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Green Skills as an Added-Value Element in Producing Competent Students

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ABSTRACT
Green skills model is developed as a reference for implementing green skills in the learning process for primary school students. Elements of green skills need to be applied as early as possible in students to produce citizens who are competent in all aspects and foremost to maintain the environmental balance. Elements of green skills can be used as a value-added in any subject and as a cross-curricular element such as Design and Technology (D&T). Research shows that the country is now passing through a phase of global warming and climate change caused by greenhouse gases. There are quite a number of people who are not aware of environmental problems and take it easy in helping reduce greenhouse gas emissions resulting from the use of fossil fuels. The concept paper reviewed the policy and the role of government in development and implementation of green technology and community practices to ensure that goal is achieved. A lot of research needs to be done in promoting and improving the existing new energy sources as an alternative renewable technologies to meet the goals of the National Green Technology Policy.

Keywords: Environment, Green Skills, Green Technology, Design Technology, Recycle

I. INTRODUCTION

Educational sector in this millennium requires students who are competitive. 21st century skills are related to several skills that are required such as communication, reading, writing, solving and reasoning skills, science and technology, as well as interpersonal and intrapersonal skills. In order to achieve a country's objective to develop a generation that has 21st century skills, in parallel to the green technology policy, a student has to dominate various skills. Green skills are included in the list of skills that a student has to acquire in order to increase self- quality and it also gives an added value to individuals to compete in this globalizational era. Skills activities that involve green environmental energy are seen as a medium to help humans preserve the environment that can be realized through green technological industry [1]. With that, ACET 2015 drafts eight main agendas that focuses on the empowerment of the Educational with Technical and Vocational Exercise field as contained in the Kuala Lumpur Declaration as a preparation to fulfill job markets and capability to adapt self with the 21st century challenges. One of the 4 out of 8 agendas in the declaration is to integrate greening skills for the preservation of the TVET program to achieve sustainable development including curbing poverty and inclusive of economic development.

Therefore, it completes the TVET system all together as a training and learning center to increase the professional teachers and coaches capacity. In primary schools now days, students learn Design Technology which starts at the age of 10 to 12. This is to produce individuals who are independent, creative, has initiative and tech-savvy. Hence, there is a need to include a consistent green skills component to develop green technology in primary school level to increase awareness towards the importance of conserving the environment [2], [3] as to what is contained in the 11thMalaysia Plan. This is to produce and develop individuals who are able to spur economic growth in the future that has more sense regarding the importance of preserving the environment. Not only does it achieve the government's objective to produce individuals that highly skilled, it also maintains a sustainable development with green technology.

Green skills had dynamic and relevant concept. Therefore, it shouldn't just be focused on economy and industry on its own but should be diversed to other fields especially education. Hence, green skills are seen to have a connection that is

synonym with the needs and trend of the current industry which is the green industry that leans towards a greener social, economical and environmental development. Before the efforts establishment of "green" industry works out, we have to ensure that each member that leads the industry are those from technical and vocational graduates that have to major in the green skills element that will form and design " Green Jobs " or " Green Career" [4].

II. GREEN SKILLS

Today, there are many mentions of green technology, green economy, green houses, green jobs and all things related to the word green. However what does green really mean? Green can be an element that is described as a natural occurrence such as trees and forest, life, stability, peace and natural. Obviously there is no accurate definition to describe the concept of green skills. However, the definition of green skills from the perspective of researchers for this experiment is a concept that emphasizes on environmental element in lives and how individuals that will be produced can ensure a preserved development through economy, community and country.

Green skills are professional and vocational skills, generic skills (sustainability approaches, problem solving, innovation) where green skills are needed in all industrial sectors as a response towards climate change and sustainable imperatives [5]. Green jobs mean " green collared jobs", which are individuals who contribute towards a better environment or to increase sustainability [6]. The Council of Australian Governments (COAG) (2008) [7] stated that green skills is a form of skills that is on the path towards a sustainable preserved development from a technical aspect, value and attitude knowledge. All these skills are needed in the work force to develop and support the social, economical and environmental outcome that is established in business, industry and community. Pavlova (2011) [8] has also listed down a few elements of green skills that are taken into account which are:

1) Environmental awareness, attitude and readiness to study about sustainable development, issues as well as challenges.
2) coordination and management of holistically approached skills towards the designated solution to fulfill economical, social and ecological objectives.
3) Entrepreneurship skills to grab the chance from low carbon technology.
4) Innovation skills to identify chances and create new strategies to respond towards green challenges.
5) STEM skills: general knowledge about the role of science, technology, engineering and mathematics to contribute to the process of a greener economy and community.
6) Analytical thinking skills: As a business and industrial step towards a model that is truly sustainable, there will be a need to understand the logic behind a rapid growing economy and how this is different from traditional model linear economic development.

Green skills is also defined as a skill that is needed to adapt one's self, product, service and process for climate change and a related environment according to the specific requirements and rules [9]. Strietska-llina, Hofman, Haro and Jeon (2011) [10] defined green skills as a knowledge, ability, value and attitude that is needed to live in growth and support the formation of a community that is sustainable and efficient management of resources. Green skills are deeply needed by all sectors no matter in the education sector, construction, industry and in all levels of workforce. While Vona, Marin, Consoli and Popp (2015) [11] in their research found out that green skills is a set from the efficiency that is related to design, output, management and technology monitoring. In the research findings, they discovered that the rules of the environment sparked a change in technology and organization that increases the demand for a higher analytical and technical skills.

Besides that, Lethoko (2014) [12] who studied the relevance between government policy, green economy and education as well as exercise in determining the way the education sector responds towards green economic skills in South America. The experiment discovered that green economy influences skills in three ways which is to bring back green development, developing green technology and to consummate green skills among workers. The industry's needs towards working skills are increasing, however the world is still lacking in that power force. There are several setbacks and issues in instilling green skills. McCoy, Patrick, O'Brien, Novak and Cavell (2012) [13] in their research stated that green skills issue needs to be solved with the training and education program that exists, as it will help in channeling green skills training to workers in the construction sector effectively. With that, the research has uncovered many challenges towards the training to form a green job that exists in the green industry development as well as ways to overcome it.

Meanwhile, Brown (2013) [2] who did a research regarding the 4 types of cohort perception that is found in the TAFE institute in Australia about the green skills growth. Through this research, most respondents are optimistic about the green skills,

however, many risks will be faced. Several jobs will appear and more changes will happen in the work and skills application angle. A clear marketing is getting bigger in renewable energy, saving energy, sustainable water system, green development and recycling. Each jobs are seen to be considering and instilling sustaining skills.

Another researcher, Jagannathan (2013) [14] stated that the training and education system has to emphasize on the level of skills, education and training that is needed for the whole cooperation and greening economy spectrum. High technical and scientific is needed in the context of reducing pollution, creating cities, transportation system and a habitat that produces a low carbon that is pleasant. His research also stated that the most important aspect is to ensure that the training and education system becomes more innovative and foreseeable. While they are preparing necessities for professional green work force, they also play an important role and influences the provision of community that is sustainable and durable. Education is needed to widen the new curriculum training and launch a promotional green business campaign. Technical and vocational training will be more critical in building a foundation that is needed for green jobs. Pavlova and Huang (2013) [15] , researched on the types of values that can be instilled in the education and technical and vocational training to deliver the green skills agenda. The values that should be instilled in the green skills in care which is to not harm the environment, hold on to science, work hard, unite, be helpful, discipline, obey the law as well as honesty and integrity even thought chaos ensues, understand the modest lifestyle and work hard for it.

Kennedy and Chow (2013) [16] did a research on the role of schools in increasing the understanding regarding the environment as a key community value that has potential to influence not only attitude but a person's actions. Their research also stated that there is an issue in the execution of green skills in schools whether the schools is able to react proactively in supporting students to be tied to the agenda regarding personal and social which is the one related to the future of the community. This research is carried out on Asian citizens which consists of West Asia; Hong Kong, China, Taipei, Republic of Korea and South East Asia ; Thailand and Indonesia. The findings of this experiment shows that while environmental education is used as a school curriculum for most students in selected countries, the result is not the same and the chances of students to know about the problems with the environment is also not the same according to different areas.

Other findings according to reports are based on evidences from HM Government (2011) [17], the demand for work force that are skillful in green economy needs a skills that is able to support resource efficiency, low carbon industry, durability towards climate and skills that can manages natural assets. All these types of assets are required in all sectors in which some of them are efficient resources oriented, scientist and engineers that applies their knowledge for renewable energy and nuclear energy to reduce pollution, scientific and technical skills to interpret climate change projections for the nature.

III. PALMER AND NEAL MODEL (1994)

Model Palmer and Neal (1994) [18] emphasized that environmental education can form knowledge about nature in research activities. Also, it can form an understanding towards nature and environmental values. Figure 1 shows the environment approach element that is adapted from the Palmer and Neal Model (1994). Hence, green technology element hopes to support the everlasting social and nature by using environmental education approach that is adapted from the model. With the approach that is adapted from the model, traditional learning method needs to be modified so that it can increase students' knowledge about taking care of the environment by applying knowledge to do recycling activities from used products as an effort to instilled the green technology element in them. Values such as independence, innovative, thrifty, and responsibility among students can be inculcated by ways such as recycling used materials.

This model explains about the attitude of an individual that can be changed through education especially environmental education. To ensure that this education is effective, an individual has to be given knowledge and information regarding issues that related to the environment such as pollution that needs awareness followed by responsive measures. With that, accurate actions based on skills and knowledge obtained has to be sown in an individual. All of these influences interests, curiosity, attitude and eagerness of a person. Hence, when there is interest, then the eagerness will soar and this path will encourage the individual towards preservation and conservation of environment [19].

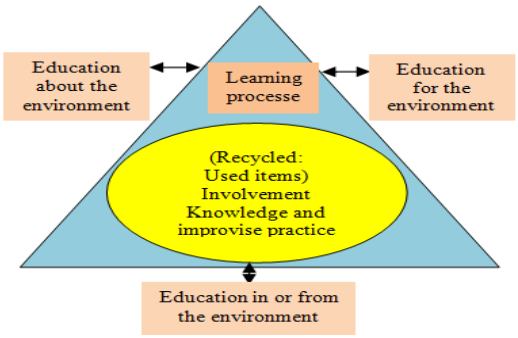

Figure 1: Environment Approach Elements (Model Responsibility Environmental Behavioral: [20]).

Besides that, internal and external factors also exist and is able to influence the formation of this interest. Internal factors are things like personality and family upbringing. Meanwhile, external factors are related to economic demand, peer pressure, community and the existence of alternatives in making choices are some of the examples of external factors that can influence the formation of interest.

IV. HUNGERFORD AND VOKL MODEL (1998)

In introducing this model, they have identified the important elements that are needed in the education program that can change the attitude of students towards the environment. Some of the way stated by them are;

1) Teaching the main concepts about the environment and human involvement.
2) Creating designs and chances for students to achieve a sense of awareness and sensitivity towards the environment.
3) Teaching analytical skills and do research on environmental issues as well as necessities in carrying out actions that will be taken.
4) Applying skills through real exposure such as field work, camping and sorts.
5) Building a self-principle for continuous actions.

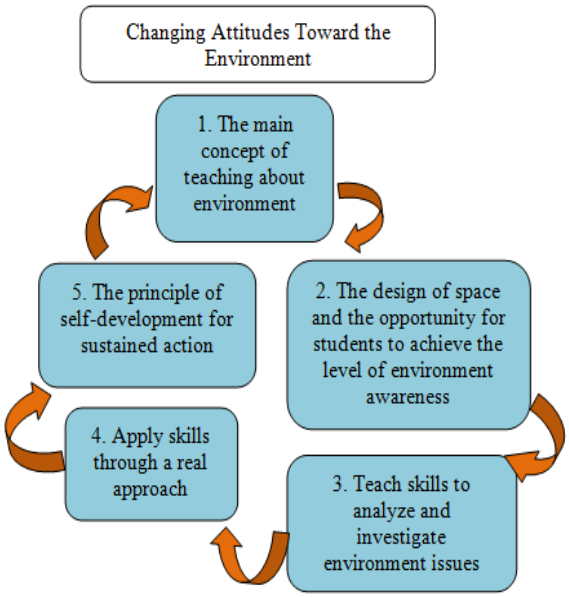

Figure 2: Movement towards a change in attitude regarding the Environment.
Source: Modified from Hungerford, Bluhm, Volk & Ramsey (1998)[21].

Figure 1 illustrate both these approaches and this model shows that attitude can be shaped through knowledge about the environment. This matter shows that their knowledge about the environment, effects and action skills that needs to be taken by someone to change their attitude about the environment. This model is very relevant to environmental education in our country. However, as we all know, changing a person's attitude can take a long time. With that, this change must be done during primary school level so that students will be aware of the importance of taking good care of the environment.

V. COMMITMENT IN PRODUCING SKILLED STUDENTS

Referring to the current development of the country that focuses on the development of sustainable and low-carbon economy, the Ministry of Education should develop a curriculum that emphasizes the element of green skills to produce students who have the awareness of sustainable development in terms of everyday life, attitudes and behavior. Students are also not spared in the interaction with the environment. They are the generation that will be involved in various fields of work, community life and some will become leaders in the future [22] .

The Curriculum Division (CPC) has drawn Curriculum Standard RBT that is drafted with an emphasis on content standards and learning standards that need to be known, understood and controlled by the primary school years 4, 5 and 6. Early exposure of basic skills in the field of technical Technology Agriculture, Home Science and cross-curricular elements such as information and Communication Technology (ICT), Creativity and Innovation and Entrepreneurship Foundation are also emphasized in this subject. But the element of continuity or also be taken into account in ensuring fertilization green skills is a culture in students. Good knowledge of the understanding of green technology have been able to create awareness on Green Technology in students, with this, there will be a good build, maintain and implementation of Green Technology [23] ,[24].

Therefore, education plays an important role in changing the economic transition towards a greener and cleaner conductive towards inclusive development [13]. Green skills need to be nurtured since the school level and the focus is on technical and vocational subjects which helps produce skilled manpower. Implementation of green skills beginning at the school is seen to be too early because they are still not necessarily certain of their direction. As Hayward (2012) [25] found that children in primary school are taught to understand and act on the principles relating to environmental and social issues. However, human development that is based on religious values, responsibility to nature, nature in a planned building also needs to be emphasized [26] .

However, the interest can be formed by exposing them with these skills from an early stage. Students in secondary schools are trained in these skills through education. Teachers need to be smart in setting teaching strategies to make students keen to learn green skills that is being taught. Teachers can apply a little sentimental element to the materials produced by students. All this can attract students to be part of the talent [13] but in Hong Kong and China, it is reported that topics related to the environment are not included as a part of the educational curriculum [27] and teachers have the lowest level of confidence to teach the topic.

As for Environmental Education, also known as education for sustainable development, it explains the concept of education for sustainable development (Education for Sustainable Development, ESD). ESD is a process for applying the values to students in developing concern, ability and their attitude towards education. The process involves students in sustainable development more effectively and help them to work towards a more sustainable future. The format of the training system that followed the students have to include green skills component and also needs to adapt to meet the needs of industry [13]. The problems related to the environment need to progress through education [28]. This principle is also applicable to those in schools because it clarifies that the aspects of education is important to encourage changes in behavior that can shape a sustainable future and not compromise the integrity of the environment, economy and society suitability for the generations of today and the future.

VI. DESIGN TECHNOLOGY

Malaysian primary schools in the Primary School Standard Curriculum in Phase 2 for the subject of Design and Technology (D&T) is a compulsory subject studied. Where students are empowered with the knowledge and skills related to technical and vocational fields, and next will be studied at the secondary school level. Curriculum Standard D&T is drafted with an emphasis on content standards and learning standards that need to be known, understood and controlled by the primary school students year 4, 5 and 6. Early exposure of basic skills in the field of Technical, Agricultural Technology, Science Domestic and cross-curricular elements such as Information and Communication Technology (ICT), Creativity and Innovation and Entrepreneurship Foundation should be given early and emphasized in this subject [29].

The objectives of Curriculum Standard RBT in national schools is to enable students to follow the teaching and learning in practicing the safety rules workshop and safe work practices, produce a product with the process of designing, knowledgeable about the technology contained in the technical field, agricultural technology, domestic science, skilled in the selection of materials, tools, machines and software and use it with the right techniques and ethics, doing-it-yourself and easy maintenance of equipment and instruments, to generate critical thinking, creative, innovative and enterprising in designing and producing quality products , using information and Communication Technology (ICT) and apply basic skills of entrepreneurship and generate ideas to solve problems.

Learning D & T can also create a new experience for students as a learning process based on the application of knowledge and skills. Students are expected to master the practical skills to do their own activities actively in everyday life. Therefore, students should be exposed to the latest knowledge and skills to achieve these practical skills. Students are also encouraged to use recycled materials and recyclable materials such as rattan, bamboo, boxes, plastic bottles, shells, wood parings and scrap plastic pipe while conducting educational activities. The use of materials that are not needed will save costs in addition to inculcate thriftiness and innovation when students produce a project. This way, students will be more aware of the resources that surround them and are able to harness its use [18]. Therefore, knowledge and practices concerning the recycling of used materials is important and needs to be nurtured in the students, especially in the subjects of D&T. Recycling unused materials could increase the environmental preservation and conservation as well applying elements of green technology.

Hence, education and training institutions in Malaysia have to figure out a method to provide a thorough awareness to younger generation about the importance of conserving the environment for the welfare of living together. However, now in elementary school subjects are taught only in respect of the World Science and Technology for phase one and Design Technology for two without emphasizing on the component level of skills and knowledge pertaining to green skills and green technology. Green skills topic which is in line with green technology should be included in the curriculum and applied and instilled as early as possible to pupils in primary schools so deeply entrenched [2], [3], [30]. As stated in the 11thMalaysia Plan which is to produce and develop the human capital that can spur economic growth in the future with the awareness of the importance of preserving the environment. The government's aim is not to only produce highly skilled human capital but also able to maintain sustainable growth and green technology [10], [31].

This is because, education pertaining to green technologies is to some extent related to

environmental education, where this subject has been introduced that is, since 1986 when the Education of Nature and Man (PAS) is introduced to students stage 2 (year 4, 5 and 6) in the primary. However, PAS across the curriculum is formally introduced in almost all subjects beginning in 1998 at primary and secondary schools. PAS is the subject of a field study of human interaction with the environment and how humans should manage the environment with responsibility for the welfare of humans [18]. To create a society that is based on green technology, it is natural to be nurtured from the outset. Although environmental education has been introduced, but the effectiveness is still not enough to achieve the goals set.

VII. THE ROLE OF THE GOVERNMENT FOR THE DEVELOPMENT AND IMPLEMENTATION OF GREEN TECHNOLOGIES IN THE EDUCATION SYSTEM.

To achieve towards sustainable direction, the government should move in the direction of a more sustainable development. But to achieve that goal without education will not result in sustainable development. People who are knowledgeable, skilled and confident will shape a more stable and secure future and this is the basis for creating a greener society. Therefore, educational institutions must provide an experience that needs to be acquired and mastered to improve the skills of an individual [32], [26]. An accurate method is to place green skills as a core module in which green skills need to be included in as an integrated or alone (stand-alone) in the curriculum. However, despite the fact that environmental education across the curriculum is carried out for a long time, environmental awareness is still at a low level [33].

Green growth is the growth of the use of resources in an efficient, clean and sustainable way. Strong commitment for green growth will ensure that the environment and natural resources of the country are preserved and protected for present and future generations [11], [34]. As in the strategic plan of the first transformation of vocational education; to provide vocational education curriculum that can produce skilled human capital to work and is willing to pursue higher education. Thus, transformation of vocational education curriculum should be carried out [15]. Meanwhile in the 11th Malaysia Plan in the fifth strategy recorded that the fertilizing of green technology culture among students is a necessary beginning of each level through the development of an effective system of syllabus. Therefore, it is very convenient for green skills and green technology to be fostered from an early stage in primary school education before students into secondary schools. Where the green values should have already been synonymous with the student so that when they move into the higher education they will be able to apply skills-green and green technology in producing a product and carry out the activities of skills according to their skills and knowledge before taking into account the aspects of green growth [35], [34], [36].

As the Government's efforts to implement green technology should be viewed from two components which are innovation through design or develop green technology. Producing and designing simple products, environmentally friendly and practical for our country, by encouraging students from the school level to create something. At higher levels, as the researchers we can produce technology that can produce a product without wasting resources such as energy and water. The new design should be practical designs that can be commercialized for local consumption and for export.

VIII. COMMUNITY PRACTICES

Users are encouraged to use and apply green technology, whether in carrying out the work process or practice of everyday life. Society should adopt green practices as much as possible, starting with the simple things that we can do. For example, we can bring water in a container without buying bottles of water. If we buy food to take back to the house, lets use our own containers instead of using styrofoam or plastic containers that are not environmentally friendly. Also, bring your own bags when shopping. Users should also give priority to the purchase of energy-efficient electrical equipment types by using energy-efficient lighting. Therefore, it will save energy even though the price of energy efficient appliances are more expensive than conventional equipment, but saving energy is abundant and less detrimental to the environment. Communities are encouraged to adopt green practices as a way of life [37]. Parents should set a good example to children so that they will be compelled to adopt green lifestyle changes. In reality culture and mindset change will be moving towards green technology and practice. Small changes we make today will have a major impact in the future.

Among others in the 11th Malaysia Plan (2016-2020) fourth strategy states about the implementation of the strategy of green growth to increase the sustainability and durability. Over 40 per cent of total employment will consist of skilled workers in 2030 (35%) by increasing awareness to realize the sharing of responsibility. By managing the overall waste where 22% of the recycling rate comes from households. The outcome of the implementation of green technologies in this growth will reduce energy consumption that can not be

reused and re-use energy that can be recycled [38]. Green growth strategy can improve the quality of growth, strengthen food security, water and energy while reducing environmental risks and ecological destruction. This strategy will be to improve the quality of life and welfare of the people when it can reduce greenhouse gas emissions and conserve ecosystems [39], [40]. For the success of the promotion of the development of green technology effective promotion to create awareness among young people, the public, the public is important which requires a change in thinking through the dissemination of information through a comprehensive program [41]. The media, non-governmental organizations, in particular school administrators need to actively promote green technology. Industries that use or develop the product in relation to green technologies can provide employment opportunities for local communities. Industry is also exploring opportunities to export 'green' products that have been produced [42]. The market for green technologies and products is very large, especially in the sector of renewable energy or renewable energy.

IX. ENCOURAGEMENT OF NEW ENERGY SOURCES AND IMPROVING EXISTING AS AN ALTERNATIVE RENEWABLE TECHNOLOGIES TO MEET THE GOALS OF THE NATIONAL GREEN TECHNOLOGY POLICY

Green technology policy is to 1) reduce the growth of energy consumption and promote economic development; 2) the growth of the Green Technology industry and enhance its contribution to the national economy; 3) increase the capacity of innovation in the development of green technology and improve competitiveness in Green Technology at an international level; 4) ensure sustainable development and preserve the environment for future generations; 5) improve education and general public awareness on Green Technology and encourage the widespread adoption of green technology.

For energy efficiency and renewable energy, the Government has introduced various fiscal incentives since 2003 for companies which generate electricity from sources of renewable energy or Renewable Energy (RE) and companies practicing activities Energy Saving Energy Efficiency (EE) where they are eligible for the Investment Tax exemption (Investment Tax Allowance) and the Status of Pioneer (Pioneer Status) [43]. These companies can also apply for an exemption of import duty and sales tax for a period of one year for machinery, equipment, materials and spare parts imports were used directly in the generation of electricity from RE and EE activities. These incentives have been improved under the 2009 Budget in which exceptions may be granted for:

1) import duty and sales tax on solar system equipment for the use of third parties is given to importers including photo-voltaic service providers approved by ST.
2) A sales tax exemption for the purchase of solar heating system equipment from local manufacturers.
3) Exemption of import duty and sales tax exemption be is given on EE equipment such as energy-efficient motor (high efficiency motors) and insulation material (insulation material) is given to importers including authorized agents approved by ST.
4) ales tax exemptions granted to purchase EE consumer goods approved by ST such as insulation materials, domestic refrigerators, ballasts for fluorescent lighting, domestic fans, lights and air conditioning.

The government should provide favorable policies to promote green technologies. The private sector, professionals and researchers must work together to create and commercialize green technologies [44]. At the same time the government has also started conducting awareness programs on Energy Efficiency and Renewable Energy which is one of the branches of green technology since 2000 through the establishment of the Center for Education, Training and Research in Renewable Energy and Energy Efficiency (CETREE) University Science Malaysia [45]. These programs are targeted at professionals, schools, higher education institutions and the public in Malaysia. Among the programs implemented by CETREE Fair Campaign is the Energy Conservation & Environment and Energy efficient campaign in University Science Malaysia, Eureka Tournament, Solar car and solar kitchen, National Science and Technology Education and others. In addition, the module has also developed CETREE Renewable Energy and Energy Efficiency Across the Curriculum for Primary Schools throughout the country to raise awareness of school children at an early stage in the Renewable Energy and Energy Efficiency [46].

In addition, the Ministry is also implementing the National Energy Month program annually to raise awareness about renewable energy and promote energy efficiency practices among the public and private sectors. Among the activities carried out during Energy Month program is holding lectures on energy efficiency, publishes guidebooks Energy Efficiency at Home, published a series of

articles in newspapers and the mass media to promote energy efficiency. In the future, the Ministry will carry out a campaign for Green Technology that will involve stake-holders including the public and the Ministries / Departments of the Government, NGOs and other relevant agencies to educate and increase awareness and knowledge of all parties about the importance of green technology in our lives. This is to ensure other programs that will be implemented by the Government in promoting and developing local green technology can be implemented effectively and appreciated by all walks of life.

X. CONCLUSION

Green skills are elements of value in producing competent students. The skills are required for producing green jobs; knowledge and skills needed to develop a green economy including public awareness about environmental issues and sustainable development of the country. Green skills need to be applied in the school curriculum. The aim in particular is to provide exposure and awareness to the younger generation of the importance of environmental sustainability through education. Green skills are developed through curriculum development, education, training, teaching and learning, and also giving green skills to the technical and vocational education coaches. In addition, developing strategies and green skills is to train the workers in industries and sectors involved. The government has changed the policy in the development of renewable energy and industrial growth related to green technology and green skills. Many other countries have also made green technology as the basis for sustainable development and sustainability of the use of disposable energy.

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