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THE INNOVATIVE SMART GREEN CAMPUS AS LIFE-BASED LEARNING CHARACTERISTICS OF FUTURE LEARNING EFFORTS TO COMPLETE THE SDG'S

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ABSTRACT

Objective: This study examines the application of the Smart Green Campus idea in higher education, focusing on its contribution to sustainability and experiential learning.

Theoretical Framework: The study is founded on theories of sustainability, intelligent campus design, and experiential learning. These frameworks thoroughly comprehend integrating green technologies and experiential learning within educational settings.

Method: This research employs a qualitative methodology, utilizing case studies of colleges executing Smart Green Campus programs to collect data. Data were collected via literature analysis, campus observations, and interviews with principal stakeholders.

Results and Discussion: The results indicate that Smart Green Campus programs enhance students' environmental awareness and skill acquisition. Green technologies, including energy-efficient structures and sustainable transportation, promote an interactive learning atmosphere. Nonetheless, problems like financial expenditures and opposition to change are acknowledged.

Research Implications: This study presents practical and theoretical implications by illustrating how Smart Green Campus initiatives can serve as examples of education aligned with the Sustainable Development Goals (SDG 6). The study emphasizes how universities can implement sustainable methods to improve environmental and educational outcomes.

Originality/Value: This study enhances the literature by offering novel insights into the Smart Green Campus idea and its practical implementation. Its significance resides in providing a novel educational framework that equips students to address sustainable development challenges and must ensure the availability of clean water and sanitation as stated in SDG 6.

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1 INTRODUCTION

Education is one of the essential pillars of building a sustainable society. In the face of increasing environmental and social challenges, such as climate change and resource crises, education must adapt to prepare future generations(Yue & Ji, 2020)(Foster, 2011)(Barth & Burandt, 2013)(Walcutt & Schatz, 2019)(Sukackė *et al.*, 2022).(OECD Future of Education and Skills 2030, n.d) In this context, the concept of an innovative green campus that integrates technology, sustainability, and experiential learning becomes essential. (2023)(Li, 2020)(Ja'afar, 2023)(Hashim *et al.*, 2022)(Wei *et al.*, 2014)A smart green campus not only focuses on efficient resource management but also creates a learning environment that supports the development of skills needed for the 21st century.(Luo, 2014)(Pratiwi *et al.*, 2020)(Li *et al.*, 2017)

Life-based learning is an approach that emphasizes the relevance of learning to students' real lives, allowing them to relate academic knowledge to issues faced in society. In the context of Smart Green Campus, (Nataliya *et al.*, 2018)(Zhuang *et al.*, 2017) Life-Based Learning provides opportunities for students to be directly involved in projects that contribute to environmental sustainability. (Definition, framework, and research issues of smart learning environments, 2014) For instance, students can learn about climate change in science class and then apply their knowledge by participating in a campus-wide energy conservation project. This article explores the relationship between Smart Green Campus and four learning competencies and how both can contribute to more effective and relevant learning.

Several campuses have implemented various initiatives to achieve Smart Green Campus status, with educators' invaluable guidance and support. These initiatives include Energy Management and Climate Change which is an

inseparable part of development based on sustainable development goals:(Models of Success: Case Study Schools shared characteristics of effective programs toolkit: creating study an effective energy conservation initiative profiles of participating schools, n.d) Khoshbakht *et al.*, 2019)(Muthu & Edwin, 2019)(Sharp, 2002)(Saleh *et al.*, 2015) Implementing intelligent building programs and using renewable energy sources reduces the campus's carbon footprint and provides a platform for students to apply their learning in a real-world context. (Vrachni *et al.*, 2022) (Tudor *et al.*, 2015)(Muthu & Edwin, 2019)(Cao *et al.*, 2015) Waste Management: Recycling programs and reducing paper and plastic use keep the campus clean and encourage students to participate actively in sustainability initiatives (Campus Sustainability Report, n.d) (Luo, 2012).

2 THEORETICAL FRAMEWORKS

The Smart Green Campus concept is grounded in sustainability theories and experiential learning models. It emphasizes the integration of green technology into educational environments. This framework advocates for using energy-efficient infrastructure, sustainable transportation, and resource management to create an eco-friendly campus that supports environmental stewardship and practical skill development (Michael & Elser, 2019) (Ja'afar, 2023) (Safitri *et al.*, 2020). Theoretical underpinnings stem from the notion that sustainability should be a goal and a core practice within educational institutions, guiding students to develop eco-conscious behaviors through active participation in green initiatives.

Another crucial aspect of this framework is life-based learning, which positions learning as directly applicable to students' real-world experiences. This approach encourages students to engage deeply with environmental issues by aligning academic knowledge with real-life sustainability challenges. Projects like energy conservation, waste reduction, and biodiversity preservation are designed to allow students to apply theoretical knowledge practically, demonstrating the practicality of life-based learning. This hands-on learning cultivates a strong connection between academic concepts and

their relevance in addressing societal challenges.

The Smart Green Campus model supports this by providing a platform for students to engage in projects like renewable energy installations and sustainable building designs. These activities foster students' ability to navigate complex problems, but more importantly, they encourage innovation and creativity. The Smart Green Campus model plays a crucial role in fostering these qualities, which are necessary for developing sustainable solutions to environmental issues.

Finally, the theoretical framework emphasizes the role of green technologies in education, highlighting their potential to create interactive and engaging learning environments. By incorporating technologies such as intelligent lighting, energy management systems, and water conservation tools, campuses reduce their ecological footprint and enhance learning outcomes. These green innovations serve as both teaching tools and practical sustainability applications, preparing students to contribute meaningfully to environmental conservation efforts in their future careers.

3 METHODOLOGY

The methods employed in this study, including reviewing literature and studying specific cases, have important implications for the future, generating optimism among the audience. The thorough examination of literature examined a range of materials concerning Green and Smart Campus projects, life-centered education, and the four essential learning abilities. (Nataliya *et al.*, 2018)(Dong *et al.*, 2020) These sources, such as journal articles, research reports, and education policy documents, gave a thorough insight into the topic. Examples of educational institutions that have effectively applied the principles of Green and Smart Campus in case studies provide concrete evidence of successful implementation. (Kwok, 2015)(Muthu & Edwin, 2019) These establishments demonstrate how these principles can be implemented, displaying the advantages. The evidence from past studies, practical instances of application in schools, and the effects on students and the community all indicate a positive outlook ahead.(Nelson *et al.*, n.d)(Nielsen *et al.*, 2018)(Moir,

2018) Combining Smart Green Campus principles with the four learning skills is more than just a current fad; it is an innovative framework for learning grounded in life. This method focuses on durability and flexibility, preparing students to succeed in a constantly changing environment.

4 RESULTS AND DISCUSSIONS

Integration and sustainability are the main principles that must be applied in life-based learning. As the earth ages due to human activities that cause pollution, we must adopt innovative green principles in education. By integrating intelligent green concepts, we teach students about the importance of protecting the environment and help them develop a more responsible mindset towards nature.

Figure 1

illustrates the application of life-based learning with an emphasis on a smart, green campus.

Figure 1. The illustration concept of life-based learning emphasizes a smart green campus.

This illustration presents Figure 1, a vibrant and well-planned "smart green campus" that exemplifies place-based learning and sustainability. Fundamentally, the campus has solid environmental aspects, such as solar panels with a sun icon, to represent its dedication to sustainable energy. Trees and greenery all around contribute to the environmentally friendly ambiance, and water-saving elements might highlight the management of resources in general and water in particular.

The central concept is depicted as a cube, emphasizing essential themes such as community, collaboration, technology, and sustainability. This graphic depiction demonstrates how campus life is tightly entwined with the outside world, fostering cross-disciplinary cooperation and emphasizing the importance of contemporary technology in putting sustainable practices into effect. The layout includes various structures that support academic, residential, and communal functions, all connected by pathways designed for easy movement. Additional features such as wind turbines and recycling symbols reinforce the campus's commitment to environmental stewardship. Overall, the image creatively depicts a green campus that integrates sustainable living-based learning.

4.1 SMART GREEN CAMPUS CONCEPT

The Smart Green Campus concept integrates green technology and sustainability principles within an educational environment. This approach focuses on creating an environmentally friendly campus that efficiently uses resources and supports the well-being of the local ecosystem.(Fachrudin & Fachrudin, 2021)(Mu *et al.*, 2015)(Cai *et al.*, 2019) While it offers numerous benefits, implementing the Smart Green Campus concept may face challenges such as initial high costs and resistance to change.(Fatwanto & Amar, 2018)(Ahmed *et al.*, 2020)(Ja'afar, 2023)(Yip *et al.*, 2022)(Sugiarto *et al.*, 2022) However, with proper planning and stakeholder engagement, these challenges can be overcome. Critical components of a Smart Green Campus include:

a) Energy Efficiency: Implementing renewable energy sources such as solar panels and wind turbines to reduce reliance on non-renewable energy;

b) Water Conservation: Utilizing rainwater harvesting systems and water-efficient fixtures to minimize water usage;
c) Waste Management: Our commitment to a Smart Green Campus is evident in our efforts to reduce waste. By promoting recycling and composting programs, we not only minimize waste but also encourage sustainable practices, fostering a sense of responsibility among us all;
d) Green Buildings: Constructing or retrofitting buildings to meet green building standards, ensuring they are energy-efficient and environmentally friendly;
e) Sustainable Transportation: Encouraging bicycles, electric vehicles, and public transportation to reduce carbon emissions;
f) Biodiversity: Creating green spaces like gardens and parks to support local flora and fauna;
g) Digitalization: Using innovative technologies to monitor and manage campus resources, such as intelligent lighting and HVAC systems.

Education and awareness are key to the success of a Smart Green Campus, which relies heavily on the active participation of students and staff. Integrating sustainability into the curriculum and promoting awareness about the importance of environmental stewardship empowers us all to make a difference.

4.2 LEARNING OUTCOME COMPETENCY

These competencies are vital for academic achievement and for preparing students to navigate the complexities of the future. The first competence is Critical thinking and problem-solving are foundational skills that enable students to analyze information critically and find creative solutions to complex problems. (Rahat *et al*., 2020) (Integrating 21st Century Skills, 2023) (Geng, 2021) In an era where information is abundant and easily accessible, discerning credible sources from unreliable ones is crucial. Critical thinking involves evaluating evidence, identifying biases, and making reasoned judgments. Problem solving, on the other hand, requires students to apply their critical thinking skills to develop innovative solutions to real-world challenges.

(Zhang, 2022) For instance, in a science class, students might be tasked with designing an experiment to test a hypothesis. This requires them to think critically about the variables involved, their methods, and how they will interpret the results. Engaging in such activities teaches students to approach problems methodically and creatively, skills that are invaluable in any field.

The second competence is Collaboration is working effectively with others, sharing ideas, and achieving common goals. In today's interconnected world, teamwork is more important than ever. Collaborative learning environments encourage students to communicate openly, respect diverse perspectives, and leverage each other's strengths. (Donohoo & Mausbach, 2021)(Demosthenous *et al.*, 2020)(Loes, 2022)(Collaboration & Group Learning, 2022)(Collaborate, 2023) Group projects are a common way to foster collaboration in the classroom. For example, students might work together to create a presentation on a historical event. Each group member would contribute unique insights and skills, whether researching information, designing slides, or presenting the material. Through such experiences, students learn the importance of cooperation, compromise, and collective effort.

The third competence is Effective communication is the ability to convey ideas and information clearly and persuasively, both orally and in writing. This competency is essential for academic success and for building strong interpersonal relationships. Good communication skills enable students to articulate their thoughts, listen actively, and engage in meaningful dialogue.(TĂNAȘCU *et al.*, 2020)(Bylkova & Chubova, 2020) Students develop communication skills in the classroom through debates, presentations, and writing assignments. For instance, a debate on a current issue requires students to research their position, construct logical arguments, and present their case convincingly. On the other hand, writing assignments help students organize their thoughts and express them coherently. By honing their communication skills, students become more confident and effective in sharing their ideas.(Lapp & Fisher, 2012)(Gautam, 2019)(Salih, 2021)

The four competence Creativity and innovation involve thinking outside the box, generating new ideas, and implementing them in various contexts.

These skills are crucial for driving progress and adapting to change. In education, fostering creativity means encouraging students to explore their interests, take risks, and experiment with different approaches. Art and design classes are often associated with creativity, but opportunities for creative thinking can be found across all subjects. For example, in a math class, students might be challenged to find multiple solutions to a problem or to apply mathematical concepts in novel ways. (Alimen *et al.*, 2021)(Zakeri *et al.*, 2023)In literature, students write their own stories or reinterpret classic works. By nurturing creativity, educators help students develop the ability to innovate and adapt essential skills in a rapidly changing world. These skills enhance academic performance and prepare students to thrive in a complex, dynamic world. By prioritizing these competencies, educators can equip students with the tools they need to succeed in school and beyond.

4.3 LIFE BASED LEARNING SMART GREEN CAMPUS

Integrating Real-World Experiences in a Smart Green Campus, Life Based Learning is an educational approach that places real-world experiences at the heart of the learning process. This method is particularly effective in a Smart Green Campus context, where sustainability and community engagement are key priorities. Here are some of the core characteristics of Life-Based Learning in this setting:(Wei *et al.*, 2023)(Implementing sustainable development through problem-based learning Pedagogy and practice, 2023)(Samuel, 2023)

a) Project-Based Learning: Students actively participate in projects that address real sustainability issues. For example, they might develop a community garden, implement a campus-wide recycling program, or design energy-efficient solutions for campus buildings. These projects enhance students' understanding of environmental challenges and equip them with practical skills and knowledge;
b) Community Engagement: Collaboration with local communities is a cornerstone of Life Based Learning. Students work alongside community members to identify and solve environmental problems, such as reducing local pollution or promoting renewable energy sources. This engagement

fosters a sense of responsibility and relevance, making learning more meaningful and impactful;

c) Reflection and Evaluation: An essential component of life-based learning is the importance of reflection and evaluation. Students are encouraged to reflect on their experiences regularly, assess their projects' outcomes, and consider their work's broader implications. This reflective practice helps students develop critical thinking skills and a deeper understanding of their contributions to sustainability.

By integrating these elements, Life-Based Learning transforms education into a dynamic and interactive process, preparing students to become proactive and informed citizens who can contribute to a sustainable future.

5 CONCLUSIONS

Learning to use life activities is very important to prepare students to face future challenges. By developing critical thinking skills, communication, collaboration, and creativity, students will be better prepared to adapt to a changing world. Through a contextual and collaborative learning approach, education can produce individuals who are not only intelligent but also innovative and ready to contribute to various areas of life. It will make the earth greener and extend the lives of living things that live together on earth

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