

E-waste Management Schools for the Homeless

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Abstract--- E-waste management is anecological, technological and social necessity in these days of rampant use and obsolescence of electronic goods, especially computers and mobile phones. In this context, each region in the world has its own problem areas. Hence area specific solution techniques also should exist. In this vein, it is proposed that regional need, local talent and indigenous technology be made miscible in an e-waste management school. This proposal is based on the belief that only sustained efforts coupled with directional education can extract the best from this trilateral meeting point. Accordingly, a suitable infrastructure, governance pattern and community living are proposed. The course and curriculum design, the teaching learning process visualized and the human resource deployment are also discussed. An analysis of the economics of the proposal lends authenticity to the proposal.

Keywords--- E-waste Management, Course and Curriculum, Separation Techniques, Recycling

I. INTRODUCTION

Despite escalating concerns regarding the two maladies afflicting any society, e-waste and homelessness, assistive technology when innovatively applied, links them positively. On one hand, every town or city in India has its own share of the homeless. The sight of their children scavenging for food, even fighting for it, for a place on the pavements for sleeping, for paper blankets, with no scope

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for education, a decent job, even menial, absolutely no access to technology except the thrown away e-waste, is tragic, to say the least. The growth of e-waste is the other significant economic and social fiasco. Higher generation of e-waste is due to the proliferation of electrical and electronic products, consumption rates and obsolescence rates. Consumerism and obsolescence also adds to the huge import of used electronics and computer products.

Whatever may have gone wrong with society, children are children, endowed with natural gifts of curiosity, capacity to focus, desire to explore the world- to see, hear, smell and handle things. And these talents require guidance to convert to capability, perseverance and productivity, sometimes even self-preservation. This is exactly what the homeless children lack, never exposed to school or having run away from school. While the e-waste cannot be wished away, littering the streets or street corners with them, is like giving fodder to the small children's natural curiosity. Deprived of elementary education or parental caution, or sufficient tools, the hapless persons who handle e-waste are exposed to hazardous materials like lead, mercury, arsenic, cadmium, selenium, and hexavalent chromium and flame retardants.

This paper proposes a school to empower the family of these children via a directional education for the children in management of e-waste. The background is given first.

II. A SOCIAL & INDUSTRIAL TRAGEDY

Both e-waste and the destitute have a few things in common. In addition to both being abandoned in the streets, both have been forsaken by high-end technology. This raises the question whether society is losing its soul to technology. Perhaps we have come to a critical stage when marginalization will result in rampant criminalization and

unbridled littering of the earth with hazardous wastes. Perpetration of the 'begging culture', cessation of the natural desire for education or knowledge and the reluctance to participate in work and earn a living are other dangerous fall-outs of the current situation.

A. A morning scene in the Temple Town

The motivation to this project came from a usual scene near a temple in the morning, unusual to people comfortable in their homes, going about their routine morning business. The bathed, well dressed and expectant devotees were at the scene, breaking coconuts to appease the Gods, right at the start of the day. The unwashed, hungry children were also there, having got up from their customary sleeping places at the pavements nearby, jostling and cheering whenever they got a coconut piece, and duly handed over to the mothers for subsequent sharing. A little later, school children passed by, perhaps grumpy about the home-work and previous day's match, not noticing the envy in the eyes of these unfortunate children. Two kids had meanwhile, got onto a box, after rummaging through the garbage piled nearby and with much care and expectation carried it to a secluded point. Then they opened the box with care and concentration and dismantled or separated the components, bit by bit without disturbing the other components. This was definitely a manifestation of the natural curiosity, total focus and the insatiable urge for stimuli.

The untapped human resource in India is huge. At the same time, there are umpteen numbers of students going through courses of no relevance to them or of no meaning to their future course of life. When specific interests are shown or talents demonstrated, we do not have the means to put them to use. In this paper the three aspects are combined effectively such that talent meets needs in the foreground of a residential school with relevant curriculum and self-learning techniques as demonstrated by [1]. The proposal is to set up E-waste management residential schools, with scope for empowering the graduating students to set up business on their own. Once infrastructure requisites are

met, material and administration support can be obtained through the parents, who stay with the wards, offering emotional support as well.

In addition, when education becomes more directional, with sufficient practical exposure, innovative technologies can emerge. The sense of self-preservation that originates in the minds of these children on account of the feeling that they are contributing towards solving a major problem of the nation, is foreseen as more powerful and sustained.

A short note on e-waste, a major problem of India follows.

B. Electronic Waste

The fastest growing class of wastes is the electrical and electronic wastes- e-waste, growing as a hyperbolic function with respect to time. The newcomers, replacement market and above all the high obsolescence rate make e-waste a contender for the top slot among substances required to be disposed of by the provisions of national laws as per Basel convention [2]. According to the National Environmental Policy (NEP), the recovery and reuse of useful materials from the generated waste must be facilitated. NEP encourages legal recognition and strengthening of the informal sectors for the collection and recycling of various materials. In addition to complying with NEP objectives and addressing sustainable development concerns, it is well known that recovery and/or reuse of useful materials from waste generated from a process and/or from the use of any material, results in reducing the waste destined for final disposal. Thus 3R (Reduce, Re-use, Recycle) strategy ensures environmentally sound management of all materials.

Considering the high recyclable potential of e-waste, an environmentally sound manner of recycling has to be initiated. E-wastes mainly contain the wastes which are generated from electronic devices and household appliances which become unfit for their intended use and are supposed to be recovered or disposed. These include personal computers, cellphones etc. E-wastes consist [3] of materials

which are toxic and potentially hazardous to the environment as well as the human health. In India, tons of used electronic products, rather e-waste, are dumped every day, posing a very serious threat to the environment. Composition of e-waste is diverse and differs in products across different categories. Broadly, it consists of ferrous and non-ferrous metals, plastics, glass, wood & plywood, printed circuit boards, concrete and ceramics, rubber and other items. Iron and steel is about 50% of the e-waste followed by plastics (21%), non-ferrous metals (13%) and others. Non-ferrous metals are copper, aluminum and precious metals ex. silver, gold, platinum, palladium etc. The presence of lead, mercury, arsenic, cadmium, selenium, and hexavalent chromium and flame retardants beyond threshold quantities in e-waste classify them as hazardous waste.

The Extended Producer Responsibility (EPR) is a strategy for environment protection making the producer responsible for the entire life cycle of the product, especially for take back, recycle and final disposal of the product. Thus the producers' responsibility is extended to the post-consumer stage of the product life cycle, if it is a part of the legislative framework. If EPR is mandatory, over a period of time, it shall become associated with the production of electronic and electrical equipment. This responsibility can be enhanced by promoting the collection and management centers as explained next.

C. Electronic Waste Management

It is reported that salvaging usable parts from discarded units and reassembling with another to create a working unit is labor intensive [4]. Yet, this involves removal, inspection and testing of components and then reassembly, which obviates the need for safety procedures, technical training, innovative and legally sound outlook. Institutional support for e-waste collection, transportation, treatment, storage, recovery and disposal, are also essential at regional levels for optimal utilization of infrastructure. Sophisticated technology and processes are expensive, and requires

expertise to recognize constituents that are potentially hazardous or with recoverable value. Some guidelines [5] are as below.

1. Identify the E-waste category: include the components and tentative year of manufacture which yields data on the exited technology and like lye-waste components present.
2. Identify the E-waste composition from year of manufacture: Ideally, industry association should maintain record of 'Electrical & Electronic Equipment' composition, regularly updated to facilitate its treatment, once it becomes E-waste. In case of doubt, determine by testing out the concentration.
3. Identify possible hazardous content and threshold in e-waste
4. Identify, whether the E-waste component is hazardous or the entire E-waste item is hazardous.
5. Identify the method or methods to separate the components
6. Determine whether, recycled, re-usable or re-furbished products are to be generated from the E-waste or
7. In case of the waste item or components thereof are to go to the landfills, the format in which they are to be converted

In order to drive a project with limited ambitions, a district with many engineering colleges is targeted. This means that about 6000 computers and tones of electronic wastes are produced because of the high obsolescence rate of such electronic products. The refurbishment and upgrading of PCs and monitors constitute one of the key drivers of the pre-recycling processes. However the calculation of the monetary flow is only based on the market value of the upgraded or refurbished items. This scheme comprises one of the most effective mechanisms to: (i) create additional value and (ii) to prevent an accelerated flow rate through the whole system. The incentive is the increasing need for low cost personal computers among the

ever-increasing group in the Indian population that uses computers. This market demand creates jobs and business in a second hand industry and at the same time decreases the huge load of PC waste. The precious metal flow is the key economic driver of the system. The high material value of gold and concentrations of this metal of up to 4 g per PC create strong incentives to recover this material fraction. Study has shown that the main material flows for the recycling processes split into glass, plastic and metal fractions[6]. The glass fraction creates little economic incentive, as it is extremely cheap and cannot be used for high quality products without better separation techniques. In terms of volume, however, the glass fraction outweighs all other flows.

Similarly, plastic recycling creates raw materials for other industries, but does not gain in quality or price. Although the selling price of recycled plastic pellets depends on the cost of primary plastic production—and hence on fossil fuel prices, the study reveals the existence of effective plastic recycling for several different plastic fractions. The metal flows split into ferrous metals, the second largest group, aluminum, copper and mixed and precious metal flows. The first three flows most likely go to specialized smelters, as the material can be regained easily during such processes and is of interest to them owing to the considerable amount of these flows. But the overall generation of value via recovery of copper, iron and aluminum is less than 10% the value added associations.

D. Electronic Waste Management in India

The EPR referred to, is an interesting tool of legislation that can bring three groups of stakeholders, the manufacturers, the consumers and the recycling plants, together. In [7] it is reported that in countries like Japan, South Korea and Taiwan, EPR has undergone trial and error processes for effective e-waste management, by defining the roles of the stakeholders. However, in developing countries like China, Thailand etc., the problem is compounded by low labor cost, rampant use of second hand

goods and commercial considerations outweighing environmental impacts.

In this context, the Indian scenario offers more problems. We have the unique informal sector taking charge of recycling our e-waste since long. In fact, as reported by [8], about 10-20k tons of e wastes are either refurbished or recycled in Delhi itself every year by the untrained informal sector even before the EPR legislation was passed in 2010. This is an outcome of commercialization based on the value of the byproducts, especially gold. This has led to a biased collusion of electronic manufacturers with the backstreet workshops where health or safety consciousness [9,10] of self or surroundings is absent. The bite can be there in the EPR regulation only if the government becomes an important stakeholder. This means that the government involves itself in not only the business of e-waste recycling but also in building up an infrastructure wherein educating the recyclers has a role in strengthening the e-waste management process in a sustained manner.

However conscientious organs are appreciative of these informal sectors that ensure that 80% of the waste materials coming to them is refurbished and only 20% is subjected to recycling[11]. Hence some Non-Governmental Organizations (NGO) had supported such sweat shops with organizational help and publicity. This kind of support given by two NGOs led to the formation of the 4R Association of Electronic Waste Recyclers. Interestingly, the first R stands for Responsible (Reduction, Reuse & Recycling). This paper proposes an addition of another R- Rehabilitation.

As was mentioned before, a meeting point of need, talent and technology is what is visualized in the project. The need aspect is highlighted above, in terms of all stakeholders- the manufacturers, consumers, the public, the government and the physical recyclers. The need is no doubt for a safe, responsible, reduction of the material flow and pollutants released by the recycling of E-wastes. Here we realize that there are several talented children, who are

doomed to be a part of the workforce in such dangerous workshops or to fend for themselves in the streets or around temples, in Thrissur. Life has taught them to retrieve anything of value from any dump, and scour them for useful components after taking them apart and if required, synthesize the parts for re-sale value, exchange or use within their scope. And while technology has forsaken these street smart children, the innovative methods that they design driven as they are by necessity, fails to enrich technology. In short so much of talent goes waste.

The whole proposal is centered on giving meaning to the life of these children, through structured classes in the '3R's- Reading, Writing & Arithmetic. Equipping them for a job, with training, preparing them for a career with higher learning in the nuances of e-waste management, and motivating them towards a vocation by encouraging creativity, are the main objectives. At the same time, in order to retain the theme of 4Rs, courses in ethics and civic senses and rehabilitation of the entire family also needs to be visualized. The presence of the family in their life, learning and practicing good civicsense together, and being responsible for the development of their wards in a community, is the concept of rehabilitation in this proposal. The parents or guardians can be responsible citizens if employment can be generated in terms of collection or separation of e-waste generated in the district in which the management school is situated. The design features of a e-waste management school and its implementation, as visualized in a Thrissur context is given next in section III. In section IV, concepts associated with the rehabilitation

process is given. In section V the obvious aspects of economics is discussed and in section V we conclude.

III. E-WASTE MANAGEMENT SCHOOL

The first step to be taken in the planning of the e-waste management school is course and curriculum development. Creation of a suitable environment is another important aspect covered in the discussion on infrastructure development, governance and administration of the school. Taking into consideration the specialties of the school, along with the special talents and capabilities of both the teachers and the learners, focus is shifted in that direction as well.

A. Course and Curriculum

In order to have the above mentioned program education objectives targeting 3 levels of graduates from the school, the proposal considers 3 education tiers. In the elementary level, the courses visualized include elementary reading and writing skills in the vernacular and English, Arithmetic, Health & Civics and Ethics [12]. At the primary level, application and analysis of the knowledge attained as per Bloom's taxonomy, are visualized to be realized through courses associated with E-waste generation, classification, separation and recycling techniques, and refurbishment methods. The secondary school education in E waste management school should be equipped with courses at higher levels of Bloom's taxonomy in critical evaluation of separation and recycling techniques and synthesis of ideas and evolution of new methodologies.

Table IA: Course & Curriculum Design

| Elementary level courses | Learning modules | Activity Modules | Learning Objective |
|--|---|---|--|
| Reading, Writing in Malayalam & English; in computer | verbal ability, comprehension vocabulary grammar, letter-report writing, | discuss, debate, question & research; story- poem writing & typing; file management; | be able to communicate in oral & written format, use of keyboard |
| Arithmetic | four operations, measurementcommerce maths, | balance sheet, tax calculation, analysis of economics | be able to carry out a business or manage own money matters |
| Civics & Citizenship | concepts of law, rules, freedoms, governing, media, power, rights & responsibilities, cooperate in decision making | formulating rules, roleplay- media, public, Government, Collaborative problem-solving and decision-making | be able to gain knowledge, skills and understanding about the organisation and working of society |
| Health & Environment Science | Personal hygiene, clean premise, beauty & bounty of nature; dangers in e-waste, contagious diseases | charts & posters, exhibition, clean campaign, community health promos; Perspectives interpretations | be able to keep self, family & premise clean, healthy & safe, enable community living |
| Ethics & Values | moral & ethical integrity; social, cultural, linguistic & religious diversity, values of democracy equity & justice | combination of class-based activities, whole-school activities and community activities; Analysis and synthesis | be able to work for sustained in natural & social environments, common good; become active & responsible local & global citizens |

A first draft is given in Table I as the design of the courses and curriculum.

Table IB: Course & Curriculum Design

| Primary level courses | Learning modules | Activity modules | Learning Objective |
|--|--|---|--|
| E-waste Generation & Classification | What, why & how of e-waste methods of classifying, techniques | Discussion, debate, evolve projects | be able to know what, where & how to collect & classify |
| Separation Techniques | Mechanical, electrical, bio- technological, green chemistry; hydro- metallurgical, | Lab to experiment with the effectiveness of the methods | be able to identify non- hazardous and best techniques |
| Recycling & Recovery Techniques | Conventional methods; cryogenic; water & acid leaching; material & component Recovery; | machine for shredding, pulverizing, eddy current recovery & water pressure & angle for flushing | be able to decide the upstream to downstream flow of e-waste materials |
| Life-cycle calculation & Refurbishing techniques | module sets & fun-kits assembly; minimize use of resources & packaging | design toys, kits for students for projects, & alternative packaging | be able to extend the life-cycle of electronic goods or components |
| Landfills & Leachate | Optimal techniques for layer design | plan landfills to form base for specific applications | be able to make best use of life-end plans |
| Sustainable development | Minimum energy products & recycling; extending life | Trace, classify & reduce all energy going into a product of local use | |
| Secondary level course | Project-1 (from listed) Project-2 (innovative) | Learn all that is required to complete them effectively | be able to make a career |

The assessment methods and grading of students will require more thoughts in the direction of programme outcomes and education objectives. However some features that to be included for effective deployment of the curriculum are given below:

1. The courses can be delivered in miniature modules over one day in each week, with evaluation of the learnt material and activity by the end of the day.
2. For quick learners an accelerated course pattern can also be planned. This is easier with many miniature modules.
3. Activities should be school based and also involving the outside world. They should be completed in groups and must also have scope for doing things individually.
4. Courses given are broad-based with scope for delivery to an age-group, rather than a standard class. Hence elementary level targets an age group of six to ten. The primary level is designed for children within the age-group of eleven to fifteen.
5. The pedagogy, the individual modules, the syllabus and the assessment pattern will take in to

consideration the objective of an e-waste management school for the destitute children. The identified target is to satisfy the need for empowering the students with the associated and necessary supporting skills, values, attitudes and dispositions to become informed, active and understanding citizens who can participate in communities at local, state, national, regional and increasingly global level.

B. Infrastructure, Governance and Administration

The different campus constituents proposed are:

1. School building with class rooms, laboratories, library and computer room.
2. Living quarters with separate dormitory for boy and girl students, and rooming arrangements for parents, kitchen and wash area and toilet complex, community hall.
3. Play grounds, storage areas and office complex.

The planned outlay is given in Fig. 1. All required facilities

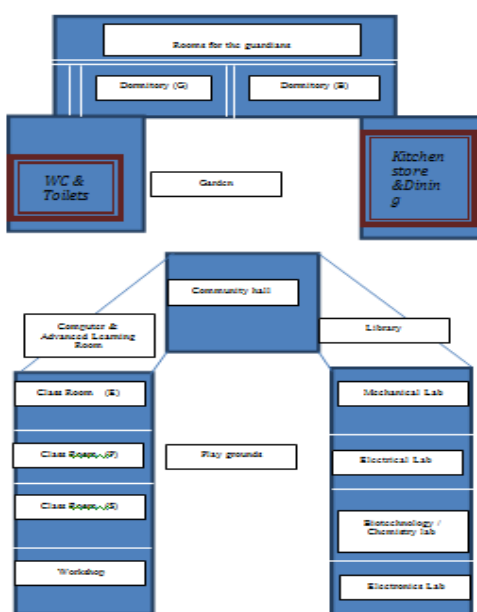


Fig. 1: Lay-out of the E-waste Management School

The planned outlay is given in Fig. 1. All required facilities for community living and a 3 tier education in an e-waste management school. The dimensions are not shown; the proposal is for education facilities for about 30 students in each class and to rehabilitate about 40 to 50 families. The other requirement that is not shown in the figure is the storage space for the e-waste and office for inventory control. It is expected that the whole set-up can be arranged in 2-3 acres.

Next let us discuss briefly the governance of the school. The coming together of need, talent and technology, the declared theme of this paper, is possible only with the strong will and motivation of government. In this proposal, the government is expected to spearhead generation of fund for infrastructure and execute it and put in place the rules and regulation for the functioning of the school. The governing council and advisory committee need to be drawn from relevant government bodies, especially local self-governance wings and industries. In order to stem the possibility of commercial considerations out-weighting technological requirements, it is suggested that government be at the helm of affairs and in control. The education in this school has to be treated on par with special school education and must also take the family support also into reckoning in the administration component.

It may be noted that community living is what is visualized. Hence some part of administration is foreseen to be contributed to, by the parents staying with the students. The maintenance and upkeep of the campus, its security, collection and separation and inventory control of electronic waste and kitchen and garden management are some responsibilities expected to be shouldered by the guardians of the students. A set of officials to oversee, allocate duties and maintain accounts and overall control, reporting to the government is also a necessary addendum to the school.

Before the teaching and supporting staff is discussed, the teaching learning process is briefly covered.

C. Teaching- Learning Process

A special type of teaching methodology is needed for a special school of this kind. Most of the course contents must be designed such that the topics can be handled by engineering college students. As of now, compulsory social service (CSS) is introduced by University regulations as mandatory for registering for the final semester. Educating the children of e-waste management school is a good learning experience for the engineering college students. The lesson contents should be delivered in the most interesting manner to catch the imagination of children who have either never gone to school, or are drop-outs having been on the fringes of society or have run away from schools. Another quality required to sustain the school, is to have the course delivery tailored to instill 'hope' within the students regarding the capability of this education system, to deliver a better tomorrow. The teaching- learning process must fuel moderate ambitions within the students and will have to cater to the intellectual development of the students rather than study to earn marks. The process must encourage an attitude making 'an earn while you learn' kind of life style possible, nourish independent thinking and desire to be independent in decision making. In the final analysis, the expectation is that the students decide what they need to learn.

All said and done, a college going student may be the best bet as are source person in such a school. The enthusiasm and identification with self, that youngsters as facilitators can muster or motivate, is unique and essential in a school of this kind. There are several take-away projects that engineering college students can derive from these visits based on the real problems encountered by students of the school in their labs or projects. It is hoped that the relationships developed in the teaching learning environment can lead to entrepreneurship on a later day in the e-waste management area. It may also be mentioned that the college own the subjects or modules being presented, and evaluate their students based on the success of the teaching learning process.

D. Human Resources

However, a team of senior faculty, within the school is also an essential. This is to monitor the process and provide checks and balances in the teaching learning process and for deciding the aptitude level of students, which is important for enabling the vision of setting up an e-waste management school. At the entry level, it is desired that all students achieve high levels in their status of 'Health, Hygiene and Happiness'. Similarly, the theme in the primary level has to be 'Character, Conduct and Cognition'. Both the human resource components involved in the teaching – learning process, necessarily should focus on and build up the 'Self-confidence, Self-worth and Self-reliance' of the students such that they aspire to a fulfilling career in their field of study.

Psychological counseling is another component that must be a part of the human resource support provided for both students and family members. Lab, Information Technology (IT) and library staff can be drawn from better performers from among the senior students based on aptitude or from motivated NGOs. The governing and advisory committees are to be constituted such that members have all suitable resources in their areas of influence. This is because they are expected to provide advises on continuous improvement of infrastructure, administration, teaching learning process, course content and syllabus, industry interactions and requirements etc. Additionally a steering committee is also recommended. In teaching, supporting learning and in counseling, inputs are important from a steering committee with a higher vision and capacity to articulate some mission statements.

IV. PROCEDURE FOR REHABILITATION

While discussing rehabilitation, it needs to be borne in mind, that it is simply a procedure, whereby, the birthrights of children, of food, clothes, and security via a roof above their heads, is reinstated by society or government. In this proposal dignity is also an important right, which is attempted to be accorded to these hapless children of the homeless and their family. The procedure for rehabilitation hence must start with

the children; thereafter include the age-group that may not be amenable to education. It must finally consider the parents and other dependents in the extended family of the children.

A. The children of the Homeless

The e-waste management school is to be founded, also based on the talent that nomadic children have been observed to possess. Rehabilitation needs to be seen in that light only. Hence care must be taken to build up the most appropriate environment, where the talents of these children flourish and guidance is provided to them to innovatively contribute to society. The procedure must be a suitable mix of tapping their exploratory talents along with a structured schooling in skill development. While the design of the infrastructure tries to provide a structured, though community living to the children, it is the course content and delivery, which is expected to open up the world to their imagination, with scope for deep interaction with it. This is foreseen in assigning the class room education to college students from several colleges, in this proposal. As mentioned before, activity based education is proposed so as to have strong bonds with the structure of the course while foraying into the outside world.

At this juncture, it may be recalled that, of the 3 Rs, the 'Reduce' concept has no meaning what so ever in the lives of the homeless, untouched as they are by the electronic bounties, technology has made possible. Their role is seen mostly associated with the other two - 'Re-use and Recycle'. It is to be 'Responsible', that the affluent society demands of the recyclers, to recover components or refurbish such that the second hand users are also given their due while the effluence of the unabated consumerist culture, thee-waste does not pollute the environment. Perhaps, rehabilitation can be seen in this back-drop as society bearing the responsibility of making the world safer for these people also, via schooling.

B. *The Youth in the Working Age-Group*

How to address this age group is a major challenge that the e-waste management school is bound to face. The youth on the streets who are exposed to a culture of violent practices and expectations are beyond the scope of this paper[13]. But, youth who are care-givers to these children, in deciding how to find food and shelter for the family while on the streets are targeted. Their independence and self-assuredness and value system used in judging how to evade authorities or share their profits may find some useful outlets in the school. Several studies exist regarding how the youth find themselves out on the streets but very few regarding motivating factors that enable them to join in the mainstream. Researchers identify the role of hope[14] in the process of leaving the streets and as a coping mechanism to decrease despair and make changes. Centering on this theme, some measures foreseen are:

1. Giving the youth an opportunity to be driving automobiles, is seen as an enabling component motivating feelings within them, regarding their ability to take charge of their own life. The college students visiting the school to teach may be happy to teach them to drive. Vehicular traffic is seen as a prominent need for the school. Students are bound to have daily visits to places that further their education. E-waste from about 20 engineering or computer related colleges or institutions need to be brought to the school for the lab purposes. When community living is visualized, other requirements for a small fleet of vehicles must be foreseen in the not so distant future.
2. Security for the campus is another empowering job that can be looked after by the youth after adequate training.
3. Physical education department is another requirement that can be constructed out of these youngsters. The effect of collective involvement in exercises and Yoga practices will develop camaraderie and general health of the community. A football or a cricket

team, some indoor games proficiency, for example in chess, prowess in athletic events are some of the outcomes that can increase the pride in the institution and lead to collective ownership of the school by the inmates.

4. Health care and simple nursing, is another training that can be meted out to the youth, in order to take care of first aid requirements and nutritional care of a 200 strong campus. Mentoring or gentle counseling may also be allocated to some, after checking the temperament and aptitude of willing youth.
5. It would be advisable to start a recycling unit within the campus, exactly along advisable lines and manning the same can be done by the remaining unemployed youth as far as unskilled labor goes. This could be slowly developed into a test-bed for a model recycling unit.

C. *The Parents or Guardians of the Children*

Here we talk about a set of people who are endowed with some qualities of resourcefulness and personal strengths to have survived the dangerous and stressful life on the streets. Having lived a life, negatively labeled and stigmatized by authorities and society alike, they are led to believe that they have no choices over their destinies. Studies [15] reveal that, when opportunities are presented and choices are made, even modest personal control over their destinies motivate these homeless people, to persevere in mastering tasks that result in positive changes in their life. Then, the school is destined to succeed as it offers a dramatic turn of events, in favour of their children. All the inner strength and resoluteness that exist in functional families can be relied upon to visit the arrangement made in the community living in e-waste management school.

V. ECONOMIC ANALYSIS

An economic analysis of a school of this nature and of such public relevance is pointless. In India, with a Supreme Court directive [16] on sheltering the 3 million homeless, the three-in-one arrangement proposed here with a capital and

recurring expenses, needs to be seen in such a light. Hence, only budgetary figures are attempted here as both capital and annual recurring expenses. This exercise is simply to show

that, at any cost, the school is a welcome proposition, and an immediate requirement. In Table III, a summary of the initial investment is given, which is over and above the land cost.

Table III: Capital / Infrastructure Expense Account

| Type | Specification | Cost |
|---|---|---|
| Living Quarters | 700 m ² | Total 1800m ² 1.5 crore |
| Toilet complex | 150 m ² | |
| Kitchen, store, dining | 180 m ² | |
| Class rooms | 320 m ² | |
| Labs, library | 450 m ² | |
| Furniture, Kitchen fittings&utensils | | 0.5 crore |
| Lab equipment& plant, library, computers, | eddycurrent separator, lathes , pulverizer, pyrolysis andelectrolysis equipment | 1 crore |
| Recurring expenditure | for living & learning | 9lacs/m |

VI. DISCUSSION AND CONCLUSION

A venue to address a serious problem, India faces, and is sure to spiral out of control is discussed. The confluence of talent, need and technology supported by directional educationis visualized. It is concluded that conventional ways of economic analysis is meaningless in this proposal.

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