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Rethinking higher education for the 4th Industrial Revolution: Synergetics in global social transformations and society building

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Rethinking higher education for the 4th Industrial Revolution: Synergetics in global social transformations and society building

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ABSTRACT: This paper highlights the need for our Rethinking Education towards a global common good and cultivating New Era Universities for the 4th Industrial Revolution (4IR). 4IR represents a fundamental change in the way we live, work, and relate to one another. It is a new chapter in human development, enabled by extraordinary technological advances commensurate with those of the first, second and third industrial revolutions. Indeed, the 4th Industrial Revolution measures up with the Post-Capitalist Society, involving policies catering to human living needs, enabling people to have a Neo-humanist outlook, and come together to form a universal and more evolved society. This evolved societal state can also come about through implementation of SDGs. 4IR requires a new vision and mission for universities as agents of social transformation and society building, which is what we as humanity must now embark upon.

KEYWORDS: humanistic higher education; Higher Education 4.0; radical socio-economic innovation

1. Executive summary

This paper examines the role of the university to meet the needs of the Fourth Industrial Revolution, comprising the following components: (i) Synergetics in Society and Academia, (ii) the Foundations of Cosmological Cycle, and Neo Psychology for Mind Liberation, (iii) the Structure of the Post-Capitalist Society, involving Neohumanism Social Outlook and a New Format of People's Socioeconomic Democratic System, (iv) the Role of Education for Human Living Needs, Progress and Fulfillment, (v) Landmarks in Education, from Ancient to Modern Times, Defining an Ideal University, (vi) Towards a Holistic Education: Academic Architecture of an Ideal Modern University to Meet the Education Needs of the 4th Industrial Revolution.

The Fourth Industrial Revolution is more than just a technology-driven change. It is an opportunity to help everyone, including leaders, policymakers, and people from all income groups and nations, to harness converging technologies in order to create an inclusive, human-centered future. Indeed, this 4th Industrial Revolution measures up with the Post-Capitalist Society, involving policies catering to human living needs, enabling people to have a Neohumanist outlook, and come together to form a universal and more evolved society. This paper thus highlights the need for our rethinking education towards a global common good and cultivating New Era Universities for the 4th Industrial Revolution.

For a stable socio-economic development of a region, a group of culturally and economically compatible countries need to come together, to share their agricultural, natural, and industrial resources

order, to constitute a synergetic socio-economic bloc or region.

We next propound a new science paradigm for the understanding of cosmology and universe development, development of physical and life sciences, psychology and cognitive science. This can help to develop a better understanding of the mind, its disorders, and rejuvenation through meditation.

For constituting the Post-Capitalist Society, we have outlined a Neohumanism social outlook combined with Neo socio-economic system of PROUT. The basic principles of PROUT are (i) rational consumption, and equitable distribution of the physical resources of the universe, (ii) guaranteed minimal necessities of life through 100% employment and minimal wage, (iii) productivity of commodities to be proportional to the collective need, to augment the purchasing capacity and standard-of-living, (iv) the economic system should foster the development of physical, intellectual, and parapsychic human potentialities as well as their implementation for collective welfare.

We have then outlined a comprehensive academic architecture for a post-capitalist university that emphasizes holistic education, societal development, and sustainability. This vision incorporates the traditional Indian concept of Gurukula, Vedic concept of Samgacchadhvam samvadadhvam (our moving together to live in harmony), and Neohumanism (beyond narrow sentiments), and aims to transform higher education in the face of the 4th Industrial Revolution. In line with the proposed ideal university, we propose a comprehensive academic architecture, that comprises of the following nine colleges with brief statements of their objectives and functions:

1) College of Humanities and Social Sciences: To develop humanitarian values of living, and the constituents of political science and governance for progressive living. In this college, we can also offer courses on (i) Neohumanism (to elevate humanism to universalism) and Democratic Political Governance (based on Progressive Utilization Theory).

2) College of Sciences and Mathematics: To provide education in physical sciences, biological and life sciences, mathematical and computer sciences. In this college, we can also offer novel courses on Cosmological Cycle (on universe development and evolution) and Microvita (on life creation on Earth).

3) College of Engineering: To offer courses in all fields of engineering. Today the most in-demand field is biomedical engineering, in which we can offer a novelty program in biomedical engineering in translational medicine. This program can provide new insights in (i) medicine, involving precision medical diagnostic and assessment methods, and (ii) surgery, involving customized biomedical engineering analysis of surgical procedures.

4) College of STEM Education: To study STEM operating in (i) our natural world: sun, and stars, lands and oceans, weather and natural disasters, (ii) our communities, in engineering infrastructure development and home appliances, computers and smartphones, transportation systems and airports, and (iii) within our body, in the form of physiological engineering and biomedical engineering. In this College, we can offer a popular program in "IASIEM Education: Integrated Approach to Science, Engineering and Medicine".

5) College of Management Science: On Business Administration, Smart Cities, and Hospital Healthcare Management. Therein, the Hospital and Healthcare Management (PhD and MD-MBA) Program, is designed to educate hospital administrators with the competency to enhance the overall quality and efficiency of healthcare delivery, in terms of cost-effective operation of hospitals and healthcare.

6) College of Law, Governance and Public Administration: To address the need for smart

governance for promoting economically sustainable cities and urban-rural communities. In this college, we can offer a novel "Governance and Public Administration Program" to educate competent and learned public politicians. This program could then also be considered as a qualification for public political offices, as city mayors, state governors, House representatives and Senators of US.

7) College of Sports Science and Engineering: To educate scientific sports coaches for working in universities and professional sports, to provide knowledgeable training to sportspersons and athletes, and enhance national performance in international tournaments and Olympic Games. In this college, we can offer a novel program on the Engineering Science of Sports and Athletic Events, to educate scientific sports coaches.

8) College of Yoga, Meditation and Yogapathy: To educate yoga teachers for schools, colleges, and hospitals, for promoting health and wellness, cognitive development, and mind-body medicine. In this college, we can offer courses in Meditation Science and Practice (leading to progressive thinking), and Psychosomatic Medicine.

9) College of Medicine and Health Sciences: To develop a novel STEM format of medical sciences, leading to precision medicine and technological surgery. In this College, we can develop a novel STEM format of Medicine, and offer MD-PhD Biomedical Engineering Program, and MD-PhD (Yogapathy) Program.

It stands to reason that, a holistic education that fosters personal and societal development, embraces Neohumanist ideals, promotes societal transformation, and provides comprehensive knowledge in various fields is crucial for the development of the ideal university for the 21st century.

In closing, the aforementioned advances are merging the physical, digital, and biological worlds in ways that create both huge promise and potential peril. The speed, breadth and depth of this revolution is forcing us to rethink how countries develop, how organizations create value and even what it means to be human. 4IR is about more than just a technology-driven change; it is an opportunity to help everyone, including leaders, policymakers, and people from all income groups and nations, to harness converging technologies in order to create an inclusive, human-centered future. The real opportunity is to look beyond technology, and to find ways to give the greatest number of people the ability to positively impact their families, organizations, and communities.

2. Synergetics in society and academia

This section introduces synergetics as the conceptual underpinning of the impact of 4IR on higher education, sometime referred to as HE 4.0.

2.1. Synergetics in society

The concept of synergetics is an important aspect of functional effectiveness and harmony, based on integration and balance of the components of a system. Normatively speaking, human existence should be trifarious, and synergetic living entails a harmonious blend of the three spheres of existence. Thus, if in a society there is emphasis only on culture and aestheticism, and not on science and technology, the standard of living will be low. Conversely, a technocrat society that ignores aesthetic values and erodes culture will be unstable. Equity and balance are key[1]. Thus technology, culture, and aestheticism constitute the ingredients (and a balanced triangle) of a synergetic society. **Figure 1** shows the integration of these three ingredients constituting a synergetic society[2].

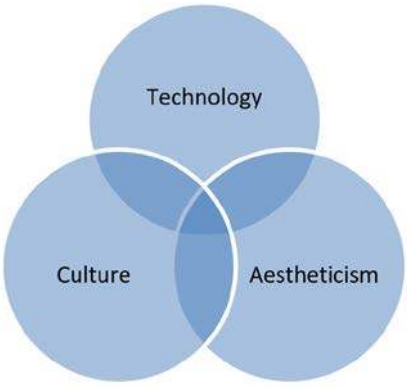

Figure 1. The synergetic society triad[2].

What are the factors needed for socio-economic development of a region? They are agriculture, natural resources, and industrial infrastructure to convert the raw materials into finished goods. There is no way that a single country can have all these three factors required for economic development. In fact, industrially developed countries depend a lot on developing countries to supply the raw materials for their industrial development and economic growth, instead of having a cooperative relationship with the developing countries for sharing natural and human resources for their combined economic development.

Thus, for economic development and well-being, a group of preferably culturally and economically compatible countries need to come together, to share their agricultural, natural, and industrial resources (**Figure 2**), in order to constitute a synergetic socio-economic bloc or region.

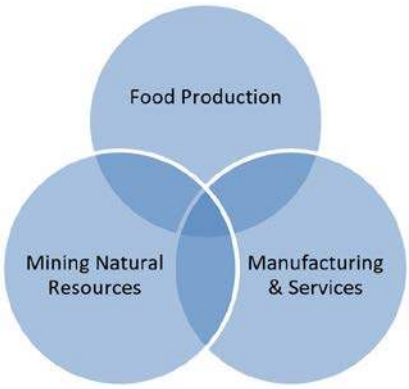

Figure 2. Synergetic socio-economic bloc or region.

In such a synergetic socio-economic bloc, local resources would be utilized maximally through local labor to form an indigenous industrial base. The economic characteristics of such a synergetic socio-economic bloc would be (1) balanced development of agricultural, manufacturing, and service sectors of economy; (2) balance of imported, exported, and locally consumed materials and goods, with an emphasis on indigenous conversion of raw materials into manufactured goods; and (3) industrial, ecological, and cultural homeostasis.

For development planning, the balanced triangle of Economic Policy is to consist of (a) people's economy dealing with production and supply of minimum essentials of life, (b) commercial economics, dealing with monetary and trade policies, for maximum utilization and rational distribution of resources, and (c) psycho economics, to enhance the intellectual and psychic potentialities of people[3,4]. **Figure 3** illustrates this balanced triangle of Economic Policy.

Figure 3. Balanced triangle of Synergetic Economic Policy[2].

In a synergetic socio-economic bloc, the agricultural sector needs to have balanced development of primary production, agro or pre-harvest industry, and agrico or post-harvest industry, as portrayed in **Figure 4**. An integrated approach to farming includes: agriculture, horticulture, floriculture, sericulture, lac culture, apiculture, dairy farming, animal husbandry, pisciculture, energy production. Among products, herbs and medicinal plants can be given special importance[5].

Agriculture is the science of cultivating the soil and production of staple crops. Horticulture is growing fruits and vegetables; fruits can be utilized to make jams, marmalade, jellies, and dried fruits. Floriculture is the cultivation of flowers; honey can be prepared from the lotus flowers; floral nectar can also be collected from lotus and is very good for all kinds of eye diseases, including retinal detachment. Useful products from insects include sericulture, lac culture and apiculture. Dairy farming includes milk production from dairy cows, goats, sheep, and buffaloes. Pisciculture is controlled breeding of fish in lakes and ponds, as they help conserve and purify the water.

Figure 4. Synergetic agricultural industry.

Finally, some of these synergetic socio-economic blocs could form mutually benefiting self-reliant socio-economic zones or SREZ(s). The SREZ(s) of a continent could then be beneficially constituted into a Self-reliant Regional Federation (or union, like the European Union) based on the values of respect for human dignity, freedom, democracy, equality, the rule of law and respect for human rights. This, in brief, constitutes the basis of synergetic regional economic development.

2.2. Synergetics in academia

Academic programs need to be synergetic with one another as well as with their applications to the community.

What are the factors of effectiveness of a post-graduate program? Research is of course a prime component of a post-graduate program. However, for research to be in turn effective, it needs to be related to and influence the community and society. Hence post-graduate studies, research, and community-outreach program all together constitute a synergetic system (**Figure 5**).

Figure 5. Synergetic post-graduate program[2].

2.3. Synergetics in education programs

Graduate educational programs must necessarily be multi-disciplinarily synergetic. For instance, a synergetic environmental program would encompass (as displayed in **Figure 6**):

a) the Faculty of Science, contributing to the study of environmental chemistry and mcrobiology,
b) the Faculty of Engineering, contributing to pollution control and biological treatment processes,
c) the Faculty of Medicine, contributing to environmental health, through the disciplines of occupational medicine (involving, among others, toxicology of medical aspects of radiation).

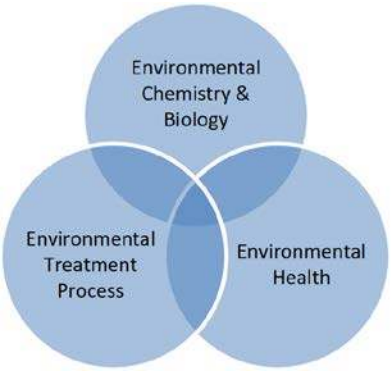

Figure 6. Synergetic environmental program.

For example, a synergetic degree program in international affairs, say in the context of multi-regional Economic Federations, could involve the Faculties of Political Science, Economics, and Law, to develop courses and research on the issues of decentralized regional development and utilization of both material and psychic resources such as a national library network[6], Intra- and inter-regional monetary and banking system, intra- and inter-federation trade policy, and a common jurisprudence structure.

3. Foundations of Cosmological Cycle, and Neo psychology for mind liberation

Science needs to provide both material and psychic fulfillment. A universal social outlook would make it possible for all people to live in dignity. At the same time, availability of the means for developing and scientifically qualifying higher faculties of mind would rescue society from materialism, enable people to experience transcendental states of the mind, and prevent psychic conflicts and drug abuse. For this purpose, we need: (i) the development and application of the Cosmological Cycle, a new science paradigm, (ii) a new concept of psychology.

3.1. Cosmological Cycle, a new science paradigm

In the past fifty years, the Theory of Relativity (special and general), has altered our views of space and time, while Quantum Theory has necessitated a new concept of the nature of matter and energy. During this period, physicists have started to regard consciousness as fundamental, and matter to be a derivative of consciousness.

Clearly, the time for propounding a new science paradigm is overdue. This new science paradigm is to provide a common base for the understanding of cosmology and universe development, development of physical and life sciences, psychology and cognitive science. This would help develop a better understanding of the mind, its disorders, and rejuvenation through meditation. The concepts, as presented below, are fundamental to this new science paradigm of the Cosmological Cycle[6–9].

In this Cosmological Cycle, the first and foremost postulate is that consciousness is the fundamental entity, incorporating the Cognitive and Operative principles. The second postulate is that consciousness is devolving into the Cosmic Mind, and the Cosmic Mind is devolving into matter. How? Through the Operative principle (in Sanskrit, Prakriti), the Cosmic mind is getting expressed into the five fundamental (ethereal, aerial, luminous, liquid, and solid) factors, providing the constituents of the physical universe. These five fundamental factors are understood to be (i) a spectrum of wave forms described as ethereal, aerial, luminous, liquid, and solid factors (in order of decreasing wavelength), and (ii) carrying sensory attributes: sound, touch, light, taste, and smell.

Now the solid factor is acted upon by two types of opposing forces: interior and exterior forces. If the interior force dominates over the exterior force, a nucleus is formed within the solid factor, and a physical structure is formed. Further domination of the interior force over the exterior force results in the conversion of the solid factor into ectoplasmic matter, manifesting a biopsychic field representing a primitive mind. At this stage, the physical structure becomes a primitive life structure. This constitutes the third important postulate.

Then, from primitive organisms to complex organisms, there is an unfolding of consciousness, with a corresponding increase in psychic dilation of the mind and concomitant increase in complexity of the nervous and anatomical structures. Increasing psychic dilation of the mind leads to intellectual, and eventually to parapsychic and intuitional development. The psychic dilation of the mind eventually culminates in its merger into consciousness. This constitutes the fourth important postulate.

3.2. Human psychology, mind liberation by ideating on consciousness

The human mind can be divided into three layers: that which perceives, that which does the work of perception, and that which gives the feeling of existence. The psychic force on the mind is thought to be caused by its interaction with the environment, and also due to the reactive momenta of the impressions on the mind caused by one's interactions and behavior. These impressions can be likened to a characterizing property of the mind, which dictates the nature of the response to a certain stimulus from the environment. This response creates additional impressions on the mind, and this is an ongoing process.

In daily life, the conscious mind is generally most active in constantly perceiving and taking the shape and form of objects and persons perceived. These impressions provide momentum to the mind in response to ongoing stimuli. This involvement or activity precludes the mind from being receptive to the attractive force of consciousness. On the other hand, if the perceiving portion of the unit mind were to ascribe consciousness to the object of its perception, and if the doer portion of the mind also ascribes the

doer activity to consciousness, then the mind does not acquire new impressions. Although mindfulness and mindful behavior have come of age in "western thought", these concepts were developed thousands of years prior in Vedic philosophy[10].

In response to its environment, the mind adopts certain inter-and intra-ectoplasmic occupations, such as hatred, fear, anger. These expressed sentiments affect certain mental glands and brain centers, especially if the sentiments get habituated as instincts. Incidentally, these subsidiary glands are also the regulatory sub-stations of organs, whose main controlling station is located in the brain. Hence, the organs also get affected by malfunctioning, sentiment-laden glands and brain centers; this is the primary cause of degeneration of the physical body structure (leading to disease) and mind (causing stress and even depression). Now when the mind gets dilated by the ideation of consciousness, carried out at the site of these glands and the brain centers, these sentimental instincts are also controlled and psychic stress is also eliminated.

In this era of mental (as opposed to physical) involvements and preoccupation, psychic ailments, neurological diseases, and mental depressions are increasing. Just as excessive physical endeavor stresses the corresponding physiological system, so also excessive mental interactions and endeavors stress the portions of the mind that perceive and do the work of perception. The ego associated with the 'I exist' portion of the mind is what makes the doer portion of the mind perform actions, which can result in painful outcomes.

The mind must always have something to ideate on; namely, it has to have an objectivity. In daily life, the objectification of the mind resulting from harsh interactions and painful situations produces deformations of the mind. At times, these situations persist and the resulting feeling of helplessness, at not being able to alleviate or cope with the resulting painful deformations of the mind, produces mental ailments.

What is the remedy for these acute and chronic painful states of the mind, resulting from inimical interactions? This pain can be alleviated by the dilation of the mind ideating on consciousness which, as discussed earlier, is the fundamental constituent of the manifested universe. It is this dilation of the mind that will help to remove its painful deformations caused by harsh inter-personal interactions and tragic situations. Further, not only will the dilated mind thus experience increasingly blissful feelings, but it will also have a greater capacity for multilateral activities. The increasing development of the mind, however, causes newer mental and psychological ailments, resulting from difficulties in coping with the increasing mental complexities. Thus, the mind has to be continually dilated, by meditation into higher consciousness. This is the basis of psychic therapy for mental ailments, by subjective well-being and mental rejuvenation[8,11].

4. Constituting the Post-Capitalist Society: Social outlook and socio-economic system

4.1. Social outlook: Neohumanism

In Vedic philosophy, consciousness is deemed to be the fundamental constituent of matter and mind, all human beings can be considered as together by the common ties of fraternity. Further, the destinies of all human beings are inter-linked. The important idea, from a social viewpoint, is that human society is one and indivisible[10,12].

Indeed, throughout history, subscription to and indulgence in narrow divisive sentiments has (i)

divided humanity, resulted in wars and bloodshed, (ii) led to colonization and bleeding of wealth from colonies, caused suppression of culture and psycho-economic exploitation. The key to global peace is for all people and all nations to accept and imbibe the universal outlook based on Neohumanism, and develop public policies based on the concept of 'one for all and all for one[12,13].

Also, because of the concept of the origin of human mind being from the Cosmic mind (and consciousness), there is an innate tendency for human beings to expand themselves mentally, intellectually, and particularly in the subtler spheres of life. Indeed, microcosms differ from one another in their individual mental flows. Development of the subtler faculties of mind results in parallelism of individual flows with the Macrocosmic flow, resulting in happiness and fulfillment. The societal culture must facilitate this expansion, and science can provide the means for it[8].

4.2. Socio-economic system: Progressive utilization theory (PROUT)

The role of science is to provide the know-how for people to live in physical comfort, as well as to enable them to expand their mind through the development of their parapsychic potentialities. This would require this new science paradigm to be recognized as part of science culture. The acquisition of parapsychic potentialities should in fact be recognized by the socio-economic system, and this constitutes a significant departure from the present-day materialistic socio-economic systems.

There are invariably many obstacles in the implementation of such a progressive outlook, caused by a great majority of the people in the world not having the basic living necessities (food, shelter, clothing, healthcare, education), as well as other requisite physical amenities to save time spent in physical chores. This points to the need of a new socio-economic order, to enable all human beings to afford the basic living necessities, to be materialistically comfortable by meriting emoluments commensurate to the significance of their work in society, and to, at the same time, be able to develop their parapsychic potentialities. Let us now delineate the psychological and socio-economic basis of such a progressive socio-economic system.

Let us enunciate the principles of this Neo socio-economic order or this new outlook on economics[4]. The first principle is cosmic ownership, individual trusteeship, rational consumption, and equitable distribution of the physical resources of the universe. The second principle is that, for individual security and societal stability, the minimal necessities of life need to be guaranteed through 100% employment and minimal wage. The third principle is that the remuneration for one's contribution to society be proportional to the importance and value of the contributions. The fourth principle is that productivity of commodities be proportional to the collective need, and that prices be kept stable; this will help augment the purchasing capacity and standard-of- living. The fifth principle is that the economic system should foster the development of physical, intellectual, and parapsychic human potentialities as well as their implementation for collective welfare. This economic system is known as the progressive utilization theory (PROUT).

4.3. Causes of present day economic and governance crisis

Now, many supposed democratic countries are becoming bankrupt, why? It is because of the present-day corporations-dominated capitalistic economic system and corporations-promoted political-party based democratic system, which are self-interest promoting systems having nothing to do with people's welfare.

In this capitalist political-economic system, there is no scope for promoting the interests of the people. So then, what happens? Firstly, their banks have been allowed to freely gamble with and lose their clients'

monies. Secondly, these countries have not concentrated on the development of innovations, and incubation of indigenous industry to convert these innovations into products for consumption and export. Thirdly, they have been importing and spending more than the revenue derivable from their exports; this has resulted in a deficit economy, national debt, and even bankruptcy.

In fact, these are also the reasons for poor economy of developing countries. In the case of a developing country like India, there is (i) added loss of people's resources due to corruption and black marketeering, (ii) inadequate production of smart human capital by universities, (iii) lack of innovation at universities, (iv) excessive importing, such as of defense equipment (with embedded corruption).

So the solution to this deplorable state is for the PROUT economic system to replace the capitalist economic system, and thereby provide a more stable and people-benefitting socio-economic order. In this Neo socio-economic (PROUT) system, there can be no justification for stock markets, and banks will not be allowed to gamble with their clients' money.

Then for overall socio-economic stability, there can be formation of socio-economic blocs (as discussed in section 2.1), by which a group of preferably culturally and economically compatible countries can come together, to share their human development through universities, natural resources, agricultural, and industrial resources (**Figure 2**), to form a synergetic socio-economic bloc or region.

4.4. Promoting local indigenous development

The basic tenet of local and regional economic development is to cater for the welfare of the local people of the region, through maximizing the socio-economic potentiality of decentralized socio-economic blocs, by the local people themselves without being controlled or exploited in the private or public sector domains.

The local residents can ensure maximum development of local resources, by enabling conversion of locally available raw materials and produces into manufacturing and processed goods. In order to ensure full-employment for the local people, medium-sized industries could be organized as cooperatives.

Therein, production would be based on the consumption demand. In this neo socio-economic order, Income-tax need not be levied, since (as in the present system) the parties most able to pay it avoid doing so, and to also discourage black-money accumulation and circulation. Instead, excise duty could be levied on the non-essential and luxury items, and the capital generated locally ought to be utilized for local development.

In this way, by enabling meeting of basic living needs, guaranteeing employment for all, keeping prices stable, augmenting the economic development of the region, and increasing salaries proportionally, the purchasing capacity of the local people and their living standards would be continually raised.

4.5. Human-centered socio-economic value system (HSS)

Commensurate with this Neo socio-economic order there is a need for a people's value system, in place of the present-day capitalist and political party based democratic system, based on the book: "Socio-Economic Democracy and the World Government"[3]. In the people's democratic system, there will be no political parties, and the government will comprise of elected members of societal sectors and associations, such as doctors' association, lawyers' association, farmers' association, industrialists' association, teachers' association[3].

Thus, the governing body (say of a city or state) will comprise of members who are directly representing the community sectors (and not their political parties), and they will be obliged to enact

policies that are in the best interest of their community sector and of the people.

For a treatise on socio-economic democracy, the book by Professor Dhanjoo Ghista entitled "Socio-Economic Democracy and the World Government"[7], can provide the underpinnings of the socio-economic-political framework of a more just and equitable world order.

5. Role of education for human living needs, progress and fulfillment

5.1. Universal outlook

All human beings have a common heritage and a common destiny. Yet, the conflicts and struggles in different parts of the world today can be linked to the lack of realization that human society is one and indivisible. This has led to suppression of the cultural and psychic expressions, and socio-economic exploitations within and among nations.

Hence, an important role of education is to help develop a Neohumanist social outlook, free from the narrow confines of all sorts of groupism, racism, and regionalism. This outlook also emphasizes that the welfare of all living beings is interlinked. All living beings, including plants and animals, have both utilitarian values as well as existential values. A balanced ecological environment is hence necessary for all of them to develop their full potential, based on the ideals of humanism, spirituality and above all, values[12].

5.2. Know-how for living needs and psychic liberation

A prime role of education is to teach the means for providing basic living needs, namely natural resources cultivation and food production, housing construction, health-care delivery, production of household amenities, infrastructure of electrical power, water supply, public transport, and railways.

However, it does not stop there. Today, a big majority of the people of the world are suffering from psychic depression due to unfulfilled and misguided psychic propensities. So, the challenge for science is to develop the means for liberation from one's psychic propensities. What is hence needed is a new science paradigm (as enunciated earlier) of devolution of consciousness into universe and primitive mind (and life), and evolution of mind into higher states of consciousness[8]. This emphasizes the need and basis for enabling psychic dilation of the mind and its subordinate psychic plexuses, to gain liberation from the propensities associated with these plexuses. In this way, human beings can progress from materialism to humanism to divinity.

5.3. Education for progress, liberation, and fulfillment

The human rights of individuals to dignified living and minimal necessities of living are to be guaranteed. However, we cannot stop here! We need to also guarantee the fulfillment of the intrinsic nature of human beings for unbarred expansion and expression of the mind. So Neohumanist educators have the unique opportunity and responsibility to enable (through education) all the people to live in dignity, to fully develop their psychic potentiality, and to facilitate the exalted progress of one another[12,13].

To this end, university curricula and research are to incorporate the above-delineated roles of education, so as to help teach and develop (through the academic programs and curricula), science and technology in tandem with human values and universal outlook. The educational emphasis on human values will help guarantee appropriate use of science and technology for human benefit. Inculcating a universal outlook will ensure the cultivation of such public policies, that no community segment in any part of the world is lagging behind physically and psychically. This will, in turn, help to culture a societal

environment, which will make it most conducive for people to divert their minds and psychic pabula for realization of consciousness. This constitutes a subjective approach by objective adjustment. **Figure 7** depicts the synergetic factors of such an education system for societal wellness, combining (i) appropriate use of science and technology for human benefits, (ii) universal outlook, and (iii) psychic liberation for attaining self-realization.

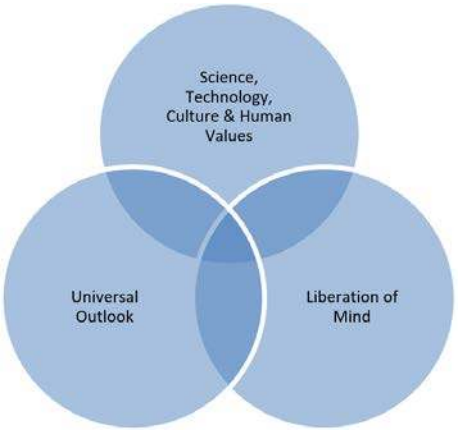

Figure 7. Education system for progress, liberation, and fulfillment.

6. Landmarks in education, from ancient to modern times

The history of education and university is the history of teaching and learning. Each generation, since the beginning of human evolution and writing, has sought to pass on cultural and social values, morality and spiritual values, economic development and governance, medicine and healthcare, science and technology to the next generation. The totality of all these disciplines constitutes human knowledge[14].

6.1. The Gurukula system of education

In the first millennium BC, formal education in Ancient India originated with the Gurukula system. As depicted in **Figure 8**, the Gurukula was residential in nature with the shishyas (aspirants of knowledge) associated with the Guru to get enlightened, as part of his extended family. At the Gurukula, the teachers imparted compressive knowledge of religion, scriptures, philosophy, literature, warfare, statecraft, medicine, astrology and history. The students made their guru as their role model. The guru imparted this knowledge to his disciples through his own example. The guru was supposed to be of flawless character, and he imparted the same flawless character to his students through his constant association with them[14,15].

Figure 8. The Guru educates shishyas.

6.2. Research university concept

Under the guidance of Wilhelm von Humbold, a new university was founded in Berlin in 1810, which became the model for a research university. A research university, according to the 1994 Carnegie classification of institutions of higher education, is deemed to be engaged in extensive research activity, offering a full range of academic programs, and is committed to providing graduate education to the doctorate degree.

Typically, research universities rankings are based upon: 1) quality measures: national academy membership, prestigious faculty awards, doctorates awarded, postdoctoral appointees, and SAT scores of entering freshmen; 2) faculty scholarly productivity index: books published, journal publications, citations of journal articles, honors, and awards.

6.3. Universities for social transformation: The modern theme for university in society

We are living in an era of significant socio-economic-political turmoil, as everyone is taking a critical look at the role of the government in providing socio-economic security and happiness factor for its people. In this phase, the 'University' takes on a very important role, in taking a leading and constructive role in the social transformations of our times.

Today, universities face significant challenges to their traditional position in society, as contemporary knowledge systems are becoming more distributed and learning becoming more ubiquitous. Where does this leave the university as a historically specialized and privileged place for development and dissemination of knowledge and learning? This is the challenge facing modern universities all over the world, to make their surrounding regions to become environmentally and socio-economically sustainable, to provide templates for local and regional sustainable peace, and to impart knowledge for enlightenment[1,2,10,14].

7. Towards an architecture for an ideal university fit for purpose in the 4th Industrial Revolution

The role of universities has evolved over time, with the ancient Greek Academy being primarily concerned with philosophical inquiry, while modern universities prioritize scientific research and technological advancements. However, in today's rapidly changing world, the traditional model of higher education must adapt to meet the needs of society. In this context, we are proposing a comprehensive academic architecture for a post-capitalist university that emphasizes holistic education, sustainable communities, and societal development. This proposal incorporates (i) the traditional Indian concepts of the Gurukula system, the Vedic concept of Samgacchadhvam samvadadhvam (let us move together, come to know one another, and come together in our thinking), and Neohumanism (beyond the narrow geo and socio sentiments), (ii) the concept of "research university", and (iii) aims to develop higher education to cater to the needs of the 4th Industrial Revolution.

What makes an ideal modern university? The proposed ideal university emphasizes heightened values of living and personal interactions with societal members. It incorporates the Neohumanist ideals in educational programs, promotes the development of society according to ancient Vedic sloka of Samgacchadhvam samvadadhvam, involves the concept of Gurukula wherein the faculty members are dedicated to foster the holistic development and enlightenment of students, and is an academically comprehensive university[14,15]. In today's times, we need to recognize that half of human knowledge is concerned with developments around us, and the other half of human knowledge is on developments within the human body. This brings us to the new concept of STEM2 education, which stands for science,

technology, engineering, mathematics, and medicine. Hence, STEM2 education integrates total human knowledge, which is essential in today's world. This is verily the era of comprehensive universities to also include medical schools.

The word 'university' comes from the Latin word universus, meaning "whole, entire". So based on this original definition, the university is to be a comprehensive research institution, encompassing all faculties, including humanities and social sciences, physical and biological sciences, environmental sciences, engineering sciences, biotechnology, pharmaceutical sciences, management, medicine and health sciences, law and governance, agriculture and forestry, and veterinary science and medicine. The university assumes responsibility for serving the regional community and promoting its social transformation, providing knowledge for holistic progress of students and society.

7.1. What then can be the comprehensive academic architecture for such an ideal modern university?

In line with the proposed ideal university, we are proposing a comprehensive academic architecture that incorporates the following nine colleges (and their roles):

1) College of Humanities and Social Sciences: To develop humanitarian values of living, and the constituents of political science and governance for progressive living. In this college, we can also offer courses in Neohumanism and PROUT, as described below:

What is PROUT:

PROUT is an acronym for the Progressive Utilization Theory. Conceptualized in 1959 by Indian Philosopher Shrii Prabhat Ranjan Sarkar, PROUT is a viable alternative to the outmoded capitalist and communist socio-economic paradigms. Neither of these approaches has adequately met the physical, mental and spiritual needs of humanity. PROUT seeks a harmonious balance between economic growth, social development and cultural expression.

Combining the wisdom of spirituality, the struggle for self-reliance, and the spirit of economic democracy, Proutist intellectuals and activists are attempting to create a new civilizational discourse. PROUT newsmagazine aims at conveying comprehensive and visionary goals of PROUT Philosophy.

Source: http://proutjournal.com

For the Neohumanism course, we can adopt an available reference text[12]: Neo-Humanism: Principles and Cardinal Values, Sentimentality to Spirituality, Human Society, by Prabhat Ranjan Sarkar. For the PROUT course, we can adopt[7]: Socio-Economic Democracy and the World Government, by Professor Dhanjoo N. Ghista to set up a new system of democratic governance, devoid of political parties.

2) College of Sciences and Mathematics: To provide education in physical sciences, biological and life sciences, mathematical and computer sciences. This is a very comprehensive college. In this college, we can also offer novel courses in cosmology cycle (*brahmacakra*) and microvita (on life creation). This Cosmological Cycle concept is well developed in the paper[8]: Consciousness and Evolution: Unified Theory of Consciousness, Matter and Mind, by Dhanjoo Ghista and Michael Towsey. For the microvita course, we can employ the book "Microvita: Cosmic Seeds of Life by Richard Gauthier[14].

3) College of Engineering: To offer courses in all fields of engineering. Today the most in-demand field is biomedical engineering, in which we can offer a novelty program in biomedical engineering in translational medicine (BETRAM), example[16]. Such a program could provide new insights in (i) anatomy, i.e., how anatomical structures are intrinsically optimally designed for their function, (ii)

physiology, i.e., quantifying physiological systems and developing indices for their function and dysfunction, (iii) medicine, i.e., developing precision medical diagnostic and assessment methods, and (iv) surgery, i.e., involving customized biomedical engineering analysis of surgical procedures (such as of coronary bypass surgery).

Biomedical engineering courses can also be offered based in the textbook: Biomedical Science, Engineering and Technology, by Professor Dhanjoo Ghista[17].

Chapter 1: Biomedical Engineering Professional Trail from Anatomy and Physiology to Medicine and Into Hospital Administration: Towards Higher-Order of Translational Medicine and Patient Care.

Chapter 35: Physiological Nondimensional Indices in Medical Assessment: For Quantifying Physiological Systems and Analysing Medical Tests' Data.

4) College of STEM Education: To study STEM operating in (i) our natural world: sun, and stars, lands and oceans, weather and natural disasters, animals and plants, (ii) our communities, in engineering infrastructure development and home appliances, computers and smartphones, transportation systems and airports, and (iii) within our body, in the form of physiological engineering and biomedical engineering. In this college, we can offer a popular program in IASIEM education[16]: Integrated Approach to Science, Engineering and Medicine, bas envisaged in an early vision paper. This program could address the big demand to educate school and college teachers in an integrated approach to the study of STEM disciplines (and their applications in diverse fields), such as physiology, biomechanics, and sports science.

5) College of Management Science: Business administration, smart cities, and hospital healthcare management. The hospital and healthcare management (PhD and MD-MBA) program, is designed to educate hospital administrators with the competency to enhance the overall quality and efficiency of healthcare delivery, by providing them with multidisciplinary knowledge in business administration and financial management combined with clinical and hospital engineering, related to cost-effective operation of hospitals and healthcare. This program can be offered by elaborating on the mission to educate and train hospital and healthcare administrators with the competency to (i) to develop cost-effective healthcare systems, and manage hospital operations in interaction with clinicians, and (ii) enhance the overall quality and efficiency of healthcare delivery. Graduates from this Department can qualify for positions as hospital administrators in healthcare organizations and hospitals. It could even be offered with internships in the Medical Center, to prepare graduates for careers as administrators in hospitals (in hospital operations management) and healthcare organizations, in providing cost-effective healthcare delivery).

6) College of Law, Governance and Public Administration: To address the need for smart governance for promoting economically sustainable cities and urban-rural communities. In this college, we can offer a novel "Governance and Public Administration Program" to educate competent and learned public politicians. This program can be formulated for (i) evaluating the effectiveness of governance programs of states and federal governments, (ii) developing rigorous approaches to policy making and implementation, and (iii) considering how legislations and bills affect human living and values. This Program could then also be considered as a qualification for public political offices, as city mayors, state governors, house representatives and senators of US.

7) College of Sports Science and Engineering: Sports Science deals with the analyses and mechanisms of sports plays and maneuvers, such as soccer corner curving kicks, baseball pitching, football quarterback passing, hockey dribbling, tennis serves, high jump and pole vault. This novel Sports

Science program would enable us to educate scientific Sports Coaches, which will help to totally transform the sports field.

To educate scientific sports coaches for working in universities and professional sports, to provide knowledgeable training to sportspersons and athletes, and enhance national performance in international tournaments and Olympic Games. In this college, we could offer a novel program on the engineering science of sports and athletic events, to educate scientific sports coaches, by elaborating on:

(i) Biomechanics of Fitness Index: Optimal Walking and Jogging Modes, and Hip Joint Assessment (Chapter 14)[18].

(ii) Analysis of Spinning Ball Trajectories of Soccer Kicks and Basketball Throws (Chapter 15)[19].

This program can educate and qualify sports coaches and managers, and could have a big impact on the performance of university and national sports and athletics teams.

8) (i) Meditation Science and Psychosomatic Medicine; (ii) Addressing Corona Virus Crisis: Animal-caring and Meditation, Progressive thinking and living[18]; (iii) Yogapathy: Meditation Science and Practice, for Psychosomatic Health, Neuroplasticity, and Well-being-An Insight[20]. The insights on yogapathy show much promise and would be a unique college for many countries. Specifically, Ghista[18] explains how meditation ideating on Consciousness promotes psychosomatic health and wellbeing. Subsequently, it presents the morality foundation of spirituality comprising *Yama* (controlling our actions) and *Niyama* (self-regulation), which are moral guidelines for human development. Meditation strengthens the morality of a human. A practical guide to meditation, involving three lessons: "(i) Ishvara Pranidhana: ideating on the divine entity pervading around us, (ii) Pranayama: breathing pranah—divine vital energy, and (iii) Cakra Shodhana: stimulating and purifying the chakras by which the surrounding endocrine glands release hormones into the organs. Ghista[18] then presents the means to validate the physiological benefit of meditation by measuring electroencephalogram (EEG) response to meditation, showing a shift of the EEG energy state to a lower frequency band, associated with decreased mental tension, increased relaxed state, and tranquility, and then even to intuitional development."

9) College of Medicine and Health Sciences: To develop a novel STEM format of medical sciences, leading to precision medicine and technological surgery; this would be the first such medical college in the world. In this college, we can develop a novel STEM format of medicine, as outlined by: STEM Model of Medicine, involving quantitative physiology, precision medicine, and technological surgery. The college can also offer MD-PhD (biomedical engineering) program, based on novel ideas. The New Era of Integrated Biomedical Engineering and Medicine: STEM Model of Medicine (STEM) encourages radical innovation. Many medical schools have started to develop a new medical curriculum, for the next generation of primary care physicians. This curriculum provides an education that integrates formal classroom-based medical science knowledge with patient-centered and disease-focused medical education. Essentially the new curriculum features foundational medical sciences courses integrated with early engagement with patients and clinical training, involving teaching medical students about the health care system, and how to integrate use of technology into the practice of medicine. The four inter-woven pillars of this new medical curriculum are Health Systems Sciences, Medical Sciences, Healthcare Informatics, and Clinical Sciences. The shift in this new curriculum is to make students more informed about healthcare delivery.

Hence, in this college, we can even offer a program in Yogapathy and naturopathy medicine (YONAM), which would be the first such program at a university anywhere in the world.

7.2. Transforming universities to embrace the changing landscape of education brought about by the 4th Industrial Revolution

We have outlined a comprehensive academic architecture for a post-capitalist university that emphasizes holistic education, societal development, and sustainability. This vision incorporates the traditional Indian concept of Gurukula, Vedic concept of Samgacchadhvam samvadadhvam (let us move together, and let us sing together), and Neohumanism (beyond narrow sentiments), and aims to transform higher education in the face of the 4th Industrial Revolution. It is a clarion call for an agenda of transforming universities to invigorate higher education for millennials, and to harness converging technologies to create an inclusive and human-centered future. Our proposed academic architecture aims to address access, cost, and effective outcomes and co-create with stakeholders, such as students, faculty, and regulators, a Higher Education 4.0 roadmap that ushers in a reimagined era[21,22].

Based on our outlined academic architecture, it is clear that the ideal university of the 21st century must prioritize holistic education and embrace the changing landscape of education brought about by the 4th Industrial Revolution. This would require a departure from traditional "sage on stage" models of education towards more interactive and student-centered approaches that leverage digital technologies and infrastructure. The importance of transforming universities to meet the needs of the 21st century cannot be overstated. According to the report by the World Economic Forum, the changing nature of work brought about by the 4th Industrial Revolution means that individuals will need to constantly upgrade their skills to remain relevant in the job market[23–25]. Universities must therefore take the lead in equipping students with the knowledge and skills they need to thrive in a rapidly changing world.

In closing, a holistic education that fosters personal and societal development, embraces Neohumanist ideals, promotes societal transformation, and provides comprehensive knowledge in various fields is crucial for the development of the ideal university for the 21st century. By co-creating with stakeholders and leveraging technologies to create a human-centered society, universities can create an educational system that prepares students for the demands of the modern world and help them to become agents of positive change in society.

Author contributions

Conceptualization, DNG and RSS; methodology, DNG and RSS; validation, DNG and RSS; formal analysis, DNG and RSS; investigation, DNG and RSS; resources, DNG and RSS; data curation, DNG and RSS; writing—original draft preparation, DNG; writing—review and editing, RSS; visualization, DNG and RSS; project administration, DNG and RSS. All authors have read and agreed to the published version of the manuscript.

Conflict of interest

The authors declare no conflict of interest.

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