessing in disguise. This crisis has rejuvenated the passionate love of life for all who are alive. The teaching-learning environment can be restructured by significantly reducing physical contact among all stakeholders, to reduce the spread of the disease. The recent digital revolution and efforts by Industry and Governments have provided good online audio and video links where the teacher and learner can form good interactive relationships without coming together at one place. The importance of physically coming together can never be underestimated, however, the wastage of the most precious resource 'time' [1] can be minimized by using Information and Communications Technologies (ICT). The faculty have to learn the "science of digital learning" for effectively implementing online teaching-learning model. The existing practices of transposing classroom to online medium is limiting the effectiveness of online education. In the last 10 years the online education was not effective as was expected by the experts in education. The perils of current online education system must be addressed to improve completion rate and defined outcomes.

Majority of students in educational institutions in this era have grown up with internet technologies. The reach of digital technologies has effaced the geographical boundaries of the world. Fear of Being Alone (FOBA) and Fear of Missing Out (FOMO) express the current generation's liking for instant communication and feedback in social circles. The elements of good life include positive emotions, relationships, engagement, meaning and achievement. This generation can really maximize the power of collaborative work to solve world's problems. The UN adopted the sustainable development goals (SDGs) in September 2015. The general assembly adopted 17 goals as 2030 agenda. The list is, (1) No Poverty (2) Zero hunger (3) Good health and wellbeing (4) Quality education (5) Gender equality (6) Clean water and sanitation (7) Affordable and clean energy (8) Decent work and economic growth (9) Industry, innovation and infrastructure (10) Reduced inequality (11) Sustainable cities and communities (12) Responsible consumption and production (13) Climate action (14) Life below water (15) Life on land (16) Peace and justice strong institutions (17) Partnership to achieve the goal [2].

The Universities have to accept the reality of online education and let go off their academic know-all stance. Collaboration with digital learning

specialists will empower University to restructure higher education for the better delivery to a large audience across the national and geographic boundaries. Teachers, Parents, and Administrators of all the nations across world should provide students right ecosystem to express their creative potential in solving real world problems. The way to educate coming generations needs to be reconfigured keeping in mind the pace and reach of current technologies along with the scope of problems faced by human race across the globe. Solutions to the problems like water and food are to be found across national boundaries respecting the nature and curtailing hegemonistic tendencies of some nations. The present situation due to Covid-19 has give an opportunity to to restructure the Boards of Studies of all faculties to include trans-disciplinary experts (who may contribute from anywhere in the world) to enable the innovation path to solve complex problems. All must revamp archaic laws which prohibit this to happen and accept inputs from all directions.

Scientist get a feel that the science has missed something which is very vital and is not explained in theories of rational choice, self-intertest and economic maximization. COVID-19 is misstep in scientific exploration for hegemony and economic maximization. The impact of the present crisis will be revealed in due course of time. This generation also has a better grasp of humanity. They have information on their fingertips and have a strong community extending the national and physical boundaries. The virtual world of internet technologies is an equalizer for all human race. The national boundaries are becoming hazy as the technologies expand in their reach and capabilities. The expressions of youth and their social media activities clearly indicate the awareness of today's youth. According to a World Economic Forum (WEF) report, 65% of primary school children today will be working on jobs which do not exist today and are beyond the grasp of our imagination.

2. The Four Essential Elements and the Binder

In our opinion, there are four essential elements to succeed in post-Covid education system. The key elements of future education system would be:

1. *Flexibility:* Education at the learner's pace and real needs (UN sustainable development goals) of the present-day world
2. *Cognitive, Emotional and Spiritual Intelligence:* Engaging humanely (respecting life over mere economic gain)
3. *Resilience:* Emphasis on bouncing back despite failures (learning from nature to flourish in the presence of adversities)

4. *Creative Thinking and Design Thinking:* Developing abilities of problem solving by creating new knowledge keeping in mind the end-product.

The above four elements are held together in the education system by a binder and which we call as *Lifelong learning.* Lifelong learning keeps the learner abreast with the current knowledge and technologies at all the times. The urge to learn is innate in every human being.

Let us discuss each element in brief.

2.1 Flexibility

In the current education system, the degrees and diplomas are awarded in fixed time duration after completion of the course subjects and other course requirements. The industry, while hiring, are testing the skills and knowledge of students even though they possess the required qualifications. The acquired qualification is only the minimum requirement. This is resulting in low employability. Obsolete courses are taught in education institutes. The social institutions, executive bodies and industry are not regularly interacting to educational institutions in meaningful ways. The present education lacks the courage to ask what kind of world its graduates will inhabit and what kind of world they will be prepared to build. We can evolve schemes wherein these institutions are coming together for the solutions of the existing problems in society and industry. The response and outcomes of hackathon competitions in our country are proof of effective implementation of such strategies.

In future education system, most of the world-class knowledge can be imparted through online courses, thus minimizing physical contact. Once a person acquires the knowledge, practical skills can be imparted in designated public laboratories or real world work places as per the course requirements. Some part of training can be shifted to live projects, and some part through project-based learning (PBL). The courses will be designed in such a fashion that learner will be studying at his pace by acquiring required body of knowledge. Once a person acquires required body of knowledge along with practical skills, the degree can be awarded. As the student is acquiring theoretical and practical knowledge simultaneously – that also working on live problems – the employability will not be an issue for such students. Such closed loop distance education system – as against present one-way distance education system – would be highly effective. This would also open huge opportunities of new jobs and job roles hitherto not imagined. Role of Artificial Intelligence (AI) and

machines equipped with Machine Learning (ML) backed up by solid foundation of Big Data, Internet of Things (IOT), and other upcoming technologies from Industry 4.0. As an example, IOT devices can be used to monitor activities of students specially to monitor ethical practices while taking examinations, quizzes, tutorials, etc. Innovations will drive the growth in such flexible Education 4.0.

For all round development of students, the life skill education should be made mandatory. Ancient wisdom for living good life should be included in the curriculum. The five *Koshas* as per *Shruti* are, namely *Annamaya Kosha*, *Pranmay Kosha*, *Manomay Kosha*, *Vidnyanmaya Kosha* and *Anandmaya Kosha.* These *koshas* give the essence of Indian way of life. These koshas will help the students for acquiring better life skills by telling them how to handle different issues [3].

2.2 Cognitive, Emotional and Spiritual Intelligence (CI, EI and SI)

Intelligence has to do with the long run and is integrative. Cleverness is preoccupied with short run and tends to fragment things. A characteristic of intelligence is the ability to separate "know how" from "know why". Obsession to do whatever is possible regardless of whether it is desirable is "know how" that is knowing in fragments, knowing without direction and knowing without commitment. The "know why" intelligence works slowly asking "why?" and "for what reason?" Real intelligence is close to what we call wisdom. Intelligent people excel in a different range of faculties. They possess strong imaginative sensibility – the power to envisage goods. They are good at priorities, at comparing various goods, at asking what matters most. They have a sense of proportion and right direction. Intelligence promotes good order or harmoniousness of surroundings. The exercise of intelligence requires forbearance and sense of limits. Intelligent action and thought do not violate the bounds of morality [4]. Intellect driven by vice cannot lead to intelligent action or thought (COVID-19 crisis).

The movie 'Modern Times' depicts the plight of repetitive work where emotional intelligence is not respected. The ivory tower talks of intellectual giants reveal the flip side of only cognitive intelligence. The present COVID-19 crisis is an example of irresponsible cognitive intelligence going berserk. A person contributes constructively to Humanity when all his/her intelligences are working in harmony. Task positive approach de-emphasises the humane aspect and becoming too much involved in the plight of underprivileged hampers cognitive aspects of humans. The studies of leaders in industry and academia using functional MRI has revealed these truths. The potential of an individual is expressed constructively when the leader has better spiritual intelligence. Most of the educators and

leaders have realized these truths. The future education system should incorporate these aspects for developing all three competencies in leaders. In our opinion, these three competencies are pillars of success in any kind of emerging scenario.

The elements which promote wellbeing in humans are identified as (a) Positive emotions (b) Relationships (c) Engagement (d) Meaning and (e) Achievement [3]. We can form acronym PREMA (In Marathi/Hindi this is LOVE). Cognitive intelligence without positive emotions may lead to undesirable ends. Economic maximization should never be at the cost of living beings. The United Nation Sustainable Development Goals (UNSDG) are real problems of wide scope before the mankind. Knowledge of many disciplines is required to solve these problems. All human race must be united to work on those problems of global scale. This is not possible without forming good Relationships across people of different geographical regions. The Water, air and food requirements are beyond geographical and national boundaries. Engaging the YOUTH for solving such gigantic problems should be main aim of new education policies. A person cannot enjoy work without meaning and UN SDGs provide meaning to the effort the youth is undertaking. The Achievement comes at last because the Indian concept of *Vasudhaiva Kutumbakam* (The Whole World is a United Family) keeps the aim of living in harmony with all living beings. The emotional and spiritual intelligence will be bye-products when we are working on the problems which aim for better living for human race

2.3 Resilience

Resilience is the ability to succeed despite repeated failures. A proper ecosystem where sincere efforts are valued and individuals working hard are respected is fertile ground for progress. In the real world, a person is successful or not is determined by his competencies. Competence is a combination of practical and theoretical knowledge, cognitive skills, behaviour and values used to improve performance. It is a set of demonstrable skills that enable and improve the efficiency of performance on a job.

Rethinking of education will improve resilience in system. All education is for living a good life, hence environmental education is mandatory for all. The goal of education is self-mastery followed by mastery of subjects. The responsibility to use the knowledge well must be an integral part of education. The knowledge should never be used for economic gains until we understand the effects of it on real people and communities. Students

hear about global responsibility in Universities. The Universities are funded by corporate research bodies and military, sometimes the responsibility is compromised for economic gain or other express wishes of rulers. Students learn, without telling them, that they are helpless to overcome the frightening gap between ideals and reality. We desperately need (a) faculty and administrators who provide role models of integrity, care and thoughtfulness, and (b) institutions capable of embodying ideals in all their operations.

The world has changed rapidly in the last two decades. One must acquire new knowledge and skills just to hold the present job. Many jobs have disappeared. New jobs – with new job description – are created and it is challenging to employ unless an individual acquires skills and knowledge required for these jobs. Some youngsters who have mastery over and good understanding of the present technologies are becoming entrepreneurs and flourishing. Google, Biocon and Apple are the best examples across world. Encouraging the youth to develop new technologies for solving our problems will bring in the momentum for change. What happened in Europe from 1900-1950 and in USA from 1950-2000 can happen in India in coming decade. This is the best chance for flourishing for the YOUTH in India. The Silicon Valley respects the resilience of Indian technocrats. Developing resilience in Indian ecosystem will help Indian YOUTH to express their true potential by mastering the latest technologies of the world.

2.4 Creative Thinking and Design Thinking

Educational institutions tend to seal themselves off from unpleasant and less rewarding challenges around them. When they do engage those challenges, they do as 'research', not as serious effort to solve real problems. Present education system is inadequate to solve most of the problems faced by us. We propose that students and faculty together should be engaging in the effort to solve real problems. Problem solving requires broadening what we take to be our constituency to include communities in which educational institutions are located. It requires flexibility and creativity. A commitment to create knowledge for long-term health of local communities and people. It requires overcoming the outmoded idea that learning occurs exclusively in classrooms, laboratories and libraries.

Developing new knowledge may help solve these problems, however, a new approach is needed. A new Green Revolution could address the hunger problem of the world. New mass transportation technologies will address the travelling problems of the world. ICT is helping us to tackle problems

of education in COVID-19 situation, but a lot more needs to be done. We must keep our eyes open for new technologies. Developing abilities of problem solving by creating new knowledge would be the major challenge for education system in coming days. 'Creative thinking' would be a new mantra. Along with the ability of creative thinking, a 'Design Thinking' approach is also required. Many assume that creative thinking and design thinking are same, but they are not. Design thinking approach is working with 'end product (or process) in mind' by making use of 'most' of the presently available or which may need 'urgent innovations' to solve the problems. Of course, design thinking also needs process of creative thinking, but essentially both the genres are needed if we need SMART solutions.

3. The Binder: Lifelong Learning

The system of didactic education was a good system long time ago. The modern education system evolved because of the active cooperation of teachers, students, industry and governments. Unfortunately, when the modern Universities were expanding and flourishing elsewhere till 1947, we were not independent. The Indian education system was subservient to British empire. After independence, a few of Indian Universities have made an impact on modern world indirectly through their students (like IITs, IIMs, IIITs, NITs and IISERSs). It is high time we restructured our education system to incorporate lifelong learning concept and increase the productivity of youth and middle-aged population for developing abilities of problem solving by creating new knowledge. One who is aiming to progress must be interested in acquiring new competencies to be successful in this world. What competencies are required to become entrepreneur or getting a job can be assessed and such courses should become a part formal education system. With ICT this can be integrated in the present education system.

The brain research programs have substantiated that a person can learn throughout his life. New experiences change the structure and function of the brain. As age advances the rate of learning may slow a little, but learning is possible.

4. Interrelations of Essential Ingredients

The above four elements and the binder are the ingredients to succeed in the post-Covid word. They are interlinked. Figure 1 describes various interrelations. The solid line indicates strong relation, and dashed line

represents connections at multiple levels. The overlapping of creative thinking and design thinking indicates incorporation of innovations in the right context.

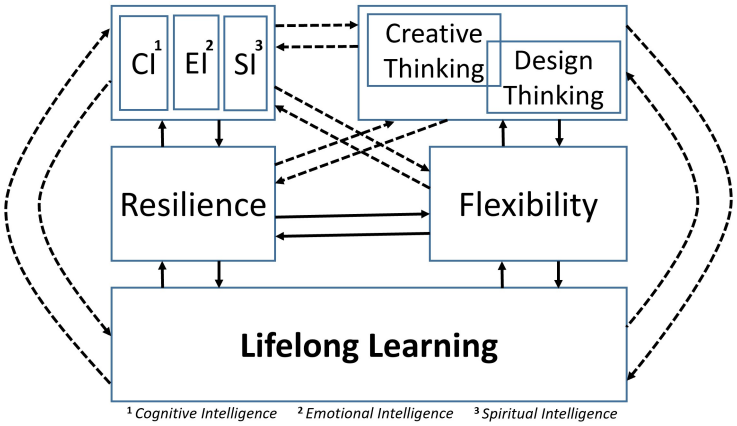

Fig. 1. Simplified interrelations among the five essential elements

Online learning is NOT only video lectures, e-books and pdfs of class notes. High quality digitized learning content should be developed to make learning interesting and engaging. To deliver subject matter online requires great deal of understanding of learning science and digital pedagogy. Every teaching faculty needs to learn this knowledge or collaborate with experts will be the other alternative. The context of diverse learner profiles poses challenge for effective delivery of content online, the institutions need to evolve the program design using these factors. Combining learning psychology, behavioural analytics, assessments to gauge and measure learner's journey and progress will help to form new strategies. Therefore, lifelong learning as a binder must be kept in mind while improvising the four key elements.

Learning science is the crux of education, not putting technology in the forefront. Learning should get reflected in the actions and behaviour of students. Learning is gradual and in incremental steps. Learning induces change in thinking and mental models of the learner as understanding deepens and concepts are strengthened. Each learning episode enables the learner to apply the acquired knowledge in practical situations of life or profession. This is possible if every faculty places proper importance to learning sciences in digital media. Institutions and faculty will blend offline and online educational models in coming days. Blended learning model (a mix of classroom and online modes) will become new norm in post COVID-19 world.

5. Summary

We stress the need to restructure the education system after COVID-19 taking in to account four key elements namely (i) Flexibility, (ii) Cognitive, Emotional and Spiritual Intelligence (iii) Resilience and (iv) Creative Thinking and Design Thinking. The binder lifelong learning provides the foundation to this framework. The future is bright. Let us make it happen.

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