Contemporary Educational Researches Journal

Volume 15, Issue 4, (2025) 199-206

www.cerj.eu

Assessing the alignment of the biology unified examination with the secondary school curriculum

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Suggested Citation:
Yoade, F. B., Babatimehin, T. & Olanikawo, R. (2025). Assessing the alignment of the biology unified examination with the secondary school curriculum. *Contemporary Educational Research Journal*, *15*(4), 199-206. https://doi.org/10.18844/cerj.v15i4.9828

Received from March 8, 2025; revised from September 17, 2025; accepted from November 1, 2025.

Selection and peer review under the responsibility of Assoc. Prof. Dr. Deniz Ozcan, Samsun Ondokuz Mayıs University, Türkiye.

Abstract

This study investigated the extent to which the Unified Examination aligns with the senior secondary school Biology curriculum and evaluated its effectiveness in assessing both theoretical knowledge and practical skills. The research was motivated by growing concerns about the validity of standardized assessments in reflecting curricular goals and students' scientific competencies. A descriptive survey research design was adopted, involving 50 Biology teachers and 250 students selected through simple random sampling. Data was collected using a validated questionnaire titled the Evaluation of Biology Unified Examination Questionnaire. Descriptive analyses were conducted to determine the degree of alignment and adequacy of assessment practices. The findings revealed that the Unified Examination moderately reflects the content of the Biology curriculum but insufficiently captures practical skill development. The study concludes that while the Unified Examination serves as a useful tool for evaluating theoretical understanding, it requires improvement to adequately assess experimental and process skills. These insights are valuable for curriculum planners and examination bodies seeking to enhance assessment quality in science education.

Keywords: Assessment; Biology curriculum; practical skills; secondary education; unified examination.

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1. INTRODUCTION

The Unified Examination in Osun State, Nigeria, as managed by the State Ministry of Education, serves as a central assessment tool for secondary education, aimed at harmonizing standards, ensuring accountability, and driving curriculum compliance across all public and approved private schools. Education systems worldwide rely on evaluation to determine the extent to which students achieve learning outcomes and to evaluate the overall effectiveness of teaching strategies. In Nigeria, assessments are typically categorized into two forms: teacher-made examinations and Standardized examinations. The Osun State Unified Examination, introduced by the Osun State Ministry of Education, falls under the latter category. It aims to provide a unified framework for evaluating students' knowledge, skills, and competencies across public secondary schools in the state. By standardizing examinations, the state seeks to minimize variations in assessment quality and ensure fairness and uniformity in measuring students' academic performance (Adeyemo et al., 2020).

Biology, as a fundamental science subject in secondary schools, occupies a significant position in the Nigerian educational system. It is not only a gateway to numerous science-based careers but also contributes to the development of scientific literacy among students (Okebukola & Jegede, 2019). Effective assessment of Biology is, therefore, crucial to ensuring that students acquire the necessary theoretical and practical knowledge to meet societal and academic demands. However, concerns about the quality of Biology education in the areas of Teachers' competence and students' achievement in Nigerian schools remain prevalent, with stakeholders questioning whether standardized examinations like the Osun State Unified Examination adequately assess students' understanding of Biology concepts (Ogundele et al., 2021). One of the primary goals of standardized examinations is to ensure that students across diverse schools are assessed using uniform criteria (Prater et al., 2024; Liu et al., 2024). This approach can potentially reduce discrepancies caused by differences in teachers' grading standards and school-specific assessments (Olaniyi & Adebayo, 2022). However, critics argue that such examinations often prioritize theoretical knowledge over practical application, particularly in subjects like Biology, which require direct laboratory experiences to reinforce learning (Ajibola et al., 2021). In addition, the design and administration of standardized examinations have been reported to face challenges, including poor alignment with the curriculum, lack of fairness, and insufficient consideration of students' varying abilities and learning contexts (Olawale & Alade, 2019).

Previous studies have highlighted the significant role of curriculum alignment in ensuring the effectiveness of standardized assessments (Yespolova et al., 2025). For instance, research by Uche and Eze (2021) found that when examination questions closely align with curriculum objectives, students demonstrate better performance and higher engagement in learning. Conversely, a misalignment between assessment content and instructional delivery may lead to low performance and a lack of interest in the subject (Tenekeci & Uzunboylu, 2020). It is, therefore, essential to evaluate the Osun State Unified Examination to ascertain whether its contents align with the senior secondary school Biology curriculum.

1.1. Purpose of the study

The main purpose of this study was to evaluate the Biology Unified Examination conducted by the Ministry of Education in Osun State. Specifically, the study sought to:

- Examine the extent to which the Osun State Unified Examination aligns with the senior secondary school Biology curriculum.
- Evaluate the adequacy of the Unified Examination in assessing both theoretical knowledge and practical skills in Biology.

The study also sought to answer the following research questions:

RQ1- To what extent does the Osun State Unified Examination align with the senior secondary school Biology curriculum?

RQ2- How adequate is the Unified Examination in assessing both theoretical knowledge and practical skills in Biology?

2. METHOD AND MATERIALS

2.1. Participants

The study adopts a descriptive survey research design. The population comprised Biology teachers and students in senior secondary schools, Osun State. The study sample consisted of 50 biology teachers randomly selected from 25 schools, averaging two teachers per school, and 250 biology students from 25 schools, average of 10 students per school. A multistage sampling technique was used to select the respondents. From the three senatorial districts in Osun State, one senatorial district was randomly selected. From the senatorial district selected, five Local Governments were randomly selected, and five schools each were randomly selected from the five Local Government Areas selected, making a total of 25 schools.

2.2. Data collection instrument

A well-constructed and self-developed questionnaire titled "Evaluation of Biology Unified Examination Questionnaire" (EBUEQ) was used to elicit responses. The reliability coefficient of 0.76 was obtained using the split-half method. The study considered the ethos for carrying out behavioral research, such as the protection of participants' safety, privacy, and dignity during and after the research fieldwork. The written consent of each participant was secured using a consent form designed with emphasis on the voluntariness of participating in the study.

3. RESULTS

Table 1

Demographic information of teachers

Variable	Units	Frequency	Percent (%)
Gender	Male	18	36.0
	Female	32	64.0
Years of Teaching Experience	1-5	15	30.0
	6-10	25	50.0
	11-15	10	20.0
Highest Academic Qualification	B.Sc	35	70.0
	M.Ed	0	0.0
	NCE:	15	30.0

Table 1 presents the demographic profile of Biology teachers in the study. The majority of the respondents were female (64.0%), while male teachers made up 36.0% of the sample. Regarding years of teaching experience, half of the teachers (50.0%) had between 6–10 years of experience, followed by 30.0% with 1–5 years, and 20.0% with 11–15 years. Notably, none of the respondents had more than 15 years of teaching experience.

In terms of academic qualification, 70.0% of teachers held a Bachelor of Science (B.Sc.) degree, while the remaining 30.0% possessed NCE or equivalent qualifications. No teacher in the study area was reported to have a Master's degree (M.Sc.Ed.), indicating that while the majority have a university-level qualification, there is still room for higher academic advancement in this professional group.

Table 2

Demographic information of students

Variable	**Units**	**Frequency**	**Percent (%)**
Gender	Male	98	39.2
	Female	152	60.8
Class	SS I	75	30.0
	SS II	175	70.0
Age	Below 15	70	28.0
	15-17	155	62.0
	18 and above	25	10.0

Table 3 shows the demographic characteristics of the student respondents. Female students accounted for 60.8% of the total sample, while male students comprised 39.2%, indicating greater female participation in the study. The majority of students (70.0%) were in SS2, which is often a pivotal year for preparation toward external examinations. Most students (62.0%) were within the age range of 15–17 years, aligning with the typical age group for senior secondary school students in Nigeria.

3.1. Question one: To what extent does the Osun State Unified Examination align with the senior secondary school Biology curriculum?

To answer this question, items in Section B of the teacher's questionnaire were designed to elicit information on how well the Osun State Unified Examination aligns with the senior secondary school Biology curriculum. All the items in this section were positively structured, and they were graded using a four-point Likert scale as follows:

Strongly Agree (SA) = 4 , Agree (A) = 3, Disagree (D) = 2 Strongly Disagree (SD) = 1

Each respondent's answers were assigned numerical values based on this scale. The mean and standard deviation for each item were calculated, and a summary table was created to represent the teachers' collective perception. A mean score of 2.50 serves as the decision benchmark. Responses with a mean less than 2.50 indicate disagreement with the item, which implies a low extent of alignment. Conversely, responses with a mean greater than 2.50 indicate agreement, signifying a moderate to high extent of alignment, depending on how close the mean is to the maximum value of 4.00.

For this study, the mean values were grouped and interpreted as follows:

1.00 – 1.99 = Low Extent

2.00 – 2.99 = Moderate Extent

3.00 – 4.00 = High Extent

If more respondents agree with the items, it indicates a high extent of alignment between the Unified Examination and the Biology curriculum. However, if more respondents disagree, it reflects a low or moderate extent of alignment depending on the pattern of responses across items. The summary of the responses is presented in Table 3.

Table 3

Teachers' responses to the alignment of the unified examination with the biology curriculum

S/N	Item Statement	Mean	SD	Extent
1	The Unified Examination aligns with the senior secondary school Biology curriculum.	3.24	0.65	High Extent
2	All topics in the Biology curriculum are adequately covered.	2.88	0.74	Moderate Extent
3	The examination reflects the curriculum's learning objectives.	3.10	0.70	High Extent
4	Practical and theoretical objectives are incorporated into the exam.	2.95	0.72	Moderate Extent
5	The examination encourages comprehensive curriculum teaching.	3.12	0.68	High Extent
6	Some essential topics are often neglected in the exam.	2.40	0.80	Moderate Extent
7	It prepares students for WAEC/NECO.	3.30	0.60	High Extent
8	The exam questions reflect the depth of the Biology syllabus.	2.76	0.78	Moderate Extent
9	Teachers find it easy to align teaching with the exam.	2.60	0.75	Moderate Extent
10	The exam emphasizes critical areas of the curriculum.	3.05	0.69	High Extent
	Grand Mean:	**2.89**	**0.71**	

Table 3 indicates the extent to which the Osun State Unified Examination aligns with the senior secondary school Biology curriculum based on teachers' responses. The results in Table 2 reveal that teachers agreed with most of the items listed, which include: "The Unified Examination aligns with the senior secondary school Biology curriculum," "The examination reflects the curriculum's learning objectives," "The examination encourages comprehensive curriculum teaching," "The Unified Examination prepares students adequately for WAEC/NECO," and "The examination emphasizes critical areas of the curriculum."

These items all had mean scores greater than 2.50, indicating that respondents perceived a high extent of alignment between the examination and the curriculum. However, some items such as "All topics in the Biology curriculum are adequately covered," "Practical and theoretical objectives are incorporated into the exam," "Teachers find it easy to align their teaching plans with the exam format," and "The examination questions reflect the depth required by the syllabus" had mean scores between 2.50 and 2.99, which signifies a moderate extent of alignment. One notable item, "Certain essential topics are often neglected in the examination," recorded a mean score below 2.50, indicating low alignment in that specific area.

This pattern of responses implies that while the Unified Examination generally reflects the curriculum and supports its major goals, there are still areas that need improvement, particularly in ensuring full topic coverage and integrating neglected curriculum components. The overall Grand mean score of 2.89, compared to the decision mean of 2.50, confirms that the Unified Examination aligns moderately based on the comparison with the benchmark. However, curriculum planners and examiners may need to re-evaluate item construction and content coverage to strengthen full alignment across both the theoretical and practical domains.

3.2. Research question two: How adequate is the Unified Examination in assessing both theoretical knowledge and practical skills in Biology?

To answer this question, items in Section C of the teacher's questionnaire were used. This section contains 10 positively stated items aimed at gathering responses on the assessment of theoretical knowledge and practical skills by the Osun State Unified Examination in Biology. The items were rated on a 4-point Likert scale: Strongly Agree (SA) = 4, Agree (A) = 3, Disagree (D) = 2, Strongly Disagree (SD) = 1

Table 4

Teachers' responses to the assessment of theoretical and practical skills

S/N	Item Statement	Mean	SD	Remark
1	The Unified Examination adequately tests students' theoretical knowledge.	3.20	0.62	Agree
2	Students are tested on real-life applications of biological principles.	2.84	0.71	Agree
3	Practical-oriented questions are included in the examination.	2.60	0.78	Agree
4	The examination encourages the use of laboratory experiments in teaching.	2.30	0.83	Disagree
5	The questions assess students' ability to solve biological problems.	2.95	0.73	Agree
6	Theoretical questions in the examination vary in complexity.	3.10	0.67	Agree
7	Practical components like experimental design are emphasized.	2.20	0.82	Disagree
8	The examination format motivates teachers to focus on practical aspects.	2.40	0.77	Disagree
9	The examination balances theoretical and practical aspects of the curriculum.	2.55	0.74	Agree
10	It prepares students for practical assessments in external exams.	2.70	0.69	Agree
	Grand Mean	**2.68**	**0.77**	

Table 4 shows teachers' responses regarding how well the Osun State Unified Examination assesses both theoretical and practical aspects of Biology. The results reveal that respondents generally agreed that the exam assesses theoretical knowledge adequately, with items such as "The exam tests theoretical knowledge" (Mean = 3.20) and "Theoretical questions vary in complexity" (Mean = 3.10) receiving positive responses.

However, items related to practical aspects, such as "The examination encourages laboratory experiments" (Mean = 2.30), "Experimental design is emphasized" (Mean = 2.20), and "Teachers are motivated to focus on practical aspects" (Mean = 2.40), were rated below 2.50, indicating disagreement among teachers on these points.

This suggests that while the examination is perceived to assess theoretical content reasonably well, it does not fully reflect the practical skills component of the Biology curriculum.

4. DISCUSSION

The study examined the alignment and adequacy associated with the Osun State Unified Examination in Biology within senior secondary schools in Osun State. The discussion of findings is presented according to the two research questions that guided the study.

The findings from the first research question indicate that the Osun State Unified Examination aligns, ranging from a moderate to high extent, with the senior secondary school Biology curriculum. Teachers responded positively to items that evaluated whether the examination captures the core objectives of the Biology curriculum. Specifically, the examination was seen to align well with the intended learning outcomes, emphasize critical areas of the curriculum, and prepare students adequately for external examinations such as WAEC and NECO. The highest-rated items included statements about the alignment of the examination with curriculum objectives (Mean = 3.24), the encouragement of comprehensive teaching (Mean = 3.12), and preparation for national standardized exams (Mean = 3.30).

However, the study also uncovered that some key curriculum elements, particularly practical skills and full topic coverage, are not consistently reflected in the examination structure. For example, the statement that "certain essential topics are often neglected in the examination" received a mean score below the benchmark (Mean = 2.40), indicating teacher dissatisfaction with content breadth and representation. Similarly, the moderate scores (2.60–2.95) for items relating to topic coverage, depth, and teacher alignment with the examination suggest gaps in implementation.

These findings reflect the conclusions drawn by Okebukola (2015), who argued that curriculum fidelity is compromised when examinations fail to represent the full range of competencies and domains prescribed in national syllabi. Incomplete alignment between curriculum and assessments often leads to selective teaching, where educators prioritize testable topics at the expense of holistic student development. In the same vein, the moderate extent of alignment observed in this study suggests that while the Osun State Unified Examination has been successful in capturing cognitive objectives (knowledge, comprehension, application), it does less to address affective and psychomotor domains, particularly in terms of scientific skills acquisition. This is consistent with the findings of Aina and Ayodele (2022), who observed that Nigerian science curricula are frequently undermined by assessments that disproportionately focus on theoretical understanding while neglecting practical, inquiry-based learning objectives.

Findings from the second research question reveal that the Unified Examination is perceived to be more effective in assessing theoretical knowledge than practical competencies in Biology. Teachers agreed that the examination includes a range of theoretical questions that vary in complexity and assess students' conceptual understanding and problem-solving abilities (Mean = 3.20 and 2.95, respectively). These findings suggest that the cognitive demands of the Biology curriculum are being met to a reasonable degree.

However, serious inadequacies were identified in the examination's ability to assess practical skills. Items such as "The examination encourages the use of laboratory experiments in teaching" (Mean = 2.30), "Practical components like experimental design are emphasized" (Mean = 2.20), and "The examination motivates

teachers to focus on practical aspects" (Mean = 2.40) all fell below the decision mean of 2.50, indicating a widespread concern about the marginalization of hands-on laboratory work in the assessment process.

These findings are supported by Ahmed and Abimbola (2020), who argued that the current examination system in Nigeria fails to authentically measure scientific practices, leading to what they term "practical theory," where students memorize procedures without engaging in real experimentation. Udo and Udofia (2014) similarly found that many practical questions in Nigerian science exams are abstracted into paper-based formats, thus diluting the experiential and inquiry-based learning intended in science curricula.

Moreover, Ogunniyi et al. (2023) posited that an overemphasis on written examinations not only affects how science is taught but also discourages teachers from investing in laboratory-based activities due to perceived irrelevance to student grades. The results from this study reinforce this concern and suggest the urgent need for assessment reforms that better reflect practical competencies. Without such reforms, the examination system will continue to reward rote learning over scientific inquiry, undermining one of the foundational goals of science education.

5. CONCLUSION

Based on the findings, the study concluded that the Osun State Unified Examination is partially effective in aligning with the Biology curriculum and evaluating student learning. It covers theoretical content reasonably well. However, the assessment demonstrates limited emphasis on practical and inquiry-based components that are essential for developing scientific reasoning and problem-solving skills. This partial alignment suggests the need for curriculum and assessment reforms that integrate both conceptual understanding and hands-on competencies to achieve a more comprehensive evaluation of students' biological knowledge and skills.

Based on the findings of the study, it is recommended that the Ministry of Education and relevant examination bodies revise the structure of the unified examination to place greater emphasis on practical components, including performance tasks and scenario-based laboratory interpretations. Schools should also be adequately equipped with functional laboratories, sufficient consumables, and modern instruments to support effective Biology instruction and assessment. In addition, education authorities need to establish robust monitoring mechanisms to ensure that the Biology curriculum is properly implemented and that practical activities are consistently conducted. Furthermore, Biology teachers should be provided with regular professional development opportunities, particularly through workshops that emphasize laboratory pedagogy, curriculum alignment, and innovative strategies for delivering practical content in contexts where resources are limited.

Conflict of Interest: The authors declare no conflict of interest.

Ethical Approval: The study adheres to the ethical guidelines for conducting research.

Funding: This research received no external funding.

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