



HIGHER-ORDER THINKING SKILLS (HOTS): A PATHWAY TO SUSTAINABILITY AND LIFELONG LEARNING IN STUDENTS

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RESEARCH ARTICLE



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Abstract

In order to meet the current needs of society, the goal of education has shifted from rote memorization to lifelong learning. Our resources are being exploited in the name of progress, which is bad for the future. Education must incorporate sustainability if we are to promote sustainable development. Students who possess higher order thinking abilities may be more sustainable and study throughout their lives. Advanced thinking capabilities, such as the capacity to analyse, evaluate, and create, are referred to as higher order thinking skills. Through a literature review, this research piece aims to investigate higher order thinking skills, sustainability, and lifetime learning. It also analyses how these skills promote progress in the area of sustainability and lifelong learning. The study's findings indicate that HOTS aid sustainability and lifelong learning in students. According to the review, lifelong learning is encouraged and HOTS are required to handle the complexity of sustainability.

Keywords: *Sustainable development, Sustainability, Lifelong learning, Higher order thinking skills*

Introduction

Our environment is degrading day by day. Climate change, air pollution, water pollution, soil degradation, deforestation, and resource depletion are the major concerns which we are facing today. Sustainable development is the need of the current times for our future generation. We can't use our resources blindly; we also need to save it for future generations. The word sustainable development originated from the Earth Summit, also known as the United Nations Conference on Environment Development, in 1992. It was an innovative conference that brought leaders, diplomats, scientists, NGOs and other stakeholders together to address ongoing environmental issues. It's high time to protect our environment. At international and national levels, work is going on for sustainable development. Sustainable development is the development without overuse of resources available so that future generations can use them for their development. Exploiting the environment is not the right way of development. If exploitation of the resources continues, it will make Earth a horrible place to live. For sustainable development we need to sensitise people towards the environment. Education is the best tool for awakening students to protect non-renewable resources and encourage them to shift towards renewable resources for sustainable development. Sustainable development can be achieved through lifelong learning, and lifelong learning can be achieved through higher-order thinking skills.

Learning is the process of recognising the frame of reference that directs our cognition, emotions, and actions, evaluating its suitability while being mindful of its origins, creating newer, more inclusive frames of reference that discriminate against experience (such as the experience of old age), and then acting outside of this context (Laal, 2011). Fischer (2000) defined lifelong learning as a mindset and habit to acquire. He further explained that lifelong learning is more than training; it is not a luxury; it is a need of the present time. Lal & Salamati (2012) said that in this changing world we need lifelong learning to adapt to this change; otherwise, we will be left behind. Lifelong learning requires higher-order thinking skills. Mainali (2012) wrote that higher-order thinking skills are cognitive processes encompass critical, rational, reflective, metacognitive, and creative thinking. They are triggered when people run across unknown issues, doubts, queries, or conundrums. Lewis & Smith (1993) defined Higher order thinking (HOT) which encompasses a range of cognitive skills that go beyond mere recall of information and involve deeper analysis and understanding. It involves using new and existing information to interrelate, rearrange, and extend knowledge to achieve specific goals or address complex problems.

Different authors discussed higher-order thinking skills in different ways. In this paper higher-order thinking skills are discussed as mentioned in Bloom's taxonomy. Higher-order thinking skills mean thinking at an advanced level. Higher-order thinking skills are usually linked with lower-order thinking skills. Students first achieve lower-order thinking, then they move toward higher-order. Bloom's taxonomy has three domains: cognitive, affective, and psychomotor. Within the cognitive realm, there exist six levels: knowledge, comprehension, application, analysis, synthesis, and evaluation. In 2001 Bloom's taxonomy was revised; the six levels became remember, understand, apply, analyse, evaluate and create. Remembering, understanding and applying come under lower-order thinking skills, which usually students are achieving through education. Now, it's time to move forward towards higher-order thinking skills. Higher-order thinking skills include the ability to analyse, evaluate and create.

Review of Literature

As we know the importance of sustainable development, it is important to integrate sustainability in students. Education serves a crucial function in inculcating sustainability through lifelong learning. Students are our next generation and should know their rights. They need to possess a profound comprehension of sustainable development to facilitate their comprehension of the terms resource disparity, economic development and concerns pertaining to the environment. According to the 2030 Agenda for Sustainable Development, lifelong learning is essential to achieving both sustainable development and high-quality education, and higher-order thinking skills are a way through which lifelong learning and sustainability in students can be achieved.

Woo, Mokhtar, Komoo & Azman (2012) explored the curriculum structure and teaching methods to inculcate sustainability in students. The curriculum structure emphasises five key features, which include contextualising, consistency between theory and practical elements, and prospective orientation. Recommended teaching methods include student-centred teaching methods, project-based learning, reflective thinking and research-based learning.

Wals & Keft (2010) discussed education for sustainable education (ESD), explored the content and pedagogical aspects of ESD, its interrelation with other emerging educational paradigms, and its significance within the framework of globalization. The goal of education for sustainable development is to strike a balance between cultural traditions, respect for the environment, and human and economic well-being. ESD encompasses various pedagogical approaches aimed at equipping learners with the knowledge, skills, and values necessary to contribute to a sustainable future.

Tejedor et al. (2022) explained the education for sustainable education in higher education. He said that after higher education, students pursue their careers and face the real field. They need to know about sustainable development before facing the complexity of the real world. The author discussed a range of teaching strategies to enhance the curriculum to inculcate sustainability in students. These strategies are based on activity-based learning.

Holm et al. (2015) discussed a framework to inculcate sustainability in students at university level. The author has identified some sustainability aspects; those are the cultural, political, economic, technical, social and environmental aspects. Frameworks involve the process – plan, do, check and act – to impart education for sustainable development.

Holdsworth & Thomas (2015) also discussed a framework for inculcating sustainability in students at university. The author used an action learning method; the initiative produced new and updated courses as well as better qualified academic staff by including academics in workshops, assessments of their courses and subjects, and curriculum renewal.

Sengupta et al. (2020) discussed the inculcation of sustainability in curricula in various regions of the globe. The incorporation of sustainability within the curriculum is not an easy task; a number of factors have to be taken care of. During creating a curriculum that includes sustainability modules, faculty members must consider the patterns that affect students' achievement. The instructor-student interaction and the module delivery's outcome will be determined by the instructor's expertise and enthusiasm for the subject. This connection frequently goes beyond content-specific competencies and leads to sustainability in action, where teachers see students' eagerness to integrate sustainability into their daily lives. Although the curriculum module covered several subjects pertaining to sustainable development, there still capacity for improvement in some subjects where teachers should focus on students' reflections.

Hays & Reinders (2020) discuss the innovative concept of sustainable learning and education (SLE). This approach prioritises the development of curricula and teaching methods that prepare individuals to effectively engage with complex, evolving situations and make positive contributions to society. In contrast to conventional models that emphasise sustainability, SLE presents itself as a unique philosophy. The authors detail key sustainability principles pertinent regarding education and propose a curriculum intended for tertiary education or professional development. They also emphasise the significance of systems thinking and self-sufficiency, concluding with a call for community involvement to nurture a shared commitment to sustainability.

This review invigilates the role of sustainability in curriculum as well as the role of higher-order thinking skills and lifelong learning in inculcating sustainability in students. Many countries are embedding sustainability in their curriculum. Many

frameworks are proposed by different authors to integrate sustainability into the curriculum. The study suggests the following insight:

1. Restructuring the education system: Traditional education has always emphasised rote memorisation, which is now shifting towards lifelong learning, which equips people to take on new challenges and opportunities throughout their lives and is essential in today's world of rapid change.
2. Sustainable Development: Concern over resource exploitation for development purposes is on the rise. The review suggests how crucial it is to incorporate sustainability into education to solve exploitation of resources. Moreover, helping students comprehend environmental challenges, sustainability in education also encourages them to adopt sustainable personal and professional behaviours.
3. HOTS and Sustainability: To manage the complexity of sustainability, higher-order thinking skills—analysing, evaluating, and creating—are crucial. Students can think critically, interact deeply with complicated topics, and come up with innovative solutions via HOTS. Through the advancement of critical thinking and problem-solving skills, these competencies assist students in navigating complex sustainability issues.
4. HOTS and Lifelong Learning: HOTS are also essential for encouraging lifelong learning. By cultivating abilities like critical thinking and innovative problem-solving, students are inspired to pursue lifelong learning. This attitude of constant learning is essential for adjusting to the shifting demands of society, including those pertaining to sustainability.
5. Addressing Complex Issues: According to the research, HOTS are vital for comprehending and tackling the complex social, economic and environmental dimensions of sustainability. Sustainability is intricate problem that cannot be resolved with simple answers or basic information.

Interconnection between HOTS, sustainability and lifelong learning

Linking HOTS with sustainability

Higher-order thinking skills include the ability to analyse, evaluate and create. These competencies are necessary for inculcating sustainability in students. Through analysing skills, students can analyse the current situation of the environment and can recognise the existing environmental issues and how it is interconnected with the societal and economic system. It will help students to ascertain the challenges and issues we are facing today, such as climate change and resource depletion and many more. Through evaluating skills, students can evaluate the existing practices, policies and government initiatives towards sustainable development. It will further help students in creating skills. With the help of creating skills, students can create sustainable technologies, eco-friendly products, opportunities through renewable resources and efficient strategies for optimal utilisation of resources. These higher-order thinking skills will ultimately lead to critical thinking and problem-solving skills. Critical thinking and problem-solving skills will help students to deal with today's complex issues and demands without damaging the environment and its resources.

Linking HOTS with lifelong learning

Lifelong learning is the ongoing process of gaining information and skills throughout the course of a person's lifetime, motivated by personal development, curiosity, and the need to adjust to changing conditions. Higher-order thinking skills of students – analysing, evaluating and creating – are the qualities of a lifelong learner. HOTS helps to improve critical thinking, independent learning, adaptability, creativity, and problem-solving, which lay the basis for continuous acquisition of knowledge and growth. Lifelong learning is not a one-time thing; it is a habit which can be inculcated in the students through these skills.

Methodology: A review of existing literature is used as methodology. Documents are sourced from Google Scholars. Keywords like 'sustainable development', 'higher order thinking skills', 'sustainability', 'lifelong learning', 'Role of HOTS in development of sustainability in students', and 'Role of HOTS in development of lifelong learning in students' are used for searching research articles.

Findings from the Study

- Higher Order Thinking Skills enhance Sustainability: HOTS serve a significant function in inculcating sustainability, as students who are pushed to think critically are more able to analyse complex environmental and societal challenges. By gaining the ability to assess and create, students can invent sustainable solutions and contribute to activities that promote ecological balance, social equality, and economic viability.
- Encouraging Lifelong Learning via HOTS: HOTS also aids lifelong learning by encouraging students to adopt a mindset of inquiry, problem-solving, and adaptability. This approach is crucial for the purpose of addressing the always-evolving difficulties in the framework of sustainability, where new information and technologies continuously reshape our understanding.
- Complexities of Sustainability need HOTS: Sustainability is a multifaceted, intricate topic that cannot be comprehended by simple learning techniques or memorisation. HOTS are essential for managing these complications. By considering diverse perspectives and developing thoughtful solutions, a student who has received HOTS training will possess critical thinking skills about the social, environmental, and economic facets of sustainability.

Conclusion

It can be inferred that sustainable development constitutes a necessity of present times; we need to inculcate sustainability in students to facilitate their comprehension of their involvement in sustainable development and contribute to it. Higher-order thinking skills are the ones which can support lifelong learning and sustainability. By promoting HOTS, teachers may empower students with the skills to tackle the difficulties of sustainable development, advocate responsible resource use, and engage in lifelong learning. This shift in education is crucial to solving the environmental problems we face globally and ensuring that the next generation is prepared to build a more equitable and sustainable world. By including HOTS in the curriculum, students will become more knowledgeable, flexible, and responsible adults who can use creativity and critical thinking to solve sustainability issues.

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References:

1. Eli, Munkebye, Scheie, E., Gabrielsen, A., Jordet, A., Misund, S., & Øyehaug, A. B. (2020). Interdisciplinary primary school curriculum units for sustainable development. *Environmental Education Research*, 26(6), 795-811.
2. Fischer, G. (2000). Lifelong learning—more than training. *Journal of Interactive Learning Research*, 11(3), 265-294.
3. Hays, J., & Reinders, H. (2020). Sustainable learning and education: A curriculum for the future. *International Review of Education*, 66, 29-52.
4. Holm, T., Sammalisto, K., Grindsted, T. S., & Vuorisalo, T. (2015). Process framework for identifying sustainability aspects in university curricula and integrating education for sustainable development. *Journal of Cleaner Production*, 106, 164-174.
5. Holdsworth, S., & Thomas, I. (2015). Framework for introducing education for sustainable development into university curriculum. *Journal of Education for Sustainable Development*, 9(2), 137-159.
6. Laal, M., & Salamati, P. (2012). Lifelong learning; why do we need it?. *Procedia-Social and Behavioral Sciences*, 31, 399-403.
7. Laal, M. (2011). Lifelong learning: What does it mean?. *Procedia-Social and Behavioral Sciences*, 28, 470-474.
8. Lewis, A., & Smith, D. (1993). Defining higher order thinking. *Theory into practice*, 32(3), 131-137.
9. Mainali, B. P. (2012). Higher order thinking in education. *Academic Voices: A Multidisciplinary Journal*, 2, 5-10.
10. Sengupta, E., Blessinger, P., & Yamin, T. S. (2020). Introduction to integrating sustainability into curriculum. In *Integrating Sustainable Development into the Curriculum* (pp. 3-14). Emerald Publishing Limited.
11. Tejedor, G., Sánchez-Carracedo, F., & Segalàs, J. (2022). Education for sustainable development in higher education-introduction to a special issue. *Sustainability*, 14(17), 10530.
12. Wals, A. E., & Kieft, G. (2010). Education for sustainable development: Research overview.
13. Woo, Y. L., Mokhtar, M., Komoo, I., & Azman, N. (2012). Education for sustainable development: A review of characteristics of sustainability curriculum. *OIDA International Journal of Sustainable Development*, 3(8), 33-44.

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