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PROF. PATRICK C. IGBOJINWAEKWU

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EDITORIAL

Journal of Science Education and Research (JSER) is a peer-reviewed published Bimonthly. It aimed at advancing knowledge and professionalism in all aspects of educational research, including but not limited to innovations in science education, educational technology, guidance and counselling psychology, childhood studies and early years, curriculum studies, evaluation, vocational training, planning, policy, pedagogy, human kinetics, health education and so on. JSER publish different types of research outputs including monographs, field articles, brief notes, comments on published articles and book reviews.

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Prof. Patrick C. Igbojinwaekwu
Editor-in-Chief

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INNOVATIVE CURRICULUM FOR SELF-RELIANCE THROUGH ENTREPERNURIAL SKILLS IN THE 21ST CENTURY: A PANACEA FOR FUNCTIONAL BIOLOGY EDUCATION IN TARABA STATE

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Abstract

In the 21st Century, the field of Biology education needs to adapt demands of a continuous dynamic world. An innovative curriculum and integration of entrepreneurial skills have become crucial in preparing students for self-reliance and successful life after tertiary institution. This study, therefore, addresses the demands of modern era, promoting self-reliance, adopting a holistic and practical approach to Biology education, facilitating diverse career opportunities such as bee-keeping, mushroom keeping, poultry, horticulture and snail farming amongst others. Through the implementation of innovative curriculum and entrepreneurial skills in Biology education, students can develop the required competencies to thrive in an evolving labor market and become critical thinkers, problem solvers and adaptable individuals who are well equipped to meet the challenges of the 21st century. The paper further suggested that acquisition of skills will help a long way to curtail societal menace such as kidnapping, arm robbery, cultism, Human and drug trafficking as well as any other kind of youthful exuberance. The study concluded that there is need to incorporate entrepreneurial skills into Biology education curriculum for a sustainable development.

Keywords: Innovative Curriculum, Self-Reliance, Entrepreneurial skills, 21st Century

Introduction

Science education is the teaching and learning of science to school children, college students or adults within the general public. The field of science education includes work in science content, science process (scientific method). The standard for science education provide sex petitions for the development of understanding for students through the entire course of their education and beyond. The traditional subjects included in the standards are physical life, earth space and human sciences. Umar, Koko, Igba, Oladimejl and Umaru (2021), posits that science education has been given global recognition as pre-requisites for scientific and technological development which provides opportunities for students to acquire relevant and useful knowledge, scientific skills, values and answers to problems in a bid to provide and interpret natural occurrence. According to Agwuudu (2018), science education is expected to inculcate the right values, self-discipline, scientific literacy and general commitment to natural phenomenon's. This implies that science education is seen as a total process of developing an individual with cognltive, affective and psychomotor potentials capable of contributing maximally to the development of the society in which they live. It also seeks to prepare individuals to be self-reliant, responsible and enterprising thinkers, who become entrepreneur that will contribute towards the economic development and sustainable environment. This education ensures the availability of food for people, creates employment for its citizens as well as the provision of services to humanity as a whole, thereby transforming a nation consuming to a manufacturing status. (Okon& Ezekiel, 2014 and Joseph & Sabina, 2018).

Biology as a subject under science education is a life science that involves the study of plants and animals. The subject plays a major role in making the learner useful to him and the society as stipulated by Anyawu, Obochi and Isa (2015). The authors submitted that the knowledge acquired from Biology enable students to relate to environmental issues which could help the learner become self-reliant. Based on the aforementioned, it becomes imperative for curriculum developers to introduce innovative curriculum which offers the students opportunity to learn independently and be able to acquire skills that can enable them to fit into the outside world. More so, that the white collar jobs are limited in circulation and it is disheartening for a parent to watch a child undergo a four year programmer, stay unemployed and unable to create a job and be an employer of labor. Hence, the need for the acquisition of skills through entrepreneurial education.

Statement of the Problem

Despite the increasing emphasis on science Education, particularly Biology, in developing nations, a significant gap remains between theoretical knowledge and practical, real-life applications that promote self-reliance and employability. Traditional Biology curricula often focus heavily on content memorization and abstract scientific concepts, with little or no emphasis on entrepreneurial skills or innovative practices that can empower learners to be self-sufficient in a rapidly changing world.

In the 21st century, where innovation and entrepreneurship are central are central to national development and global competitiveness. Biology education has yet to fully sign with these trends. Many Biology graduates struggle with unemployment or under employment due to a lack of practical skills. This raises critical concerns about the functionality of the existing Biology curriculum in equipping learners with competencies for real- world challenges. Therefore, there is urgent need to reform the curriculum Biology by integrating innovative, skill based, and entrepreneurial content that fosters self-reliance. Without such transformation, Biology education may continue to produce graduates who are academically qualified but functionally deficient in terms of employability, innovation and economic contribution.

Purpose of the Study

The purpose of this study is to examine how an innovative curriculum that integrates entrepreneurial skills can promote self-reliance and enhance the functional relevance of Biology education in the 21st century.

Innovative Curriculum

Curriculum innovation is a response to the fact that the world is dynamic and education has to change if Nigerians want to avoid preparing students for 'a world that no longer exists. In the context of educational system, innovation refers to the process of applying new techniques to ensure that students grasp the knowledge or content desired for the field and be able to apply tin the outside world. This can only be achieved through the pedagogical skills employed by teachers in classroom, since these a paradigm shift from the conventional teaching method to learner centered strategies' which allows students to actively engage in the learning process that enables him/her to apply the knowledge anywhere in the world, Button (2021),refers to curriculum innovation as a means of doing things in new ways and adopting different designs for learning to help learning become meaningful for the 21st century learners. The author further submitted that practices in education have become outmoded and learning experiences should be re-designed to be more relevant to the students' interest, abilities and cultures. An

additional challenge is that with a more diverse population of students who have a broad range of abilities. Innovation should be linked to curriculum goals as well as being challenged and differentiated to provide for an array of learning experiences.

Curriculum has been defined in different ways by different scholars. For instance, Mizanur(2020) defined curriculum as a primary guide for all educators in terms of teaching and learning ,ensuring that every student has access to challenging ,academic experiences. According to Gulzar (2021) the definition of curriculum and its interpretation varies from a narrow conceptsof"a set of subjects or programs of studies" to a broader concept of“ a series of experiences undergone by learners in the school under the supervision of a teacher/school" Finally,Harnack(1968) describes curriculum as an embodiment of all the teaching and learning experiences guided and directed by the school.

Entrepreneurship Education

Entrepreneurship Education is a form of education which makes human responsive to their personal, families and national needs and aspirations, Anho (2014) stated that Entrepreneurship Competencies carries along the concept of skills and mental awareness which are required to understand the functioning of the already existing business. Onuche and Umerii(2012) defined entrepreneurship education as a form of education that seeks to provide knowledge, skills, attitude and motivation to students for entrepreneurial skills in any settings. It equips students with the ability to seek investment opportunities. According to Ishiaka (2020), entrepreneurship education is education designee to change the orientation and attitude of recipients and the process will equip them with the skills and knowledge to start and manage business. It is in line with these benefits that the National University Commission (NUC) (2023) directed all the universities across Nigeria through the Core Curriculum Minimum Academic Standard (CCMAS) to ensure that universities develop curriculum that will enable students acquire skills in their various disciplines which will help them to be self-reliant upon graduation as from 2023 academic session. According to the CCMAS directives, the learning experiences o the students (curriculum) should comprise of 70% national content and 30% local content based on the institution's environment. In Biology education, the CCMAS directed that the following courses be incorporated into the curriculum. These courses include; Bee-keeping, Mushroom farming, Poultry, Floriculture, Gardening, Horticulture, Fishing amongst others. The aforementioned courses were not provided in the previous curriculum recommended by NUC through the Benchmark Minimum Academic Standard (BMAS) for students in tertiary

institutions studying Biology Education thereby leaving the young graduates stranded as they continue to wait hopelessly or white collar jab in order to earn a living. The courses in the previous curriculum includes; General Biology, Zoology, Genetics, General Physiology, Ecology, Statistics, Cell Biology Taxonomy and Invertebrates not to mention but a few. These courses do not provide students the opportunity to acquire skills in any way.

Bee Keeping

Is also known as apiculture, it is the practice of raising and caring for honey bees in managed colonies. It involves providing bees with suitable living conditions, Including bee-hives or bee boxes, and ensuring that they have access to food sources such as flowering plants and water supply. Beekeepers typically manage their colonies to harvest honey, bees wax and other bee by-products, as well as to support pollination of plants.

Beekeeping has a long history, dating back thousands of years. Honey bees are social insects that live in highly organized colonies, with a queen bee, worker bees and drones. Beekeeper soften manipulate the colony to create an environment that supports the health and productivity of the bees. This can involve task such as providing supplemental feed, monitoring diseases and pest, and managing the hives population.

The benefits of bee keeping go beyond the production of honey. Bees play a crucial role in pollinating wild flowers, fruit trees, crops, thereby contributing to food production and maintaining biodiversity in ecosystems. Beekeeping can also be a source of income for bee keepers through the sale of honey, bee wax, pollen, royal Jelly or other bee-related products. However, bee keeping also comes with challenges. Bees can be susceptible to diseases and pest such as arrow mites which can weaken colonies if not properly managed. Overall, Bee keeping is a rewarding and important practice that promotes the sustainability of honey, Bee populations, supports pollinations and provides valuable products for human consumption and other uses.

Mushroom Farming

Mushroom farming, also known as mushroom cultivation, is the practice of growing mushrooms for personal use or commercial purposes. It involves creating the optimal growing conditions for various types of edible or medicinal mushrooms to thrive and produce fruiting bodies, which are the above -round reproductive structures we commonly recognize as mushrooms. Mushroom cultivation can be done in a controlled indoor environment, such as greenhouse or a specialized growing room, or in an

outdoor setting. The process typically begins with obtaining mushroom spores or spawn, which serves as the starting material for growing substrate, which can be a mix of organic materials such as straw, sawdust, woodchips or compost.

Mushroom growing can be a rewarding and sustainable practice. It offers opportunities for individuals to produce their own fresh and nutritious mushrooms for culinary purposes or to explore the potential medicinal properties of certain species, additionally, mushroom cultivation can contribute to the local food industry, providing a source of income and promoting sustainable and environmentally friendly agriculture.

However, mushroom cultivation requires knowledge, attention to detail, regular monitoring to ensure successful growth and prevent contamination or disease. It is important to follow proper cultivation techniques and maintain hygiene practices to achieve consistent yields and high quality mushrooms. Finally, Mushroom keeping offers a unique and interesting way to engage with fungi, explore their diverse properties and enjoy the benefits of growing and consuming fresh mushrooms.

Benefits of Mushroom keeping

Nutritional value: Mushrooms are low in calories and fat, while being rich in essential vitamins, including vitamin D, B2 and vitamin B3 Mushrooms are also source of important minerals like Selenium, Potassium and Copper.

Antioxidants: many mushroom varieties are known for their anti-oxidant properties in protecting the body form free radicals, which can cause cellular damage and contribute to the development of chronic disease.

Immune-Boosting: certain species of mushrooms like shiitake and rishi contain compounds that have been shown enhance immune function. These mushrooms contain beta-glycan, which stimulate the immune system and helps regulate it.

Heart health: Mushrooms are low in cholesterol and fats, making them a heart healthy food choice. Research suggests that the consumption of mushroom may lower blood pressure and reduce the risk of cardio-vascular diseases.

Digestive Health: Mushrooms contain dietary fiber, which is important for promoting a healthy digestive system.. Fiber helps in regulating bowel movements, preventing constipation, and maintaining a healthy gut micro biome.

Weight Management: Due to their low calorie and fat content, mushrooms are beneficial addition to weight management plan. Their fiber content can also help increase satiety and reduce overall calorie intake.

Cancer-fighting properties: Some mushrooms, such as maitake and turkey tail, have shown potential anti-cancer properties. They contain bioactive compounds that may help inhibit the growth of cancer cells and stimulate the immune system's response to cancer.

Cognitive Function: Preliminary research suggests that compounds found in Lion's mane mushrooms may have neuron protective effects and boost cognitive function. These mushroom shave been studied for their potential to improve memory and focus. It is important to note that while mushrooms offer potential benefits, it is always advisable to consult a healthcare professional or a registered dietician medicinal before making significant changes to your diet or using mushrooms for medicinal purposes.

Poultry Keeping

Poultry keeping refers to the practice of raising domesticated birds, primarily chickens, ducks, turkeys and geese for their meat, eggs and some feathers.

Benefits

Protein source: Poultry provides a valuable source of protein through meat and eggs which are essential for a balance diet.

Income generation: It can be profitable venture for farmers, providing a consistent source of income.

Manure: Poultry droppings are rich in nutrients and serve as excellent organic fertilizer for horticulture.

Versatility: Poultry farming can be adapted to various scales, from backyards flocks to large commercial operations.

Horticulture

Is the science and art of growing fruits, vegetables, flowers and ornamental plans, typically in gardens or small-scalefarms.

Benefits

Healthy Food: Horticulture yields fresh and nutritious produce, promoting healthier diets and food security.

Environmental Benefits: It encourages sustainable practices, such as organic farming and reduced pesticide use, which benefit the environment.

Economic Value: Horticulture contributes to the economy through the sale if fresh produce, landscaping services and ornamental plants.

Aesthetic Appeal: It enhances the beauty of landscapes, parks and gardens.

Snail Farming

Snail farming involves the controlled cultivation of land snails, such as Helixaspersa for their meat (escargot) and slime production, which has cosmetic and medicinal applications.

Benefits

Low Environmental Impact: Snail farming is environmentally friendly, requiring minimal space and resources compared to traditional livestock.

High-Protein Meat: Snail meat is a good source of protein, low fat and rich in essential nutrients like iron and vitamin B12.

Cosmetic and Medicinal Uses: Snail slime is used n cosmetics for its purported skin -rejuvenating properties and it has potential in wound healing and pharmaceutical applications.

Income Generation: Snail farming can be a profitable niche market with a growing demand for snail products.

In summary, poultry keeping provides protein and income, horticulture yields healthy food and environmental benefits and snail farming offers low environmental impact, high-protein meat and potential i cosmetics and medicine. These practices can be integrated into sustainable agricultural systems for diversified farming ventures

Conclusion

Innovative curriculum development that fosters entrepreneurial skills in the field of Biology education holds immense promise for addressing the evolving needs of the 215tcentury. As the world faces complex challenges, ranging from environmental sustainability to healthcare advancements, nurturing self-reliance and entrepreneurship within biology education framework is a panacea for ensuring functional and relevant learning. This approach empowers students to not only acquire scientific knowledge but also apply it practically in ways that contribute to societal and economic well-being.

Recommendations

Based on the aforementioned findings, the following recommendations were made;

1. **Entrepreneurship Education:** Incorporate entrepreneurship modules that teach student show to identify opportunities, create business plans and navigate the entrepreneurial landscape within the field of Biology.
2. **Adaptive Curriculum:** Create a flexible curriculum that adapts to emerging trends and technologies, ensuring that students are prepared for a rapidly changing job market.

3. **Interdisciplinary Approach:** Integrate biology with other disciplines such as business, technology and ethics to foster a holistic understanding of how Biology can be applied in various contexts.
4. **Collaboration and Networking:** Encourage students to collaborate with industry professionals, researchers and entrepreneurs, providing them with valuable mentorship and real-world connections.
5. **Government and Industry Involvement:** Foster partnerships between educational institutions, government bodies and industry stakeholders to align curriculum with industry needs and promote research and development.

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