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Opinion

Ethics of Biology Education and Ethics in Biology Research in India- A Philosophical and Sociological Perspective

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ABSTRACT

Education is necessary to free our minds and to enable it to think for itself. Education has two components: One, that enables us to earn our living, and two that liberates our minds and raises individual consciousness to its highest level. The aim of higher education has been under constant change for the last five thousand years. Hindu, Buddhist, Jain, and Islamic systems of education operated in India till the advent of British rule. Through British rule, we got the western system of education including western experimental science. India had only theoretical science and Mathematics till then. In ancient India, *paraa vidya* (higher education) was distinguished from *aparaa vidya* not by the number of years spent by the student but by the nature of problems addressed and the purpose and outcome of education. Research has always been a part and parcel of higher education in India. Individual curiosity-driven fundamental research was the ideal that all academicians followed. When this ideal of pursuing research was institutionalised in the early forties, teaching and research got separated. Ministerial institutions did research, and Universities and colleges did mostly teaching. A social fact of these systems is that they were flooded with middle-class people. Middle-class people want social recognition and approval for whatever they do. Scientists are no exception. Western science demands logic, ethics and rational analysis, while eastern religions demand faith. We got science from the West, but we forgot the scientific temper. This took a toll on the quality of science produced and as a consequence, the quality of science education. Modern experimental scientific research is cost intensive. Funding for research is largely done by government agencies and it is woefully inadequate. India spends less than 0.7 % of GDP on R&D. Being mostly from the middle class, scientists indulged in unethical practices to get quick career benefits and sacrificed excellence and pursuit of Truth! The joy of doing research was replaced by the pleasure of receiving funds and awards. For students, the joy of learning was replaced by the agony and torture of examinations. Examinations became an end in themselves and got dissociated from education and learning. In the last 150 years, more than twenty-seven education commissions, appointed by colonial and independent Indian governments, have influenced our higher education institutes (HEIs). We are still evolving, clueless about what is best for our young people. Although STEM education has attracted the most attention from both public and private sectors, NEP-2020 has ushered in a new era of integration between Natural Sciences, Social Sciences, and Humanities, on one hand, and between Fundamental and Applied (read Vocational) streams, on the other hand. A redesigning of the University structure and repurposing of higher education towards social transformation is necessary. PhD programmes have to be redefined;

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an ethical way of doing science has to be taught and research methodology should include training in ethics. Doing research has become torture and a significant number of research students are facing psychological issues. The joy of discovery has been replaced by the toxicity of interpersonal relationships. As the taxonomy of human knowledge has changed, the educational components like departments, syllabus, pedagogy etc. entail to be redefined. Funding agencies also need to be educated. Indian scientists, to a large extent, are camp followers of USA scientists but the time has come that we should usher in Open Science as a culture. Science should not be restricted to ivory towers, there should be more dialogue between general society and scientists. Science should enable social transformation from being superstitious to being rational and compassionate. A Centre for Human Sciences should be opened on every campus to bridge Natural Sciences, Social Sciences, and Humanities. Our brain learns everything holistically, and not in fragments. Biology is a good example to show how not to teach a domain knowledge or discipline. The growth of Biology can be seen to have occurred in three phases. However, teaching Biology to UG students has occurred in fragments in parallel to the three phases. Dozens of departments teach Biology in fragments. Understanding Biology was a casualty in this process. Teaching was reduced to information transfer, often third-hand information. What is known and what is yet to be known is never told conceptually. The philosophy of Science gives us two opposite views of Natural phenomena or the world view. Physics, which reduced natural phenomena to certain Universal Laws, gives us a deterministic model of life and the universe. Biology on the other, dominated by Darwinian ideas of organic evolution gives us a stochastic model of biological activities. When applied to human Biology, we unconsciously slide into philosophy and theology rather than be in hard-core science based on logic. Neurobiology and Immunology will resolve these issues of consciousness, free will and fate, self and 'foreign' in near future. Till then, the least we can do is to teach Biology conceptually and not as Botany, Zoology, Biochemistry, Genetics, etc. For that, we should first come to know what the conceptual questions that Biologists ask and seek answers to are. Neither classical Biology alone, reductionist Biology alone, nor systems Biology alone can explain Biology, especially emergent properties of the whole, not observable in the parts of the system. Here, NEP-2020 comes to our rescue. *Paraa vidya* and *aparaa vidya* can be integrated. Science has to be experienced and not simply taught as it is important to validate the knowledge that we create[2].

INTRODUCTION

Agriculture, including Animal husbandry, was discovered around 10000 BCE. Thus began the transformation of the hunter-gatherer into a social animal learning to live in groups. Concepts of Society, Property, Marriage, and ownership gradually evolved. Human activity has always been driven by hunger, fear, and sex. Social order became a new concern and various forms of governance evolved all over the world. Individual liberty and Democracy, in decision making, are the twin ideals that an evolved society practices. Social unrest appears when the ruling class forgets these two fundamental foundations of social well-being.

Language and the thinking processes must have evolved simultaneously as thinking is not possible without language. Before the advent of systematic science, the thinking human being observed nature in all its glory and fury, and thus poetry was born. In some places, primitive religions appeared and took control of humans. There is no doubt that religion establishes some sort of social order. It was the creative mind that expressed these thoughts and emotions. Non emotional and analytical or logical ways of thinking about nature and natural phenomena also slowly appeared in Greece, Chinese, Hindu, Jain, Buddhist, and Islamic

[2] This article is on selected aspects of higher education system in India based on the author's memories and experiences.

societies. History of Philosophy tells us that Thales, Buddha, Charvaka, Uddalaka Aruni, Confucius, and Lao were the first social scientists who attempted to understand life and nature in a logical way without invoking God or religion.

Around the 15th century CE, a new scientific way of studying nature and natural phenomena began in Europe. Experimentation was the key component of this new Philosophy. For want of better terminology, it was called Natural Philosophy and later renamed Natural science. In the last five to six hundred years, many great thinkers like Francis Bacon have written about it and refined it as one of the best expressions and capabilities of the human mind. The history of science and the history of philosophy run parallel. While logic is the strength of all these systems of Philosophy, the validity of logic to give correct answers, has not been achieved in western science. Logic reached its pinnacle of glory with the monumental work of Bertrand Russel and Whitehead who developed mathematical logic underlying Natural Philosophy. Validated logic was developed to a great extent by Vaadiraja Swami, a Hindu monk of Madhwa School of Idealist Philosophy in Karnataka. Incidentally, idealist philosophies have also survived and flourished in our world.

The aim of Natural science was to understand the working of Nature and discover patterns, if any, in its behaviour. Physics succeeded enormously in discovering these patterns and expressed them elegantly in the form of algebraic expressions. These are the fundamental Laws of Nature (of thermodynamics, mechanics, electricity etc.). Chemistry correlates structure to function, in molecules. The molecular orbital theory explained chemical reactions. Biology in the initial stages was neither experimental nor conceptual for a long time till the 17th century CE. It became experimental afterward, largely due to the influence of a French mathematician, Rene Descartes. Darwin's theory of Organic Evolution by Natural selection in 1859 gave the conceptual framework to discuss and understand biological phenomena. Both classical Organismic Biology and the later Reductionist Biology could be easily integrated under this Evolutionary Theory of Darwin and Wallace. Only one frontier remained unresolved in Biology and that is to understand Emergent properties like Mind and Consciousness. Two conflicting theories try to explain this. One, that emergent properties also are fundamental aspects of organisation of matter and one need not look outside matter. Bertrand Russel, Roger Penrose, and many others support this explanation. Others, of course. believe that things like consciousness and mind are outside the material world and create, in fact, matter and natural phenomena. By and large, Physics has established the physical reality of nature or matter while some schools of Philosophy (e.g. Sankara's Adwaita and Buddhist Philosophy believe the world of matter and experience is either an illusion or non-real).

Natural Experimental Science developed during the Renaissance period in Europe and spread to the rest of the world through colonial rule. The British rule brought this to India by establishing the College and University system of education. The indigenous systems of Hindu, Buddhist, Jain, and Islamic traditions were largely ignored and left unsupported. Lord Macaulay's fiery speech in the then-British Parliament, in 1834, had a telling effect on this historical development. Thus started a new social conflict of interest both at the individual scientist level and at the level of the larger society. Science is a new philosophy that seeks 'Truth', and is based on logic. Interestingly, India is a country deeply rooted in spirituality and religion, which in turn are based on faith and do not demand any logic. Science came to India from the outside but scientific temper, the major component of science has not got integrated with the Indian mind. Our Universities, Colleges, and Research Institutions (or the HEIs of India) are largely populated by people of the middle class (socio-economic and cultural group). British rulers had a limited vision for higher education in India. They wanted to produce able administrators who will run this vast, diverse, and complex country. They certainly did not wish to produce Nobel-class science in India. In spite of the system, a few

world-class scientists and mathematicians like Sir CV Raman, Meghnath Saha, JC Bose, SN Bose, Ramanujan, PC Ray, Mahalanobis and CR Rao etc. produced Nobel-class science, mathematics, and statistics. In the post-independence era, science has expanded enormously. India has the third largest scientific manpower in the world. The most outstanding Nobel-class scientist is CNR Rao. Of course, there are world-class scientists in India in every area of Natural science, Engineering and Technology. A sociological perspective of current Indian science leaves much to be desired. Science is a Philosophy and a way of life; it seeks truth like any other philosophy. Ethical conduct is a fundamental basis of science, whether in research or education and training, or governance including funding. Ethics is conspicuous by its absence in all these activities of science. Science education is not inclusive; quality science education is neither accessible to all those who seek it nor is it affordable to many. Innovative thinking is necessary in achieving a balance between equity and excellence. Scientific temper does not influence funding decisions, or decisions of selections, promotions etc. The very establishment of HEIs does not follow any logic or philosophy. The goal is not clear because of changing and confusing policies governing science. Continuing debates regarding whether we should do fundamental science or utilitarian science, in the words of Rene Descartes, have confused ground-level scientists. Merit, by whatever definition, has itself become a caste with all its implications. Racism, gender bias, etc. pervade scientific establishments, making them illogical and unethical. Awards and recognitions, a characteristic feature of middle-class mentality, have pervaded scientific establishments. No decision is unanimous. At best it is consensus and at worst it is acrimonious. Science education at school, college, and university levels are in a sorry state of affairs, with no institution figuring in the top 100 in the world. While science should unite a society, it has divided it into regions, language groups, economic classes, Genders, etc. Also, there is a clear digital divide. In the absence of diversity of research projects, social auditing of science is the need of the hour. A handful of scientists have hijacked funding agencies. There is a clear divide between class science (read a little over 200 Ivory tower elitist research institutions) and mass science (read 40000 Universities and colleges), which is not good for the country. Somewhere we have faltered in planning.

What is wrong with the current system of Higher Education and Research in Science?

1. Elitism has been a feature of our higher education Institutions (HEIs). This is exhibited in behaviour, attitude, world view, and belief system. There is a gradation of course. The pure research institutions have less than contempt for the Universities and Colleges, conveniently forgetting that they come from the same very universities and colleges. The Central Universities, in general, treat the state Universities in the same manner. Private schools educated students have a feeling of superiority in comparison to government school children. Scientists, in general, do not meet and mix with uneducated and rural people. While researchers in the Universities and colleges participate in regional and National conferences and occasionally, in international seminars; scientists from research institutions attend only international meets abroad, seldom mixing with Indian university people and seldom participating in meets of the Indian professional societies. Lifestyle (daily habits) of scientists and academicians in general, is closer to western habits than to the rural Indian lifestyle. They are more urbanised and city-dwelling clans (preferably proximate to the airport).
2. Research is institutionalised. There is not much scope for amateur science as a career in India. Hence research is done by trained professionals. Without funding, professional research cannot be done. In our country, more than 90% of funding for professional research comes from the government. India is supposed to be the third largest scientific manpower in the world. Government funding for R&D has never exceeded 0.7% of GDP. Hence, demand exceeds supply. Funding policies, though sincere in intention, are unethical in practice, to say the least. There is no diversity of projects or scientists or

institutions which receive funding. Few scientists, institutions, and sometimes some areas hijack funding agencies. The problem is that the peer-review system in our country is either honest or competent but not both many times. Thrust areas, identified always sincerely, have become thrusted areas.

3. Mentorship quality is usually absent in many PIs in Universities and Research institutions, especially the latter. The number of suicides of research students has increased significantly in the recent past, causing concern about the accountability aspect. Remedial action should be taken. Ambition should be matched by competence for any researcher, be it a student or PI. Many a time, the aspiration of the bright student is not matched by the institutional PI quality and competence.
4. Selection of the faculty has to be based purely on individual competence. In practice, however, selection committees insist on thrust areas or publications in high-impact factor journals. This results in only those working in a handful of areas, getting selected. Years back during selections for the UGC Faculty Recharge scheme in Life sciences, it was realised that almost all the selected persons were working on cancer-related problems or regulation of gene expression. There was not a single ecologist or physiologist selected. For one thing, the subject domain to be taught to PG and UG students requires that all areas be represented. It demoralises workers in other areas even though they are as good as the selected persons in the quality of research output.
5. Serious mental health problems are being noticed and even reported among Research workers. This has to be taken serious note of, as future research, teaching, and innovation in our HEIs depend on the current Ph.D. students and post-docs. The risk of suicide appears to reach alarming proportions among the youth from the science stream. Lack of clarity about what is required to get a Ph.D. in science appears to be all pervasive among not only PIs, University academic administrators but also among the clerical staff in the office of the controller of examinations or dean. PhD thesis advisory committee's approach to its work is considerably casual. Absenteeism from meetings is common. When it comes to deciding that the student can submit the thesis, nobody including the committee members, the PI or guide, the administration or even UGC takes any responsibility. In many cases, the submission has been delayed by years. Added to these woes, is the changing policy as well as the interpretation of the requirement to have 1-2 publications before submission. Everybody has forgotten that a PhD thesis is a child by both the student and the guide. If one of them shows irresponsibility all hell breaks. Institutions have not deliberated seriously on what is a thesis. And who has to decide the standard/quality? Wishful thinking does not work. Clever people have learned to circumvent the rules while irresponsible people/systems are harassing poor students and driving them to mental depression.
6. Over 35 per cent of all articles published in various kinds of fake journals between 2010 and 2014, are published by Indians, says a government-appointed committee. This has raised serious concerns about the quality of research in India's academic institutions. It has also pointed out plagiarism and data manipulation as issues of greater concern that damage the credibility of institutions. It has also said that there is a lack of qualified human resources for research guidance. Infrastructure required for research is also lacking. The report has further highlighted the proliferation of predatory journals and conferences. It has blamed the trend on the mandatory requirement of publications in journals/conference proceedings for the award of doctoral degrees. As a metric in evaluating faculty under the API (Academic Performance Indicator) score, such poor-quality publications have resulted in the proliferation of predatory journals that have "abandoned classical peer review as a method of quality control."

7. Employment after B.Sc. or M.Sc. or even Ph.D. appears very bleak. Recruitment for faculty positions does not happen periodically in many universities and colleges. Delhi University is a good example to study this phenomenon. There are more than 4000 adhoc teachers in the colleges, some even working for more than a decade. Nobody answers the crucial question as to why were they appointed in the first place. There does not appear to be any concern about these adhoc faculty in the minds of the higher authorities like Professors, Deans, AC/EC members, VCs and Registrars, and even UGC. The COVID scenario has destroyed the careers of one generation of students in schools, colleges, P.G. departments, and Ph.D. students through delays and interruptions. Who is accountable for this mess? In a growing economy, unemployment and underemployment are unfathomable, to say the least. Faulty perceptions of ground realities and faulty planning at the top have to be held accountable.
8. Academic career in India exhibits variation in different sectors (central University faculty, State University faculty, Pure Research Institutions etc.) in many aspects. For example, it shows variation in salary structure for the same designation, in a number of steps to reach the top, qualifications required for upward movement, qualifications required for entry-level, qualifications for awards, promotion in rank, recognition, etc. There is no logic underlying these variations.
9. Let us take the example of Biology education and research in our country. Biology has grown in three phases. In the first phase, what is called classical biology, was established. The information gathered was based on observation and recording rather than investigation and experimentation. The sub-disciplines of taxonomy, ecology, biogeography, etc. were founded and flourished. As there was no question asked, and no experimental investigation, the information gathered was formidable. Biologists divided themselves into Zoology and Botany and later Microbiology. The departments followed the same pattern. Observation and description were the only research activity. It is only from the 18^{th} century onwards that biologists started raising questions and doing investigative experimentation using the concepts of physics and chemistry. biological methods were mostly based on Reductionist Biology, heavily dependent on physics and chemistry. A handful of biologists employed mathematical and statistical tools also. These gradually evolved into computational biology. Biological knowledge exploded in the 20^{th} century but in compartments, like biochemistry, biophysics, genetics, molecular biology, etc. Organismic biology also flourished and progressed with the help of computational techniques. The unfortunate part is that Biology was divided into nearly 10 different departments like botany, zoology, microbiology, genetics, physiology, biochemistry, biotechnology, plant biology etc. Understanding conceptual biology became a casualty. Each department within biology is an island refusing to interact with sister departments leave alone with other natural sciences like physics, geology, or chemistry. Biology is being taught in fragments without a linking story. Modern departments of life sciences do not teach Darwinian evolution with any seriousness. Moreover, reductionist biology practitioners usually do not appear to have any broad biological questions in mind while doing their research work. Techniques and technologies have become an end in themselves.

What can be done?

1. There should be a National University, with branches in every state or even a district, but located physically in rural areas proximate to agricultural land. Only rural background students and lower-middle-class students should be admitted. Preference should be given to socio-culturally underprivileged classes. The buildings also should be designed to reflect the rural ambiance. However, the facilities can be modern. They would feel the continuity from rural to urban or even ultra-modern.

2. There should be a total restructuring in terms of departments, centers, and even the nature of the faculty recruited. The taxonomy of human knowledge has changed. These divisions are no longer valid. Our brain does not acquire knowledge in compartments (like literature, chemistry, biology, etc.). Moreover, if one observes the growth of any conventional discipline like zoology, linguistics, or chemistry, we notice a huge degree of differentiation and integration. We have to organise 'knowledge domains' into dynamic and virtual structures and not permanent physical buildings.
3. Our examination system, a colonial hangover, should be replaced with a more sensitive, innovative, multi-dimensional, student-friendly, and non-intimidating system. There should be no failures. As it is a multi-component assessment, everyone clears, by crossing a certain threshold. There should not be any divisions in classes and grades. Learning has to be an experience of joy or a voyage of discovery and insight. What has been learned, ought to be assessed, and not what is taught. Learning can be graded based, not on the quantum of knowledge/information, but on the rate of learning.
4. All Ph.D. programmes should have broad social goals. For example, public health research should be preferred over basic biomedical research. There are many other centres to do the latter. Folk literature should be preferred over urban, Hollywood style literature. Even science fiction can be avoided. Human values have to be visible. Tools and technique-based laboratory science can be a part of the research to make it rigorous. Thousands of papers have claimed, for example, a cure for cancer but we do not see any wonder drug. Current elitist scientists are interested in publishing in high-impact factor journals rather than solving a problem. Many a time, the therapy suggested is more toxic than the disease itself. To achieve this, Ph.D. programmes have to be multi-disciplinary. A biologist, an economist, a physicist, a sociologist, a chemist, an engineer and a management expert should form a team and take up such multi-dimensional problems (say for example cancer in rural people and the cost of health service). Everyone can get a Ph.D. but for a small component of the research canvas. The research problem, the approach, and the discussion should be multi-disciplinary. Neither should it be like an ivory tower, oblivious to real-world experience and dimensions.
5. The reorganisation of academic activity into multi-disciplinary and thematic departments and centres has to be undertaken carefully to stimulate growth. For example, every campus should have a Centre for Human Sciences where certain social sciences like economics, history, psychology, social work, etc., and certain natural sciences like neuroscience, anthropology, genetics, health science, etc. can be placed under a single umbrella. Themes have to be developed, which straddle many of these conventional disciplines, in order to generate new frontiers of research. Old disciplinary boundaries need to be dismantled. Research methodologies also have to be shared with modifications. Both, qualitative methods and quantitative methods should be used with confidence.
6. Research workers, be they students, short-term trainees, technical support staff, visiting scientists, etc. should be supported financially. Funds should be allocated for this purpose. In the case of Ph.D. students, a fellowship should be given for the period they are working for Ph.D. All Ph.D. programmes should be time-bound. Post-M.Sc., Ph.D. and Integrated Ph.D. programmes should not cross 5 years and 7 years, respectively. Only if the institution has financial strength, exceptions can be made to run the programme for a longer period. In any case the period, cannot be allowed to last for more than ten years. Both the PI and the institution should be pulled up with appropriate administrative action. Accountability should be strictly enforced. Students also must be told clearly about what is expected of them in terms of standard/quality. The thesis advisory committees should be empowered to take decisions by majority vote, in matters concerning termination or

extension. The decision to terminate the programme (read the student) should never happen after 30% of the Fellowship period is completed. All terminations of integrated Ph.D. and post-M.Sc. Ph.D. programmes, mid-way should be always followed by the award of M.Sc. or M.Phil. degree to the student. In case, M.Phil. is not operative, M.Sc. degree in another subject should be given. The NET examination is not being conducted properly. CSIR interprets it as a qualification for fellowship benefit while UGC interprets it as a qualification for a faculty position. The qualifications required to do research are different from those required to become teaching faculty. The examination paper should be very clear on this and appropriately designed. It has never happened in our country. Further, the value of fellowship should be uniform across institutions and funding agencies. There is utter chaos in the country with regard to this. From Prime Minister's Research Fellowship worth Rs. 75,000/per month, through CSIR, ICMR, DBT, ICAR examination derived fellowship of Rs. 24,000 per month to no financial help is the range of financial help to research students. Integrated Ph.D. students should not be used as post-docs by luring them with financial benefits.

7. All academic activities like teaching, research, governance, communications, and publications should follow strict ethical guidelines. An office of research integrity should be established to investigate and suggest necessary punitive measures for all reported cases of unethical conduct including gender discrimination issues at the workplace. The recently issued CSIR guidelines and the book on ethics (an INSA publication) can be consulted. In the words of Richard Feynman, a famous Physicist, "Science is a way of trying not to fool yourself. The first principle is you must not fool yourself, and you are the easiest person to fool."
8. "Science is very relevant to human experience and scientists should work for the refinement of civilization," said Richard Feynman. Scientists live with ignorance, uncertainty, and doubt and this mindset is essential to register progress in knowledge and understanding. The true responsibility of scientists is to stir up the importance of an idea destroyed by the current education system. Our education system, especially PIs should nurture curiosity, to know and to question in the students. Einstein remarked long back that "it is a miracle that curiosity survives formal education." Our education system should never suppress discussion and criticism.
9. The post-Covid era is the best opportunity for us to redefine our education system. Institutions have to innovate and adapt in response. HEIs have to redefine the value proposition of higher education by reshaping institutional business models and culture to anticipate and serve the current and emerging needs of learners, communities, and employers. The higher education system we had, has to be replaced with a higher education system our students deserve. The learning process has to be conceptualised and become student-centric. Hitherto it was teacher-centric. Teachers and institutions have to become facilitators in this process.
10. Taking Biology education as an example, let us observe its growth in the last 150 years. In the University system of education, what started as Natural Science, soon split into Botany, Zoology, Microbiology, Geology, Physics, and Chemistry. Later, they also split further into Biophysics, Physiology, Biochemistry, Genetics, Biotechnology, etc. They are no doubt popular in getting jobs, funding for research, and for building careers. But understanding biology became a casualty. It was partially rectified when the concept of 'Life Sciences' in teaching started. Instead of gradually moving towards 'Integrated conceptual Biology,' it split into old-time departments but in new avatars like plant biology, etc. A component of biotechnology was included in every such department. Two facts about this development, ironical though, were, one, technology without engineering and management components and ambiance have no meaning. Hence no real technology

ever came out of such departments. Two, reductionist biology overtook 'Real Time Biology.' The solution available now, in order to do justice to the true nature of biology, is to have a 5-year integrated biology M.Sc. course with two branches; one, 'Organismic Biology' and another 'Reductionist Biology.' Earth science and computational and information science should integrate with organismic biology and Maths/Physics/ Chemistry with reductionist biology.

11. Every conventional knowledge domain has become transformed into a multidisciplinary and interdisciplinary in content and direction of growth. Digital education is slowly replacing education based on textbooks. Every knowledge domain, therefore, should come up with a recommended list of such books which will showcase the interdisciplinary nature of its content. NEP-2020 has emphasised the transformation of each of the conventional disciplines with strict boundaries, into a borderless dynamic knowledge domain, with porous or even no boundaries. To make it accessible to students, a book list should be prepared and recommended for reading and learning.
12. There should be only two academic positions i.e. Assistant Professor and Professor. A post-graduate degree should be made a minimum qualification compulsory for entry-level appointment. Selection should be based on a detailed interview. Broad scholars should be members of the selection committee. There should be a running salary scale with annual increments. Increment should be given only on visible and evidence-based improvement in qualification. It could be Ph.D., research publications, books written, or teaching assessments by students and colleagues. The end of the scale should meet the professor's scale halfway. Unless a significant contribution is made to domain knowledge, no promotion to professor-ship should be given. If no new qualification is acquired the person should never be made a professor. However annual increment can be given. All awards and recognitions should be abolished. At the end of the career, a person could aspire to be elected a Fellow of one National Science Academy. This recognition should not be made an incentive to do research but should be considered only as a Lifetime Achievement Award. No controversy will arise in such a situation. Salary is required to meet the socio-economic requirement. Rank is a recognition of a significant contribution to the professional domain knowledge or organisation. Under no situation, the increment can be stopped.

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