Exploring the Role of Evaluation in Curriculum Design for Agricultural Science: Perspectives from Educational Measurement Experts

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Abstract. This study investigates how curriculum design for agricultural science education in Nigeria incorporates evaluation. The study acknowledges the value of efficient assessment techniques in improving field education outcomes. The study aims to investigate several methods of evaluation, pinpoint obstacles, and provide suggestions. A conceptual framework that incorporates evaluation-related theories and concepts is created. The framework emphasises how important it is to match instructional methodologies, assessment techniques, and learning objectives. The advantages of implementing assessment techniques at various phases of curriculum development are covered in the paper. In addition, issues like varied learning outcomes and the requirement for multidisciplinary approaches are examined, along with creative evaluation techniques to deal with these issues. With a focus on improved educational outcomes, curricular relevance, ongoing improvement, stakeholder participation, creative assessment techniques, and well-informed policy formulation, the research has implications for educational practice and policy. Long-term impact analysis, comparison studies, teacher competency evaluation, student views, online learning settings, and the effect on sustainable agriculture are some of the suggested future study avenues. In addition to offering insights for enhancing agricultural science education practices in Nigeria, this research advances knowledge of assessment in curriculum design.

Keywords: Evaluation, Curriculum design, Agricultural science education, Nigeria, Educational outcomes, Assessment methods, Stakeholder engagement

1. Introduction

Nigeria, a country with a substantial agricultural industry, is aware of the importance of curriculum design in agricultural science education. The agricultural sector, which also generates jobs, rural development, and food security, is vital to the country's economy. For the agriculture sector to succeed and grow, curriculum developers must consider the special demands of Nigerian students in addition to the sector's requirements (Adamu et al., 2022). Curriculum design is the process of creating educational programmes that include learning objectives, content selection, teaching strategies, and assessment methods. However, developing a curriculum alone is insufficient; evaluating its effectiveness is equally important. Evaluation methods provide useful data on whether the curriculum is meeting the demands of stakeholders and Nigerian students as well as achieving its stated goals (Akanmu, 2016).

Examining the ways in which assessment is included into Nigerian agricultural science curricula is crucial. It first helps educators and curriculum designers assess the effectiveness of the agricultural science curricula that are currently in use and determine what needs to be updated or changed. Evaluation provides incisive criticism on the degree to which learning objectives, assessment methods, and instructional styles align. By identifying any misalignments in the curriculum, educational outcomes for Nigerian students can be improved (Ayeni, 2012). Furthermore, the incorporation of assessment into curriculum design facilitates the identification of programme benefits and drawbacks, allowing educators to focus on the areas that require improvement. Additionally, it enables educators to monitor the growth of their students, identify their individual needs, and provide individualised support. By understanding the importance of evaluation in curriculum design, educators in Nigeria can improve the teaching and learning experiences of students studying agricultural science (Ishaya, 2022).

The primary objectives of this research in the Nigerian context are as follows:

- To investigate various assessment strategies used in Nigerian agricultural science

curriculum design. This entails investigating alternate evaluation techniques appropriate for the educational setting of Nigeria in addition to formative and summative assessment methods.

- To determine the particular difficulties and factors to be taken into account while assessing agricultural science programmes in Nigeria. This includes elements like the variety of farming practices found in the nation's many areas, the requirement for evaluation techniques that are appropriate for the setting, and the use of traditional agricultural knowledge.
- To make suggestions for improving Nigerian agriculture science curriculum design's assessment procedures. This entails making recommendations on how to match assessment techniques with learning goals and outcomes, taking the socioeconomic and cultural background into account, and supporting sustainable farming methods.

2. Theoretical Framework

The conceptual model of curriculum design and evaluation, modified for the Nigerian setting, will serve as the foundation for this study. The approach takes into consideration the distinct features of Nigeria's agricultural sector and educational system, emphasising the interaction between curriculum design, teaching methodologies, and evaluation systems. The theoretical framework takes into account the relevance and applicability of well-established ideas and concepts regarding curriculum design and evaluation to the Nigerian environment. These theories offer a framework for comprehending the function of evaluation in curriculum design and how to use it to improve agricultural science learning outcomes in Nigeria (Kay, 2016).

The design of curricula in Nigerian agricultural science education offers important insights into the ideas and procedures that direct the creation of educational initiatives in this area. We can better understand the variables impacting curriculum design and the tactics used to improve agricultural science education in Nigeria by analysing the body of existing material.

Several academic studies have emphasised the necessity of aligning the agricultural science curriculum with the unique demands and challenges of the Nigerian environment. Nigeria's agricultural sector is large and includes many subsectors, such as crop production, agribusiness, animal husbandry, and fisheries (Onyeneke, 2018). As a result, the curriculum design needs to take the nation's sustainable development objectives, market demands, and regional agricultural practices into account. The literature also emphasises how important it is for agricultural science curricula to combine academic understanding with real-world application. A significant portion of Nigeria's rural populace works in agriculture (Ikeh et al., 2014). Therefore, the curriculum should incorporate fieldwork, hands-on learning opportunities, and opportunities for students to apply their knowledge in real-world agricultural contexts. This approach ensures that graduates are prepared to effectively contribute to the agriculture sector and address the challenges that farmers face in the real world. Furthermore, teaching agricultural science calls for the use of multidisciplinary approaches. Agriculture is a broad field that requires expertise in biology, chemistry, economics, and environmental science. The curriculum design should encourage collaboration between other disciplines and incorporate interdisciplinary modules to provide students a thorough understanding of agricultural concerns. (Pandey et al., 2022)

The importance of including traditional agricultural knowledge in the curriculum is also emphasised by the literature. Nigeria is home to a multitude of cultural customs, many of which date back many years and have been used to sustain communities through farming (Barbieri et al., 2014). In order to preserve cultural legacy and increase the curriculum's relevance and effectiveness in addressing local agricultural challenges, traditional knowledge systems are incorporated into the curriculum.

Lastly, the importance of continuously assessing and improving Nigeria's agricultural science curriculum was emphasised. The agriculture sector is dynamic because of shifting consumer tastes, advances in technology, and environmental concerns. Therefore, the curriculum's design should be fluid and adaptive to enable frequent updates that consider emerging trends and challenges (Ajao et al., 2022). A review of the literature demonstrates the importance of curriculum design in Nigerian agricultural science education. It emphasises the significance of ongoing improvement, the necessity of multidisciplinary viewpoints, context-specific techniques, the integration of academic and practical knowledge, and traditional agricultural expertise (Yin et al., 2022). Curriculum designers can create educational programmes that adequately educate students for the Nigerian agriculture industry by utilising these ideas.

3. Evaluation in Curriculum Design

The utilisation of assessment methods and techniques in curriculum design offers significant insights into the various procedures employed to evaluate the efficacy of educational initiatives (Al-Musawi et al., 2022).

One evaluation technique that is frequently considered in curriculum design is formative assessment. It entails obtaining input from students as well as data on their development throughout time. Formative assessment methods including tests, group or individual projects, and class discussions offer insightful information on how well students are learning the material covered in the curriculum (Ekanem et al., 2019). Instructors can utilise this feedback to identify areas for improvement, adjust their teaching strategies, and provide targeted support to improve student learning results. Summative assessment is another tried-and-true evaluation method in curriculum design. Assessing the knowledge and skills of students at the end of a learning session is its primary goal. Traditional methods like as exams and tests are often used for summative evaluation (METİN, 2013). On the other hand, it was emphasised how crucial it is to include alternative assessment methods such presentations, portfolios, and performance-based evaluations. These alternate techniques enable the assessment of practical skills and the application of knowledge in the real world while offering a more thorough insight of students' abilities (Carney et al., 2018).

It was noted that curriculum design should incorporate peer and self-assessments in addition to formative and summative assessments (Ferris, 2015).

Through self-evaluation, students are encouraged to consider how they have learned so far, identify their advantages and disadvantages, and set goals for advancement. Peer assessment involves students evaluating the work or performance of their peers, which fosters collaboration and the development of critical thinking skills. These assessment methods not only provide many perspectives on students' development but also assist students in being more responsible and self-aware of their own academic journey (Afuwape, 2019).

A different piece highlights how important it is to incorporate a range of assessment methods into curriculum design. Multiple assessment techniques, including written tests, in-person interviews, and practical demonstrations, offer a more thorough and all-encompassing assessment of students' abilities. Teachers can better portray students' abilities and capture all facets of their learning by utilising a variety of evaluation tools (Ishaya, 2022).

Moreover, the part technology plays in assessment techniques. To improve the assessment process, more and more people are using computer-based tests, online tests, and simulation activities. Thanks to these technological developments, evaluations can now be interactive and adaptive, enabling customised learning experiences and individualised feedback (Alordiah, 2023; Ajao et al., 2022).

The literature review on assessment methods and techniques in curriculum design emphasises the significance of using a range of evaluation techniques, utilising technology, incorporating self- and peer-assessment, integrating alternative assessment methods, and combining formative and summative assessments. By using these strategies, curriculum designers can assess student learning outcomes more successfully and make well-informed judgements that will improve the process' efficacy.

4. Theoretical Perspectives on Evaluation

A theoretical framework for comprehending the various ways to assessment is provided by the evaluation in curriculum design, which incorporates a number of theories and concepts. We can learn more about the theoretical stances that guide curriculum design evaluation procedures by looking at these theories.

One prominent theoretical perspective is formative assessment. The notion that assessment should be an ongoing process that fosters and facilitates learning is the cornerstone of formative assessment. It focuses on providing feedback to students at every level of their education so they may recognise their strengths and weaknesses and take the necessary action to grow. This theory emphasises how important it is to utilise assessment as a tool to guide instruction and support students' growth. (Hondrich et al., 2016).

Summative evaluation, however, adopts a different stance. At the conclusion of a learning session, the assessment of pupils' knowledge and abilities is its main focus. Summative evaluation is frequently used to assess students' overall performance and gauge how well they have met learning objectives. According to this viewpoint, assessments serve as a tool for evaluating students' learning outcomes and passing judgement on their skills (Jasmine et al., 2016). Competency-based evaluation is another pertinent theoretical viewpoint. Competency-based evaluation, as opposed to standard grading systems, concentrates

on evaluating students' knowledge of particular abilities or skills. This viewpoint highlights how crucial it is to evaluate students' capacity to apply their knowledge in practical settings and satisfy predetermined performance standards. The concept that education should concentrate on helping students develop practical skills and getting ready for the needs of the working world is in line with competency-based evaluation (Mickelson et al., 2020).

Constructivist evaluation theories also stress how crucial it is to take into account students' past learning, experiences, and cultural backgrounds while conducting assessments. These ideas emphasise how assessments can create understanding and meaning while encouraging critical thinking and active participation. Constructivist viewpoints stress the need of contextualised, authentic assessment activities that mirror real-world circumstances and motivate students to make connections between what they have learned and their personal experiences (Sunzuma et al., 2022).

The degree to which an assessment assesses what it is supposed to measure and is in line with the learning objectives is referred to as validity. Conversely, the consistency and dependability of evaluation outcomes are referred to as reliability. These ideas are crucial to ensuring that assessments give precise and insightful data regarding students' learning objectives (Ajao et al., 2022).

A wide range of theories, including constructivism, competency-based assessment, formative assessment, summative assessment, and ideas of validity and reliability, are covered in the literature on theoretical perspectives on evaluation in curriculum design. Curriculum designers can choose the best assessment strategies and tactics to employ in their instructional programmes by having a thorough awareness of these theoretical stances. These viewpoints offer a framework for creating evaluations that support meaningful and genuine learning experiences for students and are in line with the targeted learning objectives.

5. Conceptual Framework for Curriculum Design and Evaluation

Table 1: Conceptual Framework for Curriculum Design and Evaluation

Theories and Concepts	Core Principles and Practices	Application in Curriculum Design and Evaluation
Student-Centered Approach	Recognize individual learner needs, abilities, and backgrounds.	Design curriculum that caters to diverse learners, provide differentiated instruction.
Formative Assessment	Ongoing feedback and support, monitor progress, guide instruction.	Employ various formative assessment techniques (quizzes, discussions, projects) to inform teaching strategies and student support.
Summative Assessment	Evaluate overall achievement, measure academic performance.	Utilize traditional methods (exams, tests) and alternative methods (performance-based assessments, portfolios) to evaluate learning outcomes.
Competency-Based Evaluation	Assess mastery of specific competencies and practical skills.	Identify key competencies, develop assessment criteria, and design tasks that reflect real-world application.
Constructivism	Contextualized and authentic assessment tasks, promote engagement.	Design assessments that connect to students' prior knowledge, encourage critical thinking, and provide opportunities for active learning.
Validity and Reliability	Ensure assessments measure intended outcomes, provide consistent results.	Establish assessment validity by aligning with learning objectives, ensure reliability by using standardized scoring criteria.
Technology Integration	Incorporate technology to enhance assessment methods.	Utilize computer-based assessments, online quizzes, and simulations for interactive and adaptive evaluations.
Continuous Improvement	Reflect on assessment results, make necessary adjustments.	Analyze assessment data, modify curriculum and instruction based on feedback to improve learning outcomes.
Ethical Considerations	Address ethical concerns in assessment practices.	Ensure fairness, equity, and confidentiality in assessments, consider cultural and contextual factors, and obtain informed consent when applicable.
Stakeholder Engagement	Involve stakeholders in the assessment process.	Collaborate with students, parents, educators, and industry professionals to gather diverse perspectives, gather feedback, and ensure assessment relevance.
Professional Development	Continuous learning for educators in assessment practices.	Provide training and support to educators on effective assessment strategies, data analysis, and interpretation for ongoing professional growth.

A theory that acknowledges each learner's unique requirements, skills, and background is the student-centered approach. It highlights the fundamental idea of creating a curriculum that offers individualised instruction and accommodates a range of learners. This method is used in curriculum design and evaluation by developing teaching tactics and resources that cater to each student's individual needs and learning preferences. It seeks to create an atmosphere that is learner-centered and encourages students to participate actively in their education.

Another theory is formative assessment, which entails monitoring students' progress, directing lessons, and giving them constant feedback and support. The fundamental idea behind formative assessment is to use a variety of methods, including talks, projects, and quizzes, to inform instructional tactics and offer students support. Formative assessment is essential to curriculum design and evaluation since it provides information about students' learning and development. It supports teachers in determining areas for growth, making well-informed decisions about their lessons, and giving pupils the assistance they need.

Comparatively, summative evaluation is more concerned with measuring academic performance and assessing overall success. It entails assessing learning outcomes using both conventional techniques, such exams and tests, and non-traditional techniques, like performance-based assessments and portfolios. Summative assessments are used in curriculum design and evaluation to give a thorough assessment of student accomplishment and to gauge how well the curriculum is accomplishing the intended learning outcomes.

A theory known as competency-based evaluation seeks to evaluate an individual's mastery of particular abilities and practical skills. It entails determining the most important competencies, creating evaluation standards, and creating projects that have practical applications. By incorporating competency frameworks into the curriculum, competency-based evaluation is used in curriculum design and assessment. It contributes to ensuring that students gain the abilities and competencies needed for their next career steps.

Constructivism is a paradigm that emphasises the importance of contextualised, genuine assessment tasks to promote engagement. When designing and evaluating curricula, constructivism is applied by making assessments that are connected to students' prior knowledge, encourage critical thinking, and provide opportunities for experiential learning. This approach ensures that assessments align with constructivist learning principles and facilitate meaningful comprehension.

Validity and reliability, two fundamental concepts in assessment, help to guarantee that tests measure the intended objectives and produce accurate findings. Maintaining validity and dependability is essential for both curriculum development and evaluation. It comprises specifying assessment criteria precisely, using standardised scoring processes, and aligning assessments with learning goals. This ensures that the

tests assess the things intended to be evaluated and produce results that are consistent and comparable.

Utilising technology to enhance assessment methods is the concept underlying technology integration. Technology integration is used in curriculum design and evaluation in a variety of ways, including as computer-based assessments, online assessments, and simulations. Because these tools provide interactive and adaptable evaluation procedures, the assessments they provide are more engaging and successful.

A core principle of continuous improvement is taking evaluation results into account and making necessary adjustments. Examining assessment results, identifying areas that require work, and modifying the curriculum and instruction in response to feedback are ways to achieve continuous improvement in curriculum design and evaluation. The curriculum is regularly modified to improve learning outcomes through this iterative process.

It is imperative to consider ethical considerations when performing assessments. When required, informed consent must be acquired; cultural and contextual factors must be taken into account; assessments must be carried out with the assurance of fairness, equity, and confidentiality. The implementation of fair, inclusive, and privacy- and rights-aware assessment techniques addresses ethical concerns in curriculum design and evaluation.

Stakeholder involvement is another important concept that emphasises involving stakeholders in the assessment process. This includes educators, parents, students, and businesspeople. Implementing stakeholder involvement in curriculum design and evaluation involves seeking out different perspectives, gathering feedback, and confirming the relevance of the evaluations. We can ensure that assessments consider the needs and expectations of all parties concerned by cooperating.

Professional development is a crucial strategy in evaluation methodologies that emphasises instructors' continuous learning. It is crucial to provide educators with assistance and training in data analysis, interpretation, and practical evaluation methods if they are to continue developing as professionals. Teachers will be equipped with the necessary skills to administer and evaluate tests with confidence if they get professional development in curriculum design and evaluation.

6. Relevance of this Conceptual Framework to Agricultural Science Curriculum Planners

The conceptual framework that was previously discussed in relation to curriculum design and evaluation is highly relevant for agricultural science curriculum planners. Agricultural science is a specialised discipline that requires a thorough understanding of scientific ideas in addition to practical skills and industry-specific background knowledge. By using the previously described theories, concepts, fundamental principles, and practices, agricultural science curriculum designers can ensure the creation of an all-encompassing and effective curriculum that meets the needs of students and aligns with the goals of agricultural education.

In agricultural science curriculum development, the student-centered approach is especially important. It is essential to consider each student's specific interests and career goals while developing a curriculum, as everyone has different demands, abilities, and backgrounds in the agricultural field. By tailoring the curriculum to the diverse learner profiles, agricultural science curriculum planners may create pertinent and captivating learning experiences that increase student motivation and achievement (Igbokwe, 2015).

Formative assessment is a crucial component of agricultural science curriculum development. Agricultural science teachers can employ ongoing feedback and support to monitor their students' progress, identify areas for improvement, and adjust their course. Through this kind of assessment, curriculum designers ensure that students have learned the ideas and skills of agricultural science while also providing them with the resources and instructional styles they need to meet their unique requirements.

Summative assessments are required in agricultural science curricula in order to evaluate students' overall performance and determine their level of achievement. Curriculum designers can use a range of assessment strategies, such as exams, tests, performance-based assessments, and portfolios, to properly evaluate students' knowledge and abilities. This information helps evaluate the effectiveness of the agricultural science curriculum and offers direction for future developments (Ishaya, 2022).

Competency-based evaluation is highly relevant to the development of agricultural science curricula since it assesses students' understanding of specific competencies and practical skills required in the agricultural sector. By identifying important abilities

and designing assessment tasks that reflect real-world applications, curriculum planners can ensure that the curriculum meets industry standards and prepares students for successful careers in agriculture.

Constructivism is particularly helpful for creating agricultural science courses because of its emphasis on real-world context and authentic assessment challenges. Curriculum designers can create exams that build on students' prior knowledge, encourage critical thinking, and provide opportunities for active learning to develop meaningful and relevant assessments that appropriately reflect the complexities of the agricultural economy. This approach promotes a deep understanding and useful application of agricultural science concepts and skills (Nwoke et al., 2022).

Ensuring the validity and dependability of exams is crucial while developing an agricultural science programme. By aligning assessments with learning objectives and implementing consistent scoring rules, curriculum designers may ensure that exams accurately assess students' knowledge and produce consistent, comparable outcomes. As a result, when evaluating the effectiveness of the agricultural science curriculum, the assessment data is more trustworthy and valuable.

Technology integration is highly relevant to the development of agricultural science curricula since it allows for the use of state-of-the-art evaluation procedures. By utilising computer-based examinations, online tests, simulations, and other technical tools, curriculum designers can create engaging and dynamic assessments that highlight the use of technology in the agriculture industry. This approach raises students' digital literacy and prepares them for technological advancements in the agriculture sector (Okeji, 2021).

One of the main tenets of agricultural science curriculum design is continuous development. Curriculum designers can continuously improve the curriculum to match the changing demands of the agriculture sector by considering assessment results, examining data, and making the required modifications. Through this iterative approach, the agricultural science curriculum is kept up to date, applicable, and efficient in preparing students for the opportunities and challenges of the sector (Sutrisno, 2021).

It is crucial to take ethical issues into account while developing an agricultural science programme. Promoting diversity and upholding students' rights requires ensuring assessments are fair, equitable, and

confidential as well as taking cultural and contextual elements into account. When necessary, curriculum designers must also secure informed consent from students in order to guarantee ethical evaluation procedures in the agricultural science curriculum (Samuel et al., 2022).

Finally, the creation of an agricultural science curriculum requires the involvement of stakeholders. Involving parents, instructors, experts from the agricultural sector, students, and other stakeholders guarantees that the curriculum takes into account the needs, expectations, and viewpoints of the agricultural community. In order to ensure that the agricultural science curriculum is relevant and applicable, curriculum planners can obtain insightful input by working together with stakeholders during the evaluation process.

7. Considerations on how the conceptual framework can be applied

Planners of agricultural science curricula should perform in-depth needs assessments in order to comprehend the unique requirements, passions, and professional aspirations of students pursuing agriculture. This will assist in adjusting the curriculum to fit the various learning profiles of the students and guarantee that it is relevant to their future employment.

A programme in agricultural science ought to balance academic understanding with applied capabilities. Curriculum designers may make sure that students gain a solid foundation in both the theoretical and practical facets of agricultural science by fusing scientific concepts with practical experiences.

The agricultural science curriculum must be in line with industry best practices and standards. It is recommended that curriculum planners be current with the most recent developments and developing trends in the agricultural sector in order to effectively integrate pertinent content and skills into the curriculum.

Field excursions, internships, and practical projects are examples of experiential learning activities that should be included in agricultural science curricula. Students will be able to use their knowledge in practical situations and have hands-on experience in a variety of agricultural settings as a result.

It is possible to monitor students' progress and give timely support and guidance by implementing formative assessment tools, such as frequent quizzes, conversations, and feedback sessions. programme

designers will be better able to pinpoint problem areas and modify the programme to suit the individual needs of each learner.

Case studies, research projects, and simulations are examples of authentic assessment tasks that can be integrated into the agricultural science curriculum. The development of pertinent capabilities will be ensured if these assignments force students to apply their knowledge and abilities in real-world situations and mirror real-world events (Nwoke et al., 2022).

Technology can be used to improve instructional strategies and assessment techniques in the creation of agricultural science curricula. Digital materials, virtual labs, and online platforms can all be used to give students interactive and interesting learning experiences.

Planners of agricultural science curricula should periodically assess the program's efficacy using data analysis, student input, and industry views. The evaluation approach ought to guide any necessary alterations and enhancements to guarantee that the curriculum stays current and in line with the changing demands of the agriculture sector.

Curriculum designers must ensure that the evaluation processes adhere to moral standards such cultural sensitivity, confidentiality, equity, and fairness. Teachers should acknowledge the diverse backgrounds and perspectives of their pupils while also taking ethical considerations into account when selecting educational materials and activities.

Collaboration with Stakeholders: Planning an agricultural science curriculum must involve all relevant parties, such as parents, educators, industry professionals, students, and members of the community. Their opinions and suggestions can offer insightful information about the requirements and standards of the agriculture sector, increasing the curriculum's applicability and efficacy.

8. Role of Evaluation in Curriculum Design for Agricultural Science

Evaluation is a crucial part of curriculum design to ensure that the agricultural science curriculum is current, efficient, and aligned with agricultural education goals. Through the use of theoretical perspectives and the conceptual framework, we may examine the role that evaluation plays in the development of agricultural science curricula and potential benefits.

Evaluation first helps curriculum designers assess the current state of agricultural science education and identify opportunities for improvement. By conducting needs assessments, gathering feedback from stakeholders, and analysing data, evaluators can gain valuable insights into the pros and cons of the curriculum. Curriculum designers can use this data as a starting point to produce lessons that satisfy student needs, adhere to industry standards, and highlight the most recent advancements in agricultural science (Ishaya, 2022).

In order to make sure that instructional strategies and assessment techniques are in line with the curriculum's learning objectives, evaluation is also essential. Assessors can make sure that learning objectives are SMART—specific, measurable, achievable, relevant, and time-bound—by carefully examining them. This alignment aids in the development of a cogent and integrated curriculum that directs the creation of teaching plans and assessment designs (Akanmu, 2016).

Practices for curriculum review offer various potential benefits at different phases of development. Evaluation aids in determining the essential knowledge domains and capabilities that must be included in the curriculum during the early stages of development. Evaluators can ascertain the attitudes, abilities, and knowledge that students need to develop in order to thrive in the agriculture sector by performing a thorough needs analysis (Okeji, 2021).

Continuous evaluation enables constant feedback and review during curriculum development. By using an iterative process, curriculum designers can make the necessary changes and enhancements based on feedback from stakeholders and evidence. In order to make sure that teaching strategies, learning activities, and instructional materials are effective in engaging students and achieving the desired learning objectives, evaluators evaluate them.

By incorporating assessment practices into the curriculum during its implementation phase, educators can keep an eye on students' progress and pinpoint areas that need improvement. Formative assessment techniques, like tests, discussions in class, and feedback sessions, give important information about how well students grasp the ideas and abilities of agricultural science. This data lets teachers make decisions about their lessons and adapt their pedagogy to each student's unique needs (ONOKPAUNU, 2023).

Summative assessments, which gauge students' overall performance at the conclusion of a course or programme, also heavily rely on evaluation. Evaluators guarantee the validity and reliability of the assessment results by employing standardised scoring standards and assessment tasks that correspond with the learning objectives. This data sheds light on the degree to which the curriculum successfully equips students for careers in agriculture.

Evaluation also facilitates the alignment of instructional methodologies, assessment techniques, and learning objectives. Evaluators can make sure that there is coherence and consistency between what is taught, how it is taught, and how it is assessed by regularly evaluating the alignment of the curriculum. This alignment helps guarantee that students are picking up the essential knowledge and abilities listed in the curriculum and improves the validity of assessment outcomes (Samuel et al., 2022).

9. Challenges and Considerations in Evaluating Agricultural Science Curricula

When evaluating agricultural science curriculum, there are a number of particular challenges and considerations that need to be made. The unique features of agricultural science education, which necessitate multidisciplinary approaches and integrate academic knowledge with practical application, are the cause of these challenges. By examining these issues and considering innovative strategies for assessment, we can successfully tackle these obstacles.

Assessing agricultural science courses is challenging due to the vast range of learning objectives. Agricultural science encompasses a wide range of subfields, such as soil science, crop science, animal science, and agricultural economics. It's probable that every subdiscipline has different learning goals and outcomes. Evaluators need to consider this diversity in order to develop assessment methods that effectively capture the distinct knowledge, skills, and competences associated with each sub-discipline (Brevik et al., 2022).

To get around this problem, assessors may combine formative and summative evaluation methods. Formative assessments, which encompass laboratory experiments, fieldwork, and hands-on demonstrations, can document the application of knowledge and skills in authentic scenarios. Summative assessments, such as written exams, oral presentations, and project reports, are used to determine how well students can synthesise and analyse information in addition to understanding theoretical concepts. Assessors can fully understand the learning objectives of their

students in agricultural science by using assessment strategies.

Another consideration while evaluating agricultural science curricula is the need for knowledge application in the real world. Students in agricultural science must apply what they learn in the classroom to real-world scenarios because the topic is hands-on. Traditional methods of assessment that just focus on theoretical comprehension may not accurately represent students' ability to apply what they have learned in practical situations (Ferand, 2022).

Assessors might consider this by using real-world scenario-based realistic assessment activities. This category can include case studies, research projects, problem-solving exercises, and simulations. Students can demonstrate their ability to apply their understanding of and competence in agricultural science to solve problems in the real world by using these assessment methods. In addition, assessors should consider industry partnerships, internships, and work-based learning opportunities. These provide students the chance to showcase their practical skills and receive feedback from industry experts.

Furthermore, the interdisciplinary nature of agricultural science creates an additional challenge for curriculum evaluation. Agricultural science integrates biology, chemistry, economics, environmental science, and other disciplines. A comprehensive approach considering the interrelationships and interactions among multiple disciplines is required to assess interdisciplinary learning outcomes (Pandey et al., 2022).

To get around this problem, evaluators can employ interdisciplinary evaluation methods and strategies. This may include cooperative learning experiences where students work in interdisciplinary teams to solve complex agricultural problems by applying their knowledge and skills from a variety of topic areas. Evaluators may also utilise scoring criteria or rubrics that are designed to assess interdisciplinary skills such as critical thinking, problem-solving, and cross-disciplinary communication. Assessors might focus on the integration of knowledge and skills from other disciplines to efficiently assess the interdisciplinary learning outcomes of agricultural science curriculum.

Innovative methods and strategies for evaluation can also help to resolve these problems. Assessment processes can be made better with the usage of technology. Examples of this include the use of online platforms for formative assessments, virtual simulations for practical skill evaluations, and digital portfolios to showcase interdisciplinary projects. Adaptive assessment systems allow you to customise assessments to each student's particular needs and learning style.

Incorporating teachers, students, and business professionals into the evaluation process may ensure that the results are relevant and in line with industry standards, as well as produce informative outcomes. Regular feedback loops and cycles for continuous improvement can be established in order to gather input and adjust the curriculum as necessary in response to the findings of evaluations.

10. Recommendations for Enhancing Evaluation in Agricultural Science Curriculum Design

To enhance the assessment processes in the creation of agricultural science curricula, several recommendations can be made. These guidelines aim to improve the alignment of assessment methods with learning objectives and outcomes, while also emphasising the importance of continuous assessment and feedback loops in curriculum design.

Clearly stated learning objectives and results are essential for agricultural science curricula. Assessors can create evaluation strategies that directly support these goals by outlining the knowledge and skills that students should possess. The effective measurement of the intended learning outcomes is ensured by this alignment of the assessment tasks.

To capture the numerous facets of learning, agricultural science courses should incorporate a wide range of evaluation tools. This category can include written exams, lab reports, fieldwork assessments, presentations, projects, and portfolios. Assessors can use a variety of ways to evaluate a wide range of knowledge and skill sets while accounting for the different learning styles and preferences of their students.

To enhance the practical application of knowledge, assessment methods should mirror real-world agricultural practices as closely as possible. This can involve incorporating fieldwork, industry internships, and case studies that require students to apply their knowledge to solve agricultural problems. By aligning assessments with authentic practices, evaluators can assess students' ability to transfer their learning to practical situations.

Agricultural science is an interdisciplinary field; thus, students have to incorporate knowledge from different fields. To take this multidisciplinary component into

consideration, assessors had to develop assessment methods that measure students' ability to integrate knowledge and skills from other disciplines. Teachers might utilise cooperative projects, interdisciplinary case studies, and problem-solving activities to assess how well their students have applied multidisciplinary techniques in agricultural science.

The design of an agricultural science curriculum must take continuous evaluation into account. This entails monitoring pupils' development on a regular basis and giving timely comments for development. Formative evaluations, like quizzes, group discussions, and one-on-one feedback sessions, can give continuous feedback and point out areas that require further assistance. The curriculum can be improved and adjusted iteratively in response to evaluation results. Educators, business people, students, and community people are among the stakeholders who must be involved for agricultural science curriculum design to be evaluated effectively. Stakeholder involvement allows assessors to obtain a range of viewpoints, comprehend industry demands, and guarantee curricular relevance. Stakeholders can offer insightful opinions on learning objectives, assessment strategies, and the general calibre of the curriculum.

Technology is a major factor in the enhancement of evaluation processes. Adaptive assessment methods, virtual simulations, and internet platforms can all provide interactive and personalised testing experiences. Technology may also be useful in the collection and analysis of data, enabling assessors to track students' progress, identify patterns, and make informed decisions to improve the curriculum.

Motivating students to contemplate and analyse themselves is an effective way to enhance the quality of evaluation procedures. By allowing students to reflect on what they have learned, evaluate their own progress, and create growth plans, teachers may promote metacognition and provide students the resources they need to take ownership of their education.

11. Key Takeaway

The most significant takeaway from this study is the significant influence of evaluation on curriculum design in Nigerian agricultural science education. By implementing effective evaluation strategies, teachers can ensure that learning objectives align with assessment methodologies, instructional strategies, and anticipated learning outcomes.
This study's primary contribution is its conceptual framework, which highlights the need of evaluation in

Nigerian agricultural science curricula. Through the integration of theories and concepts linked to evaluation, this framework aids in raising awareness of the significance of evaluation in enhancing educational outcomes. Teachers can ensure that students acquire the necessary knowledge and skills in agricultural science by integrating learning objectives and outcomes with instructional strategies and evaluation methods. Problems with agricultural science curriculum assessment, such as the need for multidisciplinary methods and different learning outcomes, can also be resolved with innovative evaluation strategies. The study's recommendations are intended to enhance assessment practices and, consequently, Nigeria's agricultural science curriculum.

12. Implications

There are various ramifications for educational practice and policy from the investigation of the function of evaluation in Nigerian agricultural science curricula.

Teachers may make sure that students in agricultural science education attain the intended learning outcomes by implementing efficient evaluation techniques and coordinating them with instructional strategies, learning objectives, and assessment systems. Better knowledge acquisition, skill development, and overall academic success may result from this.

A more authentic and relevant agricultural science curriculum can be created by incorporating assessment procedures into the curriculum development process at various stages. Students can acquire useful skills and information that are immediately applicable to the agricultural industry by integrating interdisciplinary approaches and matching evaluations with actual agricultural activities.

Ongoing monitoring and improvement are made possible by the curriculum design's emphasis on continuous evaluation and feedback loops. Through consistent evaluation of students' progress and comments, teachers may pinpoint areas that require attention and implement the required modifications to elevate the standard of agricultural science instruction.

Participation from a range of stakeholders in the assessment process, such as educators, professionals from the industry, students, and community members, can promote cooperation and guarantee that agricultural science courses are current and applicable.

Their opinions and suggestions can help create well-rounded, industry-aligned curriculum designs.

The recognition of obstacles and factors to be taken into account while assessing agricultural science courses opens the door to the creation and application of creative assessment techniques and plans. This can involve testing students' knowledge, abilities, and competencies in agricultural science through a variety of methods, such as multidisciplinary projects, industrial internships, and technology-enhanced assessment tools.

The research's conclusions and suggestions can guide the formulation and application of policies pertaining to agricultural science education in Nigeria. This research can be used by policymakers to ensure that standards and guidelines for curriculum design incorporate evaluation procedures and to support evidence-based decision-making.

13. Future Research

This investigation on the function of evaluation in Nigerian agricultural science curricula creates opportunities for more study in this area. Some possible topics of investigation for subsequent research include:

It can be insightful to look into how assessment procedures affect students' academic and professional outcomes over the long run. Evaluation techniques can be improved and refined by looking at how curriculum design evaluation methods affect students' achievement in postsecondary education or in their employment in agriculture.

Undertaking a comparative examination of assessment methodologies in agricultural science curricula across several areas or nations might offer a more comprehensive viewpoint. Evaluation processes in Nigeria can be advanced by comparing the efficacy of evaluation techniques, finding best practices, and comprehending contextual elements that affect evaluation in various educational systems.

It is possible to perform research to evaluate agricultural science instructors' proficiency in developing and utilising assessment strategies. Researching the abilities, dispositions, and information necessary for efficient evaluation in curriculum design can help professional development programmes and teacher training initiatives.

Investigating how students view and interact with evaluation in agricultural science courses can provide important information about their participation and academic performance. Assessing students' needs and preferences can be made easier by having a better understanding of how they view and react to various forms of evaluation.

Examining the function of assessment in online agricultural science education is essential given the growing popularity of online learning environments. Research can concentrate on finding efficient assessment techniques and approaches that are unique to online learning environments, taking into account elements like technology infrastructure, assessment authenticity, and student involvement.

Research on how curriculum design evaluation affects the promotion of sustainable agriculture practices can be very beneficial. Comprehending the ways in which assessment techniques can foster learners' comprehension of ecological responsibility, resource administration, and sustainable farming approaches helps advance the more general objective of sustainable growth within the agriculture industry.

References

Adamu, M., Idriss, I. D., & Sheriff, I. A. (2022). A Literature Review of Salam Contract for Agricultural Development in Gombe State, Nigeria. *Fitrah: Jurnal Kajian Ilmu-Ilmu Keislaman*, *8*(2), 223–236. https://doi.org/10.24952/fitrah.v8i2.5955

Afuwape, M., & Adeyi, F. A. (2019). Impact Assessment of Perceived Curriculum Factors on Nigerian Students' Behaviour in Basic Science and Technology. *Journal of Education in Black Sea Region*. https://doi.org/10.31578/jebs.v5i1.192

Ajao, H. O., Alegbeleye, I., & Westfall-Rudd, D. (2022). Curriculum design in an agricultural education program in Nigeria: Towards advancing career readiness. *Advancements in Agricultural Development*, *3*(2), 17–30. https://doi.org/10.37433/aad.v3i2.159

Akanmu, S. A., Olorundare, A. S., & Uphai, J. (2016). How Effective İs The Nigerian Senior School Agricultural Science Curriculum? A Survey Of Evidence From Content Development To Product. *European Scientific Journal, ESJ*. https://doi.org/10.19044/esj.2016.v12n4p395

Al-Musawi, A. S., Al-Ani, W., Amoozegar, A., & Al-Abri, K. (2022). Strategies for Attention to Diverse Education in Omani Society: Perceptions of Secondary School Students. *Education Sciences*, *12*(6), 398–

398. https://doi.org/10.3390/educsci12060398

Alordiah, C. O. (2023). Proliferation of Artificial Intelligence Tools: Adaptation Strategies in the Higher Education Sector. (2023). *Propellers Journal of Education*, *2*(1), 53-65. https://ijvocter.com/pjed/article/view/68

Ayeni, A. J., & Afolabi, E. A. (2012). Teachers' instructional task performance and quality assurance of students' learning outcomes in Nigerian secondary schools. *International Journal of Research Studies in Educational Technology*, *1*(1). https://doi.org/10.5861/ijrset.2012.v1i1.47

Barbieri, R. L., Gomes, J., Alercia, A., & Padulosi, S. (2014). Agricultural Biodiversity in Southern Brazil: Integrating Efforts for Conservation and Use of Neglected and Underutilized Species. *Sustainability*, *6*(2), 741–757. https://doi.org/10.3390/su6020741

Brevik, E. C., Krzic, M., Muggler, C. C., Field, D. J., Hannam, J. A., & Uchida, Y. (2022). Soil Science Education – A Multi-national Look at Current Perspectives. *Natural Sciences Education*, *51*(1). https://doi.org/10.1002/nse2.20077

Carney, P. A., Mejicano, G. C., Bumsted, T., & Quirk, M. E. (2018). Assessing learning in the adaptive curriculum. *Medical Teacher*, *40*(8), 813–819. https://doi.org/10.1080/0142159x.2018.1484083

Ekanem, J. T., Inyang, E. B., & Umoh, I. M. (2019). Impact of Formative Evaluation Modes on Learning Outcomes among Senior Secondary Agricultural Science Students in Uyo, Akwa Ibom State. *Journal of Education, Society and Behavioural Science*, 1–11. https://doi.org/10.9734/jesbs/2019/v32i430177

Ferand, N. K., DiBenedetto, C. A., Myers, B. E., & Barry, D. (2022). Implications of Science Illumination on Student Content Knowledge of Technical Floriculture and Core Scientific Ideas. *Journal of Agricultural Education*, *63*(2), 169–185. https://doi.org/10.5032/jae.2022.02169

Ferris, H., & Flynn, D. (2015). *Assessment in Medical Education; What Are We Trying to Achieve? 4*(2). https://doi.org/10.5430/ijhe.v4n2p139

Hondrich, A. L., Hertel, S., Adl-Amini, K., & Klieme, E. (2016). Implementing curriculum-embedded formative assessment in primary school science classrooms. *Assessment in Education: Principles, Policy &*

Practice, *23*(3), 353–376. https://doi.org/10.1080/0969594x.2015.1049113

Igbokwe, C. O. (2015). Recent Curriculum Reforms at the Basic Education Level in Nigeria Aimed at Catching Them Young to Create Change. *American Journal of Educational Research*, *3*(1), 31–37. https://doi.org/10.12691/education-3-1-7

Ikeh, M. E. i, Ifeanyieze, F. O., & Ugwuoke, C. U. (2014). Integration of Climate Change into the Senior Secondary School Agricultural Science Curriculum in Nigeria. *Atmospheric and Climate Science*, *04*(04), 614–621. https://doi.org/10.4236/acs.2014.44054

Ishaya, A., & Bello, D. L. (2022). An Appraisal on the Readiness of Secondary Schools toward the Attainment of Self-Reliance through Agricultural Science Education in North East Nigeria. *International Journal of Education, Learning and Development*, *10*(7), 28–38. https://doi.org/10.37745/ijeld.2013/vol10n7pp2838

Jasmine, S., Jacob, T. M., & Sathyendra, S. (2016). Vertical integration of basic science in final year of medical education. *International Journal of Applied and Basic Medical Research*, *6*(3), 182–182. https://doi.org/10.4103/2229-516x.186958

Kay, D. M., & Kibble, J. D. (2016). Learning theories 101: application to everyday teaching and scholarship. *Advances in Physiology Education*, *40*(1), 17–25. https://doi.org/10.1152/advan.00132.2015

METİN, M. (2013). Öğretmenlerin Performans Görevlerini Hazırlarken ve Uygularken Karşılaştığı Sorunlar. *Educational Sciences: Theory & Practice*. https://doi.org/10.12738/estp.2013.3.1452

Mickelson, S. K., Brumm, T. J., Hanneman, L. F., & Steward, B. L. (2020). *Using Engineering Competency Feedback To Assess Agricultural Engineering Curriculum*. https://doi.org/10.18260/1-2--12603

Nwoke, E., Uitto, A., & Lavonen, J. (2022). *A Comparative Study of Upper Secondary School Biology Curricula in Two Countries: Finland and Nigeria*. *33*(1), 38–49. https://doi.org/10.33828/sei.v33.i1.4

Okeji, C. C., & Mayowa-Adebara, O. (2021). An evaluation of digital library education in library and information science curriculum in Nigerian universities. *Digital Library Perspectives*, *37*(2), 102–118. https://doi.org/10.1108/dlp-04-2020-0017

Onokpaunu, M. O., & Ezenwafor, J. I. (2023). Needs Assessment of Teaching Methods used for Implementing Accounting Education

Curriculum in Federal Colleges of Education in South-South Nigeria. *Journal of Global Research in Education and Social Science*, 1–9. https://doi.org/10.56557/jogress/2023/v17i18086

Onyeneke, R. U., Nwajiuba, C. A., Emenekwe, C. C., Nwajiuba, A. O., Onyeneke, C. J., Ohalete, P., & Uwazie, U. I. (2019). Climate change adaptation in Nigerian agricultural sector: A systematic review and resilience check of adaptation measures. *AIMS Agriculture and Food*, *4*(4), 967–1006. https://doi.org/10.3934/agrfood.2019.4.967

Pandey, S., Justement, L. B., & Taylor, R. (2022). Incorporating Immunology into the Undergraduate Curriculum to Promote Interdisciplinary Science Education. *Journal of Immunology*, *208*(1_Supplement), 106.04-106.04. https://doi.org/10.4049/jimmunol.208.supp.106.04

Samuel, O. A., Sani, A. U., & Oluwatosin, A. V. (2022). *Assessment of Teaching Effectiveness of Science Ethical Issue Concepts in Basic Science and Technology Curriculum in Junior Secondary School, Gombe State*. *2*(2), 250–258. https://doi.org/10.4314/kje.v2i2.31

Sunzuma, G., Zezekwa, N., & Munakandafa, W. (2022). Pre-service teachers' preparation program: Is it responsive to the constructivist school curriculum? *Journal of Mathematics and Science Teacher*, *2*(2), em012–em012. https://doi.org/10.29333/mathsciteacher/12205

Sutrisno, N. T. A., Zar'in, F., & Salehcah, S. (2021). *Local Content Curriculum Model for Early Childhood Scientific Learning*. *15*(1), 81–100. https://doi.org/10.21009/jpud.151.05

Yin, S., Guo, F., Yu, Y., Li, Y., & Ullah, K. (2023). *Practical teaching method innovation decisions related to labor and reading at agricultural colleges based on entropy-fuzzy AHP combination weights*. *8*(4), 7641–7661. https://doi.org/10.3934/math.2023383