International Journal of Scientific Research & Engineering Trends
Volume 5, Issue 4, Jul-Aug-2019, ISSN (Online): 2395-566X

Environmental Awareness and Education as Reagents for Sustainable Development

Dr. Ekata Singh
Department of Chemistry
Dr. R. M. L. Government Degree College, Aonla, Bareilly, Uttar Pradesh, India

Abstract- Sustainable development needs to adopt a new way to interact with the environment and not only technological advances but also culturally. Environmental awareness and education are major components of this change and it is all to do with ecological literacy, ethical responsibility and sustainability-oriented decisions. This paper provides the background on environmental education and how it is used in higher education and chemistry for a sustainable future. Through the integration of sustainability theories into the curriculum it will enable students to develop a cognitive approach and a behaviour towards environmental protection. Green chemistry is a key source of knowledge in chemical science as it can help reduce pollution and resource use to make chemicals safer. Teaching methods which are concerned with environmental issues (problem-based learning, experiential training, interdisciplinary education and collaboration) are recognised as the best way to link theoretical knowledge with the real-world ecological problems. This research also demonstrates the role universities and research agencies play in the promotion of sustainability through curriculum reform, policy alignment and cooperation. But problems such as lack of uniformity in curriculum, poorly trained teachers and lack of resources continue to prevent the implementation of environmental education in much of the world including in developing countries. The research shows that environmental consciousness and education are the key sources of sustainable development and they are the drivers of ethical citizenship and work ethics. Systems-based education and interdisciplinary integration, as a result, are the key to solving the environmental challenges and achieving sustainability goals long term.

Keywords- Environmental awareness; Environmental education; Sustainable development; Environmental literacy; Green chemistry; Higher education.

I. INTRODUCTION

The global pursuit of sustainable development is therefore increasingly dependent on society's collective consciousness, knowledge and behaviour change. Fast industrialization, urbanization and unsustainable consumption have exacerbated environmental problems including climate change, biodiversity loss, pollution and depletion of resources. Technological solutions are not enough, but the human perception of and interaction with the environment has to be changed. So environmental awareness and education are now the essential tools to help achieve that change and enable people and communities to participate in sustainability goals (Lozano 2013; Sterling 2011). It is a holistic and interdisciplinary approach that brings environmental, economic, and social aspects of sustainability together. It is not limited to the sharing of ecological knowledge but also critical thinking, problem-solving and value-based thinking skills. ESD is designed to support people in dealing with complex environmental issues while simultaneously keeping development and ecological integrity as their top priorities.

Effective environmental education, according to current research, is to build the awareness, attitude, skills and to actively engage in sustainable practices (Tilbury, 2011; Wals, 2012). Higher education institutions are central to ESD and are responsible for knowledge generation, innovation and societal change. Universities will be the ones to influence future leaders, professionals and policymakers in the future by embedding these principles into education and research. Sustainability in all disciplines enhances the awareness that students have about environmental problems and promotes pro-environmental behavior (Lozano et al., 2009; Lozano et al., 2014). Science-based disciplines such as chemistry have become a topic of sustainability as the community has adopted green chemistry practices in order to prevent pollution, atom economy, safer chemical synthesis, and energy efficiency.

© 2019 IJSRET

Such approaches are practical solutions for reducing the environmental footprint of industrial and laboratory processes, while supporting scientific innovation and environmental education (Burmeister et al., 2012). More recent research supports the need for pedagogical innovations that improve environmental education. Problem-based learning, inquiry-based learning and experiential learning have been shown to enhance student engagement and apply knowledge from theoretical research to real-world environmental problems. Community-based learning and participatory processes contribute to bridging the gap between the information we have in our own academic field and the community and give students a sense of responsibility and citizenship (Sterling, 2011; Lozano, 2013).

In addition, interdisciplinary education is becoming more and more significant to combat the many dimensions of sustainability issues as it allows for the integration of scientific, social and ethical perspectives (Wals, 2012). Despite the great progress in environmental education and ESD, there are still many issues to be addressed in such areas as fragmented curriculum implementation, lack of uniform frameworks, poor faculty training, and not enough institutional support especially in developing countries. There is also a lack of knowledge and action, and knowledge is not always followed by sustainable behaviour.

The solution to these challenges needs to be integrated by institutions, national and global levels such as policy change, capacity building and embedding sustainability in accreditation and evaluation systems (Tilbury, 2011; Lozano et al., 2014). In this context, the present study focuses on the role of environmental awareness and education as driving forces for sustainable development and how these can be integrated in educational systems such as chemistry and science as a whole, and on the role of sustainability in higher education. Based on the previous literature and lessons learned from it, the paper aims to highlight the strategies that are effective, place the gaps and identify ways for a better environmental education system which will be able to sustain sustainability in the future.

II. ROLE OF HIGHER EDUCATION IN PROMOTING ENVIRONMENTAL AWARENESS AND SUSTAINABLE DEVELOPMENT

Higher education institutions (HEIs) are the focal point in the development of environmental awareness and sustainable development as their educational infrastructure is at the heart of knowledge generation, skills and change in society. Universities not only provide education but also have a role to play in the social and ethical values of the future generations and how they are going to regard the environment. HEIs have emerged as a central player in the global sustainability crisis and in the education sector in promoting environmental awareness and sustainable practices in many aspects of the world (Cortese, 2005; UNESCO, 2005). The higher education community has such a strong role in the integration of sustainability into educational programs. ESD within education programs allows students to build critical thinking, systems thinking and problem-solving skills for a multi-dimensional world with the need for environmental knowledge and knowledge about each environment (Barth et al., 2007; Lambrechts et al., 2013). These interdisciplinary approaches are particularly relevant as sustainability issues are beyond the boundaries of the conventional subject areas and must be addressed from the scientific, social and ethical perspective (Scott & Gough, 2007; Jickling & Wals, 2008).

This curriculum change will ensure graduates not only have technical experience, but also the full holistic knowledge of sustainability. For science-based areas such as chemistry, higher education is crucial to sustainable practices and green chemistry principles are the core of education in a way that promotes environmental practices that are sustainable. They are based on pollution prevention and resource efficiency and design of environmentally benign processes in the laboratory and can help to balance scientific innovation with sustainability objectives (Burmeister et al., 2012; Eilks & Rauch, 2012). By integrating these ideas into laboratory practice and the course material in universities we can bridge the gap between theoretical knowledge and actual environmental use and students have an integral role in supporting sustainable industrial and research practice.

Higher education institutions are not only producers of curriculum but also agents of behavioral change by promoting environmental awareness and responsible behaviour among students. As behavioral theories argue, awareness alone is not sufficient to drive positive behaviour; positive attitudes, social norms and a positive environment are all needed (Ajzen, 2005; Kollmuss & Agyeman, 2005). HEIs can do so by creating learning environments that encourage the environment and that students are engaged in and take part in sustainability efforts. These are the things that would make students want to be involved in eco-friendly behavior (Holbrook, 2010; Sterling, 2011). Higher education institutions are also driving sustainability with their research and innovation.

Universities are at the heart of new technologies, policies and approaches to solving environmental problems. Research on renewable energy, waste management and sustainable agriculture is not only a basis of scientific knowledge but also policy and practice for the local, national and global level (Lozano et al., 2014; Lozano et al., 2015). Research and policy can be more sustainable when they are shared by academia, industry and government. Higher education at the institutional

© 2019 IJSRET

level has to do all of its sustainability work. Universities are making sustainability declarations and policies and campus-wide projects to reduce their environmental footprint and to encourage ecological practices (Lozano et al., 2014).

Examples include energy conservation, waste reduction, sustainable procurement and green campus development. HEIs are living laboratories for practical sustainability practice, so they create this kind of lab model in the real world (Lozano, 2013). While these are welcome developments, we have encountered some barriers for sustainability in higher education. These include limited faculty training, lack of coordination of interdisciplinary work, and an absence of institutional support. Also, the knowledge from theory is not translated into practice in sustainability (Tilbury, 2011; Wals, 2012). To overcome these issues, we need systemic changes: curriculum reform, capacity building and policy support at institutional and governmental levels (Hopkins & McKeown, 2014).

III. THEORETICAL CONTEXT OF ENVIRONMENTAL AWARENESS AND SUSTAINABLE DEVELOPMENT

A clear concept of the transition from environmental awareness to sustainable development is critical to understanding the way knowledge is converted into action. Environmental awareness is extremely important but does not lead to sustainable action; it is cognitive and psychological processes and a pathway which determines individual and collective actions. This is a continuum with awareness to understanding to attitude → behavior → sustainability and so on, and each stage is very important for future environmental targets (Kollmuss & Agyeman, 2005; Palmer, 2009). Environmental awareness is the knowledge and understanding of environmental issues and how to overcome them, the consequences and solutions. It is the cognitive basis for attitudes that develop.

But awareness is not enough to change behavior, because people may have knowledge but not actually do anything about the world (Kollmuss & Agyeman, 2005). The gap between awareness and action is well established and is often explained by psychological, social, and contextual factors (Kollmuss & Agyeman, 2005). Attitudes are the evaluative part of environmental awareness and are an individual's attitude towards environmental issues, beliefs, and emotions. Positive environmental attitudes are an important factor in motivating people to take positive environmental actions. Educational activities (especially for higher education) are a key factor to foster these attitudes by promoting critical thinking and ethical thinking and to create environmental responsibility (Sterling, 2011; Tilbury, 2011).

The development of such attitudes is reinforced by interdisciplinary learning and experiential education that link theory and practice to environmental issues. Behavior, the next stage of the approach, is the real actions people or organizations take to minimize environmental impact. These may mean making their waste less trashy, conserving energy wisely, and even taking part in environmental conservation projects. Attitudes and behavior are influenced by social norms, perceived control, economic constraints, and institutional support (Ajzen, 2005). As such, good environmental education should have to do with both knowledge and attitudes but also the environment in which behavior change is not possible.

The relationship between awareness, attitude, and behavior is explained in detail through the Theory of Planned Behavior, which is a commonly accepted model for predicting and understanding people's behavior. According to this theory, behavior is determined by the intention of the individual and thus through three key factors: attitudes to behavior, the personal norms, and the perception of behavioral control (Ajzen, 2005). In the context of environmental sustainability, it means that people are more likely to behave in the environment when they have positive attitudes, social support for their action, and that they feel they can do the actions. Sustainability outcomes are the cumulative influence of environmentally responsible behavior at individual, institutional, and societal levels. Larger environmental losses, conservation of natural resources, and ecological balance are the results. Higher education institutions are at the forefront of these outcomes by promoting environmental awareness, attitudes, and sustainable behavior through curriculum integration, research, and campus initiatives (Cortese, 2005; Lozano et al., 2014). In addition, integrating sustainability skills into education increases the capacity of people to contribute more meaningfully towards sustainable development (Barth et al., 2007; Lambrechts et al., 2013).

Table 1: The differences between traditional and sustainability-integrated curricula are summarized

Aspect	Traditional Curriculum	Sustainability-Integrated Curriculum
Primary Focus	Subject-specific knowledge and content mastery	Holistic understanding of environmental, social, and economic sustainability
Approach to Learning	Teacher-centered, lecture-based	Student-centered, participatory, and experiential learning
Curriculum Structure	Discipline-specific and fragmented	Interdisciplinary and integrated across subjects

© 2019 IJSRET

Learning Objectives	Knowledge acquisition and examination performance	Development of sustainability competencies (critical thinking, systems thinking, problem-solving)
Teaching Methods	Conventional lectures and rote learning	Problem-based learning, project-based learning, and field-based experiences
Role of Students	Passive recipients of information	Active participants and co-creators of knowledge
Assessment Methods	Exams focused on memorization	Continuous assessment, projects, real-world problem solving
Environmental Perspective	Limited or optional inclusion of environmental topics	Core integration of environmental awareness and sustainability principles
Skill Development	Emphasis on theoretical knowledge	Emphasis on practical skills, ethical reasoning, and decision-making
Connection to Real-world Issues	Weak linkage to real-life problems	Strong linkage to real-world environmental and societal challenges
Behavioral Impact	Minimal influence on attitudes and behavior	Promotes pro-environmental attitudes and behavioral change
Role of Institutions	Knowledge providers	Change agents promoting sustainability in education and practice
Use of Technology	Limited and traditional	Use of digital tools, simulations, and sustainability-focused technologies
Long-term Outcome	Academic achievement	Sustainable mindset, responsible citizenship, and societal impact

Other educational frameworks provide evidence for transformative learning and the connection between awareness and action of people and the concept of planned behavior as well. Transformative learning methods ask learners to critically examine their values and assumptions which in turn promote deeper behavioral change and long-term commitment to sustainability (Sterling, 2011). Such approaches are evidence of a need for participatory, experiential and interdisciplinary learning beyond traditional knowledge transmission.

IV. ENVIRONMENTAL AWARENESS AND BEHAVIORAL CHANGE

Environmental awareness is an important aspect of sustainable development but its effectiveness is determined by its ability to affect behavior. People may have an intimate knowledge of environmental issues but it doesn't always translate into tangible actions that are pro-environmentally appropriate. This is also referred to as the "value-action gap" and is the result of human behavior differences and awareness-based strategies are limited (Kollmuss & Agyeman, 2005; Palmer, 2009). Environmental awareness influences behavior in that it shapes perceptions, beliefs, and attitudes towards the environment. Awareness and greater awareness help people see what bad habits are doing and therefore to feel responsible and ethical towards the environment and thus the responsibility of environmental protection. Educational programs (especially in higher education) facilitate this awareness by including sustainability topics in the curriculum and encouraging critical thinking (Tilbury, 2011; Sterling, 2011).

Awareness is important but must be accompanied by supportive psychological and contextual factors to drive behavior change. Behavioral change is a multi-dimensional process involving both internal and external factors. Internal factors are attitudes, values, motivation, and personal norms and external factors are social norms, culture, economic conditions, and institutional frameworks. According to the Theory of Planned Behaviour, behavior is influenced by our attitudes toward behavior, subjective norms, and how we feel about it, that is the behavior (Ajzen, 2005). The Theory of Planned Behaviour explains that people are more likely to take environmentally responsible behavior if they are socially acceptable and socially supported and feel that their actions are within their ability to do so. But there are barriers to sustainable behavior in the environment despite the increasing awareness of environmental issues: limited resources and access to sustainable alternatives, habit and socioeconomic environment. People might know the benefits of reducing plastic and energy consumption but opt to do that without resources and technology or infrastructure for them.

This disconnect between awareness and action means that behavior change is not an issue of knowledge but of support and conditions (Kollmuss & Agyeman, 2005). Educational methods can help fill the gap and enhance cognitive and affective engagement which are needed to work on both the

© 2019 IJSRET

social and environmental level. Experiential learning, problem solving and community-oriented approaches are found to be beneficial in real-world applications of environmental knowledge (Holbrook, 2010). All of these focus on active participation and reflection and development of practical skills to drive long-term behavioral change. Interdisciplinary education also allows for an understanding of the interrelation of the environmental, social and economic systems to give rise to integrated and informed decision making more clearly and concretely (Scott & Gough, 2007).

Higher education institutions are also very relevant to behavioral change and climate change is encouraged. Students are encouraged to take part in environmentally friendly practices on campus through waste management programs, energy conservation systems for students and sustainable transportation systems that are not just a supplement to theoretical learning but also encourage sustainable behaviors and lifestyles (Lozano et al., 2014; Lambrechts et al., 2013). Social and cultural factors have a huge influence on environmental behavior. Peer influence, societal expectations and cultural norms can affect or hinder the adoption of sustainable practices. Educational institutions can use social and cultural factors to create a culture of learning together and in the environment and a culture that is sustainable on campus based on student learning and campus culture. Such efforts build a social environment in which people would take and maintain positive environmental practices.

V. INTEGRATION OF SUSTAINABILITY IN CURRICULUM

Sustainability must be integrated into education because it is the key to achieving long-term environmental, social, and economic goals. As issues like climate change, resource depletion, and environmental degradation become more prevalent, we need to integrate sustainability into educational systems. Higher education institutions (HEIs) play an important role in this as they provide learners with the skills and values to respond to many sustainability issues (Cortese, 2005; UNESCO, 2005). Education for Sustainable Development (ESD) is a multiparty approach to learning that incorporates environmental, economic, and social aspects of sustainability. Today's education systems do not teach sustainability as a separate subject, but it is integrated into the curriculum as students learn about global issues and are able to see how they are interrelated with each other (Huckle & Sterling, 2005; Scott & Gough, 2007).

This integration promotes systems thinking and can help students to think about problems from several angles, which is necessary for sustainable solutions. One of the most important aspects of curriculum integration is the development of sustainability skills (Barth et al., 2007; Lambrechts et al., 2013). By integrating these skills into courses, students are not only made aware of environmental issues but also can use them in working and life situations. This competency-based approach is in line with the overall goals of sustainable development and it prepares graduates to be change agents in society. In science, particularly chemistry, sustainability was incorporated with green chemistry principles.

Green chemistry promotes friendly chemical processes, waste reduction, and resource usage which are in line with scientific education goals for sustainable education (Burmeister et al., 2012; Eilks & Rauch, 2012). By incorporating green chemistry into the curriculum and teaching, students can understand the environmental impact of chemical processes and create positive innovations in chemistry. Pedagogical and teaching strategies are equally important for incorporating sustainability into the curriculum. The traditional lecture-based approach is being augmented by a range of hands-on and experiential learning methods (problem-based learning, project-based learning, community engagement, and networking). These methods help students participate and apply knowledge from the theoretical space to real-world problems (Holbrook, 2010).

Experiential learning, in particular, allows students to be engaged in environmental problems, thereby enriching knowledge and fostering long-term behavior change. There is a need for interdisciplinary and transdisciplinary approaches to sustainability. The knowledge gained from academic subjects (e.g., environmental science, economics, sociology, and engineering) is of great importance if we want to understand sustainability in all aspects and be able to address issues (Jickling & Wals, 2008). Also, alliances with universities, industries and communities build a basis for sustainability education in the real world to be relevant and impactful. But there are barriers to embedding sustainability in curricula—rigid disciplinary boundaries, poor faculty training, a lack of institutional support and little to no resources. In many cases, sustainability programs are scattered or limited to specific courses and do not fit in programs (Tilbury, 2011; Wals, 2012). Institutional resolve is required; curricula need to be updated; and sustainability education needs to be a model at universities. Universities will have to make sustainability the case and training and teaching ethical and effective in their own way. Campus practices like energy conservation, waste management, and sustainable infrastructure provide practical learning and support sustainability in education (Lozano et al., 2014; Lozano et al., 2015). These "living laboratory" approaches supplement experiential learning and demonstrate that sustainable practices are possible in practice.

VI. GREEN CHEMISTRY AS A DEVICE FOR SUSTAINABLE DEVELOPMENT

© 2019 IJSRET

The environmental impact of industrialisation and chemical processes has resulted in a call for sustainable approaches in chemical science. Green chemistry has emerged as a radical approach that has been introduced to educate chemical students and practice in line with sustainable development principles. Green chemistry aims to develop products and processes to minimize the production and consumption of harmful substances to minimize pollution from the environment and to provide resource efficiency in the process (Burmeister et al., 2012; Eilks & Rauch, 2012). At its core, green chemistry is governed by a set of principles such as waste avoidance, atom economy, energy efficiency, renewable feedstocks, and safer chemicals.

Not only are these principles to address environmental issues, they also contribute to economic and social sustainability where they cut costs, enhance safety, and make processes more efficient. Green chemistry is not only a step away from pollution control techniques, but a proactive and preventive approach that is essential to pursue long-term sustainability goals. Green chemistry is a natural part of learning about the environment and sustainable practices of students (Burmeister et al., 2012). Green chemistry in education is also important to ensure and to provide students with the knowledge to develop environmentally friendly technologies. To do that, the curriculum must be integrated into the curriculum and the students must understand and apply green chemistry to a product. Many laboratory experiments are performed with hazardous chemicals and produce huge waste.

If we redesign laboratory protocols and reagents, microscale experiments, and waste management practices in schools so they can be as safe and sustainable as possible, we can reduce the environmental impact, as well as enhance student learning experiences. And these practices are based on theory, but also teach students sustainability. Green chemistry not only promotes clean processes and reduces the environmental impact of chemical products but also helps to promote the green economy of the industry. With the green chemistry approach, companies have seen increased productivity and less waste production and less energy consumption. In this way, green chemistry contributes to sustainable development for the betterment of the environment, by balancing growth in the economy and environmental protection (Lozano et al., 2013). Green chemistry promotes innovation in the development of new materials and manufacturing processes which are both environmentally friendly and economically viable as well.

Green chemistry is not just related to the environment but also to social and ethical aspects. In reducing toxic chemicals and reducing environmental risks, green chemistry reduces public health and safety and is an important part of sustainable development objectives, as is being advocated by global organisations like UNESCO (2005). Despite this potential, green chemistry is not yet widely adopted in an effective way. Green chemistry has a lot of challenges, such as awareness among teachers and industry professionals, lack of resources to develop curriculum, and the resistance to change from conventional methods that are present in schools and industry, and the need for a more concerted effort by academia, industry, and policymakers to create a more integrated ecosystem to make green chemistry work (Tilbury, 2011). And to do so, we need more capacity building, policy support, and educational materials for green chemistry in chemical sciences to promote sustainability and make it more sustainable.

VII. CHALLENGES IN ENVIRONMENTAL EDUCATION

As environmental education is more and more recognised as a vital part of sustainable development, its implementation has been difficult in much of structural, pedagogical and socio-cultural aspects. With the progress made with the inclusion of sustainability in education, there is still a gap between policy intentions and implementation. This is where environmental education needs to be changed to be a real change in practice and change in behaviour that yields sustainable outcomes. One of the major challenges is that sustainability has been broken into a series of courses in education. In many education systems, environmental education is a very isolated subject and is not a part of an entire curriculum. The compartmentalized approach has negative consequences for students as they realise the interconnected nature of environmental, social and economic systems (Tilbury, 2011; Wals, 2012). These rigid disciplinary boundaries also hinder the interdisciplinary collaboration needed to tackle complex sustainability issues (Jickling & Wals, 2008).

The lack of trained teachers is yet another major issue for sustainable education. Sustainable education is not only about knowledge of sustainability-related concepts, but also about new pedagogical concepts such as experiential learning, problem-based learning and interdisciplinary learning (Hopkins & McKeown, 2014). But there is so little development and resources for teachers to implement these learning strategies. Such limitations often lead to traditional lecture-based teaching methods that are not challenging for students in terms of critical thinking. The gap between awareness and action is also referred to as the “value-action gap” which is a big problem. Students can learn about environmental issues, but that doesn’t always translate to pro-environmental behaviour. Social norms, economic pressures, lack of infrastructure and habitual behavior have made it difficult for people to change behavior (Kollmuss & Agyeman, 2005).

© 2019 IJSRET

So education methods need to do more than just pass on information and also provide information that can be used to influence attitudes, motivations and context. Because of the institutional and infrastructural limitations of environmental education, the situation is more than just poor resources, poor teaching equipment and little laboratory or field-based learning in many institutions. In administration, sustainability efforts are often not prioritized and poorly organized (Lozano et al., 2014). Environmental education programs are not implemented and continue to be unsustainable without institutional support. Lack of a formal and objective framework and evaluation mechanism also makes sustainability in education even more difficult. There is little guidance on how sustainability can be incorporated in the curriculum and few tools to evaluate students' competence in that area.

The success of environmental education in schools is therefore not easy to predict and consistent across institutions (Tilbury, 2011). There are also socio-cultural factors that affect environmental education. Environmental issues have to do with cultural beliefs, society as a whole, and people's interest in sustainable practices as well as economic interests and people's cultural beliefs. In some cases, the economic needs are the first priority and environmental concerns are secondary and therefore, education interventions are less important (Huckle & Sterling, 2005). To tackle these challenges we must be culturally relevant to sustainability at a local level. Technology is evolving so quickly that it is not just making environmental education difficult, but it is creating opportunities. While digital tools and online platforms are a boon for access to information and innovative learning methods in many countries, digital infrastructure and digital literacy are not always available in all countries. And it is important that people in all countries have access to these technologies so that they can contribute to environmental awareness in a better way (Holbrook, 2010).

VIII. FUTURE PERSPECTIVES AND INNOVATIONS

Environmental education needs to evolve as environmental issues become more pressing on a local and global level as well as more relevant, adaptable and impactful. Some of the trends that will be the focus in environmental education and what we need to be doing as we are coming to a technological thinking, multi-disciplinary world and we are thinking at the next level. Advancing environmental education is about a future that incorporates technology, pedagogy, and sustainability in education and is possible. In environmental education we need to see new technologies coming from digital and technological space. Virtual laboratories, simulation models such as geographic information systems (GIS), online learning platforms are all the new tools to enhance student learning and access.

These technologies can help people visualize complex environmental processes, process real-time data and engage in hands-on learning experiences with the environment in order to better understand the environment (Holbrook, 2010). But open access to digital resources is also necessary for digital tools to be available for students and can be used in a much more effective manner. Sustainability is also a subject of interdisciplinary and transdisciplinary education. In the future sustainability challenges are very complex and need to be worked on outside of the boundaries of discipline. Natural sciences, social sciences and humanities knowledge that are integrated in environmental education is also a way to gain a better understanding of the environmental problems and problem-solving skills (Jickling & Wals, 2008).

Building on these relationships with academia, industry, government and communities will increase the practical relevance and social and cultural importance of environmental education. Transformative learning will also play a significant role in environmental education in the future. Education and change and society away from the knowledge-based mode of doing things is not about knowledge, it is about critical reflection and active involvement. This is to break with current paradigms and to live more sustainable lives (Sterling, 2011).Transforming learning practice within curricula can help to bridge the gap between awareness and action, and lead to long-term behavior changes in learners.

In addition, sustainability competencies will be a priority to develop in the future education system as well. Systems thinking, anticipatory skills, and planning for the future in a context of complex sustainability challenges, such as systems thinking, planning strategy, and collaboration are crucial in solving such complex ecological problems (Barth et al., 2007; Lambrechts et al., 2013). Educational institutions need to develop curricula to provide the framework of knowledge and skills that implement these and to provide the students with opportunities to apply these competencies into their day-to-day life situations and experiences. Sustainable campuses and "living laboratories" in higher education are also an important development in higher education. Universities are increasingly turning to sustainability practices in their campuses (for example, energy efficiency, waste management, water conservation, and sustainable infrastructure).

The activities are practical and allow students to practice sustainability and build on what we have been taught about sustainability in theory (Lozano et al., 2014; Lozano et al., 2015). Such practices also demonstrate institutional commitment to sustainability and how society can be changed. Global collaboration and policy integration will also inform the future of environmental education. UNESCO, for example, argues for Education for Sustainable Development (ESD) to achieve the global sustainability goals. Policy frameworks,

© 2019 IJSRET

funding mechanisms, and international cooperation are important to develop sustainable education (UNESCO, 2005; Tilbury, 2011). Green chemistry and sustainable science practices will continue to be promoted in education and research in order to foster innovation in sustainability.

Green technology and sustainable solutions may reduce the ecological footprint of scientific and industrial activities (Burmeister et al., 2012; Eilks & Rauch, 2012). Research and innovation in these directions will be needed to find sustainable solutions to the current environmental challenges. But we shouldn't expect the future to be without problems. Resources are scarce, teachers are not trained, and education is not available. Building institutional capacity, developing leadership, and engaging the community will be crucial to overcoming these barriers and the successful implementation of innovative approaches (Hopkins & McKeown, 2014).

IX. CONCLUSION

Indeed, the findings show that environmental awareness and education are core to sustainable development, not just in the context of a sustainable society but the basis of it. Global environmental issues are more and more serious and harder to address and thus the urgent need for a more educated, responsible and action-oriented society is more vital. What we have shown in this paper is that the path from awareness to sustainability is complex and interdependent and that it is attitudes, behaviors and institutional frameworks that determine success. Awareness is the cognitive platform but it is values, skills and context that are what make sustainable behavior work. The main result of this research is that higher education institutions have a great influence on sustainability thinking and practice.

With curriculum combined with international studies, and the promotion of knowledge about sustainability, universities will develop leaders who will be able to respond positively to environmental challenges in the future. Green chemistry and other methods make education relevant in real life and science, and can be used to bring sustainability into science, education and work. But there's still so much more that is making environmental education less effective: fragmented curriculum, poor teacher education, institutional restrictions and a gap of knowledge and action. They show that education cannot lead to sustainable development unless there is institutional change and policy change and socio-economic change. That is a combination of knowledge sharing and changing behavior and culture.The future of environmental education is about innovation and cooperation. Digital technologies, transformational learning, and interdisciplinary frameworks are the foundation of its development and it is well-positioned to enhance the impact of the education world. And global initiatives like UNESCO and others in the environment and education such as Education for Sustainable Development (ESD) are also a tool of sustainability at local and global levels and have to be taken forward as a strategy.

REFERENCES

1. Ajzen, I. (2005). Attitudes, personality, and behavior (2nd ed.). Open University Press.
2. Barth, M., Godemann, J., Rieckmann, M., & Stoltenberg, U. (2007). Developing key competencies for sustainable development. International Journal of Sustainability in Higher Education, 8(4), 416–430.
3. Burmeister, M., Rauch, F., & Eilks, I. (2012). Education for sustainable development (ESD) and chemistry education. Chemistry Education Research and Practice, 13(2), 59–68. https://doi.org/10.1039/C1RP90060A
4. Cortese, A. D. (2003/2005 reprint). The critical role of higher education in creating a sustainable future. Planning for Higher Education, 31(3), 15–22.
5. Eilks, I., & Rauch, F. (2012). Sustainable development and green chemistry in chemistry education. Chemistry Education Research and Practice, 13, 57–58.
6. Holbrook, J. (2010). Education through science as a motivational innovation for science education. Science Education International, 21(2), 80–91.
7. Hopkins, C., & McKeown, R. (2014). Education for sustainable development: An international perspective. In Handbook of education for sustainable development.
8. Huckle, J., & Sterling, S. (2005). Education for sustainability. Earthscan.
9. Jickling, B., & Wals, A. E. J. (2008). Globalization and environmental education. Journal of Curriculum Studies, 40(1), 1–21.
10. Kollmuss, A., & Agyeman, J. (2002/2005 widely cited). Mind the gap: Why do people act environmentally? Environmental Education Research, 8(3), 239–260.
11. Lambrechts, W., Mulà, I., Ceulemans, K., Molderez, I., & Gaeremynck, V. (2013). The integration of competences for sustainable development in higher education. Journal of Cleaner Production, 48, 65–73.
12. Lozano, R. (2013). Are companies planning their organisational changes for corporate sustainability? Journal of Cleaner Production, 48, 275–284. https://doi.org/10.1016/j.jclepro.2013.01.038
13. Lozano, R., Ceulemans, K., & Seatter, C. S. (2015). Teaching organisational change management for sustainability. Journal of Cleaner Production, 106, 205–215. https://doi.org/10.1016/j.jclepro.2014.03.031
14. Lozano, R., Lukman, R., Lozano, F. J., Huisingh, D., & Lambrechts, W. (2014). Declarations for sustainability in higher education. Journal of Cleaner Production, 48, 10–19. https://doi.org/10.1016/j.jclepro.2011.10.006

© 2019 IJSRET

15. Palmer, J. A. (2009). Environmental education in the 21st century: Theory, practice, progress and promise. Routledge.
16. Scott, W., & Gough, S. (2007). Sustainable development within education: Principles and practice. Routledge.
17. Sterling, S. (2011). Transformative learning and sustainability: Sketching the conceptual ground. University of Plymouth.
18. Tilbury, D. (2011). Education for sustainable development: An expert review of processes and learning. UNESCO.
19. UNESCO. (2005). United Nations Decade of Education for Sustainable Development (2005–2014): International implementation scheme. UNESCO.
20. Wals, A. E. J. (2012). Shaping the education of tomorrow. UNESCO.

© 2019 IJSRET