

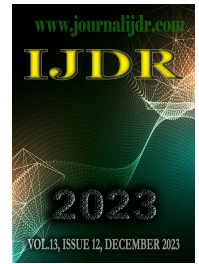


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RESEARCH ARTICLE

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OUR VISION AND MISSION FOR UNIVERSITIES IN INDIA, INCLUDING SETTING UP INDIAN RURAL UNIVERSITIES FOR RURAL COMMUNITY DEVELOPMENT, FOR PROMOTING HOLISTIC DEVELOPMENT IN INDIA

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ABSTRACT

A higher education domain that needs considerable attention and development in India is the importance of academically comprehensive, research intensive, and community contributing universities, to address community, regional, and national needs.

It is our vision and mission to further develop the universities in India, to initiate a renaissance in India in all realms of public life and people's living, by

1. Developing the Central universities, State universities, and IITs to become prime research & development universities, contributing to sustainable community development.
2. Having all IITs to have Medical Colleges, because biomedical engineering is woven into medicine, for development of precision medicine and patient-tailored surgical procedures.
3. Set up a new batch of Indian Rural Universities (IRUs), to promote holistic rural development.
4. Transforming Private Universities to be research and community-engaged universities.

To thereby

- (i) promote urban and rural developments, smart governance for community development, healthcare delivery, and industrial development, and
- (ii) Herald a new era of shared prosperity, peace, and progress.

Rural University education is an effective tool for bringing about social change in rural regions through rural community development. Herein, we are providing a visionary concept of what a rural university should be, to address the multi-dimensional needs of rural regions in India.

The rural community development programs can comprise:

- Agriculture, animal husbandry, rural industries.
- Rural infrastructure engineering: water supply, sanitation, roads, buildings, electrical power supply.
- Primary to tertiary health care development and services.
- Family welfare, women welfare, and childcare.
- University education, including adult education, social education and literacy for the adult population.
- Community organization and sustainable community development.

For all these developments, we require the setting up of Indian Rural Universities

This Paper comprises of these two sections:

Section I. Our Grand Vision and Mission for Holistic Development in India

Section II. Rural University Education, for Rural Community Development in India.

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INTRODUCTION

We want to

1. Revive Urban India, by developing 'Smart Cities', providing core infrastructure, clean environment, basic amenities (of electricity, water supply, sewerage), public transport and housing for the urban poor.

2. Promote Rural development, through enhanced agricultural production by efficient irrigation system, primary to tertiary healthcare delivery system, solar power electricity system for rural homes, farms, and industry.
3. Make India a manufacturing powerhouse, by involving universities in promoting indigenous industrial development.
4. Develop Smart Governance of cities and states, to contribute to urban and rural infrastructure and economic development.
5. Rejuvenate the Cultural heritage of India, by promoting Yoga science, cognitive enhancement, and integrated medicine.

In this regard, Central universities, State Universities, IITs, and Private Universities can all play primary and pivotal roles for the implementation of this mission.

Section I. Our Grand Vision and Mission for Universities in India, for Holistic Development in India

Our visionary perspective of the role of a university in society is as follows: A university is verily a laboratory for the development of a progressive society, by delineation of its ideals in all fields of human thought and endeavor, and by the development of education and research programs for imparting these ideals. A university hence needs to have a pulse of the problems challenging society and a clear delineation of its role in cultivating the requisite solutions for its progress.

To address this vision, we are providing the following Items:

- **Item I.** Importance of academically comprehensive, doctoral research, and community engaged Universities to serve community needs.
- **Item II.** Universities as Centers of Excellence in Education and Research, contributing to Community Development and People's Living.
- **Item III.** Higher Education for Holistic Development of India.

Item I. Importance of academically comprehensive, doctoral research, and community engaged Universities to serve community needs:

Adomain that needs considerable attention and development is that of the importance of academically comprehensive, doctoral research, and community engaged universities. In India, our universities are in big need of this structure and theme, and this includes IITs, AIIMS, Central universities and State universities. For example, now considerable breakthroughs are taking place at the intersection of medicine and biomedical engineering. However, in India, medical colleges (such as AIIMS) are on their own, while science and technological universities (like IISc and IITs) do not have medical colleges. So, we need to implement the concept of academically comprehensive research universities, to promote such interdisciplinary research and development.

Universities also need to contribute towards (i) governance and planning of cities and states, to promote optimal operation and performance of all the public sectors, and (ii) industrial and community infrastructure development. Essentially, we want Indian universities (Central universities, State universities, IITs, and Private universities) to (i) be academically comprehensive, and to be involved in developing new knowledge in academic fields and (ii) be community engaged, by contributing to industrial development, and by developing economically sustainable communities. In this way, we can also get Indian universities to be ranked among the top 50 universities in the world, like even so many Asian universities.

So, for a university to appropriately develop new knowledge in academic disciplines, to promote holistic development in India, it needs to have an academic structure comprising of many of the following colleges: 1. College of Humanities and Social Sciences. 2. College of Sciences: physical, biological and environmental sciences. 3. College of Engineering. 4. College of Management: business management, city planning & management, hospital & healthcare management. 5. College of Medicine (allopathic, ayurvedic, naturopathic medicine) and Health Sciences. 6. College of Law and Governance. 7. College of Agriculture and Life Sciences. 8. College of Yoga and Mind-Body Medicine. 9. College of Education, for School Teachers (such as in STEM Education). 10. College of Sports Science and Engineering (to educate scientific sports coaches).

Item II. Universities as Centers of Excellence in Education and Research, while contributing to Community Development and People's Living

Universities need to promote advancements in all academic disciplines, as indicated above: This can lead to more elevated thinking and progressive living of the people. In these Colleges, many of the textbooks and journal papers can contribute to programs and courses, particularly in social sciences, biomedical engineering, medicine and health sciences, management science, STEM education, yoga and yogopathy, sports science and engineering.

1. In the Biomedical Engineering Departments of universities (particularly of IITs), we can offer a new type of Physiological Systems Engineering Courses, based on the textbooks:

- (i) Applied Biomedical Engineering Mechanics (CRC Press, Taylor and Francis, 2009) [<https://drive.google.com/open?id=0BzOPIHbjWLYta3djeFV0MkRaMXc>].
- (ii) Cardiology Science and Technology (CRC Press, Taylor and Francis, 2016), designed as computational cardiology to transform cardiology and take it into the era of STEM. [https://drive.google.com/file/d/1Tw2WVLElWLLIblazb8S-GPXh8Y_hwI10].
- (iii) Biomedical Engineering of Pancreatic, Pulmonary, and Renal Regulatory Systems, and Applications to Medicine (Elsevier Publisher, 2023) [<https://www.elsevier.com/books/biomedical-engineering-of-pancreatic-pulmonary-and-renal-systems-and-applications-to-medicine/ghista/978-0-323-95884-4>].

These courses can provide precision formats of function, dysfunction, and treatment of physiological systems. We are also proposing that all Biomedical Engineering departments have collaboration with Medical Colleges, and together offer MD-PhD (Biomedical Engineering) programs.

2. In Medical Colleges (such as AIIMSs), we can incorporate the "STEM Model of Medicine", [https://drive.google.com/file/d/1PgLsgjKAm_BeIF1gclYf0tMxvx13Wae]. In the medical curriculum, to provide a more rigorous and precision formulation of medicine, which can then also be applied to enhance the level of clinical care.

Then in the paper, New Era of Integrated Biomedical Engineering and Medicine: STEM Model of Medicine (STEM²), Part 2. Gateway to new format of Medical Colleges, Pacific Journal of Medical and Health Sciences, ISSN: 2456-7450, Vol.4, No.1, 2022, pp-01-09 [<https://drive.google.com/file/d/1qswWgijQPrY20QeB3loU5UrnxpV4LmDw6>] is setting the stage for a new era of integrated medicine, resulting in the formulation of new types of computationally based disciplines of Anatomical Engineering, Physiological Engineering, Medical Engineering, and Surgical Engineering.

We can also set up MD-PhD (Biomedical Engineering) Programs between Medical Colleges and Departments of Biomedical Engineering, towards development of precision medical diagnostics and patient-tailored surgical procedures, medical inventions, and devices.

3. Now, we are proposing that all IITs have medical colleges, so that their Biomedical Engineering Departments can have close collaborations with their Medical Colleges. Today, all big innovations are taking place at the intersection of Biomedical Engineering and Medicine. Hence the interweaving of Biomedical Engineering and Medicine is very important for both medical education as well as healthcare delivery.

4. In the Indian Institutes of Management, we can offer MBA degree program in Hospital and Healthcare Management (HOHM), based on the journal paper: Hospital and Healthcare Management Program (Curriculum and Outcomes), Pacific Journal of Medical and Health Sciences, ISSN: 2456-7450, Vol.4, No.1, 2022, pp-01-09 [https://drive.google.com/file/d/1_eO8TYifBOT7q_N9bK20ZDuf8W9w7PI]. The HOHM Program is designed to provide hospital and healthcare administrators with the relevant multidisciplinary knowledgebase in business administration, clinical and hospital engineering, economics and financial management, related to cost-

effective operation of hospitals and healthcare delivery. For that purpose, we could especially offer a novel MD-MBA (Hospital and Healthcare Management) Program, jointly between the Medical Colleges and Indian Institutes of Management.

5. In India there are many Colleges of Education. In these Colleges, we can offer a novel Integrated STEM² Education Program, based on the journal paper: IASTEM² Education: Integrated Approach to Science, Technology, Engineering, Mathematics, and Medicine [<https://drive.google.com/file/d/1JPX78p6OlhHM8WHKxDZolacZufdeQyjo>] to provide an interdisciplinary and transdisciplinary approach to learning across academic disciplines, wherein academic concepts are coupled with real-world problem-based learning. This Program, based on STEM² concept (of science, technology, engineering, mathematics, medicine), addresses the big demand to educate and train schoolteachers and college professors in an integrated approach to the study STEM disciplines and their applications. It is important to recognize that STEM is working all around us and even within us, and it affects virtually every component of our everyday living. Community development involves the development of all the public sectors, which can all be designated as STEM fields.

Some sample Courses, emphasizing Integrated approach to STEM Learning are:

1. Physics (with Applications in Engineering, Physiology, Sports, and Medicine),
2. Biochemistry, 3. Mathematical Biology, 4. Quantitative Physiology (based on Physics and Engineering Principles), 5. Calculus, with Applications in Cardiology, 6. Mathematics in Science, Engineering and Medicine,

6. Setting up new Colleges of Yoga: Yoga Meditation and Yogapathy (Mind-Body Medicine), at universities: Today, Yoga is the most in-demand field, for psychosomatic health and well-being, cosmic thinking and cognitive development, promoting enlightenment and mind liberation from propensities.

We can set up this unique College of Yoga, having Departments of

- (i) Yoga Meditation: Science and Practice, for Psychosomatic Health and Well-being
- (ii) Yogapathy (Mind-Body Medicine): Psychosomatic Preventive and Curative Medicine, offering courses based on the journal papers: Yogapathy: Meditation Science and Practice, for Psychosomatic Health, Neuroplasticity, and Well-being—An Insight, *Pacific Journal of Medical and Health Sciences*, ISSN: 2456-7450 | Vol.4, No.1, 2022, pp-10-24. [<https://drive.google.com/file/d/1ksDIU4s8ioAN6ORsk7pX26EGjbPOpf3J>]. Yogapathy: Psychosomatic Preventive and Curative Medicine —The need of the day, by Dhanjoo Ghista, *Pacific Journal of Medical and Health Sciences*, ISSN: 2456-7450 | Vol.4, No.2, 2022, P. 21-42 [<https://drive.google.com/file/d/1-Rzjx2wKqygbKryYvv9zlgRQxf38ZHT6>]. This paper could then even lead to the development of an important MD-PhD (Yogapathy) Program, jointly between the College of Yoga and the Medical College.

7. Setting up new Colleges of Sports Science and Engineering, at universities: This would be the first such Program in India and worldwide, for careers in sports coaching. The courses offered in this Program would be based on the book chapters:

- (i) Biomechanics of Fitness Index: Optimal Walking and Jogging Modes, and Hip Joint Assessment, Chapter 14, *Applied Biomedical Engineering Mechanics*, by Dhanjoo N. Ghista, CRC Press, 2009. [<https://drive.google.com/file/d/143CinVyNPeqzHpBBGUfQE0D9SzoPBZlu/view?usp=sharing>].
- (ii) Analysis of Spinning Ball Trajectories of Soccer Kicks and Basketball Throws, Chapter 15, *Applied Biomedical Engineering*

Mechanics, by Dhanjoo N. Ghista, CRC Press, 2009 [https://drive.google.com/file/d/1G_SFDACx7enPAAAnlMzxl-qbN-BNoCGM4]. This program can contribute to enhancing India's performances in International tournaments, Asian Games, and Olympic Games.

8. Setting up “Political Governance, Cooperative Economy, and World Government Program”, jointly in the University Colleges of Humanities and Colleges of Law. This important program would be based on the textbook: *Socio-Economic Democracy and the World Government* [<https://drive.google.com/open?id=0BzOPIHbjWLYtU193UTNRLTZIUkE>]. In developing an enlightened political-governance and socio-economic environment, this book provides a people empowered and benefitting socio-economic political-governance system, based on (i) Democratic Governance System (DGS), whereby the most qualified representatives of all the functional sectors of the community get elected to the local legislature, and (ii) Cooperative Economic System (CES) of cooperatively managed institutions and enterprises, whereby the corporation's revenues are only distributed among the company employees. Together, DGS and CES can promote progressive living for the people and economic equity. Then the World Government constitution in the United Nations can be structured to promote progressive development of all the countries of the world, prevent domination of some militarily powerful countries and their invasions of other countries, promote fair governance of countries and progressive living of their people, and serve as a template of world peace.

Item III. Higher Education for Holistic Development of India:

Our vision for universities is for them to be temples of higher learning, engaged in gathering, generating, storing, and disseminating knowledge relevant to societal needs.

By making all these developments outlined above in Item II, we can upgrade Central universities, State universities, IITs, and Private universities, to (i) make them more comprehensive in academic disciplines, and (ii) also have them actively involved in industrial development and sustainable community development.

Let us also set up a new network of Indian Rural Universities (IRUs) to promote all-round rural development. Together these universities can cultivate immense research and development to address the problems of India's urban and rural development, knowledgeable governance of cities and states, agricultural productivity, and indigenous industrial development, towards inculcating a renaissance in India and transforming it into a people-dedicated and holistically prosperous country.

Through it all, our noble objective is to implement the UN Sustainable Development Goals [https://drive.google.com/file/d/1U9JpDN83w0TXYC5muQB9H-oi7M_9auc4] to help initiate such a renaissance in India, to impact all realms of public life and people's living.

Section II. Rural University Education, for Rural Community Development in India

To address this need, we are providing the following Items:

Item I. Rural Development: Components of Rural development: From Natural Resource Management to Community Development Planning & Organization to Smart Village Governance.

Item II. Rural Universities: The need for Rural Universities for progressive living of Rural Populations: through university education, agricultural development, local industry incubation, primary to tertiary healthcare delivery, and jobs creation.

Item III. Making Rural Communities Economically Sustainable: Balanced development of all the community sectors: For a sustainable community, we want the revenue brought into the rural towns by the revenue-generating horticultural and agricultural sector and the

manufacturing sectors to be adequate to sustain the community services sector, the small-business sector, financial and professional sector.

Item IV. Rural University for Rural Development (RURD) project: Catalyst for change: Local access to college education and courses, research faculty and facilities will encourage the rural students to pursue higher education. Being able to remain in their home areas will pursuing college education will benefit the rural students and their families.

Item V. Rural University's Academic Structure and Features: A Rural University can comprise of the following colleges:

1. College of Humanities and Social Sciences,
2. College of Science and Mathematics,
3. College of Engineering and Technology,
4. College of Nursing and Allied Health,
5. College of Medicine and Health sciences,
6. College of Management Science and Business Administration,
7. College of Law, Governance, and Public Administration,
8. College of Education and Integrated STEM Field,
9. College of Farming and Agricultural Biotechnology,
10. College of Yoga Meditation and Yogapathy.

Item VI. The Need for Rural Universities: Expansion to State and Nationwide Rural University movement: The low cost of living, low wages, and low cost of local natural resources is an advantage to attract human, industrial and business capital to rural regions. With proper planning and local control, the positive values associated with rural living can be taken advantage of, to enhance the quality of life and transform the rural communities to make them functionally sustainable.

Item 1. Rural Development



Rural Development Programs can have the following main components:

Sustainable Natural Resource Management: methods of remediation and community management of resources, such as in the coastal region of Gujarat and the area surrounding the Gir Forest (where there is increased groundwater salinity due to over-pumping), and Surendranagar District (one of the most drought-prone regions in Gujarat).

Soil and Water Conservation: watershed groups and participatory irrigation management, irrigation and ground water recharge systems, promotion of micro-irrigation devices like drips and sprinklers; river basin management, including the construction of check dams and irrigation tanks.

Basic services and Infrastructure: fulfilling the perennial need for water, energy, and fodder; providing infrastructure for drinking water, technical know-how as well as infrastructure for generating alternative energy and fodder growth for cattle.

Forest Conservation and Management: raising and protecting forest land and village commons; tree planting campaigns and watershed-related reforestation; alternatives to biomass consumption, including biogas plants and solar lanterns.

Climate Resilience encountering through climate & saline resilient crops and agro-industry: in areas impacted by drought, agriculture pests or salinity ingress due to climate change, to introduce alternative crops that are more resilient to these changes; in saline areas, to introduce saline-resistant crops, such as sapota; helping farmers to raise incomes through agro-industry, such as by organic fertilizer production, handicrafts, bamboo furniture and honey production.

Renewable Energy: exploring alternative energies, through biogas, windmills and solar energy projects; construction of biogas plants and household biogas units (attached to household toilets); piloting solar lanterns that can be charged at a central charging station run by an entrepreneur; piloting biogas plants, solar cookers and windmills, including a low-cost windmill for water pumping; the ultimate aim of the program being to: reduce the consumption of biomass and non-renewable sources (such as kerosene) and the drudgery and indoor pollution affecting rural women.

Drinking Water Availability (such as priority programs in saline areas of Gujarat): building drinking water schemes, percolation wells and roof rainwater harvesting structures; water harvesting systems for the home have been introduced; impact: reduction of drudgery for women and girls, improved water quality and reduced bacterial content.

Economic Development (through Improved Food Security, Increased Income and Reduced Risk): agricultural and non-agricultural interventions that help improve food security, increase agricultural incomes, reduce risks of the landed farmers and provide livelihood options for the poor farmers.

Social development: programs that address social inequities and integrate everyone regardless of gender, caste, or tribal origins in the decision-making process, and thereby providing a "voice" to the marginalized.

Community Development Planning & Organization: mobilization of communities so that they can plan for and implement their own development plans: support the construction of infrastructure, improve productivity, create awareness for water conservation and natural resource management; the aim of these programs is for the committee level organizations to become self-reliant with the skills to federate and form linkages with government programs.

Smart Village Governance: formation of a range of organizations (at the village, sub-village, and multi-village levels) that are responsive to the needs of their communities and influence local governance structures; interaction of village governance groups at the state level, to influence government policies regarding the village groups' rights.

Savings and Credit: to address economic crises due to flooding or drought and/or to purchase seeds and farming tools, by creating self-managed community-based savings groups, linked to banks and access credit for their members.

Item II. Rural Universities

The need for Rural Universities for progressive living of Rural Populations: through university education, agricultural development, local industry incubation, primary to tertiary healthcare delivery, and jobs creation. More than ever before, our Rural Communities are in dire need for active involvement of universities, through their academic programs, for: (i) encouraging and inspiring students to pursue higher university education to develop their future, while being able to live in their hometowns; (ii) sustaining farming

communities, which constitute the base of the rural regions, (iii) promoting innovation and enabling scientific, technological and medical advancements locally, to enrich the rural communities; (iv) cultivating industrial development and creating employment, by attracting companies but essentially by incubating new companies locally; (v) ensuring people of requisite purchasing capacity for their basic needs, while providing scope for their cultural and aesthetic expressions; (vi) developing sustainable rural communities, creating grass-roots economy, and providing a healthy lifestyle for the rural population. People in rural areas would thereby see an increase in economic activity and the quality of life, associated with increase in the educational level of their youngsters. Even in agro-based industries that require considerable physical labor, there needs to be an influx of new technologies to make them viable. Providing the work force for these industries requires opportunities for local knowledge and skills by imparting university education.

University education can enable growth of agro-industries, community infrastructure services, social health care delivery system, and high-tech manufacturing: For rural communities to be economically competitive there is a need to develop a skilled, productive, and an enlightened rural populace. Universities and associated research institutes can enable the development of such a populace, and they can also drive scientific and technological advances in all fields: humanities and social sciences, science and engineering, medicine and health care, law and governance, state and corporate management. These academic fields of the university can contribute to social transformation, by developing sustainable communities.

Rural Universities can provide the requisite knowledge base and human capital for:

- Farming and infrastructure development and maintenance,
- Cultivating locally developed innovations and incubation of companies,
- Local cooperatively managed businesses, corporations, and financial services,
- Providing employment opportunities in all work domains,
- community healthcare delivery system,
- Bringing economic and functional stability to families,
- Inspiring rural children to complete their high-school education, advance their studies and look forward to a fulfilling lifestyle,
- Creating sustainable communities, and thereby providing a bright future to the rural families and children.

Item III. How to make Rural Communities Economically Sustainable, by the balanced development of all the community sectors:

A rural sustainable community can be developed as follows:

- (i) Establish a rural university having (i) both under-graduate and post-graduate programs, and (ii) competent faculty, by which their 'research and development projects' can attract high-tech companies, which can then create jobs and also brings additional talented people into the community, and thereby provide opportunities for local people to open new businesses.
- (ii) The rural university can also engage (through its post-graduate students) in community infrastructure projects and town planning, by bringing new ideas and technologies into community improvement.
- (iii) With (i) industry incubation, creation of businesses and jobs, and resulting increase of resources, along with (ii) coordination of local natural resources, local human capital and local needs, progress can be made for adequate infrastructure development towards making the community to become sustainable.

A functionally sustainable rural community (FSRC) can be defined as comprising several rural towns, together providing economic

sustainability to the community. Sustainable development for rural communities is concerned with developing adequate standards of living, based on the provision of community services and adequate quality-of-life. These entails developing a means of generating revenue by developing agriculture and horticulture sectors and the creation of urban markets, so as to support community services (such as health care, public transport, education, water supply, sanitation, electrical power) and sustain small businesses, shopping malls, banks, financial corporations, and professional services.

Rural areas need professional education (such as in engineering and business management) to address the hiring needs of service industries, and to avoid people's migration to cities. For this reason, in addition to the revenue generating horticultural and agricultural sectors (comprising about 25 % of the total population), we need to also develop:

- (i) A manufacturing sector, for farm equipment, home use appliances, and indigenous medicines, comprising 15% of the population.
- (ii) A community service sector, for education, health care delivery and infrastructure (water supply and sewage disposal, electrical power generation using renewable energy, and high-speed internet), comprising another 35 % of the total population.
- (iii) Small businesses, financial (cooperative banking) and professional sector, comprising the remaining 25% of the population).

Balanced Development of all Community Sectors: For a sustainable community, we want the revenue brought into the rural towns by the revenue-generating horticultural and agricultural sector and the manufacturing sectors to be adequate to sustain (i) the community services sector, (ii) the small-business, financial and professional sector, as well as (iii) a rural university for human capital and know-how development required for these four sectors. Then these FRSCs will be able to attract manufacturing companies to be relocated to rural regions, to benefit from the low cost of living and correspondingly lower wages. This will create rural employment and help turn around the national economy. Indeed, this is Rural University concept can help to trigger a nation-wide movement, contributing more to help rejuvenate our economy.

A Rural University hence needs to develop education programs, human capital, research innovations, and technologies to meet the needs of all the four population sectors:

- (i) Revenue generating horticulture and agricultural sector.
- (ii) Manufacturing sector for farming equipment, home use appliances, and indigenous medicines.
- (iii) Community Services sector for school education, infrastructure development (roads, water and electrical power supply, high-speed internet), and healthcare delivery.
- (iv) Small-Business, Financial, and Professional Sector.

Item IV. Rural University for Rural Development (RURD) project

Catalyst for change

Local access to college education and courses, research faculty and facilities will encourage the rural students to pursue higher education. Being able to remain in their home areas will pursuing college education will benefit the rural students and their families. The setting up of a rural university in a region will transform a somewhat under-developed region into a land of thriving townships, of residential communities, cottage industries, parks, educational institutions, health and medical clinics, shopping malls, farms and wadis, and even agro-pharma-healthcare industries, to thereby provide fulfilling work opportunities and lifestyle for the people.



To implement this total-development project, a rural university is to be planned with a three-fold purpose, to

- (i) Develop the requisite engineering, healthcare, farming, industrial and business-management infrastructure for the community,
- (ii) Engage and employ the local people in this infrastructural development,
- (iii) Educate the local people, to empower them into taking over and sustaining all aspects of community development.

Through its Colleges, the local Rural University (RLUN) will be involved in all aspects of land and community development:(i) from farming to environmental development, (ii) use of renewable energy sources and manufacture of herbal medicines, (iii) primary-to-tertiary medical care and healthcare delivery, (iv) women's education and welfare promotion through cottage industry development, (v) cooperative organization & management of production & distribution, as well as (vi) community services of water supply, electrical power (with renewable energy technologies) and transportation facilities. RLUN's educational, social, infrastructural, farming, industrial, and community development programs are meant to impact all aspects of community transformation: socio-cultural and economic development, agricultural and industrial development, healthcare delivery, and school education (from primary to tertiary), from enhancing literacy to spiritual rejuvenation.

This RURD project constitutes a model of how to cultivate a vibrant sustainable community, having:

- Education and healthcare delivery.
- Farms and agroindustry.
- Community infrastructure: electricity, telephone system, water supply, roads, and public transport.
- IT, pharmacy, banking, computer manufacturing, and hand-phone and hand phone manufacturing industries.
- Employment guarantee for all.
- Socio-cultural and economic security.

A Rural University can comprise of the following colleges:

1. College of Humanities and Social Sciences
2. College of Science and Mathematics
3. College of Engineering and Technology
4. College of Nursing and Allied Health
5. College of Medicine and Health sciences
6. College of Management Science and Business Administration
7. College of Law, Governance, and Public Administration
8. College of Education and Integrated STEM Field
9. College of Farming and Agricultural Biotechnology
10. College of Yoga Meditation and Yogapathy

Industrial Park: A rural university will also include an Industrial Park to attract companies, in agricultural equipment manufacturing, pharmaceuticals, and renewable energy. Post-graduate and doctoral students will work on technologies and products of these hi-tech companies, who would in turn sponsor their research scholarships. Work-study programs can also be made available for students. Some of the RLUN faculty members could be consultants with these

companies, and in turn some senior staff of companies would also teach courses at RLUN. This would be a win-win situation for both the companies and the university.

Together, these Colleges will undertake to:

1. Help the adult population to do more productive farming, and thereby enhance their small-farm productivity.
2. Get the adult population working in the community development projects: electrical power & renewable energy, water supply & sanitation, roads & transportation.
3. Set up banks, and also develop small-scale enterprises (such as clothes making) for the women through micro-financing.
4. Provide education, healthcare, and employment for all.
5. Teach the young generation how to:
 - work in information technology and banking.
 - work in farming: agriculture, horticulture, floriculture, dairy farming.
 - work in the engineering fields, ranging from electric power plants to food products manufacturing.
 - practice pharmacy and nursing.
 - practice medicine and provide healthcare delivery.
 - manage companies and set up small-scale business enterprises.

In this way, we can help to develop people's potentialities and make their lives fulfilling.

While the student population of the region could go to study at some university elsewhere, and learn these professional practices, it is much better for them to

- Live, study and work in their own community.
- See their community develop, and to be involved in its development.
- Practice as information technologists, bankers, engineers, pharmacists, allied-health workers, doctors, teachers, farmers, teachers, and community infrastructure managers.

Thereby they can be actively involved in the social transformation and economic development of their community and region.

Item V. Rural University's Academic Structure and Features: Herein, we are describing some salient features of the Colleges of Rural University.

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 Democratic Governance system. For the Neohumanism course, we can adopt this text book:

Neo-Humanism: Principles and Cardinal Values, Sentimentality to Spirituality, Human Society, by Prabhat Ranjan Sarkar: [<https://drive.google.com/file/d/136vCGvz303rMMIsZVKnIBLy3N4D2IwaDj>].

For the Democratic Governance course, we can adopt the textbook: *Socio-Economic Democracy and the World Government*, by Dhanjoo N. Ghista, World Scientific (2004) [https://drive.google.com/file/d/1NPHjHRm9uv5VmDKXzCwKoTiE-1lZ41_J], to set up a new Democratic Political Governance system and Cooperative Economic System, combined with a World Government constitution.

2. College of Sciences and Mathematics: To provide education in physical sciences, biological and lifesciences, mathematics and computer sciences. This College can also provide the foundation of the development of Medical Sciences courses in the College of Medicine. Mathematical and physics formulation of physiology can

make it more quantitative, leading to more precision medical diagnostics. A course on "Mathematics in Physiology and Medicine" offered in Year 2 of the Medical Program can have a big impact in the College of Medicine. In this College, we can also offer a course on the Cosmology Cycle, based on the article: Consciousness and Evolution: Unified Theory of Consciousness, Matter and Mind, by Dhanjoo Ghista and Michael Towsey, International Conference on Science of Consciousness, Stockholm, 2011 [<https://drive.google.com/file/d/1jOiPzoNjNmnLkToTqeCBt9zFCe169rvT>]. In the early stage of the Cosmological cycle, the Cosmic mind also emanates microvita, which energize matter to form an ectoplasmic mind. Under the influence of microvita, matter evolves into subtler structures through synthetic reactions, thereby providing the templates of primitive life structures on Earth, represented by primitive states of mind (and consciousness). For details on this phenomenon, we can employ the book: "Microvita, Cosmic Seeds of Life" by Richard Gauthier [<https://drive.google.com/file/d/1LVPlbrxATVleVO93Ax5VSRKeSYTzKkQy>]. Then, further development of human mind and consciousness can be brought about by yoga meditation, as described in the below section 10, *College of Yoga Meditation and Yogapathy*.

3. College of Engineering and Technology: To offer courses in all fields of engineering. Today, the most in-demand field is Biomedical Engineering, in which we can offer a novel Program in Biomedical Engineering in Translational Medicine (BETRAM) [https://drive.google.com/file/d/1_DCom0T28-9mKH5IZG_w3Lc_jlbfIIOC].

This program can provide new insights in (i) Anatomy, in how anatomical structures are intrinsically optimally designed for their function, (ii) Physiology, in quantifying physiological systems and developing indices for their function and dysfunction, (iii) Medicine, by developing precision medical diagnostic and assessment methods, and (iv) Surgery, involving customized biomedical engineering analysis of surgical procedures (such as of coronary bypass surgery).

These textbooks can be employed to offer courses on this theme of BETRAM:

- (i) **Applied Biomedical Engineering Mechanics** (CRC Press, Taylor and Francis, 2009) [<https://drive.google.com/open?id=0BzOPIHbjWLYta3djeFV0MkRaMXc>].
- (ii) **Biomedical Engineering of Pancreatic, Pulmonary, and Renal Regulatory Systems, and Applications to Medicine** (Elsevier Publisher, 2023). [<https://www.elsevier.com/books/biomedical-engineering-of-pancreatic-pulmonary-and-renal-systems-and-applications-to-medicine/ghista/978-0-323-95884-4>].
- (iii) **Biomedical Science, Engineering and Technology** (InTech publishers),

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 [<https://drive.google.com/open?id=0BzOPIHbjWLYtZ08zX0Ywa0INX1k>].

Based on these books, the Biomedical Engineering Departments can also offer MD-PhD (Biomedical Engineering) with the Colleges of Medicine.

4. College of Nursing and Allied Health Sciences: To educate healthcare professionals for a diverse rural community with knowledge and leadership for community service. The College will offer both Bachelor of Science and Master of Science degrees in Nursing and Allied Health Sciences, to prepare health professionals to

address the determinants of health, promote policy and advocacy, and provide a moral compass for health care quality, delivery, and access.

The Bachelor of Science Program will comprise of the following courses:

1. Anatomy & Physiology,
2. Nursing Fundamentals,
3. Cellular & Molecular Biology,
4. Microbiology & Infection Control,
5. Pharmacology,
6. Behavioral Sciences,
7. Pharmacology and drug therapies,
8. Nursing Sciences,
9. Nursing Skills Simulation Lab.
10. Nursing care in Illness (psychopathologic and pathophysiologic health alterations and therapies across lifespan),
11. Nursing Care Systems (interface between clients and healthcare professionals),
12. Practicum, Clinical Nursing (nursing skills in communication, interviewing, health assessment & maintenance, and identification of threats to health in clinical settings).
13. Practicum: Nursing Care in Illness (supervised nursing care; emphasis on skills in health assessment, developing competency in nursing therapies, and developing role as care agents for patients of all ages).
14. Nature of Health, Threats to Health and Health Promotion (principles of nursing care to promote health & wellness and prevent disease in clients; assessment of health patterns in terms of risk, vulnerability, resilience & protective factors).
15. Clinical Attachments in the Ward, ICU & OT.

For the Master of Science program, the following courses can be offered: 1. Human growth and development (from prenatal life to old age). 2. Professional Nursing Experiences and Issues. 3. Understanding Human Responses (Psychopathological and Pathophysiological human responses to health and illness). 4. Pharmacotherapeutics in Nursing (Pharmacology & drug therapies and drug information resources). 5. Nursing Care in Illness (assess human functioning, pathophysiologic, and psychosocial issues; person-environment relationships). 6. Nursing Care with Families in the Community (biopsychosocial and overall-health assessment of families, characteristics of nursing care in homes). 7. Nursing Practicum-1 (Nursing skills in communication, interviewing and health assessment, risk management and patient safety). 8. Nursing Practicum-2 (Nursing skills simulation on mannequins). 9. Specialized Nursing Care-1 (in Acute and Chronic illness, ICU, and in OT). 10. Specialized Nursing Care-2: Cardiovascular Nursing, Gerontology Nursing, Neuroscience Nursing (dealing with nervous system dysfunction), Cancer care (carcinogenesis, pathology, metastasis) and treatments (chemotherapy, radiation, surgery, immunotherapy), and Pain Management.

5. College of Medicine and Health Sciences: To develop a novel STEM Model of Medicine. In this College, we can develop a novel STEM format of Medicine, involving quantitative physiology, precision medicine, and technological patient-specific surgery [https://drive.google.com/file/d/1PgLsgjKAm_BeIF11gclYf0tMxvxI3Wae].

This book, Cardiology Science and Technology (Taylor and Francis) is designed as Computational Cardiology to transform cardiology and take it into the era of STEM [https://drive.google.com/file/d/1Tw2WVLElwlLlIazb8S-GPXh8Y_hw110]. It can be employed to MD-PhD (Cardiology) program.

In the Medical College, we can also offer a novel MD-PhD (Biomedical Engineering) Program, based on the paper: New Era of Integrated Biomedical Engineering and Medicine: STEM Model of Medicine (STEM²), Part 2. Gateway to new format of Medical Colleges, by Dhanjoo Ghista, Pacific Journal of Medical and Health Sciences, ISSN: 2456-7450, Vol.4, No.1, 2022, pp-01-09

[<https://drive.google.com/file/d/1qswWgiQPrY20QeB31oU5Urnpxv4LmDw6>].

6. College of Management and Business Administration: To offer BBA and MBA degrees in the fields of management and business administration. The feature of this college will be the Hospital and Healthcare Management (MBA & PhD) Program, that is designed to educate hospital administrators with the competency to enhance the overall quality and efficiency of healthcare delivery, by providing them multidisciplinary knowledgebase 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 based on the articles:

- (i) Hospital and Healthcare Management Program, by Dhanjoo Ghista [<https://drive.google.com/file/d/1BeTYG0LAjDwXhJBsgb1qPQwyfRVs9Y9H>].
- (ii) Hospital and Healthcare Management Program (Curriculum and Outcomes), by Dhanjoo Ghista. Pacific Journal of Medical and Health Sciences, ISSN: 2456-7450, Vol.4, No.1, 2022, pp-01-09. [https://drive.google.com/file/d/1_eO8TYifBOT7q_N9bK20ZDuf8W9w7PI_/view?usp=share_link].

This College will also offer a unique MD-MBA (Hospital and Healthcare Management) Program jointly with the College of Medicine, to educate medical doctors to become knowledgeable in hospital administration.

6. College of Law, Governance, and Public Administration: Providing smart governance for developing economically sustainable communities.

Governance is the act of governing. It is the creation of laws and policies that shape a state or country through deep analysis, research, and discussions. Governance is the brain that creates the various aspects of society. Public Administration on the other hand, is the act of implementing the end results of governance, ensuring that a work force of enforcers can carry out the will of governance. In this College, we can offer a novel Program in Governance and Public Administration to educate competent and learned public politicians. This program can enable (i) a knowledgeable governance and infrastructure framework policies and planning to provide economic stability and sustainability, (ii) efficient public administration by means of systems engineering and operations research methodologies, and (iii) design of economically sustainable communities.

This Program could then also be considered as a mandatory qualification for public political offices, as city mayors and state governors. Going forward, we could even make it mandatory for all politicians to have degrees in this program. This will help to cultivate a much better society, in which people can have happy living.

8. College of Education and Integrated STEM Field: Preparing teachers, counselors, and administrators to promote excellence in education. STEM is 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 even (iii) within our body, in the form of physiological engineering and biomedical engineering. For all that, we can offer a program in IASIAM (Integrated Approach to Science, Engineering and Medicine) Education [https://drive.google.com/file/d/16BfnSRfzBloacI_K_5nrxi65JrlU5B4i]. This Program can 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, medicine, and sports science. Our STEM² concept (to also include Medicine):

Science, Technology, Engineering, Mathematics, and Medicine play a vital role in human comfort, health, and wellbeing. Science, Technology and Engineering are operating all around us, and Medicine is working for our health and well-being. In this 21st century, we need to offer our students education and learning in a wide range of the STEM field, involving (i) physical, biological, and mind sciences, (ii) engineering and technology, (iii) physiology and medical sciences, (iv) city and hospital management, and (v) sports physics and engineering.

Sample Courses, emphasizing Integrated approach to STEM Learning:

1. Physics (with Applications in Engineering, Physiology, Sports, and Medicine), 2. Biochemistry, 3. Quantitative Physiology (based on Physics and Engineering Principles), 4. Biomechanics (of Orthopedic and Cardiovascular systems), 5. Introductory Engineering (with Applications in Anatomy and Physiology), 6. Calculus, with Applications in Cardiology, 7. Sports Physics and Engineering, 8. Mathematics in Science, Engineering and Medicine, 9. Yoga, Meditation and Mind-Body Development, 10. Mathematical Analysis of Physiological Non-dimensional Indices in Medical Assessment, 11. Biomedical Engineering, 12. Computational Orthopedics, 13. Computational Cardiology, 14. Great Inventors and Inventions, 15. Hospital and Healthcare Management Program, 16. City and State Governance and Administration Program,

These courses are also outlined in the paper: IASTEM² Education: Integrated Approach to Science, Technology, Engineering, Mathematics, and Medicine, for Advanced Knowledge, Community Infrastructure, Healthy Living, and Society Building: [<https://drive.google.com/file/d/1JPX78p6OlhHM8WHKxDZolacZufdeQyjo>].

9. College of Farming and Agricultural Biotechnology: Integrated Approach to Farming combined with Agricultural Biotechnology to enhance productivity. The College programs are oriented to promote self-reliance by being production oriented.

The College emphasizes an integrated approach to Farming, addressing:

- The Science and Technology of farming, to include agriculture, horticulture, sericulture, lac culture, dairy farming, animal husbandry, and pest control.
- Cultivation of Medicinal plants & herbs and certain crops (such as onion and garlic) that can be processed into medicinal plants, as well as making of Medicines from honey and floral nectar.
- Maintaining Soil fertility and proper use of organic fertilizers (or bio-fertilizer bacteria), so as to promote beneficial function of the associated bacteria.
- Management of Farming systems through: Water conservation and irrigation (using collected surface water), Energy production such as using biofuel plants (as renewable and less polluting energy source) made from non-edible plants (such as Jatropha) which can grow on semi-arid lands unsuitable for food crops (and thereby not promote deforestation and switching from food crops to biofuel plants agriculture), and Farming machinery.
- Development of Agro-industries, such as making of milk products, clothing from fibers from okra and pineapple, jams and marmalade from fruits, floral nectar for treating eye diseases, silk from silkworms, lacquer (for furniture varnish) produced by insects grown on trees such as palash and Indian plum, and rectified honey and beeswax from a variety of flowers.
- Economics of farming and farming industries.

Agricultural Biotechnology: Scientific techniques based on an understanding of DNA, to increase agricultural productivity. Starting from the ability to identify genes that may confer advantages on certain crops, and the ability to work with such characteristics very

precisely, biotechnology enhances breeders' ability to make improvements in crops and livestock. Genetic engineering process allows the transfer of useful characteristics (such as resistance to a disease) into a plant by inserting genes (DNA) from another organism. Virtually all crops improved with transferred DNA (often called GM crops or GMOs) to date have been developed to aid farmers to increase productivity by reducing crop damage from weeds, diseases, or insects.

Molecular markers and Molecular diagnostics: Traditional breeding involves election of individual plants based on visible or measurable traits. By examining the DNA of an organism, molecular markers can be used to select plants that possess a desirable gene, even in the absence of a visible trait. Thus, breeding is more precise and efficient. Then molecular diagnostic methods are used to detect genes or gene products that are very precise and specific. Molecular diagnostics are used in agriculture to accurately diagnose crop/livestock diseases.

Vaccines: Biotechnology-derived vaccines are used in live stock and humans. They are stable at room temperature, and do not need refrigerated storage; this is an important advantage for smallholders in tropical countries. Some vaccines have been developed to offer protection against some infectious illnesses, such as to protect cattle and water buffalo against the morbillic septicemia, a leading cause of death for both species.

Tissue culture: Tissue culture is the regeneration of plants in the laboratory from disease-free plant parts. This technique allows for the reproduction of disease-free planting material for crops. Examples of crops produced using tissue culture include citrus, pineapples, avocados, mangoes, bananas, coffee and papaya.

10. 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 novel college, we can offer courses in (i) Yoga Systems and Yoga Science, (ii) Yoga Practice, Yoga Lifestyle, Meditation Science, (iii) Yoga Therapy and Healing.

These Courses can be based on the following books and articles:

- (i) Meditation Science and Psychosomatic Medicine, by Dhanjoo Ghista [<https://drive.google.com/file/d/1qLZPsr-e2Lcg0jk6L8GLiVT9xk-MEAQy>].
- (ii) Yogic Treatments and Natural Remedies, by Shrii Prabhat Ranjan Sarkar [Ref 1].
- (iii) Cure Yourself with Yoga, by Acarya Hiranmayananda Avt [Ref 2].
- (iv) Addressing Corona Virus Crisis: Animal-caring and Meditation, Progressive thinking and living, by Ac. Dhanjoo Ghista, Prout Journal August 2020 (Pages 13-16) <https://drive.google.com/file/d/1LYAhx9yFDVyuc-fE9dRzaxtAJqH5pqq-/view?usp=sharing>].
- (v) Yogapathy: Meditation Science and Practice, for Psychosomatic Health, Neuroplasticity, and Well-being-An Insight, by Dhanjoo Ghista, Vinithasree Subbhuraam, Michael Towsey, Pacific Journal of Medical and Health Sciences, ISSN: 2456-7450 [Vol.4, No.1, 2022, pp-10-24 [<https://drive.google.com/file/d/1ksDIU4s8ioAN6ORsk7pX26EGjbPOpf3J>]].

Now Yogapathy constitutes mind-body medicine, as portrayed by the paper: Yogapathy: Psychosomatic Preventive and Curative Medicine —The need of the day, by Dhanjoo Ghista, Pacific Journal

of Medical and Health Sciences, ISSN: 2456-7450 | Vol.4, No.2, 2022, P. 21-42 [<https://drive.google.com/file/d/1-Rzjx2wKqygbKryYvv9zlgRQxf38ZHT6>]. Then, based on this paper, we are hence proposing a new Yogapathy-Allopathy Integrated medical system, for which we can even offer a novel MD-PhD (Yogapathy) program, jointly with the College of Medicine.

Item VI. The Need for Rural Universities: Expansion to State and Nationwide Rural University movement

The low cost of living, low wages, and low cost of local natural resources is an advantage to attract human, industrial and business capital to rural regions. With proper planning and local control, the positive values associated with rural living can be taken advantage of, to enhance the quality of life and transform the rural communities to make them functionally sustainable.

In the present-day economic climate, rural communities must rely on their own resources for their development

Through Rural Universities, we can make the rural communities thrive, to encourage companies and businesses to relocate to rural areas to take advantage of lower costs of living and labor. Rural communities must retain their population, through economic development of farming and agro-forestry industries. This will encourage rural companies and professionals to continue to operate in the rural regions. Failure to preserve rural communities will cause migration to cities, and in fact worsen the unemployment situation.

This model for rural development by means of the Rural University can be exported across the nation

Currently, urban areas benefit from the development of combined upper-level universities and research institutes. Rural Universities are needed to rejuvenate rural living and the economy by developing sustainable rural communities. Further, rural universities will enable rural students to study in their home area and then to continue to live there by finding adequate employment and business opportunities. When local communities take the responsibility of setting up their own local university, they will be able to make their towns economically sustainable for a fulfilling lifestyle.

CONCLUSION

We are proposing the establishment of Rural Universities (and Colleges) all over the States and then nationwide, to form sustainable rural communities and augment the rural economy.

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