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Intercalating a Multi-Barreled Approach to Educational and Pedagogical Reform: A Brief Summation of our Publications on Pedagogy

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Abstract: The objective of this paper is to summate and summarize the core tenets of our proposed multi-barreled approach to educational and pedagogical reform. This is accomplished in this paper by eliciting the core philosophy behind our approach, and presenting them in the form of easily understandable principle or bullet points; it would be more appropriate to refer to them as action points that can be easily implemented by various educational institutions and planning bodies to improve academic performance and achieve national productivity goals and milestones to boot. The progress made by mankind in the realm of education in the past few years and decades has been enormous. However, progress on this front has mostly been quantitative and not qualitative. In other words, major qualitative progress has not been achieved beyond the realm of fantasy. A large part of the problem is that wide variations persist, and there is no universal gold standard to benchmark progress against. Progress in education and in pedagogy will become make or break as economies move towards orange economies, and as birth rates fall. Economists and planners would therefore be well-advised to take educational and pedagogical reform seriously.

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I. INTRODUCTION

The objective of this paper is to summate and summarize the core tenets of our proposed multi-barreled approach to educational and pedagogical reform. This is accomplished in this paper by eliciting the core philosophy behind our approach, and presenting them in the form of easily understandable principle or bullet points; it would be more appropriate to refer to them as action points that can be easily implemented by various educational institutions and planning bodies to improve academic performance and achieve national productivity goals and milestones to boot. The progress made by mankind in the realm of education in the past few years and decades has been enormous. However, progress on this front has mostly been quantitative and not qualitative because standards of education are ununiform. In other words, major qualitative progress has not been achieved beyond the realm of fantasy. A large part of the problem is that wide variations persist, and there is no universal gold standard to benchmark progress against. In other words, there is no conceptual clarity yet. Progress in education and in pedagogy will become make or break as economies move towards orange economies, and as birth rates fall.

Birth rates have been falling consistently for years, and may fall even further. There are various factors for this and we have discussed all these extensively on population management. Attempts to boost birth rates artificially have almost never worked. If attempted in developing countries like India, they may have undesirable consequences like boosting the quantum of unskilled labour – if at all they work, that is. This is what we as anthropologists must inform.

The trick here would be to boost and improve the quality of the education system, while taking measures to counter the effect of lower birth rates as we have suggested and proposed in innumerable publications. Of course, we must also move towards sustainable development models at the same time, and we are already making pretty good progress on this front. Economists and planners would therefore be well-advised to take educational and pedagogical reform seriously. This is a make or break situation. This is a do or die situation. The following are therefore, the essentials of our approach from the point of view, and the perspective of this paper. They are deliberately and intentionally kept brief, as the title of this paper would clearly suggest:

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- *Strong Emphasis on Stem - Science, Technology, Mathematics*

"Science, technology, engineering, and mathematics", abbreviated for STEM in short, is one of the most talked about terms today. Loosely defined, it is an omnibus and an umbrella term that is used to collectively refer to the distinct yet tightly inter-related disciplines of science, technology, engineering, and mathematics. This term is more commonly and gainfully employed in the context of education policy or educational planning in governmental bodies and educational institutions. It is sometimes, and not without valid reason seen as a passport and a ticket not only to individual success, but also to national success, but national proficiency, and national competence in a wide variety of economic and non-economic areas. While STEM has canonically and traditionally included science, technology, engineering, and mathematics, some loop in soft and inexact sciences such as economics, psychology, sociology, anthropology, and political science too. In countries such as India, the latter classification is much less commonly. While the origin of the term STEM is generally thought to have originated in the United States through the efforts of Beverly Schwartz, Charles Vela, Peter Faletra, and others, the term is widely used in some context or the other in India too, and several other developing countries. In countries such as India proficiency in STEM subjects is seen as highly valued, though proficiency and competence may be slipping. A correction mechanism must be put in place, as other Asian tigers are taking off in science. All nations on the planet must see STEM proficiency as the bedrock of national success, and must take steps to up their ante in this regard, to outshine and outpace other rivals.

- *Strong Linguistic Skills*

In the broad field of linguistics, linguistic competence refers not only to proficiency in a language as such, but to the system of unconscious knowledge that one has access to when they learn or know a particular language. The term must be naturally distinguished from "linguistic performance", which includes the ability and competence to use one's own language or acquired language in the real-world. The critical period hypothesis is well-established hypothesis in the field of applied linguistics and second language acquisition which argues that a person can achieve native-like fluency in a second language only before a certain age, and the ability to learn a new language tapers off sharply after this age. Aspects such as linguistic ideology must be of course factored in, and the social sciences have a lot way to go before they can be considered mature. Learners' ability by social and cultural class, ethnic background and a wide variety of other factors must also of course be roped in, and an analysis be performed on the basis of a wide variety of factors. Linguistic ability is also tied inexorably to verbal intelligence. Verbal intelligence refers to the ability to understand and reason through the medium and mechanism of language. It also includes the repertoire of vocabulary, reading comprehension, and the ability to express oneself flawlessly and effectively through the artful use of words. It also encompasses a person's capacity to think abstractly and concretely and use language to communicate with others, solve problems, conceptualize things, think critically, learn dynamically and proactively and grow. We have also the concept of linguistic expectation, and non-linguistic expectation, which we have written about extensively. We have also written extensively about language dynamics, and English is a neutral and a non-controversial language in India, though biased towards the elite. Lexical development of non-dominant languages must also be thought of, and countries such as Japan and South Korea have progressed remarkably, without proficiency in a dominant language. [1] [2]

- *No Dogma Regarding Language, no One Size Fits all Bill*

In 1906, Mahatma Gandhi wrote in his book Hind Swaraj or Home Rule that a universal language for India and its primary lingua franca would be Hindi, with the option of writing it in Persian or Nagari characters. This would be essential he believed for fostering, nurturing and inculcating inter-faith harmony, and for providing administration in a language that could be easily understood by the people. However, Gandhi sometimes supported Hindusthani as well, though explicit support for the latter dwindled after independence. Gandhi's ideas eventually reigned supreme, though the seeds for linguistic provinces were sown way back in 1917, with the constitution of the Andhra Congress Provincial committee. Linguistic states took off in a big way after 1956, with Andhra Pradesh taking the lead. There was some opposition to the imposition of Hindi in the South and in the West, and as of 2025, English remains as well-entrenched as before. However, the proficiency of teachers in English leaves a lot to be desired, and in some cases, students learn neither English nor their mother tongue. Consequently and resultantly, their real-world understanding and grasp on a variety of subjects stumbles and falters. The quality of education suffers too. However, there is no denying the fact that there is a substantial English speaking elite in India, and their contribution to the economy remains spectacular and stellar. Therefore, no one size fits all bill is ever possible. The trick is to make education in the mother tongue as attractive as possible, and work out lexical development of Indian languages in parallel. We had written about this at length previously. The government of India has already initiated some baby steps in this regard, though a formalization and generalization of techniques becomes necessary. Recently, engineering graduates from a Marathi-medium college graduated with honors, and landed plum jobs in multinational corporations. This should throw vital clues at planners; however, the abolition

[1] Akmajian, Adrian; Demers, Richard; Farmer, Ann; Harnish, Robert (2010). *Linguistics: An Introduction to Language and Communication*. Cambridge, MA: The MIT Press

[2] *Aronoff, Mark; Rees-Miller, Janie, eds. (2000). The handbook of linguistics. Oxford: Blackwell.*

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of English is almost impossible. This would create a large furore and an uproar in many sections of society. Besides, it cannot ever come to pass. Even if students learn in the vernacular, a sufficient level of knowledge of the English language is required. Also, refer to our sections on functionalism and the automation of education. [3] [4]

- *360 Degree Knowledge - Minimal Knowledge Regarding all Useful Subjects*

Beside proficiency in core subjects and critically useful subjects such as science and mathematics, it would be greatly useful if the students' knowledge base is critically enhanced in various other subjects too- these must be thrown in in bits and pieces, and only to the extent necessary. We leave this to educational planners and thinkers at the second rung, and the second layer. However, many subjects in the social sciences are essentially Eurocentric in orientation, and all this must change with the passage of time. Knowledge of such subjects must ideally be imparted before students opt for specialization – In India, this would be before grade or class ten. [5] [6] [7] [8]

- *Strong Focus and Emphasis on Concepts*

A concept may be defined as an abstract idea or a general notion, in almost any subject under the sky. A concept often serves as a building block for much more complex ideas and paradigms. Concepts are fundamental to cognitive abilities, and are vital to many disciplines such linguistics, psychology, and philosophy. In the Indian education system, knowledge of concepts is seldom imparted consciously and meticulously. Also a review of previously acquired knowledge in the form of nuggets is seldom imparted. All this must change, and if implemented, will improve educational outcomes greatly, as the students understand the subject matter much, much better.

- *Strong Focus and Emphasis on Application of Knowledge*

Application of knowledge refers to the process of applying theoretical knowledge into practice in order to solve real or realistic problems, make decisions, or achieve specific goals in actual real-world conditions and situations. Students must be taught real-world applications of theory, and this must be done with a practical tinge or practical flavor to it. Even if practical knowledge cannot be dynamically or realistically imparted, it must at least be mentioned in passing in all subjects, including more abstract ones such as mathematics. For example, real-world application of calculus may be taught to students. Application-based learning, which is also sometimes known as project-based learning, is a teaching method where students learn by applying previously acquired knowledge to real-world problems and constructive projects though hands-on and collaborative learning.

- *Lexical Development of Indian and Other Non-Indian Languages Including Technical Vocabulary*

Lexical development of Indian languages, or other non-dominant languages is of paramount importance for the smooth functioning of the education system, though this has hitherto been neglected by Indian planners. We had written about lexical development of non-dominant, or relatively non-developed languages extensively in a previous paper. Several thumb rules such as ease of learning, maximizing economic output, maximizing cultural output, maximizing social empowerment and social mobility, maximizing first language proficiency, maximizing second language proficiency, non-redundancy, alignment to the needs of the job market, etc. Words such as Sulphuric acid, and keyboard may be left as they are as duplication would not only be foolish and futile, but would greatly add to student overload, who must end up learning two words in each case. [9]

- *Functionalism in Education*

We had dealt with the concept of functionalism in our paper, "Embracing "Functionalism" in pedagogical theory: Why we may eventually need to justify every component of pedagogical and course content" which was published in the early part of 2025. Functionalism as it originated in the social sciences in the early part of the twentieth century related to the role played by different functions of society in maintaining social cohesion and social order. We had written extensively about functionalism in our previous papers. Readers may read them for further clarity, or may refer to a standard textbook for further clarity. This would require teaching foundational concepts and competencies, teaching life skills, teaching practically useful knowledge. Everything in the syllabus must be justified, and syllabus framers must strive to provide an adequate justification for everything in the syllabus; contrarily, nothing useful must be left out from the syllabus. Also, aspects such as Shakespeare's plays and Milton may be left out entirely. This is nothing but a non-brainer. Readers are requested to read

[3] King, Christopher R. (1994). One Language, Two Scripts: The Hindi Movement in Nineteenth Century North India. New Delhi: Oxford University Press.
[4] Shapiro, Michael C. (2001). "Hindi". In Garry, Jane; Rubino, Carl (eds.). An encyclopedia of the world's major languages, past and present. New England Publishing Associates. pp. 305–309
[5] Bruner, J. S. (1966). Toward a Theory of Instruction. Cambridge, Massachusetts: Belkapp Press.
[6] Bruner, J. S. (1971). The Relevance of Education. New York, NY: Norton
[7] Rogers, C. R. (1983). Freedom to Learn for the '80s. New York: Charles E. Merrill Publishing Company, A Bell & Howell Company.
[8] Jones, Leo. (2007). The Student-Centered Classroom. Cambridge University Press.
[9] Developing cogent strategies for the lexical development of non-dominant languages: Empowering linguistic have-nots and maximizing linguistic performance, Sujay Rao Mandavilli, IJISRT, July 2024

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all our multiple publications on pedagogy – books and papers included. We had also developed theories of pedagogical content in a previous paper. [10]

These included the maximum relevant learning principle, the maximum individual psychological impact principle, the alignment with learning capacity principle, the maximum individual benefit for life or career principle, the rational individual principle, the maximum societal benefit principle (Practical needs approach. Local needs approach or societal metrics approach), the maximum long-term societal benefit principle, the maximum international long-term societal benefit principle, the antidote to popular ideologies principle, the science and pseudo science principle, the change in individual mind-orientation principle, the altered social behaviour principle, the change in cultural or societal orientation principle, alteration in mindspace principle, the neutralization of perspective principle, the principle of non-dogma, the sociology of science principle, the overarching knowledge principle, the internal consistency principle, the cultural needs principle, the individual needs principle, the justification for inclusion principle, the intelligent learning principle, the student friendly course content principle, the meaningful Identity formation principle, the thought worlds and worldviews principle, the ideal Choice of language principle, etc. These have been explained in detail in our previous papers and publications.

- *Teaching Foundational Competencies.*

Foundational competencies refer to those fundamental skills and abilities which serve as a basis for enhanced learning and development, or a wide variety of fronts, and are applicable across various roles and contexts. While there is no satisfactorily universal list of foundational competencies, these largely align with life skills, and partly overlap with them. The key aspects of foundational competencies are universality, foundation for future learning, and relative non-changeability. They must also be relatively versatile, and adaptable to a wide variety of complex and derived situations. As such, they may or may not be included in the primary syllabus, and may be included and incorporated in the secondary and the additional syllabus as necessary. Concepts such as numeracy, financial literacy, learning skills, communication, team work, leadership, managerial skills, and team playing skills may form a part of this list; however, some of these may overlap with other components of our list.

- *Teaching Practically Useful Knowledge*

Practically useful knowledge must also be taught as far as possible, and nothing that is extremely useful in the real-world, must as far as possible be left off the list. One approach is to make as list of such skills based on the utility or value they have in the real-world, and then work backwards to the syllabus. As a part of this rubric, we may wish to teach health, hygiene, nutrition, and other practically useful skills, for example.

- *Focus on Innovative and Creative Thinking Methods*

Innovation refers to the process of creating, producing or inventing something new, regardless of whether it is an abstract concept or idea, an application of something that already exists, product, service, process, that either creates value or adds a new use or application. Innovation almost always create something new of practical value, and also greatly improves society in the process. Creativity refers either to the innate or acquired ability to form new, novel or highly valuable ideas or works using one's own imagination. Creative output may either be intangible and abstract, or tangible and non-abstract. Creativity may also be used to find new solutions to problems, or to apply pre-existing knowledge in new and in creative ways. We may use several techniques for innovation and creativity; for example, we may use lateral thinking skills to examine problems from an unconventional angle, or we may use out of the box thinking techniques. We may also adopt grounds up thinking techniques or 360 degree thinking techniques as necessary. Students possess an enormous degree of innovative and creative thinking which must be tapped and harnessed. However, our rigid and regimented thinking systems does not allow such instincts to flourish, prosper and thrive. Instead, it nips them in the bud. We must nurture student curiosity, whet intellectual curiosity, and whet their appetite for learning. This is what our education system should focus on. [11]

- *Focus on Logic and Reasoning*

Logic and reasoning are two tightly interrelated processes of thinking, and the term is thought to have originated from an ancient Greek term logos meaning language. They are so tightly interrelated, that one cannot be understood without another. Logic may be described as a formal system that is used to quantify the veracity of arguments and conclusions, while reasoning is a much wider process of drawing inferences and arriving and concrete and reliable conclusions. Logic therefore provides the framework for evaluating reasoning, while reasoning makes use of logic in order to solve problems and make informed and calculated decisions. Logic and reasoning skills are said to be sorely lacking among today's students, and this may be said to be on account of rote learning and memorization, a relic of the pre-internet age. We had discussed and debated logic and reasoning extensively in our previous papers.

[10] Embracing "Functionalism" in pedagogical theory: Why we may eventually need to justify every component of pedagogical and course content, SSRN, January 2025

[11] *Platzer, Norbert A. J. (1963-04-18). "Incentiveness, Motivation, Training Needs of a Scientist". The Springfield Union. p. 52*

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➢ *Focus on Critical Thinking Skills*

Critical thinking is extremely important in today's world, and is a critical part of the orange economy. Critical thinking is nothing but the ability to analyze information objectively and form reasoned judgments, without error, bias, or prejudice. Critical thinking requires actively questioning all previously-held assumptions, identifying potential and manifest biases, and using logical reasoning in order to evaluate evidence and make informed decisions. Core aspects of critical thinking include several aspects such as analysis, evaluation, judgment, inference, estimation, prediction, etc. The importance of critical thinking extends to informed decision making and problem solving, though this is only an extremely short list. One must develop critical thinking skills by questioning all forms of assumptions, and by asking why all the time. One must also inculcate a plurality of perspectives, and be open-minded to new perspectives, opinions and ideas. [12] [13]

➢ *Focus on Scientific Method and Distinguishing Between Science and Pseudoscience*

The scientific method is a formal method for acquiring knowledge that is characterized by systematic investigation and has molded and guided progress in science for aeons. Early thinkers such as Aristotle, and Plato contributed to scientific thought, and so did Rene Descartes, Francis Bacon, Sir Isaac Newton, and others at a later point in time. Scientific method is also based on Epistemology, which is the science of the construction of knowledge. It also heavily derives from the philosophy of science which decides what constitutes genuine science, and what does not; Scientific method also involves the formulation of hypotheses based on evidence or proof, rather than mere hunches or conjectures, the further development of such hypotheses, and the development of better theories and laws. These are all formulated as a series of sequential and interdependent steps. Students must be strong in scientific method; they must also learn to distinguish between science and pseudoscience.

➢ *Focus on Life Skills*

Life skills are abilities for adaptive and positive behavior that enable humans to deal effectively with the demands and challenges faced in everyday life. This concept is also termed as psychosocial competency, and such skills include social skills, thinking skills, and emotional skills as well. The degree of importance accorded to each of the skill tends to vary greatly depending on social norms and community expectations intrinsic to the society in question, but skills that lead to physical and emotional well-being are much more important and universal. They must be inculcated, taught, and practiced regardless of the society in question. According to Madhu Singh, UNESCO Institute for Education, Hamburg, life skills can be defined as follows: "Ensuring that the learning needs of all young people and adults are met through equitable access to appropriate learning and life skills programmes". Life skills are typically imparted informally through parenting, but we believe the time has come to develop them formally in students in classrooms. Students must at least be aware of them, and their existence. This is because most students are not exposed to them during parenting, and are raised in less than ideal conditions. We had proposed a total of three hundred and ninety two skills in a book entitled, "A practical compendium of top life skills and universal human values from a social sciences perspective". This was published under various names in Google books, Amazon and Eliva press.

➢ *Focus on Universal Human Values*

Universal human values refer to shared beliefs, guiding values and strong principles that are considered to be extremely important, pivotal and basic regardless of cultures and societies, often serving as the ethical and moral foundation for value based judgments and judgments. These values, such as truth, love, peace, universal brotherhood, and nonviolence, are often fundamental and a foundational to a harmonious and stable society, not to speak of an inclusive one. Such values also bring out the inherent dignity and worth of every individual, irrespective and regardless of their social, cultural or socio-economic background. Some common examples of Universal values include respect for human rights, environmental responsibility, social justice, civic sense and engagement, etc. To sum it all up, universal human values are essential and necessary to build a just, equitable, and peaceful world, fostering both individual and collective wellbeing, justice, peace and harmony.

➢ *Developing Numerical Skills and Numeracy*

Numerical skills, or numeracy skills, are the ability to understand, manipulate, and apply mathematical concepts and information in a wide variety of everyday practical situations. Such skills encompass basic arithmetic (addition, subtraction, multiplication, and division) as well as the ability to interpret and utilize data for various downstream uses and applications, understand and interpret different types of graphs and charts, perform statistical analysis, understand ratios and trends, and apply mathematical principles to solve real-world problems. Strong numerical skills are extremely important and in various aspects of life, such as research, teaching and academics, managing personal finances to succeeding in a wide plethora of professional fields. Students nowadays often use calculators and computers, and forget to practice their numeracy skills. This leads to declining numeracy skills in general.

[12] Zegarelli, Mark (2010). *Logic For Dummies*. John Wiley & Sons. p. 30

[13] Wile, Bruce; Goss, John; Roesner, Wolfgang (2005). *Comprehensive Functional Verification: The Complete Industry Cycle*. Elsevier. p. 447

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➢ *Developing Problem Solving Skills*

Problem-solving skills refer to a wide array of general abilities that are needed to identify, analyze, and resolve complex real-world problems effectively and efficaciously. Such skills involve, but are not limited to, critical thinking, innovation, creativity, and decision-making to find solutions to seemingly complex and intractable issues. These skills may be important in both academic and non-academic settings, impacting learning abilities greatly. Key components of problem-solving skills include problem identification, data gathering, data analysis, data interpretation, brainstorming, creative analysis, proposing of solutions, evaluation of solutions, and decision making. Problem solving skills may be inbuilt into a plethora of problems; else, they may be taught as a supplementary topic.

➢ *Focus on Time and Space Encapsulation*

We have written extensively on time and space encapsulation, and we consider it to be one of the central tenets of contemporary twenty-first century pedagogy. This is essential because pre-scientific constructs still eerily dominate, even among more educated fold. Many educated people consider the earth and the universe to be just a few thousand years old, while in reality, the universe is over eleven billion years old, and the earth 4.6 billion years old. People also believe in religious creationism of different kinds, and in mythology too. The time has come to set this right, and allow a more scientific point of view to dominate. Readers are requested to refer to our earlier ruminations on time and space encapsulation. Time and space encapsulation will provide a broader and a more overarching framework against which other subsidiary phenomena can be studied and truthfully investigated without bias or dogma. [14]

➢ *More Ethnography and Groundwork- Driven Research*

Ethnography is a systematic and an often prolonged study of different cultures from a usually emic perspective, though other approaches may often be applied. Traditionally speaking, ethnography explores culture and its several interrelated attributes from the point of view of the subject of the study. Ethnography is therefore a type of qualitative social research that a systematic and deep-rooted study. At the core of ethnography is the participant observation method, which was popularized by Bronislaw Malinowski and others in the early 1920's. We believe that ethnography must be progressively applied to pedagogical cultures, and this will give non-western cultures and non-western societies a leg up and eliminate western bias. [15] [16] [17]

➢ *Better Educational Psychology*

Educational psychology is an extremely important branch of psychology that is extremely close to our heart so much so that we have discussed this extensively in the past. This field of study is closely and extremely focused on understanding how people learn and acquire new skills in the context of different social and cultural settings, and how this suitably acquired knowledge can be used to improve educational practices across a broader spectrum of learners. Key aspects of educational psychology include understanding the learning process, applying psychological principles, addressing individual differences, promoting effective teaching and learning, etc. Educational psychology must be used in all aspects of education and pedagogy for better decision making, but unfortunately this is not done.

➢ *Better Cultural Understanding and Cross-Cultural Understanding Among Students*

Cultural understanding is the ability to interact harmoniously and effectively with people not only from one's own culture but individuals hailing from diverse cultural backgrounds. It requires understanding the beliefs, values, customs, and behaviors of individuals from diverse backgrounds from their own perspective, without letting go of one's own cultural perspective. Bases, prejudices and stereotypes must also be got rid of. Developing cultural understanding and cross-cultural understanding is becoming exceedingly crucial and important for effective and hassle-free communication, building sustaining and long-lasting relationships, and achieving success in personal and professional life. Cross-cultural understanding also requires the ability to understand cultural differences, and bridge cultural worlds. Such skills must be taught to students from a young age preferably as an integral part of the curriculum, though history, geography and the social sciences.

➢ *Better Interpersonal Skills Among Students*

Interpersonal skills refer to a wide range of general abilities that people use to effectively interact and communicate with other people across a cultural and social spectrum. These skills are extremely essential for building strong and long-lasting relationships, collaborating beneficially with teams, and managing a wide range of interpersonal situations successfully. Such skills may include a wide range of abilities, including verbal and nonverbal communication abilities and strategies, adaptability, flexibility, active listening, empathy and understanding, teamwork, collective goal setting, emotional intelligence, besides conflict resolution

[14] Hunt, Martin (2006). "Why Learn History?". In Hunt, Martin (ed.). *A Practical Guide to Teaching History in the Secondary School*. Routledge. pp. 3–14

[15] Hymes, Dell. (1974). *Foundations in sociolinguistics: An ethnographic approach.* Philadelphia: University of Pennsylvania Press.

[16] Kottak, Conrad Phillip (2005) *Window on Humanity : A Concise Introduction to General Anthropology*, (pages 2–3, 16–17, 34–44). McGraw Hill, New York.

[17] Heath, Shirley Brice & Brian Street, with Molly Mills. On Ethnography.

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mechanisms. These intersperse and overlap with life skills, and communication skills, and as such, all the three go hand in hand.

- *Preparing Students to Face the World*

Preparing students to face the real-world and preparing students for the future requires suitably empowering them with a wide range of skills that extend far beyond traditional academics and conventional areas of study. This naturally includes aspects such as creative and critical thinking skills, problem-solving skills, communication skills, and collaboration skills, as well as promoting adaptability, flexibility, dynamism, vigour, vitality, and a growth mindset. Students must be taught to adapt and adjust in an ever-changing world.

- *Teaching Students Social and Civic Responsibility*

Social responsibility is an important ethical concept that requires a person or an individual to work and cooperate with other people and organizations across a spectrum for the wider benefit of the community. Environmental awareness which is becoming extremely important nowadays, is understanding how human actions affect the biotic and abiotic world and recognizing the importance of human protection of the environment, while furthering sustainable development. Civic sense refers to the practice of responsible citizenship and meaningful participation in the civic affairs of a community. It encompasses a wide range of behaviors such as respecting laws, rules, and regulations, maintaining public and common spaces, and showing consideration for fellow citizens by not interfering in their rights and liberties.

- *Emotional Well Being of Students*

Emotional well-being in students requires not only the ability to understand and manage one's own emotions, but also cope with life's broader and wider challenges, build healthy, sustaining and meaningful, relationships, and merge various skills into a broader overarching framework to achieve, sustain, and maintain success on a wide set of operating parameters. Emotional well-being leads to improved mental health and enhanced quality of life, besides of course, resilience, positivity, and higher productivity. This requires building up positivity, empathy, and replacement of negative thoughts with positive ones. It also requires stress, trauma and agony management to a great degree, most of which can be acquired only in real life. Students must at least be made aware of them. We also then have the concept of socio-emotional learning which helps students become more aware of these aspects. Students must develop emotional intelligence, and one that is measured by the emotional quotient.

- *Making Students Technology Savvy*

Students must also be made technologically savvy right from a very young age, and must be caught generally young. Being technologically savvy means having a strong understanding and a workable and an efficient practical knowledge of modern technology, more so computers and digital devices which are widely used in all walks of everyday life. Being tech-savvy is becoming increasingly important in today's world for both personal and professional success. This requires proficiency with devises, trouble shooting, understanding concepts, and problem solving skills. The concepts of technology must be taught through theory right from a young age, and practical lessons must also be applied and generally made available.

- *Enhancing Inquisitiveness, Thirst for Knowledge, and Passion for Learning*

Inquisitiveness is a strong desire to acquire new forms of knowledge, by asking questions and exploring new concepts and ideas. Inquisitiveness is also characterized by innate and passionate curiosity and a tendency to investigate or inquire a broad spectrum of issues. Inquisitiveness is generally seen a positive trait associated with a thirst for knowledge and understanding, except when applied excessively. Inquisitiveness leads to a thirst, hunger or passion for knowledge which is a strong and persistent desire to learn and acquire new forms of knowledge. This naturally impacts learning outcomes positively, and boosts economic productivity as well.

- *Moving Towards Artificial Intelligence Based Education and Automation of Education in due Course*

This is absolutely, and by far, the most important paper and the most important section of this paper. This is because it bears and carries with it, the absolute potential to transform education completely, and change it for the better. This can be done by imparting education that is by far of much higher quality than it is at present. This will significantly iron out all the present issues associated with low teacher quality, low level of knowledge of the teacher, poor teaching skills, absence of English knowledge or proficiency, absence of knowledge or proficiency of any other knowledge, inability to resolve doubts, etc. It will also iron out problems with lack of uniformity or consistency of education. It will also bridge gaps between different socioeconomic groups and sociocultural groups. It will also bridge gaps between elite schools and non-elite schools. It will also help India and other developing countries catch up with the west. We believe this concept is so important, it will be a game changer and an epoch maker for the world. It is indeed very important, but there are many pitfalls involved. Firstly, we need to improve infrastructure. Electricity supply is still erratic, though solar panels can be made available to all schools in the near future. This is already being done in several Indian states, Computers and robots need to be purchased (we had already discussed progress on this front previously) and back up and contingency plans need to be made available. As a matter of fact, automation of education is already catching steam in higher education. As a matter of fact, many institutes in Kota in Rajasthan are closing down as education is being increasingly automated. Therefore, automation and AI in education can be the next big thing in the twenty-first century.

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Artificial intelligence is being increasingly used in learning in many countries in education, though trends in adaption vary. Artificial Intelligence is transforming education by personalizing learning content and techniques, automating repetitive administrative tasks, and providing new ways for educators to engage meaningfully with students. Tutoring, student monitoring and grading can both be automated to a large degree, providing consistency and quality. The entire process of teaching can also be automated, with teachers serving only as standbys. We believe automated teaching and automated learning is the ways forward, but there must be adequate checks and balances. There is a sad dichotomy here; developed nations are not particularly interested in the needs and aspirations of developing countries, while there is a genuine dearth of high quality intellectuals in developing nations. We still have copy paste scholarship in a vast majority of cases. Someone must set the tempo, pace and direction and provide the necessary template and format for developing countries.

Therefore, we must have digital learning sooner than later. Digital learning makes use of technology-based platforms to support and enhance many parts of the learning process, or the entire learning process. Digital learning uses digital platforms, resources, and tools to impart education, both in traditional settings and in entirely online settings. This may include diverse aspects such as online courses, educational videos, digital textbooks, and interactive learning platforms. We may also have flipped learning or student-centric learning built on the multiple concepts of a flexible environment, rich learning culture, intentional content, and professional educator. We may also have blended learning where traditional learning methods are interspersed with online activities. Gamification, virtual reality and augmented reality are also becoming increasingly common in education. [18] [19] [20]

- *Microlearning and Nanolearning*

Microlearning is a novel approach and technique to learning that typically delivers pedagogical content in short, and in focused bursts, to enhance students' learning abilities. Therefore, larger units of learning are broken down into smaller, and much more manageable units, making it easier for learners to absorb information and retain it. Nanolearning is another learning method that delivers content in extremely short, bursts, to allow for quick acquisition of knowledge and its reinforcement. Both approaches go hand in hand, and can be extremely useful in the context of the twenty-first century.

- *Scaffolding and Handholding*

Scaffolding in education is a novel teaching strategy in which educators provide temporary support to help students learn entirely new concepts or skills which they may otherwise have great difficulty in grasping and assimilating. This support may be gradually reduced as students become more proficient in the subject, and gain confidence and mastery of it. Handholding of students must also be accomplished, particularly weak ones.

- *Collaborative Learning*

Collaborative learning is an approach and technique where students work together in usually small groups to solve complex problems, complete tasks, or learn entirely new concepts. The emphasis here is interaction, shared responsibility, and social aspects of learning, where students learn from each other often in a casual and a comfortable setting. This method is opposed to individual learning, as it makes use of the skills and problem solving abilities of many learners to achieve a common goal. Collaborative learning involves group work, active participation, social interaction and shared responsibilities, and offers diverse perspectives as well. Examples of collaborative learning are study groups, discussion grounds, problem solving groups, project groups, common interest blogs, and online threads.

- *Progress Tracking and Comprehensive and 360 Degree Student Evaluation*

Student progress tracking is commonly accomplished by means of report cards. Grading is commonly resorted to, though in some cases, marks are awarded as a percentage of one hundred. There are wide variations between country to country and school system to school system, though the fundamental essentially remain the same. Extracurricular activities are not usually graded in the main layout but presented as supplementary information. There must be greater end to end evaluation of students, and aspects such as attitude and behavior must be factored in. Talent areas and weak areas must also we still have a long way to go here, and complete 360 degree evaluation is a long way off.

- *Sports and Games*

Different types of sports and games must be encouraged in school. This is sometimes not possible given the fact that many schools do not have sufficient or adequate play grounds or playing fields. Physically vigorous activities such as football and volleyball must be encouraged or promoted as opposed to sedentary ones such as cricket and tennis. Swimming may also be encouraged, though very few schools possess swimming

[18] *Hartman, J.; Moskal, P. & Dziuban, C (2005). Preparing the academy of today for the learner of tomorrow.*

[19] Wicks, David A; et al. (2015). "An investigation into the community of inquiry of blended classrooms by a faculty learning community". *The Internet and Higher Education*. **25**: 53–62

[20] Alexander, S. & McKenzie, J. (1998). *An Evaluation of Information Technology Projects for University Learning*. Canberra, Australia: Committee for University Teaching and Staff Development and the Department of Employment, Education, Training and Youth Affairs

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pools. The advantage of sports and games are that they allow for greater physical fitness, allowing students to concentrate on their tasks better.

- *Better Physical Fitness Among Students*

Physical fitness refers to the ability of an individual's body to perform different kinds of daily activities effectively and efficiently without undue stress and fatigue. Physical fitness allows people to participate in heavy work schedules, sports and leisure activities with a great deal of energy, enthusiasm, and alertness. Physical fitness requires proper nutrition, regular exercise, adequate rest, and a combination of all these. Students must be graded on the basis of their physical fitness, endurance and stamina given the fact that these will stand them in good stead throughout their entire lives.

- *Other Extracurricular Activities as Required*

Other types of extracurricular activities such as dance, drama, elocution, quizzes, astronomy, martial arts, trekking and signing may also be promoted, and one or more of these may be made mandatory. These will undoubtedly aid in the confidence building of students in general, and help them to discover their true passions, talents and strengths. This process may even have a bearing on their eventual success in life.

- *Student Discipline*

Good old-fashioned student discipline must still be adhered to, and this will still yield and bear rich dividends throughout life. Students must be taught to be punctual and respectful to teachers, school staff and other students. They must inculcate good manners and good habits. Bullying, ragging and other forms of indiscipline must not be tolerated at any costs, and under any circumstances. Students may even be graded on the basis of their discipline, and unscrupulous behavior stigmatized if necessary through operant conditioning.

- *Better Teacher Training*

Teacher training, which is also sometimes known as teacher education, is a formal and a structured process that is designed to equip future teachers with the knowledge, skills, and capabilities that are necessary for them to become effective educators. This training generally encompasses a wide variety of subjects, including but not limited to, pedagogical skills, student psychology, subject-matter knowledge, and knowledge of allied subjects. Teacher training is a weak area in India, and many teachers lack the attitude and the temperament to become good teachers – they lack the requisite primary skills too. In many cases, teachers are so badly and poorly paid, that this acts as a disincentive for them to enter the profession.

- *Better School Infrastructure*

School infrastructure in India is generally in shambles – it is in a pathetic state with the exception of many private schools, and high-end corporate schools. There have however been some improvements in areas such as electricity, computer access, and drinking water, and solar power installation. Some significant gaps still persist in other areas like internet access, libraries, science laboratories, sanitation, facilities for extracurricular activities, and facilities for children with special needs. A holistic school infrastructure is of paramount importance for creating a conducive learning environment and enhancing learning abilities. Wide variations in infrastructure in schools promote the learning and the digital divide and ensure that the full potential of the overall Indian population is not reached. Of late, the central government has launched missions such as the Samagra Shiksha Abhiyan, though we still have a long way to go here.

- *Personalized Learning as Far as Possible and Student Centric-Approaches*

Personalized learning is an approach to learning and education that seeks out to tailor fit the learning process to meet each student's unique and special needs, interests, learning styles, and personal habits. It does away wherever possible, with a one-size-fits-all model to one where instruction, pace, and content are all tailor made to suit each student's unique learning style and learning abilities. This approach also additionally aims to increase student engagement, proficiency in a wide variety of fields, overall accomplishment, and self-directed learning by providing customized support and teacher interventions if necessary. This must be combined with student-centric processes wherever possible and necessary. This is not a pipe dream; this is indeed possible if good processes are in place, and good teachers exist. We must bear in mind the fact that great stalwarts such as Mokshagundam Vishweshwarayya and APJ Abdul Kalam came from government schools, albeit pre-independence. The quality of government schools barely appears to have improved ever since.

- *Talent Identification and Talent Nourishment*

Talent identification refers to a complex and a highly structured process of recognizing individuals who have the potential to excel or perform remarkably well in a given specific area, such as science or a given sport or profession. This step by step involves identifying those with the aptitude and capability to develop into high-performing individuals in their chosen field of endeavour or study. This process can be applied to various fields in schools, including sports, academics, and extracurricular activities. This field is nascent in India, and barely existent.

- *Non-Discrimination on the Basis of Caste, Ethnicity, Social Background or Religion*

Additionally, there should be no discrimination in schools, colleges and other educational institutions on the basis of caste, ethnicity, social background or religion. This rule should be uniformly applied regardless of whether the institution is a government one, government backed of affiliated one, or a private one. This rule should be applied in true letter and spirit, and there should be a mechanism for escalating exceptions and violations. This will ensure that the full potential

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of each student is realized, besides ensuring that a spirit of camaraderie prevails.

- *More User-Friendly Textbooks*

More user-friendly textbooks should be developed eventually, and textbooks should be replete with rich and variegated illustrations, drawings and examples, preferably easy to understand ones. Colour drawings and must be gainfully employed and used wherever necessary. These must bring out all the concepts in an easy to understand and an easy to comprehend fashion. Guidance notes may be provided for teachers and even parents wherever possible. Bilingual textbooks too can help in certain cases, and we look forward to teacher and student feedback here. Parents too can contribute with their feedback. The meanings should at least be provided in an additional language at the end of each chapter.

- *Parent Participation*

Parent participation is indeed necessary throughout the process of education, and parents should be made important stakeholders in the entire process of education. Parents must be told that they will be important beneficiaries if their children do well at school. They must also be told that they will do well later on in life, if and only if they do well in school. Parent teacher meetings must be held regularly, and parents must be signatories to student report cards.

- *Taking Student and Parent Feedback*

In addition, parents and students feedback may be obtained at regular intervals. This will ensure that their feedback is included in future improvement processes. In some cases, however, schools and educational systems may not be ready for such feedback, as taking feedback, and not implementing suggestions will prove to be an utter disappointment for both students and parents.

- *Remedial Coaching for Weak Students if Required*

In addition, remedial coaching, remedial classes and remedial tuitions may be arranged for weak students, and students who are not upto the mark. Some schools provide remedial classes in the school premises itself, typically after school hours, while some other schools have a policy of not allowing such tuitions on their premises. However, coaching may be recommended to parents and students by the school, and parents and students may arrange it on their own accord.

- *Reducing Gaps in Performance Among Students, and Socioeconomic Groups*

We had written about socioeconomic groups and sociocultural groups in several of previous books, papers and publications. These concepts are extremely important, and must be borne in mind at all times, and in all situations. This becomes extremely necessary because different the outcomes of different groups of students are determined by their respective enculturation processes which may be either unique or may vary widely. Different children are subjected to different pulls and pressures at home, and their educational attainments and their educational outcomes would be greatly dependant on them. Therefore, the root causes of poor performance must be identified on a case to case basis, patterns identified, and remedial action must be taken as necessary.

- *Keeping Abreast of Latest Trends in Pedagogical Research*

Institutions must also keep abreast of the latest trends in educational research and in pedagogy. Pedagogy is the term used to imply the science of education or the study of education. Pedagogy is a vital and a rapidly evolving field of study though it has barely reached its full potential. Indians and people from other developing countries must also contribute to the science of pedagogy and keep it alive, well, and kicking. As readers would be probably aware most of the concepts in this paper are new, and that is why keeping abreast of latest trends assumes added significance and is of paramount importance.

- *Keeping Abreast of Latest Trends on Technology*

Researchers and pedagogy experts must also keep abreast of trends as they arise in technology particularly in relation to pedagogy, and must incorporate changes in the syllabus and teaching methods as and when they become necessary. This is because technology is playing an increasingly larger and larger role in education and in pedagogical methods and techniques, and is likely to play a much larger role in the years and decades to come.

- *Keeping Abreast of Latest Trends in Various Academic Disciplines*

In addition, teachers of various subjects and disciplines, and experts specializing in various subjects and disciplines must ensure that they keep in touch with the latest research in their own respective subjects. This is indeed necessary and of paramount importance because administrative and managerial staff of schools, colleges and educational establishments will not be familiar with the mechanics and dynamics of different fields of study. Neither will educational planners be – that is why they need to employ subject matter experts as required.

- *Better Translational Collaboration in Pedagogical Research and Research Outcomes*

Better translational collaboration in pedagogical research and research outcomes must also be initiated and maintained at all times. We had spoken about two types of collaboration previously, namely vertical collaboration and horizontal collaboration. Vertical collaboration refers to collaboration between unequals – in such a case, transfer of knowledge, expertise and knowhow is involved, while horizontal collaboration refers to collaboration between two or more developing nations. The latter is extremely useful and productive given the fact that developing countries have their own unique needs and challenges which are different from developed ones.

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➢ *Continuous Improvement Based on all the Above Parameters*

Continuous improvement must also be initiated and maintained based on all the above parameters. This must be an iterative and a feedback-driven process, and one with adequate checks and balances. This concept initially originated as the Deming cycle and the plan, do, check, act cycle in the 1950's, though it is now widely used across disciplines. This approach and techniques can be beneficially used and gainfully employed to reduce waste and enhance efficiency. It can also be used to ensure that all processes are constantly kept uptodate.

➢ *Open Education as Required*

The Open School System in the Indian context and in Indian quasi-legal jargon, refers to a highly flexible form of education that is designed primarily for students who are not in a position to attend regular daytime classes due to various personal, social, or economic reasons. This may include several reasons such as enrolment in other courses, or full-time education. This terminology is widely used in India only; it has a slightly different or an altogether different meaning and connotation in other countries in Europe and North America wherever it is used. Open education however makes sense only beyond a certain level or a certain age bracket. It may not make sense for young children who need full-time education to succeed.

➢ *Goal of Maximizing Human Productivity*

Productivity, refers to how efficiently resources including human and non-human ones, are used to produce different kinds of goods and services. It is almost always measured as a ratio of output to input, or similar standards. Increased productivity almost always leads to higher and more rapid economic growth and improved living standards. Education is a key and an important driver of productivity and economic growth, and education plays a major role. Not often education itself, but the quality and essential character of education. This must be realized by planners and academicians alike.

➢ *Mimicking Upper Class Enculturation Patterns Among Other Classes as Far as Possible*

Enculturation in the fields of social and cultural anthropology, and in other fields of the social sciences, refers to the process by which individuals or groups of individuals learn and absorb, the essentials and vital dynamics of their surrounding culture and acquire values and norms that are appropriate or necessary to adopt to that culture, or thrive in the context of that culture and its worldviews or operational characteristics. Upper class parents do tend to have overall lower fertility rates than other classes, though this is by no means a rigid and a hard and fast rule. Upper class parents do tend to lavish more attention on their children that other parents do, and this may often work in both ways. Upper class parents may spoil their children, or not teach them the importance of hard work the way other parents do. Therefore, educational systems may attempt of a convergence between the two. One in reminded of the PURA scheme or the provision of urban amenities in rural India scheme floated a few years ago; the two bear some similarities to each other.

➢ *Modulating the Role of Identity*

Identity is a very important and an essential part of human existence, so much so, that much of human life and mundane quotidian activity revolves around it. Identity may include personal identify, national identity, territorial identity, social identity, cultural identity, economic identity, political identity, or a combination of all these. Of late, some Indian religious leaders in India have called for the accentuation of religious and national identity. However, we believe that education must be kept secular at all times. And identify modulated and kept in check (or within bounds). Secularism must be implemented in true letter and spirit of the term without malice, bias and prejudice of any sort and kind. This would work multi-dimensionally and multi-dimensionally, and ensure harmony among various groups.

➢ *Adopting Metrics and Measurements*

A metric refers to a system of measurements. This is what metric refers to in the general sense of the term, while not referring to the metric system of measurement, or the SI system of units. Metrics are also measures of quantitative assessment that may be used for the multiple purposes of assessing, comparing, and tracking performance of an activity or a set of activities. Measurement refers to the act or process of measuring something. As an extension, we may state that this also involves benchmarking it with something, usually a previously arrived at standard. Measurements must not only be used to evaluate student performance, but also to assess other activities such as teacher performance, school performance, or process optimization.

II. CONCLUSION

The objective of this paper was to summate and summarize the core tenets of our proposed multi-barreled approach to educational and pedagogical reform. This was accomplished in this paper by eliciting the core philosophy behind our approach, and presenting them in the form of easily understandable principle or bullet points; it would be more appropriate to refer to them as action points that can be easily implemented by various educational institutions and planning bodies to improve academic performance and achieve national productivity goals and milestones to boot as well. This would be like killing two birds with a stone. The progress made by mankind in the realm of education in the past few years and decades has been enormous. However, progress on this front has mostly been quantitative and not qualitative, and the quality of education remains subpar for the most part. In other words, major qualitative progress has not been achieved beyond the realm of fantasy. A large part of the problem is that wide variations persist, and there is no universal gold standard to benchmark progress against. Progress in education and in

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pedagogy will become make or break as economies move towards orange economies, and as birth rates fall. Economists and planners would therefore be well-advised to take educational and pedagogical reform seriously if their countries and citizens are to progress, and if inequalities are to drop.