A STUDY ON GREEN CHEMISTRY AND AWARENESS ON ITS ENVIRONMENTAL USES

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ABSTRACT

In this qualitative research, we wish to explore acceptable pedagogical methods for education and learning in green chemistry for students and teachers by investigating the teaching technique for promoting Green Chemistry education and supporting green chemical education (GCL). Since 2000, 45 papers have been discovered in pairs of scientific journals specifically describing GCE teaching methodologies. The papers were appraised on the basis of the categories of instructional strategies used and the revised version of the Bloom taxonomy. Collaborative, interdisciplinary and problem-based learning was applied in 38 and 35 studies selected. These were the most popular teaching strategies, along with a broad mix of other teaching and teaching strategies. GCL was fostered in 44, 40, 34 and 29 publications by developing collaborative and interdisciplinary learning abilities, means of increasing environmental awareness, problem learning skills and the knowledge of educational systems. The results imply that incorporating Green Chemical Instruction (GCT), for example via sustainable education, has increased GCL via sustainable environmental awareness, behavioural change and cognitive processes.

Keywords: Green Chemistry, Environment, Awareness

INTRODUCTION

Sustainable development has been recognised as an important global priority since the release of Agenda 21 in 1992[1]. Agenda 2030 and its goals for sustainable development have also just been confirmed[2]. Our common future report[3] states that sustainable development meets the expectations of the present without jeopardising the ability of future generations to meet their own expectations. This underlines the long-term component of sustainability and presents justice as an ethical goal for achieving equity among current and future generations[4]. The objectives of sustainable development demand on Chemist, Engineer and Decision-maker[7,9] to undertake responsibility for sustainable solutions and complicated difficulties to tackle environmental and environmental concerns such as "white pollution"[5,6] and "endocrine disruptive chemicals"[7]. However, it is not enough to recognise this concept. Results are equally crucial and values and ideas about the sustainability of green chemistry need to be shared with future chemists. Green Chemistry Education (GCE) is intended primarily to promote and strengthen scientific knowledge and create the essential sustainability skills between present and future generations[11]. However, 25 years after the interdisciplinary development, green chemistry practises are maybe progressive rather than transformative, as the XII Principles [12] do not consider themselves to be a coherent approach for the "such activities" and "how"[13]. According to Anastas, sustainability has nothing to do with green chemists, the curriculum and education of engineers[14]. In addition to minimising waste and danger, the larger societal effects of responsible technological innovation might also be addressed through GCE[15]. It demands an active search for different solutions to societal challenges[16] and the inclusion of further humanistic principles, such as the fair and equitable distribution of benefits based on a minimum of one of the Sustainables Development Goals[17] in order to ensure sustainability in the broadest sense. Rhoten and al.[18] and Klein and Newell[19] understand interdisciplinary education as a way of designing and educating curriculums where teachers are incorporating information and theories from different disciplines to encourage and enhance students' ability to develop new solutions and approaches for current problems. Sadly, inadequate emphasis has so far been focused on integrated teaching techniques to promote sustainable higher education (SE)[20,21]. In this study, sustainable education is described as education based on the principle of sustainability[22]. It must be interdisciplinary, collaborative, transformative and immersive. A typical strategy for integrating a curriculum is to handle a subject or topic by lensing different topics[23]. Interdisciplinary education is a complex psychological and cognitive process[24,25] which does not mean a single process, method or method; different teaching procedures are necessary, depending upon the history, traditions and ways of thinking of each discipline, to foster and support an interdisciplinary learning outcome[24,26].

GREEN CHEMISTRY

The literature study begins with a brief overview of the link between green chemistry and other disciplines in order to promote sustainable development. They next evaluated how green chemistry education is taught and the features of teaching methods that support green chemistry learning. Tripp & Shortlidge defines the idea of 'interdisciplinary science' as follows: Interdisciplinary science is a method that combines expertise/know-how from skilled individuals in two or more areas with distinct ideas, approaches and studies to transcend beyond the boundaries of one topic. Green Chemical is an interdisciplinary science that aims at assuring a sustainable future and promoting collaboration in discovering and implementing practical solutions between life scientists and society scientists. The knowledge and inventiveness of individual scientists in many fields, such as biology, mathematics, engineering and psychology in increasing chemical industries, may contribute in protecting the environment. The first Green Chemistry course was developed at college level by Professor Terry Collins of Carnegie Mellon University. This course was eventually open to graduates and graduates. Themes include clean chemicals, non-toxic chemistry and biotechnology. Sustainability ethics, aside from the linkages between fundamental chemical theories and the real world implications of chemical products and processes, is also important in the curriculum.

SUSTAINABILITY ISSUES

Other major topics include interdisciplinary education and sustainability education. An interdisciplinary Green Chemistry curriculum should be combined with other scientific courses, such as biology and artificial intelligence, and non-scientific topics, such as psychology, entrepreneurship, ethics, legislation, and regulations. The main objective of GCT is to encourage people to accept the concept of sustainable development. The individual plays a vital part in this scenario. Because education should be seen as something more than training, this course attempts to promote students' willingness to study and increase sustainable development attitudes.

When these themes were applied, green chemistry integration with other disciplines was seen as effective solutions to problems addressed by the case studies and lab work in "Real-world". These programmes give a key chance for students to increase their global knowledge and work capabilities.

One of the primary components of interdisciplinary learning is understanding how to teach questions in an interdisciplinary curriculum. Interdisciplinary learning in this subject usually necessitates collaboration because of the nature of the unsustainable issues. The integration of cognitive, social and emotional components might provide interdisciplinary, green chemistry training to increase the awareness of obstacles and obstacles. Typically, interdisciplinary learning also involves the collective experience of reflecting on topics, comparing information in different disciplines, encouraging and preparing to critically examine the impact of integration in key areas of the development of thinking abilities. The aims of students include building their knowledge and understanding of the human world in the area of sustainability, studying decision-making on ethical, social, environmental, economic problems, and learning to act and to respect sustainable thinking. In this context, in addition to sustainability theories, positive psychology may present different approaches to exploring the relation between social values and well-being.

CONCLUSIONS

In sum, we may deduce that GCE integration with natural science, psychology and philosophy may boost GCT and GCL on the basis of our findings and theoretical frameworks. The first is to increase the students' understanding of the linkages between natural and human surroundings by integrating GCE with ecology. Second, the combining of GCE with psychology will help students understand the synthesization and integration of intangible relationships between nature and human well-being. Third, integration of GCE with philosophy may help us reflect on an interdisciplinary perspective of the difficult interlinked situations and get an overview of the connections between the objects.

In addition to incorporating GCE in other areas, systemic thinking approaches and high levels of thought capacity such as syntheses (creativity) and evaluation, need to be enhanced to support, for example, the design of green processes and LCA students in green chemistry. In order to attain learning goals, it is also crucial to increase ICT educational capacities and the digital knowledge of GCE students and instructors, because it is vital that they work with actors outside the university, such as researchers and representatives of other professional groups.

More importantly, developing environmental awareness via green chemistry studies and sustainable development issues for students is essential, since Green Chemistry's key aims are to preserve the environment and reduce pollution. Prosocial behavioural changes in students coming from personal and social responsibility (PTSR) in educating children might play a key role in this respect, since TPSR is one of the greatest models of responsibility, values, and skills in life.

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