Proposal for Educational and Engineering Contrivances to Expedite the Achievement of Millennium Development Goals 2015

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***Abstract* – In spite of the fact that human body is the most marvelous machine engineered to perform better than many computers, still we are unable to employ every person and to save a large number of human beings dying of poverty and hunger. Just as we have produced the thermostat to auto control the setting of temperature with in a narrow range, in the same way we can also develop a contrivance to achieve in time, all the millennium development goals-2015 (MDG-2015) by auto feed back controls. Such a contrivance may enable us to utilize public money more objectively and efficiently for achieving our goals. The recommendations of the President's Council of Physical Fitness and Sports (PCPFS) may also be promoted through such an engineering contrivance. The information & communication technology is now quite well developed and may certainly help in changing the existing paradigm of education. The current paradigm of education is helping the rich people more than doing so to the poor. A large number of unemployed persons are compelled to take jobs worth less than $ one a day. To improve the existing scenario, the author has made an attempt in this paper to change the compass and to engineer our road map using the following four hypotheses. *One,* each human being can produce more than her/his own requirements provided s/he is given an opportunity to learn and work. *Two,* before making any public expenditure, the output of the project should be evaluated scientifically for the cost-effective validity of its implementation. *Three,* during the period of children's education, growth and development, the best course contents and road maps need to be used for enabling them to choose active and productive lifestyles. *Four,* the success of any project depends on the engineering of intrinsic personality of the implementing agencies. This paper proposes preliminary contrivances for expediting success in the achievement of MDG-2015 and to monitor the inclusion of physical activity in the core course contents of all school children.**

***Index Terms* – Contrivance, Implementation, Sociostat, Validity,**

I. Introduction

Education and Engineering are *sine qua non* for achieving any goals. While Education is the art and science of developing human potentials by drawing out the best out of a learner's body, mind and soul; Engineering is the art and science of the application of fundamental sciences (mathematics, physics, chemistry, biology) for designing, developing, operating and managing the mechanical and social engines for the benefit of human beings. Similarly, physical education is the art and science of the process of learning to develop integrated personality, promote health, and prevent disease by willfully adopting regular physical activity through designed exercises, recreation, sports and behavior changes needed for a wellness way of life [1].

The eight millennium development goals (MDG) – 2015 set by the United Nations Organization (i.e. 1. Eradicate extreme hunger, 2. Achieve universal primary education, 3. Promote gender equality & empower women, 4. Reduce child mortality, 5. Improve maternal health, 6. Combat HIV/AIDS, malaria and other diseases, 7. Ensure environmental sustainability and 8. Develop a global partnership for development [2]), are quite far from being achieved. This is so in spite of huge human efforts with the help of various campaigns, missions and legislations like Right to Work, Education for All, Physical Education for All, Sports for All, Literacy for All, Work for All, Food for All, Healthy People 2010 etc. In spite of our best in puts for the last 60 years or so, the targets are repeatedly pushed beyond the set deadlines for all above campaigns. We need to put greater scientific and better engineered tools, with pragmatic priorities to the operations needed to produce better results. Hence, the basic job before us is to examine the wrongs in the existing implementing system and to change the paradigms of implementation wherever relevant after a critical analysis of the present scenario.

We have engineered our path to heavenly bodies, created robots and remote controls, but we have not been able to do much for the millions dying due to extreme hunger. Also, we have not been able to find enough work to get employment and adequate daily wages for the survival of all poor people living in different parts of the world. Let us multiply our areas of developing the inventions and do **research inclusive to the benefits** of the poor masses on the one hand and of those citizens who are suffering from inactivity diseases on the other. For doing so, let us **do a critical and scientific evaluation of why our huge help** of billions of dollars has not been enough to provide mechanisms of creating jobs that provide better than the current earning of US $1 per day for more than 50% of the workers' population in sub-Sahara Africa[3]. The MDG Report 2008 indicates that overall increase in the prices of food has had a direct and adverse effect on the poor, to the

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tune of the possibility of pushing another 100 million people to the absolute poverty zone [3].

It is quite surprising that most of the research organizations have not conducted research to realize the eight MDG goals, which the U.N. aims to achieve by 2015. Let us we the engineers, step in and make the task more scientific.

II. Material & Method

The present paper has taken the materials from the following sources:

1. Facts of MDG 2008 Report [3]
2. Facts from Atlas 2006 [4]
3. Foundations of Physical Education, Exercise Science and Sports [5]
4. Facts & Figures from a publication of the Ministry of Human Resources Development, Govt. of India [6]

The methodology used in the present study is philosophical where in the methods of syllogism, deductive reasoning and scientific approach have been used.

III. Observations and Results

Tables I to IV have been compiled from the data given in the sources mentioned in the material and method section above.

In spite of excess food produced, we are unable to eradicate the problem of chronic hunger (Table-I).

Table II shows that in spite of the recommendations (resolutions of the senate and many health promoting agencies), we have not been able to either include physical education among the mandatory core subjects, in all schools or provide required time duration needed for teaching it.

Table I : The quantity of food produced & distributed in the world [4].

Food Production	Food Distribution system	Conclusion
20% more than human Race can consume.	More than a billion people suffer from chronic hunger.	Contrivances are needed to improve distribution strategy and that of transport of the food produced.

Table II : Comparative picture of recommended and existing time requirement for physical education in schools [5].

School	Recommended Time (minutes per week)	Existing Pattern in Schools*	
		Minutes/ week	P.E. Exemption
Elementary	30 to 150	30 to 150	16.7% Schools
Middle	275	80 to 275	25.3% Schools
High	225	Nil to 225	40% Schools

* In addition 50% of Grade I to V and 95% of Grade XI & XII students do not take any Physical Education Course.

Table III : Ten yearly population statistics of India from 1901 to 2001 (in millions) [6].

Census year	Population in millions	Decade Growth		AAEG* %	PG** %
		Absolute	%		
1901	238.40	-	-	-	-
1911	252.09	13.69	5.75	0.56	5.75
1921	251.32	-0.77	-0.31	-0.03	5.42
1931	278.97	27.65	11.00	1.04	17.02
1941	318.66	39.68	14.22	1.33	33.65
1951	361.08	42.42	13.31	1.25	51.47
1961	439.23	78.14	21.64	1.96	84.25
1971	548.15	108.92	24.80	2.22	129.94
1981	683.32	135.16	24.66	2.20	186.64
1991	846.42	163.09	23.87	2.14	255.05
2001	1028.74	182.31	21.54	1.95	331.47

***** Average Annual Exponential Growth rate (per cent).
****** Progressive Growth rate over 1901 (per cent)

The expenditure on family planning (adopted mainly by educated people) has not helped to reduce the exponential rate of growth which rather increased from 0.56% in 1911 to 1.95% in 2001 (Table-III).

It is evident from Table-IV that the human resource has not been properly utilized in China & India because the gross domestic product (GDP) from services is very less in these highly populated countries as compared to all other six countries tabulated.

In fact, there is no dearth of opportunities and resources but a lack of proper planning, mapping & evaluation. For example, Japan has little resource of land, even then its GDP/capita is very high. Similarly, Singapore has the highest population density per square km but even then it has managed quite a high GDP/capita.

Table IV : Comparative national demographic statistics of eight countries [4].

Country	Land Area (Sq.miles)	Population Density per sq km	GDP/ Capita (US $)	S* (%)	I* (%)	A* (%)
China	3,705,405	136	6800	33.1	52.3	14.6
India	1,269,221	336	3300	51.2	26.6	22.2
Japan	1,45,902	338	31500	74.0	24.7	1.3
Singapore	255	6509	28100	65.0	34.9	0.1
Korea (south)	38321	487	20400	62.2	34.6	3.2
UK	93788	247	30300	72.4	26.6	1.0
Germany	1,37,847	231	30400	69.4	29.4	1.1
USA	3,794,083	30	41800	79.4	19.7	0.9

* S = Services, I = Industry & A = Agriculture.

From the above facts, it is evident that if all humans are given work, there will not be any poverty in the world. The problem is not of the scarcity of resources but of the scarcity of logical road mapping and of validly approved and evaluated expenditure model of employment structure.

Let us now ponder over the following questions:-

1. Is there any open opportunity to the poor to go somewhere and say I want to work for getting my food?

   i.e. "Work for All" centers are currently missing (which can easily be run by the production & sale of essential products by voluntary workers and unskilled labor), but for lack of vision and provision of "Workshops assuring work for all volunteers on self-sustaining basis".

2. Is there any open opportunity communicated by any agency that any poor child can come and study here?

3. Is there any agency looking for making synergic use of knowledge created by research in all fields for the benefit of the poor and weaker sections of our society.

   There is a need to create CAKEs (**C**entre for the **A**pplication of **K**nowledge already **E**xisting at each district headquarter for helping the poor).

All the above questions need valid evaluation of proclamations made, expenditures incurred and outputs obtained in a designed and scientific way. For this, we need to develop some validity testing mechanism before incurring public money. A preliminary attempt has been made and illustrated in Fig.1(a).

The above mechanism as applied to goal-1 of MDG-2015 (i.e. Eradication of Extreme Hunger) is illustrated in Fig.1(b). It has been found that after providing the original infrastructure for the "Work for All" centres, there will not be any further need of annual budgets for these centres.

We can achieve "No Child Left Behind" goal probably, by engineering a model having a sociostat with swinging actions of evaluating and monitoring to control the balance between budget and outputs through a feedback system {Fig.1(a)}. Like a thermostat which maintains the set temperature, a sociostat may be defined as an engineering contrivance needed to maintain a given social parameter within an acceptable narrow range. Without using any sociostat for the millions of dollars spent on literacy campaigns, illiteracy eradication programs or on poverty eradication, we are unable to calculate expenditure per unit of output {Fig. 1(b)}.

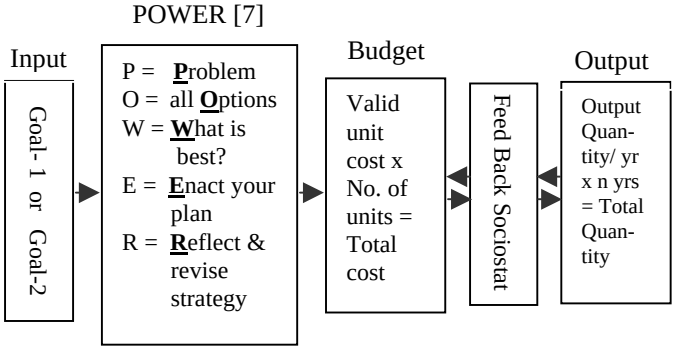

Fig.1(a): Validity testing road map for public expenditure.

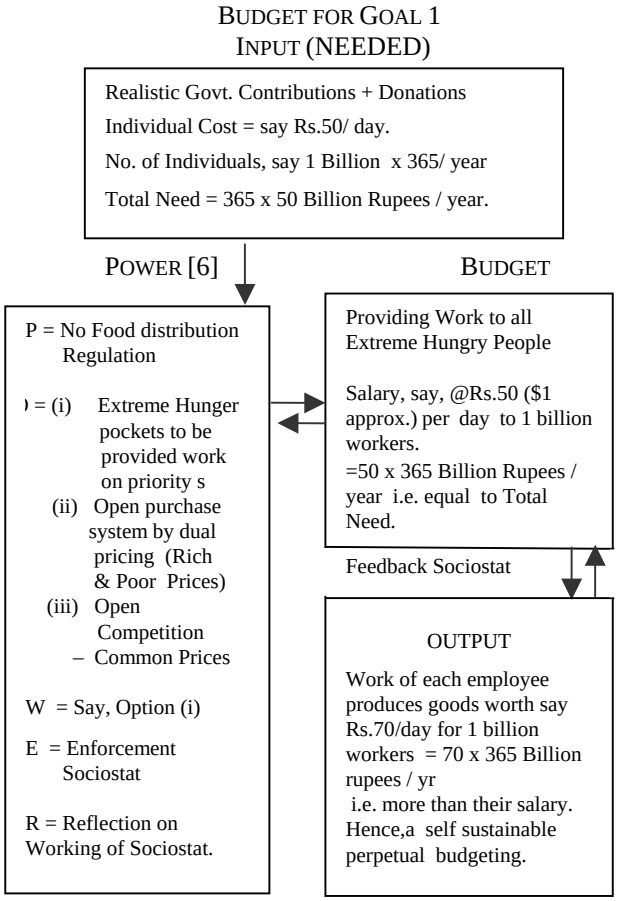

Fig.1(b): Validity testing road map for eradication of extreme hunger(MDG-1)

Without inventing any contrivance, the MDG-2015 have been restricted to quadrant-II shown in Fig.2 and thus do not get any urgent attention of the majority of the citizens and the expected achievements are not made by the set target deadlines.

As for the calculation of mechanical efficiency, we use scientific formulae, so should we scientifically calculate the social and economic efficiency by the following formulae:

1. Literacy Expenditure Quotient = Total money expended/ Number of literate people produced with this money.
2. Poverty Eradication or Employment Quotient = Expenditure/Number of jobs created.

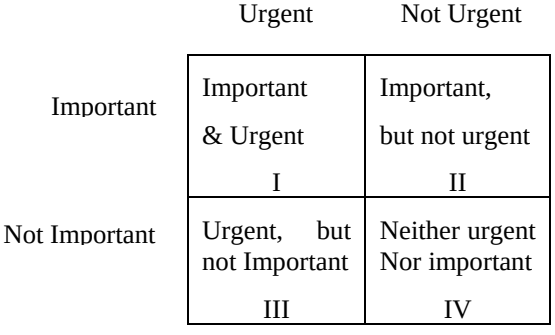

Fig.2: Four quadrants getting varied human attention and efforts.

Research should be carried for improving some inexpensive contrivance to provide productive work of unskilled or simple skilled nature for which a small duration training is sufficient per person. E.g. Any person can be taught in 1-2 hours to make paper envelops out of even waste paper or recycled paper.

Similarly, we may consider nationalizing the brick kiln labor and may reserve it on priority to those people who are at a greater risk of dying due to hunger. Thus, a work centre where bricks, envelops, cotton thread production (as suggested by Mahatma Gandhi's contrivance of Charkha and Takli, i.e. simple spinning wheels) or similar other semi-skilled or unskilled jobs' centres could be provided through proper engineered mapping at each village, town, district or city centre by adequate distribution of these centres as per local requirements.

3. We may study existing data available to design standard infrastructure needed to develop a self sustaining work centre for the illiteracy dominant areas in the world rather than sanctioning all grants to national and local governments without seeking any engineered contrivance to check corrupt practices.
4. The unengineered monitoring method of calculating efficiency from the amount of expenditures incurred should be replaced by engineered method of outputs made with the calculation of per unit expenditure.

We are likely to find more number of illiterate children today than those existed 50 years back, indicating thereby that the attempts to eradicate illiteracy are not being engineered or professionalized.

Besides advanced research in specialized areas, some research and planning should also be carried for engineering of poverty eradication, illiteracy eradication and for providing physical education to all children & adults, on professional lines.

If the concept of the following category of Engineers is created now, we may be successful in achieving the Millennium Development Goals in time i.e. by 2015:-

1. Poverty eradication engineers or/and unemployment eradication engineers.
2. Substandard housing eradication engineers or low cost residence production engineers.
3. Educational engineers (Who plan, design and develop scientific contrivances for the education of target groups like pregnant women and unemployed parents after providing them work for family meals).
4. Just like biomedical technology engineers we need 'Validation Standardizing Engineers' or 'Evaluation Engineers' who should be able to prove the validity of expenditures being made by various autonomous agencies as per their respective priority of goals.
5. Health promotion engineers (for designing, developing, operating engineered contrivances for regular physical activity, health and physical education which are the primary mode of medical treatment).

Let us pay more attention to the evident mismatch between the recommendations and the budget allocations to various public domain activities and the absence of any centre for the coordinated engineering of new recommendations and policy decisions made by various autonomous bodies and government departments. Amazingly, **every one of us including government departments, autonomous bodies and the general public, is in agreement** that scientific temper should be promoted. But unfortunately when it comes to practice, there is hardly any scientific agency **to validate** the actions being taken for millennium development goals, illiteracy eradication, course contents and course duration etc. through any sociostat. Based on scientific research, we do not have any valid method to test the **quality and equity in opportunities for education and work for the poor and the underprivileged.**

Similarly, the departments and faculties of physical education & sports sciences were to be started by the year 1986 in each university in India, but till date in 2009, only five universities have started the faculty while about 60 universities have started the department of physical education. Interestingly, the funding agencies have no engineering contrivance in place to examine whether the decisions made are implemented by the subordinate autonomous bodies. Scientifically speaking, the fault in this example does not lie with the universities but with the system not to rely on any engineering of "grantstat" (a sociostat needed to be used for increasing or decreasing grants in relation to the outputs).

Due to the absence of valid engineering contrivances, sometimes the two recommending bodies give contrasting instructions (Fig.3). For example, in 1996, Surgeon General in US gave a recommendation to add mandatory regular physical activity participation, and accordingly schools were asked by Centre for Disease Control (CDC), National Association of Sports & Physical Education (NASPE), PCPFS and the Senate to include the subject of physical education among core subjects from Kindergarten to grade12.

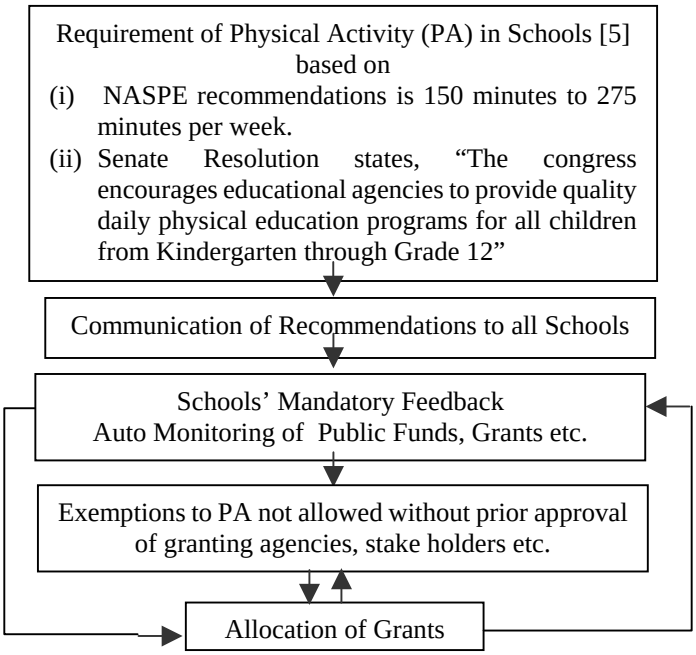

Fig.3 : Preliminary proposal of grants sanction contrivance to monitor physical activity in schools.

But the respective curriculum councils recommended five core subjects (without including physical education) namely **English, Mathematics, Science, History & Political Science** in schools of many states [5]. Even Healthy People 2010 and MDG 2015 are facing the same fate of non achievement of goals in time due to dependency on multiplicity of agencies not using any engineered sociostat.

More over, in order to enable each child to draw out the best out of his body (genes), mind (vision), heart (passion) and soul, we should plan for making provision of open schools to be run free of cost by established philanthropists.

The critical analysis made in the present study indicates that there is an urgent immediate need to **engineer scientifically some mechanism of sociostat just like a thermostat so that the important decisions made are neither overlooked easily nor allowed to take position in quadrant-II (Fig.2). This is possible by introducing some automatic reminder to provide a negative feedback to the concerned implementing authorities to act scientifically to promote the implementation of the resolutions, proclamations, declarations and decisions made by UNESCO, the World Bank, National or State Governments and by the public funded autonomous bodies**.

Similarly, we need Educational Engineers to stear the design for modeling all round development of personality by engineering all the four domains of personality development namely Cognitive, Affective, Psychomotor and Spiritual, with the help of appropriate feedback mechanisms in curricula prescribed to school and college students.

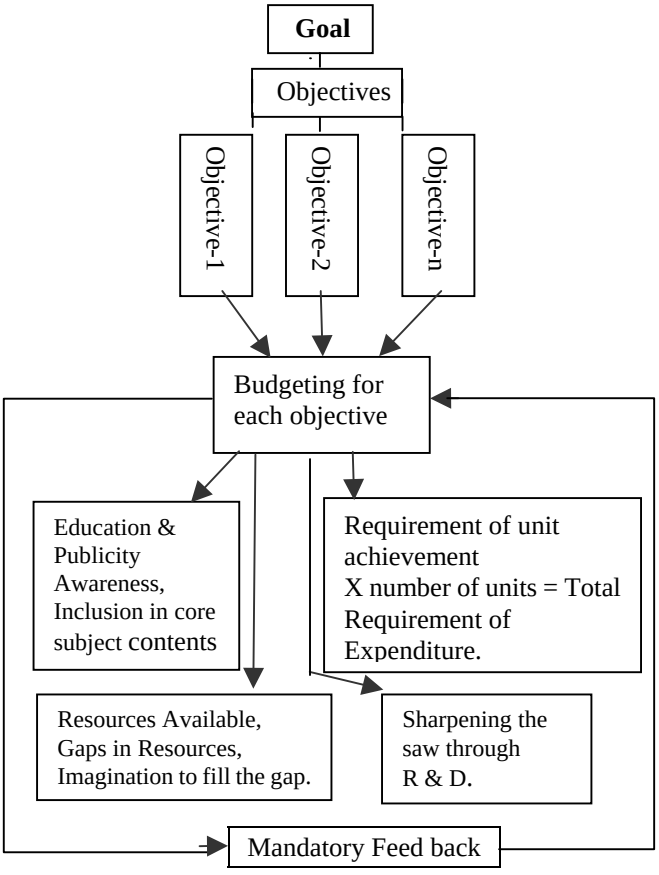

Fig.4 : Preliminary Contrivance Design.

The scientific approach clearly advocates that models and road maps of education should be constructed by the experts (may be called as educational engineers) rather than by **the democratic process of voting among the non-subject expert voters in most of the unwieldy academic councils of the present day universities**.

Keeping in view the need, a preliminary engineering contrivance has been designed to act as a sociostat to bring homeostasis in social goals e.g. MDG-2015 and Healthy People 2010 (Fig.4).

This contrivance will engineer social change by helping the poor, downtrodden and the real needy persons. Engineering of such contrivances will not only help the rich and middle classes but will also generate benefits for the poor.

IV. Conclusions

It is high time that we promote social engineers and scientists who are likely to be more successful in designing strategies and road maps in achieving social goals. This will bring inter-disciplinary and multidisciplinary research at the helm of affairs for removing social inequalities. The author has made an attempt to justify his proposal for the construction of a "POWER" sociostat, where POWER is an acronym used earlier by Anspaugh & Ezell [7] for health management where 'P' stands for locating the '**P**roblem', 'O' for analysis of existing **O**ptions, 'W' for **W**hat is the best solution, 'E' for **E**nactment of best solution and 'R' for **R**eviewing the results and modifying the options, as illustrated in Fig.1(a).

The author also suggests that without taking appropriate scientific steps now, it will be very difficult to attain the desired achievement in poverty alleviation, illiteracy eradication or unemployment eradication from the globe. The gap between the rich and the poor is ever widening and will go on widening unless steps are initiated by using engineering contrivances to maintain proper control of the situation, before it gets too late.

The easiest method is by scientific planning and engineering, so that our plans go hand in hand with the policy decisions. Once the job is entrusted to the scientific personnel for creating planned engineering contrivances on the theory of **sociostasis** just like biological homeostasis, that is, by creating a **sociostat (an automated mechanism to check crossing of critical limits of any social parameter)**, we can easily achieve our targets in time.

In addition to the above contrivance designs illustrated in Figs. 1, 3 & 4, the following four steps are also recommended. *One,* creation of **'WWFA'** i.e. **W**orkshops of **W**ork **F**or **A**ll preferably, managed by utilizing the right human resources being altruistic non government organizations and religious bodies. *Two,* creation of CAKEs i.e. **C**entres of **A**pplication of **K**nowledge already **E**xisting. *Three,* valid measurement & evaluation to be applied through Experts Committee or Courses Development Council. A CAKE may also work to utilize the art and science of compiling existing knowledge for expeditious achievement of millennium development goals by *sharpening the saw* of implementation processes. The utilization of existing

finances need to be used more scientifically for creating world wide distribution of infrastructure of self sustaining centers based on the hypothesis that each person will produce more than his/her wages. This will create balance between the proclamations and implementation process. and *Four*, Creation of **(ME)^2** Centers i.e. An engineering unit of establishing **M**anagement of holistic **E**ducation and standardizing **M**easurement and **E**valuation methods in academics by developing appropriate contrivances. The author has recommended the concept of a sociostat to give scientific approach to economize the public expenditure. The knowledge and urgency of implementation of MDG-2015 and other similarly important resolutions of international importance should automatically find place in core curricula followed in schools so as to sensitize and expose the mind of the youth for willful commitment to implement these resolutions in the best possible ways.

There is a need to introduce **valid methods** of implementation to be engineered by scientific personnel. Based upon the contents of his paper, the author further recommends that UNESCO may consider to put major thrust of its efforts on the creation of **self sustaining infrastructures rather than allocating funds to various agencies.**

We need to invent engineering contrivances like the ones proposed in the present paper (Figs.1, 3 & 4) for successful achievement of MDG by the year 2015.

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