EDUCATION FOR SUSTAINABILITY: ITS IMPLICATION ON BUILT ENVIRONMENT STUDIES

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Abstract

Sustainability has become a key in every development area. In order to promote sustainable development the education plays a major role. Identifying the significance of education for sustainability, UNESCO declared a decade for Education for Sustainable Development from 2005-2014. With this initiation 'Education for Sustainable Development' (ESD) was widely discussed, critically analysed and many countries have attempted to include ESD into main stream education systems. Even though commonly referred as ESD its Implications are varied among different disciplines and identifying the particular issues may pave way to educate in a sustainable manner. Within built environment studies it has become more important since 1/6th of the world's fresh water use, 1/4th of all wood harvests, 2/5th of all material flows, and 2/5th of all energy flows are utilised by the buildings. Sustainability could be broadly defined as use of resources that would safeguard its security for use of future generations. The strategies and methodologies to utilise within built environment could be different and the implications for educating therefore also need to suit the nature of the activity.

Incorporating of ESD into curriculum is a key aspect and level of intervention, identifying learning outcomes, training of teachers, teaching methods and assessments are some vital areas to consider. Preparing learning outcomes is one of the important tasks that could immensely impact the education program. There the similarities are found among the existing learning outcomes that have been written for ESD that promote an attitude change. But a need is also seen to formulate specific LOs to address different subject matters. Therefore integration of LOs into curriculum that addresses specific issues pertaining to Built environment studies could provide favourable results. The paper attempts to discuss the current developments of ESD in understanding the learning outcomes suitable for educating in Built environment studies.

Key words: Educating for Sustainability, Built environment studies, Learning outcomes, curriculum

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1. Introduction

The term Sustainable development first came into public light in 1987 (United Nations, 1987), and since then it has become a concept that is integrated into any form of development that utilizes earth resources. With the UN declaring decade for education for sustainable development the education need for sustainable development was concretised (UNESCO, 2005). Thereafter not only sustainable development but 'Education for Sustainable Development' (ESD) also integrated into many education programs. The approaches and interpretations used within ESD programs are in a wider range since both education and sustainable development are complex concepts. When individually complex concepts of education and sustainable development are combined, the result is a hyper-complex concept which is very open to interpretation(Læssøe, Schnack, Breiting, & Rolls, 2009).

Even though commonly referred as ESD, its implications are varied among different disciplines and identifying the particular issues may pave the way to educating in a sustainable manner. Within built environment studies it has become more important since 1/6th of the world's fresh water use, 1/4th of all wood harvests, 2/5th of all material flows, and 2/5th of all energy flows are utilised by the buildings. We all wish to live in built environments and all human activities are taken place within some sort of built form. We built houses to live, shops for commercial activities, offices to work, parks for recreation, cinemas for entertainment and roads and rails to go from one built area to another. It is impossible to imagine a world without built environments and also one could imagine its impact on existing earth resources.

Sustainability has varied definitions. It could be broadly defined as use of resources that would safeguard its security for use of future generations. The strategies and methodologies to utilise within built environment could be different and the implications for educating therefore also need to suit the nature of the activity. Initiating an ESD program is always a challenge and there are many aspects that need careful consideration. Incorporating into existing curriculum is a key aspect and level of intervention, identifying learning outcomes, training of teachers, teaching methods and assessments are some important areas to consider. If initiating an ESD program identifying the Learning Outcomes (LOs) it would become an even more challenging task. Every subject area has its own salient factors and the learning outcomes should reflect them. The success of the ESD program would depend highly on finding the correct LOs. Therefore integration of LOs into curriculum that addresses specific issues pertaining to built environment studies could provide favourable results.

Considering the existing Learning outcomes commonalities are found within them that promote attitude change(Svanstorm, Lozano-Garcia, & Rowe, 2008). Considering the complex activities of built environment it is doubtful whether only focusing on attitudinal change could benefit the sector. More specific technological knowledge and skills are essential and need to be identified at the time of formulating the LOs. This could make way for a sustainable ESD within built environment studies.

2. Educating for sustainability: The Need

We live on the earth with its limited resources. Industrialization and rapid development in many sectors occurred during the turn of 20th century and use of existing resources without paying considerations on their scarcity set alarms among developers. The concept of sustainable development emerged as a soothing remedy to preserve the remaining resources for the use of the future generations. Sustainable development is defined in many ways but basically it is the development of utilising resources without compromising its existence for use of future generations.

Sustainable development has three components: environment, society and economy (McKeown, 2002). McKeown further explains that these three components are seen as same size overlapping circles and the intersection is the human well being.

The Rio Declaration on Environment and Development UNEP (1972) expands out the definition by listing 18 principles of sustainability.

- People are entitled to a healthy and productive life in harmony with nature.
- Development today must not undermine the development and environment needs of present and future generations.
- Nations have the sovereign right to exploit their own resources, but without causing environmental damage beyond their borders.
- Nations shall develop international laws to provide compensation for damage that activities under their control cause to areas beyond their borders.
- Nations shall use the precautionary approach to protect the environment. Where there are threats of serious or irreversible damage, scientific uncertainty shall not be used to postpone cost-effective measures to prevent environmental degradation.
- In order to achieve sustainable development, environmental protection shall constitute an integral part of the development process, and cannot be considered in isolation from it. Eradicating poverty and reducing disparities in living standards in different parts of the world are essential to achieve sustainable development and meet the needs of the majority of people.
- Nations shall cooperate to conserve, protect and restore the health and integrity of the Earth's ecosystem. The developed countries acknowledge the responsibility that they bear in the international pursuit of sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command.
- Nations should reduce and eliminate unsustainable patterns of production and consumption, and promote appropriate demographic policies.
- Environmental issues are best handled with the participation of all concerned citizens. Nations shall facilitate and encourage public awareness and participation by making environmental information widely available.
- Nations shall enact effective environmental laws, and develop national law regarding liability for the victims of pollution and other environmental damage. Where they

have authority, nations shall assess the environmental impact of proposed activities that are likely to have a significant adverse impact.

- Nations should cooperate to promote an open international economic system that will lead to economic growth and sustainable development in all countries. Environmental policies should not be used as an unjustifiable means of restricting international trade.
- The polluter should, in principle, bear the cost of pollution.
- Nations shall warn one another of natural disasters or activities that may have harmful trans-boundary impacts.
- Sustainable development requires better scientific understanding of the problems. Nations should share knowledge and innovative technologies to achieve the goal of sustainability.
- The full participation of women is essential to achieve sustainable development. The creativity, ideals and courage of youth and the knowledge of indigenous people are needed too. Nations should recognize and support the identity, culture and interests of indigenous people.
- Warfare is inherently destructive of sustainable development, and Nations shall respect international laws protecting the environment in times of armed conflict, and shall cooperate in their further establishment.
- Peace, development and environmental protection are interdependent and indivisible.

These "Rio principles" provide a basis for us to understand the parameters of sustainable development and orient our efforts in an appropriate way that understands the cultural differences and subject in discussion. It can also be observed that to achieve many of these principles, education could play a leading role within any implementation strategy.

Education is found to be the key in popularising the sustainable development and building an attitude for it among every global citizen. Declaring the decade for educating for sustainability by UNESCO in 2005 (2005-2014) is a giant step towards this and According to UNESCO's recent documents, sustainable development is the "ultimate goal of the man-environment relationship"; thus, the whole educational process should be "reshaped for sustainable development" ((Sauve, 1996).

Education will merely end as the attitude change, but is the strategy for behaviour change that needs to take active participation for sustainable development. It is also important to understand that many who act against sustainable development are also the people who are more educated. What we called un-educated, un-civilized primitive communities may have the best practices in terms of sustainable development. Therefore the need to incorporate ESD into existing education programs seem to be higher than general education. It is the people who are educated take decisions regarding many development programs. And they pave way for sustainable practices.

Development sectors in current global context are so vivid and need for sustainability education also reflect this diversity. Depending on the need a universal ESD program will not

be applicable across all the field of studies and the different needs at different levels could be identified as follows.

- Decision makers: to make correct decisions that will ensure sustainable development
- Professionals: to provide services within a framework that would not conflict with principles of sustainable development and to provide domain specific knowledge and skills to take actions.
- Educators: to integrate of ESD in every possible aspect in teaching
- Student at Higher education : to build knowledge , skills and attitudes to take actions towards Sustainable development
- Students in Primary and secondary education: to build an attitude towards the sustainable development practices and to seek further knowledge when necessary
- General public: to build an attitude for best sustainable development practices and to understand the implication if they are violated.

In initiating an ESD program, the understanding the overall need for ESD as well as the specific needs become important.

3. History and developments in ESD

Since the time the sustainable development was first endorsed at the UN General Assembly in 1987, the parallel concept of education to support sustainable development has also been explored. From 1987 to 1992, the concept of sustainable development matured as committees discussed, negotiated, and wrote the 40 chapters of *Agenda 21*. Initial thoughts concerning ESD were captured in Chapter 36 of *Agenda 21*, "Promoting Education, Public Awareness, and Training."(McKeown, 2002)

Numerous debates and controversies have arisen during the last 10 years over ESD and its inclusion in the trends of economy (Gonzalez-Gaudiano, 2005). ESD was first described by Chapter 36 of *Agenda 21*. This chapter identified four major thrusts to begin the work of ESD: (1) improve basic education, (2) re-orient existing education to address sustainable development, (3) develop public understanding, awareness, and (4) training.

Improve basic education

This was taken as the first priority on the basis that in order to understand ESD the basic literacy ability should prevail within the community. For many nations, the path to a sustainable future for their citizenry begins with greater access to basic education (Hopkins & McKeown, 1999). Yet the demarcation of the basic education differs drastically from one nation to another. Some countries may take the literacy ability as the basic education where some may define basic education as primary or secondary education. But merely providing basic education will not pave way for an effective ESD program since it also involves critical thinking skills. Analytical skills, problem identification and interpretation and ability take a decision for a change.

Re-orient existing education to address sustainable development

Re-orienting education is a more difficult task for every country within the existing education frameworks, yet it is a very important aspect in every level of education. This should happen in a systematic manner clarifying different roles in different sectors as well as in different levels of educations. These interventions are the focus of many ESD programs and country specific policy decisions have already been made for education change in many countries.

Develop public understanding, awareness

Public awareness takes a different form in educating but yet equally important. It would help people to support policy decisions or reject development initiations that are against the principles of sustainable development. No program could achieve its anticipated results without the proper community participation. Community participation without relevant knowledge would also become useless. Therefore the educating for public understanding and awareness is an integral part of any ESD program.

Training

Training is differentiated from education as developing a specific skill to carry out a specific task. Training provides skills for best practices how to actually achieve a sustainable initiative. Training could also happen at various levels. The community leaders are also need to be trained as well as labourers. Working personals performing at different levels are in need to be trained to perform their activity within a sustainable framework. The labourers at lowest levels who would operate machinery and maintain them become important segment of ESD program within this training aspect.

Since UNESCO Declaration of the decade for ESD an increasing interest was observed and many initiations and developments were also observed. Different countries have incorporated the ESD into different areas that are particular to that country. In many countries ESD is integrated into environmental studies and climatic change. In most countries 'Environmental Education' (EE) is a more established field. Educational initiatives and, in particular, research of relevance to ESD can often be found under the name of EE (Læssøe, Schnack, Breiting, & Rolls, 2009).

New conceptual development such as green buildings, energy efficiency, renewable energy, carbon footprints, environment impact assessments are also outcomes of ESD programs coping with different issues within sustainable development. Many of these conceptual developments are focusing on built environment emphasising its importance within ESD programs.

4. Sri Lankan initiatives for ESD

Within Sri Lankan context, the official initiations have taken almost decade since the declaration of the action plan was launched at level of ministry of education. Many higher education programs have taken steps in incorporating sustainable development aspects into the existing education programs. It is positioned in any cases within the environment education and also integrated with climate studies. The green building council of Sri Lanka has also taken steps in ensuring a sustainable built environments and have published a good practice guide and also created an assessment framework to assess the green buildings.

5. Considerations in ESD programs and their implications on built environment studies

ESD Programme is no different from an average education program, but only it has more complications and interdisciplinary in nature. Considerations that impact education program for its effective execution could also influence ESD program. Curriculum design and integration, identifying learning outcomes, teaching methods, teaching domains, level of interventions, teacher training, assessment, field specific features, and research are among the leading considerations.

Placing ESD within an existing curriculum is a difficult decision in every education program. When ESD is introduced into an existing educational system and school, a number of structural tensions arise. ESD does not have a pre-determined structure; instead it can be implemented in a variety of forms, thereby creating the possibility for adaptation to the established systems(Læssøe, Schnack, Breiting, & Rolls, 2009).The Built environment studies is complex in nature and curriculums also reflect the complexity. Many subjects are overlapping and interconnected. Integrating ESD into existing structures could happen at multiple levels across multiple subjects.

The Green building concept is one dominant area that has creep into built environment studies as to address the ESD needs indirectly. Its impact was felt immensely. Many professional bodies were formulated to address the complex issues faced within this area and many countries have established Green Building councils.

Working guides prepared by professional bodies were amended with green overlays and changing of RIBA (Royal Institute of British Architects) Plan of work with a green overlay is one such example. It is also observed that CPD (Continuous Professional Development) programs conducted by leading professional bodies are also focusing on promoting Green buildings. Sustainable site, energy and Atmosphere, water efficiency, Materials and resources, Indoor environment Quality, are some common aspects considered in many of these green building design strategies (Hui, 1999).

The legislations were also amended to include some of these aspects as regulations where a behaviour change is imposed even without an attitude change. This is a strong intervention that has impacted the built environment studies. Even though programs were not basically positioned as ESD programs educating on new regulations are in fact part of an ESD program. Even within academic programs more academic merit was imposed on projects that integrate these sustainable built environment principles. And research was also promoted that interact with sustainability. Development of new materials that promote green buildings is a popular area in research and innovation that are based on principles of ESD.

The initiatives of ESD in general have made an impact on Built Environment studies while adding more complexity to its inherent complicated nature.

6. Learning Outcomes in ESD

Identifying the correct Learning outcomes (LOs) is a key to success in any education program and ESD would fine no exemption. The Tbilisi declaration which was put forward in 1977 during the first intergovernmental conference on environmental education addresses education at all levels and could be considered as the first step towards formulating LOs in ESD (Svanstorm, Lozano-Garcia, & Rowe, 2008).

Next set of LOs could be found within the UN declaration of the Decade of Education for Sustainable Development (DESD). In this the broader goal is to integrate the principles, values and practices of sustainable development into all aspects of education and learning. These initiatives were addressing society as whole and were focused on attitude change. But there were other developments focusing higher education as well as directed towards specific profession. Among these different approaches commonalties are found and one basic factor is the focus on attitude change in identifying the LOs for ESD program.

In USA, US Partnership for Education for Sustainable Development was able to get together the leaders of over 20 academic disciplinary associations to discuss each discipline's potential contributions to a more sustainable future. National associations for psychology, sociology, philosophy, religion, biology, chemistry, engineering, architecture, anthropology, political science, math, and broadcasting are among these disciplinary organizations. Disciplinary Associations Network for Sustainability (DANS) was formed after the gathering. A second national network, the Higher Education Associations Sustainability Consortium or HEASC was formed to catalyze education for a sustainable future in the programs and operations of mainstream higher education associations and their members (Svanstorm, Lozano-Garcia, & Rowe, 2008). The associations in HEASC in education sector at different levels.

HEASC and DANS members have worked together to share drafts of LOs. Their LOs, in order to develop and maintain sustainable communities, are (Svanstorm, Lozano-Garcia, & Rowe, 2008):

- Each student will be able to define sustainability.

- Each student will be able to explain how sustainability relates to their lives and their values, and how their actions impact issues of sustainability.
- Each student will be able to utilize their knowledge of sustainability to change their daily habits and consumer mentality.
- Each student will be able to explain how systems are interrelated.
- Each student will learn change agent skills.
- Each student will learn how to apply concepts of sustainability to their campus and community by engaging in the challenges and solutions of sustainability on their campus.
- Each student will learn how to apply concepts of sustainability globally by engaging in the challenges and the solutions of sustainability in a world context.

These LOs are more action based providing skills for actual change in dealing with sustainability issues. But again the change of attitude and behaviour seem to be the dominating factor. However, most ESD groups and programs have their mission as the goal of changing citizens' attitudes and values toward the natural environment. For many this is their declared ultimate goal (Arbuthnott, 2009). Educating at various levels across different disciplines was generalised in many ESD programs thus the more common attitude change was emphasised in LOs. Therefore the necessity to identify discipline specific LOs can be seen and it could also impact the success of the ESD program.

7. Learning outcomes in built environment studies

It is clear that the basis of educating for sustainability is based on a positive attitude change towards protection of environment. But the level of attitude change for a behaviour change and the need of relevant knowledge and skills needed for the behaviour change could vary among disciplines. In built environments studies the focus is on construction, various disciplines are taught different aspects of construction. Architects are concerned on design, engineering are focusing of engineering and technological aspects, quantity surveyors are there to consider the financial consequences.

The learning outcomes for merely attitude change will not be adequate in built environment studies. The necessary knowledge and skills would play a major role in taking actions for a change. Learning outcomes should be identified in all three domains with equal emphasis.

Some of the key aspects to be considered in all domains are outlined as follows:

Knowledge

Knowledge within built environment studies has a vast spread. It includes the basic knowledge from natural sciences, social sciences, construction technology, engineering principles, communication, history, economics, and design. Finding LOs among these knowledge based subjects will be based on particular sustainability goal. One may even find

that some of the subjects that were being taught for a long time have no relevance in promoting a sustainable built environment and would rather conflict with its principles.

The knowledge should focus to

- Understand the issues that conflict with Sustainability
- Understand the underlying factors and possible remedies to ensure sustainable built environment
- Understand the latest developments within the sector
- Knowledge on green building concept
- Knowledge on recent legislations and their implications on built environment

Skills

The skills are equally varied and include design skills, communication skills, professional skills and technical skills. Within them specific skills need to be addressed in formulating LOs such as:

- Advance design skills that could include best sustainability practices
- Skill to incorporate green building concepts into design
- Skills to remedy any shortfall in sustainability practices
- Skills in selecting alternative materials that safeguard the sustainability
- Skills to conduct research to explore existing knowledge
- Skills to follow technical procedures to avoid any harm to environment
- Professional skills to work with existing litigations
- Communication skills to effectively communicate to community and other stakeholders the consequences of sustainable built environments

Attitude

Attitudes have been the basis of ESD principles and built environment studies should also have a similar emphasis.

- Positive attitude change that could lead to a behaviour change in general towards sustainable built environment
- Attitude to incorporate sustainability practices at every stage in construction process
- Attitude to take decisions in favour of sustainability
- Attitude to refuse and reject activities that could conflict with sustainable built environment principles

The above LOs are put forward in a more generalised terms for many disciplines within the built environment studies and particular program of studies can further expand these while identifying their own issues. Integration of three pillars of sustainability: environment,

society and economy, should be considered at every step for sustainability of the education program as well.

8. Concluding remarks

It is clear that education for sustainable development within built environment studies has its own specific implications. Since built environment utilising majority of the existing resources the ESD program focus in this sector should be intense. Learning outcomes are generally identified within all three education domains but a specific program can focus on one main domain. It is seen that ESD is primarily focusing on attitude change and therefore LOs are usually focused on effective domain. But the built environment studies have much complex considerations that merely attitude change will not serve the purpose. A thorough knowledge and skills are equally important.

The different levels of human skills that are involved in built environment should also be given due consideration in ESD programs. The unskilled labour in construction could play a major role in maintaining a sustainable construction activity.

Therefore, ESD program within built environment studies needs to identify the learning outcomes across the disciplines, levels of education and most importantly positioning within existing systems for sustainability of the implementation program.

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