Chapter 1
Potential Nexus of Science Technology and Indigenous Knowledge for Teaching Agricultural Science:
A Theoretical Proposal

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ABSTRACT

There is a need to understand the pedagogical reasons for an integrated agricultural science education. Indigenous knowledge is critical. The aim of the study was to provide a theoretical analysis of the nexus of science, technology and indigenous knowledge systems. A nexus generally refers to a connection or link between different elements or systems. The study selected science, technology and indigenous knowledge systems as major advancements in agriculture teaching and learning. Six predominant principles and components of these advancements were compared for potential indication of connectedness and combined impact. The approach of combining quantitative and empirical metanalysis found science to be the predominant factor (36%) in the understanding of the nexus compared with technology (33%) and indigenous knowledge (31%). To provide a global perspective, the study used case studies to explain the relevance of My Folio Pedagogic Planning as the closet framework. Future research in science, technology and indigenous knowledge education nexus is recommended.

1. INTRODUCTION

Fletcher (2004) stated "A frequent criticism levelled at university education is the emphasis on theory rather than practice. The challenge for academics remains complex where competing demands require creative solutions to course design and implementation that will accommodate diverse learning needs of students." The diversity of learning needs is a global challenge in the higher education sector. It affects both lecturers (teachers) and students(learners). Higher education teachers (lecturers) in science

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are generally not trained to teach. The reliance is on content expertise, which is determined by special qualifications. For students, the entry points from school largely influence the decision to admit a student. This approach creates challenges that may affect teaching and learning as a modern key performance area for lecturers and the consequence of missing the opportunity to achieve the key performance indicators which define the expected key indicators, especially that of preparing students with a set of generic skills that will be the building blocks of personal and professional success (Griffith University Graduate Profile). This skill development s be designed to enhance professional expertise and personal effectiveness in ways that equip a university graduate for life-long learning.

1.1 History of Agricultural Education

Agriculture education has evolved significantly over time. Initially, it was closely tied to the daily lives of people, especially in rural areas where farming was a common occupation. In the United States, for example, agriculture was an integral part of the school curriculum in the early 20th century, reflecting the agrarian lifestyle of the population. The formalization of agricultural education as an academic discipline began in the 19th century with the Morrill Acts, which established land-grant colleges in the U.S. These institutions provided practical education in agriculture and the mechanical arts. Over the years, agricultural education expanded to include a wide range of scientific subjects related to animal and plant production, soil science, and environmental management (Agrawal et al., 2022).

Modernizing agricultural education involves integrating modern technologies and innovative teaching methods to enhance learning and application. This has progressively led to effective methods which form the multidisciplinary nature of agricultural education (Agrawal and Jaggi, 2023).

Extension Services: These services bridge the gap between research and practical application. Extension agents provide personalized guidance through farm visits, workshops, and demonstrations, helping farmers adopt new techniques and improve productivity.

Multimedia Tools: Utilizing videos, online platforms, and mobile apps can make agricultural education more accessible, especially in remote areas. These tools provide valuable information and training materials that farmers can access anytime.

Curriculum Reform: Updating the curriculum to include modern topics such as precision agriculture, biotechnology, and renewable energy systems is crucial. This ensures that students are equipped with the latest knowledge and skills needed for sustainable farming.

Hands-on Training: Practical, field-based training is essential for effective learning. This includes internships, apprenticeships, and on-farm training programs that provide real-world experience.

Community-Based Learning: Encouraging collective learning through group meetings and workshops fosters a sense of community and allows farmers to share experiences and best practices.

By adopting these methods, agricultural education can better prepare individuals for the challenges of modern farming, promoting sustainability and innovation in the agricultural sector. These methods promise to transform the landscape of agriculture in higher education (Rana, 2020)