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Bridging The Gap In Enhancing Agricultural Education Teacher Training For Creative And Technological Engagement

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Abstract

In the realm of agricultural education, the integration of creativity and technology holds immense promise for preparing educators to meet the evolving challenges of the agricultural sector. This paper explores the critical need to enhancing teacher training, focusing on equipping educators with the skills and knowledge to effectively integrate creative pedagogies and technological tools into their teaching practices. The paper delves into enhancing agricultural education teacher training for creative and technological engagement. It explores into the concept of a teacher, teacher training, objectives of teacher training, need for enhanced teacher training, current training programs and their limitations, implications of bridging training gap for agricultural education teachers, creative and technological strategies for teacher training in agricultural education. The paper recommends for a concerted effort to empower educators and enhance the quality of agricultural education by prioritizing investments in technological infrastructure to support the integration of virtual simulations, AR/VR, and online learning platforms into agricultural education curricula.

Keywords: Keywords: Creativity, Technological, Engagement, Agricultural Education, Teacher Training

Introduction

Agricultural education in Nigeria faces significant challenges, particularly in enhancing teacher training for creative and technological engagement. Traditional teaching methods and the rapidly evolving technological advancements has become increasingly apparent. This disparity impacts not only the quality of education

provided but also the preparedness of students to enter the modern agricultural workforce. It is crucial to ensure that teachers are equipped with the necessary skills and knowledge to integrate innovative teaching methods and technological tools into their curriculum.

Agricultural education is a comprehensive field of study and practice that encompasses the teaching of agricultural sciences, natural resources, and land management through a blend of theoretical knowledge and practical experience. Agricultural education is the teaching of agriculture, natural resources, and land management through hands-on experience and guidance to prepare students for entry-level jobs or further education to prepare for advanced agricultural careers **(**Osborne & Dyer 2020). It involves the systematic instruction of agriculture and related subjects to equip learners with the necessary skills, knowledge, and attitudes to pursue careers in agriculture and to contribute to agricultural innovation and sustainability (Roberts & Ball 2021). Agricultural education encompasses formal and informal learning experiences aimed at enhancing the understanding of agricultural concepts, promoting sustainable agricultural practices, and encouraging leadership in the agricultural community.

Effective teacher training equips educators with the knowledge, skills, and competencies necessary to teach and facilitate learning in agricultural education. This includes staying updated with the latest advancements in agricultural practices and educational techniques (Cochran-Smith & Villegas, 2015). Teacher training refers to the process of equipping educators with the knowledge, skills, and competencies necessary to effectively teach and facilitate learning (Cochran-Smith & Villegas, 2015). In the context of agricultural education, this involves not only understanding agricultural principles but also being adept in modern teaching methodologies and technologies. Continuous professional development and training programs are crucial for teachers to stay updated with the latest advancements in agricultural practices and educational techniques. By focusing on creative and technological engagement, teacher training programs can foster a more dynamic and effective educational environment, ultimately leading to better outcomes for students and the agricultural sector as a whole.

Creative engagement in education involves using innovative teaching strategies that stimulate students' imagination and critical thinking. It includes project-based learning, problem-solving activities, and the incorporation of arts and creativity into the curriculum (Robinson, 2011). Sawyer (2011) considers it as the integration of creative processes and critical thinking into the learning experience, allowing students to connect new ideas with existing knowledge in innovative ways. It encourages a participatory and experiential approach to education, where students actively contribute to their own learning. Creative engagement is a critical aspect of modern education that seeks to make learning more dynamic, enjoyable, and effective by incorporating innovative and imaginative teaching methods (Beghetto & Kaufman 2010). By fostering creativity and critical thinking, educators can enhance students' intellectual curiosity and engagement, leading to a deeper and more meaningful learning experience. In agricultural education, creative engagement can help students better understand and apply agricultural concepts in real-world scenarios, fostering a deeper interest and motivation in the subject.

Technological engagement refers to the use of digital tools and platforms to enhance the teaching and learning experience. This includes the use of e-learning platforms, virtual simulations, and digital resources that provide interactive and immersive learning experiences. Technological engagement is the incorporation of digital tools and resources into the educational process to create interactive and personalized learning experiences (Selwyn 2011). This includes the use of computers, tablets, online platforms, and educational software to facilitate learning. Technological engagement is a key aspect of modern education that focuses on using digital tools and resources to enhance teaching and learning. By integrating technology into the educational process, educators can create more interactive, personalized, and effective learning experiences for students. For agricultural education, technological engagement can facilitate access to up-to-date information, virtual farm tours, and interactive modules that help students grasp complex agricultural processes and innovations (Means, et al 2014).

Enhancing teacher training for creative and technological engagement in agricultural education is essential for advancing the agricultural sector. By addressing the gaps in teacher training and embracing innovative teaching methods, educators can inspire and equip the next generation of agricultural professionals (Robinson, 2011). The importance of such initiatives is underscored by studies indicating that well-trained teachers who are adept at using technology can significantly improve student learning outcomes (Ingersoll, 2007). Therefore, investing in teacher training for creative and technological engagement is not just beneficial but essential for the advancement of agricultural education in Nigeria.

Who is a Teacher?

Agwu (2015) views a teacher as an individual who possesses the knowledge and methods capable of bringing about change and who must also have the willingness and ability to alter human behavior. Agwu and Ogbonnaya-Iduma (2016) describe a teacher as someone who transmits knowledge to help learners build, identify, and acquire skills necessary for life's challenges. Learning, particularly in educational settings, prepares students to solve societal problems. Despite the significant role of teachers in society, their contributions are often undervalued. Awotua-Efebo (2001) suggests that teachers can enhance the quality of education by making the curriculum engaging and inspiring students towards curiosity and self-directed learning. Education may open the doors to modernization, but it is the teacher who holds the key, serving as the central figure in the educational process.

Teachers facilitate the understanding of objects, ideas, events, or concepts for learners, acting as facilitators of learning. Obi (2017) describe teachers as representatives of society, judges, resource persons, helpers, ego supporters, group leaders, and parent surrogates, among other roles. Given their significant societal role, teachers are well-positioned to ensure learning and achievement within the Nigerian education system. Additionally, teachers must meet the minimum academic qualifications as set by the Teachers Registration Council of Nigeria (TRCN Act) to effectively and efficiently teach their subjects at the relevant educational level, complemented by the necessary pedagogical training to impart appropriate knowledge, attitudes, and skills to students.

Teachers are educational personnel who work with learners to facilitate their learning, making their role one of the most critical determinants of educational quality. To perform effectively, teachers must possess competent knowledge of their profession. Wokocha (2013) notes that in Nigeria, the Teachers Registration Council of Nigeria determines who qualifies as a teacher, the required knowledge and skills, and periodically raises these standards. Currently, the minimum requirement to be a teacher in Nigeria is the National Certificate in Education (NCE) or a Post Graduate Diploma in Education (PGDE) (FRN, 2013). However, Kolawole (2015) points out that recruiting individuals for teacher training poses a significant challenge, as those who do not meet admission requirements for more lucrative courses are often advised to transfer to faculties of education to become teachers. This practice affects the quality, commitment, and competence of future teachers from the point of admission through the training period.

Teacher Training Program

Teachers are known as national builders in the society. It is their core responsibility to give training to the new generation according to needs of the nation in the world. Training refers to the systematic process of enhancing the skills, knowledge, and competencies of individuals to perform specific tasks effectively (Desimone & Garet (2015). Training is a systematic process designed to enhance the knowledge, skills, and competencies of individuals to perform specific tasks effectively. It involves the development of both theoretical understanding and practical abilities through various forms of instruction and practice. Training can be applied in various contexts, including education, industry, military, healthcare, and more, to improve performance and ensure proficiency. Training is a fundamental component of teacher preparation and professional development. It enhances subject matter knowledge, develops pedagogical skills, promotes reflective practice, instills professional ethics, builds classroom management capabilities, encourages innovation, and supports continuous professional growth (Salas et al 2012). Investing in comprehensive training programs is essential for producing competent and effective teachers who can positively impact student learning and achievement.

Teacher training is designed to equip educators with the knowledge, skills, and pedagogical techniques necessary to effectively teach and manage classrooms. The training aims to develop teachers who can foster critical thinking, creativity, and problem-solving skills among students. It is the process of equipping prospective educators with the necessary knowledge, skills, and attitudes to effectively teach and manage classrooms. This includes theoretical instruction and practical experiences that prepare teachers to meet the diverse needs of students (Loughran, 2020). Darling-Hammond et al (2017) consider it as the systematic development of teaching skills and methodologies that enable educators to facilitate learning. It involves learning about curriculum design, instructional strategies, assessment techniques, and classroom management

Teacher training is not limited to initial education but includes ongoing professional development throughout a teacher's career. This perspective emphasizes the importance of lifelong learning and staying current with educational research, technology, and evolving pedagogical practices (Desimone & Garet, 2015). It includes hands-on teaching experiences such as student teaching, internships, and practicums. These experiences are critical for applying theoretical knowledge in real-

world classroom settings and for developing practical teaching skills. It's an induction program designed for newly qualified teachers. These programs provide support and mentoring during the early years of teaching, helping new educators transition into the profession and improve their practice (Ingersoll & Strong, 2018).

Objectives of Teacher Training

Teacher training programs are designed with several key objectives aimed at preparing educators to effectively facilitate learning and support student development. These objectives encompass various aspects of pedagogy, professional growth, and classroom management. The objectives of teacher training align with the goals outlined in the National Policy on education to ensure that teachers are adequately prepared to meet the educational needs of students and contribute effectively to national development (Adeyemi & Adeyinka 2013). Here are the objectives of teacher training as outlined in the Nigerian National Policy on Education (cited in Adeyemi & Adeyinka 2013):

Enhancing subject matter knowledge: Teacher training aims to deepen teachers' understanding of the subjects they will teach. This includes both content knowledge and pedagogical content knowledge to ensure accurate and comprehensive delivery of curriculum.

Developing pedagogical skills: Training programs focus on equipping teachers with effective instructional strategies, classroom management techniques, and assessment practices. This prepares teachers to meet the diverse learning needs of students.

Promoting professional ethics and standards: The policy emphasizes the importance of ethical behavior, professionalism, and adherence to educational standards among teachers. This includes fostering a commitment to integrity, equity, and inclusivity in education.

Fostering reflective practice: Teacher training encourages reflective practice, where educators engage in continuous self-assessment, collaborate with peers, and integrate new knowledge and insights into their teaching practice.

Supporting lifelong learning: The policy highlight the need for continuous professional development for teachers. This includes opportunities for further education, workshops, seminars, and other forms of professional development to update skills and knowledge.

Encouraging innovation and continuous learning Teacher training encourages educators to innovate in their teaching practices and stay abreast of developments in education. This includes integrating technology into lessons, exploring new teaching methodologies, and participating in professional development activities (Desimone & Garet, 2015).

These objectives highlight Nigeria's commitment to preparing competent and effective educators who can contribute positively to the development of the country's education sector and society at large.

Current Training Programs and their Limitations in Nigeria

In Nigeria, teacher training programs are essential for preparing educators to meet the challenges of modern education. However, these programs face several limitations that impact their effectiveness and the quality of education provided. Adeyemi & Adeyinka (2013) notes that the following are training programs in Nigeria

1. **Pre-Service Teacher Education**: This includes programs offered in colleges of education and universities, such as the Nigerian Certificate in Education (NCE) and Bachelor of Education (B.Ed.) programs. These programs aim to equip future teachers with subject knowledge and pedagogical skills.

2. **In-Service Professional Development**: Continuing education programs are provided for practicing teachers to enhance their skills and knowledge throughout their careers. These may include workshops, seminars, and online courses facilitated by government agencies, NGOs, and educational institutions.

3. **Teacher Induction Programs**: Some states and educational bodies implement induction programs for newly qualified teachers to support their transition into the profession. These programs often focus on classroom management, curriculum delivery, and professional ethics.

Limitations

1. Quality and relevance of curriculum: There is a concern about the outdated and theoretical nature of some teacher training curricula. Many programs do not adequately address current educational trends, technology integration, or practical classroom challenges.

2. Infrastructure and resources: Limited access to modern teaching aids, technology, and instructional resources hinders effective training. Many training institutions lack adequate facilities and resources needed to simulate real classroom environments.

3. Teacher shortages and overcrowded classes: Nigeria faces a shortage of qualified teachers, especially in rural areas. Additionally, overcrowded classrooms make it challenging for teachers to implement effective teaching strategies and provide individualized attention to students.

4. Inadequate funding and support: Teacher training institutions often suffer from inadequate funding, which affects the quality of programs and the professional development opportunities available to educators.

5. Quality assurance and monitoring: There is a need for improved quality assurance mechanisms to ensure that training programs meet national standards and effectively prepare teachers for the realities of the classroom.

Creative Engagement for Enhancing Agricultural Education Teacher Training

Creativity, as described by ILiello and Houghton (2008), involves the capacity to generate novel, valuable, and often unexpected ideas, solutions, or insights. It encompasses divergent thinking that breaks from traditional ideas, rules, and patterns across various domains such as arts, sciences, business, and everyday life. Creativity transcends existing boundaries to produce meaningful innovations, interpretations, and methods, driven by originality, progressiveness, and imagination. Valued for its role in fostering innovation, problem-solving, and cultural expression, creativity stands as a cornerstone of human achievement and societal advancement. Neriman and Gul (2023) further highlight creativity as the ability to generate original products, think innovatively, and create unique inventions by challenging conventional norms,

emphasizing its pivotal role in integrating technology and driving progress in the 21st century. Creativity fuels creative engagement by inspiring learners to approach learning with curiosity, openness, and a willingness to innovate. Creative engagement, in turn, provides the fertile ground where creativity can flourish, leading to transformative educational experiences and meaningful personal growth.

Sawyer (2011) view creative engagement as the integration of creative processes and critical thinking within the learning process, enabling students to connect novel ideas with existing knowledge in inventive ways. Creative engagement represents a pivotal element of contemporary education, aiming to enhance learning dynamics, enjoyment, and efficacy through the incorporation of imaginative and innovative teaching methodologies (Beghetto & Kaufman, 2010). By nurturing creativity and critical thinking, educators can cultivate students' intellectual curiosity and deepen their engagement, resulting in a more profound and enriching learning experience. In agricultural education, creative engagement plays a crucial role in helping students comprehend and apply agricultural concepts in practical contexts, thereby cultivating heightened interest and motivation in the subject matter.

Creative engagement holds significant importance in agricultural education teacher training as it enriches the learning experience and prepares educators to effectively teach and inspire students in agricultural sciences. Sawyer (2011) highlights the importance of creative engagement in agricultural education as:

Enhancing teaching effectiveness: Creative engagement strategies, such as project-based learning and experiential activities, enable agricultural educators to develop innovative teaching methods. These methods foster deeper understanding and application of agricultural concepts among students

Promoting practical skills development: By incorporating hands-on learning experiences and problem-solving activities, creative engagement helps teachers develop practical skills that are essential for teaching agricultural techniques and practices effectively.

Fostering critical thinking and problem-solving: Creative engagement encourages agricultural educators to think critically and develop solutions to complex agricultural challenges. This approach prepares them to guide students in applying analytical skills to real-world agricultural scenarios.

Cultivating innovation in agricultural practices: Creative engagement in teacher training encourages educators to explore innovative approaches to agricultural education. This includes integrating technology, sustainability practices, and entrepreneurship into the curriculum to prepare students for modern agricultural challenges.

Increasing motivation and engagement: Engaging agricultural educators creatively in their training enhances their motivation and enthusiasm for teaching. This enthusiasm translates into more engaging and dynamic classroom environments that inspire students to pursue careers in agriculture.

Creative Engagement Strategies

Creative engagement strategies for enhancing agricultural education teacher training programe involve innovative approaches that actively involve educators in dynamic, practical, and collaborative learning experiences. These strategies not only improve

teaching effectiveness but also ensure that teachers are well-equipped to inspire and educate future generations of agricultural professionals.

1. **Project-based learning:** Project-based learning has been shown to effectively prepare teachers by engaging them in authentic teaching experiences and fostering reflection on their instructional practices. As noted by Barron (2020) project-based learning engages teachers in real-world projects that require planning, research, and practical implementation. This method helps educators experience the benefits of hands-on learning and understand how to integrate similar projects into their own classrooms. It enhances teachers' ability to create meaningful, context-based learning experiences for students .
2. **Experiential learning:** Experiential learning involves immersing educators in practical, hands-on experiences that mirror real classroom challenges. Experiential learning is a direct, hands-on activities such as farm visits, fieldwork, and agricultural simulations. This approach allows teachers to gain practical experience and insights into agricultural processes and techniques. It fosters a deeper understanding of agricultural concepts and enhances the ability to teach these concepts effectively. Kolb, & Kolb (2018) observe that experiential learning not only prepares educators for the complexities of teaching but also encourages lifelong learning and professional development through reflective practice and active engagement with educational theories and methodologies.
3. **Collaborative learning communities:** Collaborative learning communities play a crucial role in teacher training programs by providing educators with opportunities to engage in collective inquiry, collaborative problem-solving, and shared professional learning experiences. (Wenger, McDermott, & Snyder, 2002) opine that establishing professional learning communities where teachers collaborate, share best practices, and support each other in professional growth is necessary in collaborative learning communitie**s**. Collaboration enhances teachers' problem-solving abilities and fosters a sense of community and shared purpose. Teachers can explore new instructional strategies, analyze student data, and reflect on their teaching practices in a supportive environment.
4. **Mentorship and coaching:** Mentorship and coaching are powerful strategies for enhancing teacher training programs by providing personalized support, guidance, and professional development opportunities tailored to individual educators' needs. Mentorship and coaching offer personalized guidance to teachers, helping them identify their strengths, areas for growth, and career goals. Through mentorship and coaching, educators receive targeted feedback and resources to improve their instructional techniques, classroom management skills, and pedagogical approaches. Mentors and coaches encourage teachers to engage in reflective practice, prompting them to critically analyze their teaching practices, identify effective strategies, and adjust their approaches based on student outcomes (Hobson, et. Al. 2009).
5. **Action research:** Action research serves as a creative and effective strategy for enhancing teacher training programs by integrating practical research activities with instructional practice (Sagor 2011). Encouraging teachers to conduct action research projects within their classrooms to explore innovative teaching methods and assess their effectiveness. Action research fosters a culture of continuous improvement and reflective practice. By incorporating these creative engagement strategies, agricultural education teacher training programs can enhance the

quality of instruction, promote innovative teaching practices, and ultimately improve student learning outcomes in agricultural education.

Technological Engagement Strategies for Enhancing Agricultural Education Teacher Training

Technological engagement plays a crucial role in enhancing agricultural education teacher training by integrating digital tools and platforms that support innovative teaching methodologies and improve learning. Clark (2020) outline the following as technological engagement for enhancing agricultural education teacher training

1. **Virtual simulations and farm management tools**: Incorporating virtual simulations and farm management software allows educators to provide hands-on training experiences without the need for physical farms, enhancing student engagement and practical learning. Virtual simulations provide educators with immersive, interactive environments where they can practice teaching agricultural concepts and strategies. These simulations replicate real-world scenarios, allowing teachers to experiment with different instructional approaches and receive immediate feedback on their teaching methods. Farm management demonstrate efficient farm operations and decision-making processes. Educators can use these tools to analyze data, simulate agricultural scenarios, and develop instructional materials that reflect current agricultural practices and challenges. These technologies facilitate experiential learning, improve instructional techniques, and prepare teachers to effectively teach agricultural concepts.
2. **Online learning platforms**: Utilizing online learning platforms facilitates flexible and accessible teacher training programs, enabling educators to access resources, participate in collaborative discussions, and receive feedback remotely. These platforms provide teachers with opportunities to access a wide range of resources, including instructional materials, videos, webinars, and interactive modules, tailored to agricultural education. These platforms often incorporate assessment tools and feedback mechanisms that help educators monitor their progress and evaluate their understanding of agricultural concepts and instructional strategies.
3. **Mobile apps for agricultural skills development**: Mobile applications offer interactive modules and tutorials that enhance teachers' and students' understanding of agricultural practices, promoting lifelong learning and skill development. Mobile apps have emerged as valuable tools for agricultural skills development, offering accessible and interactive platforms to enhance learning and professional growth among teachers in agricultural education. Mobile apps designed for agricultural skills development provide teachers with convenient access to a variety of resources, including tutorials, quizzes, videos, and reference materials. These apps often cover diverse topics such as crop management, livestock care, pest control, and sustainable farming practices, catering to the specific needs of agricultural education. These apps empower teachers to adapt their instructional strategies and incorporate innovative practices into their teaching to better prepare students for the complexities of modern agriculture.
4. **Remote sensing and precision agriculture technologies**: Integrating remote sensing technologies and precision agriculture tools enables teachers to teach advanced agricultural concepts, such as data-driven decision-making and sustainable farming practices, preparing students for modern agricultural

challenges. Remote sensing and precision agriculture technologies are revolutionizing agricultural education by providing educators with advanced tools to teach modern farming techniques and sustainable practices. Remote sensing technologies, such as satellites and drones, enable educators to collect high-resolution data on crop health, soil conditions, and environmental factors across large agricultural areas. By incorporating remote sensing and precision agriculture technologies into educational programs, institutions can prepare educators to leverage cutting-edge tools and practices in agriculture.

5. **Augmented reality (AR) and virtual reality (VR)**: AR and VR applications immerse teachers in virtual agricultural environments, allowing them to explore complex agricultural concepts and practice decision-making in simulated scenarios. AR allows educators to overlay digital information onto real-world environments, creating interactive learning experiences where teachers can demonstrate agricultural concepts and practices directly in the classroom or simulated farm settings. For instance, AR can simulate the growth stages of crops or illustrate the impact of environmental factors on agricultural production, providing educators with effective visual aids to enhance teaching. Educators can use VR simulations to train on machinery operation, demonstrate safety protocols, and provide virtual field trips to diverse agricultural environments, thereby enriching their practical knowledge and instructional skills. By incorporating AR and VR into teacher training programs in agricultural education, institutions can enhance the professional development of educators by providing them with immersive, interactive tools to refine their instructional techniques, deepen their understanding of agricultural concepts, and prepare them to effectively educate future generations of agricultural professionals.

Technological engagement strategies are pivotal in transforming teacher training programs within agricultural education, equipping teachers with the tools and skills necessary to thrive in modern teaching environments. The integration of virtual simulations, augmented reality (AR), online learning platforms, mobile applications, and precision agriculture technologies enriches instructional methodologies by providing immersive, interactive, and accessible learning experiences. Aluko, et al (2021) emphasizes that as technological advancements continue to evolve, their role in agricultural education remains essential for preparing teachers who can adapt to the dynamic challenges and opportunities within the agricultural sector, ultimately contributing to sustainable agricultural development and the future success of agricultural professionals worldwide.

Conclusion

Bridging the gap in enhancing agricultural education teacher training through creative and technological engagement is crucial for preparing educators to effectively meet the challenges and opportunities of modern agriculture. Integrating innovative strategies not only enhances instructional methodologies but also enriches educators' professional development and readiness to impart cutting-edge knowledge to students. These approaches also enhance educators' ability to teach complex concepts effectively but also foster collaborative learning environments where best practices and innovative ideas can be shared and implemented. By embracing these innovative strategies, educational stakeholders can bridge the gap in enhancing agricultural education teacher training, ensuring that teachers are equipped with the skills, tools, and mindset needed to prepare future generations of agricultural professionals who can innovate, adapt, and lead in a rapidly evolving agricultural landscape. This

holistic approach not only enhances educational quality but also contributes to sustainable agricultural development and global food security.

Recommendations

Hence it was recommended that:

1. Educational institutions and policymakers should prioritize investments in robust technological infrastructure to support the integration of virtual simulations, AR/VR, and online learning platforms into agricultural education curricula.
2. Continuous professional development programs should be tailored to empower educators with the skills and knowledge necessary to leverage new technologies effectively in agricultural education.
3. Encourage collaboration among teachers, industry experts, and researchers to co-create and implement innovative teaching methods and curriculum that reflect current and future agricultural trends.
4. Educational institutions should conduct ongoing research and evaluation to assess the impact of technological engagement strategies on teaching effectiveness, student learning outcomes, and the overall advancement of agricultural education.

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