



AN ASSESSMENT OF LECTURERS' ADHERENCE TO BLOOM'S TAXONOMY IN CONSTRUCTING VALID AND RELIABLE EXAMINATION QUESTIONS IN JIGAWA STATE COLLEGES OF EDUCATION

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Abstract

This paper aims to evaluate the Lecturers' adherence to Bloom's taxonomy in constructing valid and reliable examination questions in Jigawa State Colleges of Education. This concerns the issue of the alignment of semester examination questions with Bloom's Taxonomy of cognitive objectives regarding the extent to which lecturers in Nigerian Colleges of Education apply these principles in assessment practices. Based on the above, three purposes and three research questions were formulated. A mixed-methods design was employed, which combines both Content analysis of randomly sampled 50 semester exam question papers across disciplines, coded by Bloom's cognitive levels from knowledge to Synthesis, and Structured questionnaires. Data were analysed using descriptive statistics (quantitative) and thematic analysis (qualitative). The major findings of the study indicate a disproportionate focus on lower-order cognitive skills (knowledge and comprehension) over higher-order skills (Analysis, Evaluation, and synthesis). Lecturers cited limited training and time constraints as barriers to adherence. Questions often lacked construct validity due to

misalignment with learning outcomes. Lastly, some recommendations were made, such as lecturers should ensure that the semester exam questions reflect the cognitive level of the learning outcomes, the question papers should be thoroughly checked and vetted by an expert at the departmental and school level before being taken to moderation.

Keywords: Assessment, Bloom's Taxonomy, Valid and Reliable, Examination Questions Colleges of Education.

Introduction

Assessment quality is considered the most determinant factor of educational effectiveness and the overall quality of education, particularly in teacher training institutions. Examination questions, as key instruments of assessment, must be carefully constructed to be both valid and reliable. In Nigeria, Colleges of Education are mandated by the National Commission for Colleges of Education (NCCE) to deliver a curriculum that fosters not only content mastery but also higher-order cognitive and pedagogical skills among pre-service teachers (NCCE, 2019). When examination questions reflect the Bloom's taxonomy, they support the National Policy on Education's call for "functional, relevant, and qualitative" education that cultivates critical thinking, problem-solving, and innovation (Federal Republic of Nigeria [FRN], 2013). Therefore, the construction of valid and reliable assessment instruments that align with nationally endorsed frameworks, such as Bloom's Taxonomy, is considered very necessary.

Bloom's Taxonomy, developed by Benjamin Bloom and colleagues, is a widely recognized framework that categorizes cognitive skills from lower-order thinking (such as remembering and understanding) to higher-order thinking (such as analysing, evaluating, and creating). The taxonomy serves as a guide for educators in crafting examination questions that promote comprehensive cognitive development, encouraging students to engage in critical thinking and problem-solving beyond rote memorization. Adhering to Bloom's Taxonomy in examination construction ensures that assessments are aligned with learning outcomes. Using Bloom's Taxonomy as a guide for constructing examination questions encourages educators to design assessments that foster deep learning, critical thinking, and problem-solving abilities among students. It also helps align assessment items with instructional objectives, ensuring a balanced distribution across cognitive levels, which enhances both the validity and reliability of tests (Bloom, 1956; Rajeev Ranjan, 2024). Therefore, the appropriate use of Bloom's taxonomy, which classifies cognitive processes from remembering to creating in examination construction, enhances its validity and reliability.

Validity, in this study, refers to the extent to which examination questions accurately measure the intended learning outcomes specified in course syllabi and national curriculum standards. A valid assessment aligns with both the content (coverage of key topics) and cognitive (Bloom's levels) domains of the curriculum. Reliability, on the other hand, denotes

the consistency and stability of assessment results over time and across raters or items (McMillan, 2022). Moreover, the construction of valid and reliable examination questions is essential for accurately measuring students' learning outcomes. When lecturers construct questions that predominantly target lower-order thinking (e.g., recall), the assessment lacks construct validity because it fails to capture higher-order competencies that will improve professional teaching delivery (Okebukola, 2021). However, the above three concepts (Bloom's taxonomy, validity, and reliability) form a triadic framework: Bloom's Taxonomy informs the cognitive structure of assessment tasks, while validity and reliability serve as quality indicators of whether those tasks measured the intended outcomes stated in Colleges of Education curriculum as mandated by the NCCE.

Colleges of Education are higher institutions of learning set up for teacher education training under the supervision of the National Commission for Colleges of Education (NCCE). Colleges of Education are defined as specialized tertiary institutions devoted primarily to teacher education and professional development. According to Law Insider (2025), a College of Education is an educational institution dedicated to training individuals to become competent teachers by equipping them with the necessary pedagogical knowledge, methodological skills, and ethical grounding to effectively deliver instruction in schools. The College of Education focuses on producing teachers prepared to engage with primary and secondary school curricula and pedagogies. The Nigerian Academic Forum (2023) emphasizes that these colleges are instrumental in improving the quality of education through specialized teacher training, research in education, and community service.

The conceptual foundation of this study comprises three interrelated concepts: Bloom's Taxonomy of Cognitive Objectives, assessment validity, and assessment reliability. **Bloom's Taxonomy:** Bloom's Taxonomy serves as the primary conceptual lens for analyzing the cognitive demand of examination questions. Originally developed by Bloom, Engelhart, Furst, Hill, and Krathwohl (1956) and later revised by Anderson and Krathwohl (2001), the taxonomy categorizes cognitive processes into six hierarchical levels: Remember, Understand, Apply, Analyse, Evaluate, and Create. The revised version emphasizes active cognition and distinguishes between knowledge dimensions and cognitive processes, offering a more nuanced framework for instructional and assessment design.

Bloom's Taxonomy of Educational Objectives was originally conceived by Bloom et al. (1956) as a framework for classifying cognitive levels, and substantially revised by Anderson and Krathwohl (2001) to reflect contemporary understanding of how learners process and apply knowledge. The revised taxonomy organizes cognitive processes into six hierarchical levels. These are: Remember, Understand, Apply, Analyse, Evaluate, and Create, each representing increasing intellectual demand and supporting the development of higher-order thinking (Krathwohl, 2002).

Bloom's Taxonomy is not treated merely as a classification tool but as the core cognitive benchmark for evaluating the quality of examination questions in Colleges of Education. It

is integrally linked to the two foundational pillars of assessment quality: validity and reliability. Specifically, the taxonomy provides the criterion for determining whether examination items reflect the full range of intended learning outcomes, particularly the higher-order thinking skills emphasised in the Revised National Policy on Teacher Education (NCCE, 2023).

Validity

Validity refers to the extent to which examination questions accurately measure the intended learning outcomes specified in course syllabi and national curriculum standards (AERA, APA, & NCME, 2014). A valid assessment aligns with both the content (coverage of key topics) and cognitive (Bloom's levels) domains of the curriculum. When lecturers construct questions that predominantly target lower-order thinking (e.g., recall), the assessment lacks construct validity because it fails to capture higher-order competencies that are central to professional teaching practice (Okebukola, 2021).

Reliability

Reliability in educational assessment refers to the consistency and dependability of scores produced by a test or assessment instrument. A reliable assessment yields similar results under consistent conditions, meaning that if the same group of students is assessed at different times or by different raters, their scores should be stable and repeatable. The reliability of test scores is the extent to which they are consistent across different occasions of testing, different editions of the test, or different raters scoring the test taker's responses. This consistency in educational assessments often informs important decisions about students' academic progress, placement, and instructional needs. This denotes the consistency and stability of assessment results over time and across raters or items (McMillan, 2022). If an assessment is unreliable, the results may misrepresent students' true abilities, leading to inappropriate interventions or unfair judgment. This study is grounded in Constructivist Learning Theory and Cognitive Theory of Learning, both of which underpin the rationale for using Bloom's Taxonomy in assessment design.

Constructivist Learning Theory (Vygotsky, 1978; Bruner, 1996) posits that learners actively construct knowledge through engagement with meaningful tasks and social interaction. From this perspective, assessment should not merely test memory but provide opportunities for learners to demonstrate understanding, apply concepts in new contexts, and reflect critically on their knowledge processes that correspond directly to the upper levels of Bloom's Taxonomy. In teacher education, constructivist-aligned assessments help pre-service teachers internalize pedagogical content knowledge and develop adaptive expertise (Darling-Hammond et al., 2022).

Cognitive Theory of Learning emphasizes the role of mental processes such as encoding, retrieval, and metacognition in knowledge acquisition (Mayer, 2021). Bloom's Taxonomy operationalizes this theory by providing a scaffolded progression from basic recall

to complex cognitive operations. When assessments mirror this progression, they support cognitive validity, the degree to which test tasks engage the same mental processes required in real-world teaching (Pellegrino et al., 2016).

These theories are institutionalized in Nigerian policy through frameworks like the National Teachers' Policy (FRN, 2022), which advocates for "learner-centered, inquiry-based, and reflective" assessment practices. The Minimum Standards for Teacher Education (NCCE, 2023) further stipulate that assessment instruments must "measure cognitive, affective, and psychomotor domains and promote higher-order thinking skills." Thus, the theoretical expectation is that lecturers, as curriculum implementers, will design examinations that reflect these cognitive and constructivist principles.

Several empirical studies have examined the extent to which lecturers in Nigerian tertiary institutions adhere to Bloom's Taxonomy in constructing examination questions, particularly within teacher training institutions

Yusuf and Salisu (2022) conducted a mixed-methods study across three Colleges of Education in Northern Nigeria (Kano, Kaduna, and Bauchi) to explore lecturers' implementation of outcome-based education principles. Their findings revealed that most lecturers had a limited understanding of Bloom's Taxonomy and tended to design examination questions that emphasized recall and comprehension. Despite national policy expectations, assessments rarely engaged higher-order cognitive skills. However, the study relied primarily on self-reported data and interviews, without conducting a systematic content analysis of actual examination scripts. Moreover, it did not include institutions in Jigawa State, leaving a regional evidence gap.

Another study conducted by Bello and Musa (2020), they analyzed 600 examination questions from Colleges of Education in Kaduna State using Bloom's Taxonomy as a coding framework. They found that 68% of questions targeted the "Remember" level, 22% the "Understand" level, and only 10% combined across the four higher-order categories (Apply, Analyse, Evaluate, Create). Its scope was confined to Kaduna, limiting generalizability to other North-Western states like Jigawa.

This study bridges that gap by empirically evaluating the alignment between policy-prescribed cognitive standards (via Bloom's Taxonomy) and actual examination practices, thereby contributing to both theory (by testing the applicability of cognitive and constructivist frameworks in Nigerian tertiary education).

Statement of the Problem

The construction of valid and reliable examination questions is essential for accurately measuring students' learning outcomes. In Jigawa State Colleges of Education, lecturers are responsible for designing examination questions that should comprehensively evaluate students' knowledge and cognitive abilities. However, there appears to be a lack of consistent adherence to Bloom's Taxonomy in the construction of these questions. This inconsistency

raises concerns about the validity and reliability of the assessments, potentially compromising the quality of education and the accurate evaluation of students' cognitive skills. Many examination questions tend to focus excessively on the lower levels of Bloom's Taxonomy, such as knowledge, recall, and understanding, while neglecting higher-order cognitive skills like analysis, evaluation, and creation. These issues may result in assessments that fail to reflect the full spectrum of learning outcomes, leading to unreliable and invalid measures of student achievement. However, evidence suggests that there may be gaps in lecturers' adherence to this framework, potentially affecting the validity and reliability of examinations and, consequently, student performance and learning quality.

While several studies have examined lecturers' use of Bloom's Taxonomy in Nigerian tertiary institutions, none have specifically investigated the same topic in Jigawa State Colleges of Education. This study addresses that gap through a mixed-methods empirical design. The study aims to empirically assess the extent to which lecturers in Jigawa State Colleges of Education adhere to Bloom's Taxonomy when constructing examination questions, and to examine the challenges affecting its possible use.

Research Questions

Based on the above purposes, the following research questions were posed.:

1. To what extent do the lecturers in Colleges of Education adhere to Bloom's Taxonomy when constructing examination questions?
2. What is the distribution of examination items across lower-order and higher-order cognitive domains?
3. What are the challenges facing the lecturers in the construction process?

Methodology

Research Design

This study adopted a mixed-methods approach. A mixed-methods design is a situation in which both qualitative and quantitative methods are used in the process of collecting data in the conduct of particular research. In this research, a descriptive survey research design (quantitative method) was complemented by content analysis of past question papers (qualitative method) to empirically assess lecturers' adherence to Bloom's Taxonomy in constructing valid and reliable examination questions in Jigawa State Colleges of Education.

Population and Sample

The population for this study comprises all 153 lecturers who are involved in setting examination questions across various departments in Jigawa State College of Education and Legal Studies, Ringim. The sample size of 111 lecturers was determined using Taro Yemani's formula for sample size. On the other hand, the sample of 60 question papers was sampled from different departments for content analysis.

\Sampling Techniques

A multi-stage sampling technique was used in conducting the study. At the first stage, the proportionate sampling technique was used to select an appropriate sample size of lecturers as well as the question papers from different departments of the college. This is because some departments have a higher number of lecturers than others. At the second stage, simple random sampling was used accidentally to select the appropriate sample from each department to ensure an equal chance of representation across disciplines.

Data Collection Instruments

A structured questionnaire, “Lecturers’ Adherence to Bloom’s Taxonomy in Examination Construction Questionnaire (LABT-ECQ)” was used to collect the quantitative data from the lecturers, and “Bloom’s Taxonomy Coding Rubric (BTCR)” was used for document analysis of the past question papers as an instrument for data collection for the conduct of this study. A questionnaire was administered to gather quantitative data on the lecturer’s adherence to Bloom’s Taxonomy in examination question construction, as well as challenges encountered. At the same time, the researchers used “Bloom’s Taxonomy Coding Rubric (BTCR)” For document analysis on 60 sampled examination question papers for the 2023/2024 first and second semester examinations across the selected departments.

Data Analysis

Data collected from the questionnaires were coded and analysed using SPSS. Descriptive statistics, including frequencies, percentages, means, and standard deviations) was used to summarize lecturers’ adherence as well as the challenges they are facing in adopting Bloom’s Taxonomy in their question construction. Document analysis of examination questions involved classifying each question according to the cognitive levels of Bloom’s Taxonomy and evaluating the distribution of questions across the lower-order and higher-order cognitive levels. The result from the structured interview was used for the integration of results into the general findings of the study.

However, the researchers used the following categories of means obtained from the analysis of the questionnaire was used in making decision and interpretations.

Mean = 3.50 and above, high adherence, and High challenges

2.50 – 3.49 moderate adherence and moderate challenges

Below 2.50 low adherence and low challenges.

Results

The Demographic information of Respondents comprises 111 lecturers, where 102 were male, while nine (9) of them were female. The majority of the sampled lecturers (62.2%) had 11–15 years of teaching experience, followed by 27.9% with 6–10 years. This suggests that

most respondents are moderately experienced. Furthermore, the qualification of the sampled lecturers showed 64.0% possess a Master's degree, while 20.0% hold a Bachelor's degree and 16% hold a PhD degree. This implies that most lecturers are academically qualified to engage in instructional and assessment activities. The results of this study were presented in accordance with the research questions as follows:

Research Question 1: To what extent do the lecturers in Colleges of Education adhere to Bloom's Taxonomy when constructing examination questions?

Table 1: Mean Ratings on Lecturers' Adherence to Bloom's Taxonomy

Item	Median	SD	Decision
I consciously consider Bloom's Taxonomy when constructing questions	2.79	0.82	Moderate
My questions reflect balance across cognitive levels	2.41	0.68	Low
I include higher-order thinking questions	1.87	0.82	Low
I use appropriate action verbs aligned to Bloom's levels	1.81	0.78	Low
I review questions to align with learning outcomes	1.96	0.96	Low
I consider content coverage and cognitive demand	1.65	0.48	Low
I have adequate knowledge of Bloom's Taxonomy	1.55	0.64	Low
Grand Mean	2.01	—	Low

From Table 1 above, the findings revealed that lecturers demonstrate an overall low level of adherence to Bloom's Taxonomy in constructing examination questions, with a Grand Mean = 2.01. Although lecturers moderately reported that they consciously consider Bloom's Taxonomy when constructing questions, with a mean of 2.79, while other indicators show low adherence.

Research Question 2: What is the distribution of examination items across lower-order and higher-order cognitive domains?

. The distribution of items across the six cognitive levels is presented in Table 2 below:

Table 2: Distribution of Examination Items by Cognitive Level

Cognitive Level	Frequency	Percentage (%)
Remembering	51	20.9
Understanding	120	49.2
Applying	44	18.0
Analyzing	19	7.8
Evaluating	7	2.9
Creating	3	1.2

Total	244	100.0
Cognitive Level	Frequency	Percentage (%)
Remembering	51	20.9
Understanding	120	49.2
Applying	44	18.0
Analyzing	19	7.8
Evaluating	7	2.9
Creating	3	1.2
Total	244	100.0

A total of 244 examination items extracted from 60 question papers were analysed using the Bloom's Taxonomy coding rubric. The results from Tables 2 and 3 above indicate that the majority of examination items were concentrated within the lower-order cognitive domains, accounting for 88.1% of the total items analysed.

Table 3: Summary Distribution of Cognitive Domains

Category	Frequency	Percentage
Lower-Order (Remembering, Understanding, Applying)	215	88.1
Higher-Order (Analysing, Evaluating, Creating)	29	11.9
Total	244	100.0

Among these, the understanding level alone constituted the highest proportion, 49.2%, followed by remembering 20.9% and applying, 18.0%. In contrast, only 11.9% of the items were categorized under higher-order cognitive levels. Specifically, analysing accounted for 7.8%, evaluating 2.9%, and creating 1.2% of the total items. This distribution clearly demonstrates a very low proportion of higher-order items, which suggests that examination questions rarely require students to engage in critical thinking, problem-solving, or creative reasoning.

Research Question 3: What challenges do lecturers encounter in constructing Bloom-aligned examination questions?

Table 4: Mean Ratings on Challenges Affecting Bloom's Taxonomy Adherence

Item	Mean	SD	Decision
Difficulty in generating higher-order questions	1.86	0.51	Low
Time constraints	2.18	0.73	Low
Large class size	2.41	0.51	Moderate
Limited training in test construction	3.16	0.37	High
Lack of institutional moderation	3.05	0.84	High
Insufficient teaching resources	3.23	0.44	High
Grand Mean	2.65	—	Moderate

The findings reveal that lecturers experience a moderate level of challenges in constructing Bloom-aligned examination questions, with a Grand Mean = 2.65. However, the nature of the challenges varies across different factors. The most significant challenges identified were: insufficient teaching resources with a mean = 3.23, limited training in test construction, and inadequate institutional moderation. These factors were rated high, indicating that they are the major constraints affecting lecturers' ability to adhere to Bloom's Taxonomy. On the other hand, factors such as difficulty in generating higher-order questions (Mean = 1.86), time constraints (Mean = 2.18) were rated low, suggesting that lecturers do not strongly perceive them as major barriers, while large class size (Mean = 2.41) was rated moderate.

The results from the questionnaire indicated that lecturers demonstrated a low level of adherence to Bloom's Taxonomy (Grand Mean = 2.01). This self-reported data suggests that lecturers only moderately consider Bloom's Taxonomy and rarely incorporate higher-order cognitive levels in their examination questions. This finding is strongly supported by the document analysis results, which revealed that 88.1% of examination items were concentrated within the lower-order cognitive domains, while only 11.9% reflected higher-order thinking skills.

The consistency between these two data sources indicates a high level of convergence, suggesting that lecturers' perceptions of their practices align with the actual structure of the examination questions they construct. This reveals a coherent pattern across all data sources that lecturers report low adherence to Bloom's Taxonomy, while examination questions confirm low cognitive-level diversity.

Discussion

Lecturer's adherence to Bloom's Taxonomy in constructing examination questions

The findings of this study revealed that lecturers demonstrated a low level of adherence to Bloom's Taxonomy in constructing examination questions (Grand Mean = 2.01). Although some lecturers reported that they consciously consider Bloom's Taxonomy in their examination construction. This finding is consistent with the reviewed study of Idowu and Esere (2017), which reported that lecturers in Nigerian tertiary institutions often rely on recall-based questions due to familiarity and ease of construction. Similarly, Adegoke (2019) found that limited assessment literacy significantly constrains lecturers' ability to incorporate higher-order cognitive skills into examination items.

The document analysis revealed that 88.1% of examination items were concentrated within lower-order cognitive domains, while only 11.9% represented higher-order thinking skills. The dominance of the understanding level (49.2%) further highlights the emphasis on comprehension-based questions. This result strongly corroborates earlier empirical findings of Audu and Umar (2020), who found that examination questions in Colleges of Education were predominantly limited to knowledge and comprehension levels, with minimal representation of analytical and evaluative skills. Similarly, Muriithi (2018) reported that only a small proportion of examination items in teacher-training institutions reflected higher-order cognitive processes. Therefore, the current findings confirm that the limited inclusion of higher-order questions may undermine both the validity and reliability of examination outcomes in the studied Colleges of Education.

The study revealed that lecturers face moderate challenges, with the most significant factor being limited training in test construction, with a mean = 3.16, insufficient teaching resources, and a lack of institutional moderation. These findings are in strong agreement with the reviewed studies of Adegoke (2019), which emphasized that inadequate training in assessment practices is a major barrier to effective item construction. Similarly, Audu and Umar (2020) identified a lack of professional development opportunities and weak institutional support as key factors affecting lecturers' adherence to assessment standards. This contrasts slightly with Idowu and Esere (2017), who identified time constraints as a significant factor. However, the present finding suggests that the issue may not be primarily due to time or individual inability, but rather to systemic factors such as lack of training and institutional support.

Integration of Findings

The integration of findings from the questionnaire and document analysis reveals a strong convergence. Lecturers' self-reported low adherence to Bloom's Taxonomy is consistent with

the observed dominance of lower-order cognitive questions in examination papers. This alignment strengthens the validity of the findings.

Conclusion and Recommendations

This study has examined the lecturers' adherence to Bloom's Taxonomy in the development of valid and reliable examination questions, which are fundamental for effective educational assessment and student learning outcomes in Jigawa State Colleges of Education. The findings reveal that many lecturers used lower-order cognitive questions in their assessment. The research also highlights key challenges faced by lecturers, such as limited training, resource constraints, and institutional support gaps.

1. Colleges should organize regular workshops and training programs on Bloom's Taxonomy and principles of valid and reliable test construction to enhance lecturers' skills and knowledge.
2. College management should develop and enforce clear assessment guidelines mandating balanced representation of cognitive levels in examination questions, ensuring comprehensive assessment coverage.
3. Colleges should establish peer-review mechanisms for examination question papers at each school level to improve the quality of questions through collaborative evaluation and feedback.
4. Lecturers should devote themselves to applying the knowledge acquired during the workshops and seminars in constructing their test items.
5. Colleges should provide lecturers with access to assessment design resources, sample question banks, and technological tools to aid effective exam construction.
6. Colleges should implement systematic monitoring and evaluation for proper checking and moderating examination questions to ensure alignment with cognitive objectives, validity, and reliability.

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