

Are They Ready? Assessing Requirements Engineering Readiness of Final-Year Computer Science Students in the AI Era

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Abstract—Artificial intelligence (AI) is transforming software development and redefining requirements engineering (RE) practices and demanding new competencies from emerging software professionals. This study assesses the readiness of final-year computer science students for RE practice in the AI era. A quantitative survey of 124 students at Ahmadu Bello University, Nigeria, examined their understanding of RE concepts, familiarity with RE tools, awareness of AI-assisted RE techniques, and confidence in applying RE in practice. The results indicate moderate preparedness. Students demonstrated strong understanding of traditional RE activities, particularly functional and non-functional requirements specification, but weaker competence in requirements prioritisation, traceability, and agile-based RE practices. Familiarity with industry-standard RE tools was low, and awareness of AI-driven RE techniques was limited, despite widespread informal use of general-purpose AI tools. Confidence was higher for conventional RE tasks than for tool-supported and AI-assisted activities. Nevertheless, students expressed a strong need and willingness for further training. The findings highlight gaps between academic RE education and evolving industry demands, underscoring the need for more practical, tool-oriented, and AI-integrated RE curricula.

Index Terms—Requirements Engineering; Software Engineering Education; Artificial Intelligence; AI-assisted RE; Student Readiness; RE Tools; Curriculum Design

I. INTRODUCTION

The rapid integration of Artificial Intelligence (AI) into software development is transforming how software systems are conceived, designed, and delivered. Within this evolving landscape, Requirements Engineering (RE) remains a cornerstone of successful software development, ensuring that stakeholder needs are effectively captured, analyzed, and translated into functional solutions. As highlighted in prior research [1] [2], RE serves as the qualitative backbone of software engineering, upon which all subsequent phases depend. The RE process demands strong analytical, communication, and collaboration skills, as engineers must work closely with clients and cross-functional teams to elicit, specify, validate, and manage requirements effectively [2].

As AI-driven approaches increasingly support and automate RE tasks, such as requirements elicitation, analysis, prioritization, and validation, the expectations placed on future software

engineers are shifting significantly. Over the past two decades, researchers have proposed numerous tools, techniques, and automation methods to enhance RE effectiveness [3]–[6]. However, despite these advances, evidence continues to show poor RE practices in the software industry [7]. Many software project failures are still attributed to inadequate RE processes and competencies [1], suggesting that RE-related tasks are either poorly defined within organizations or performed by individuals lacking the required knowledge and skills [8]–[10]. Furthermore, there remains limited empirical evidence regarding the specific knowledge, skills, and competencies industries expect from professionals performing RE-related roles, often referred to as requirements engineers [11].

These limitations are further amplified in the context of AI-based systems, as the process of building AI-based software differs from traditional software development approaches, making it more challenging to apply existing techniques and tools [12]. Using existing requirements engineering practices when dealing with unexplainable or unpredictable systems has introduced new issues and challenges, including challenges in defining requirements and the emergence of new requirements, such as those related to data and ethics [13].

Undergraduate computer science programs are designed to provide students with a broad foundation in computing, covering programming, systems analysis, software engineering, and emerging technologies such as AI. However, despite this broad academic exposure, many final-year students may have limited practical experience with AI-assisted RE tools and Agile-based RE practices, which are becoming standard in modern software projects. This potential gap raises important questions about how well these students are prepared to meet the demands of the AI-enabled software industry, where automation and intelligent systems increasingly influence requirements processes. Moreover, previous studies have found a mismatch between the skills and knowledge of graduates and the competencies required by industry, suggesting a gap between academic RE education and real-world expectations [2] [8]–[11].

In developing contexts such as Nigeria, this issue is particularly salient. Nigeria represents one of Africa's largest

and fastest-growing IT markets, with significant potential for software innovation and workforce development [14] [15]. Yet, there is little empirical evidence on the knowledge, skills, and competencies required by the Nigerian software industry for effective RE practice. Past investigations in Europe, Latin America, and China have revealed similar skill gaps [8]–[10], but comparable research in Nigeria remains limited. Understanding this local context is crucial for aligning academic training with industry demands and for fostering the next generation of AI-ready software professionals.

This study, therefore, seeks to assess the readiness of final-year computer science students for requirements engineering in the AI era. Specifically, it examines students' conceptual understanding of RE principles, their familiarity with RE tools, their awareness of AI-assisted RE techniques, and their confidence in applying these skills in practical contexts. By situating this investigation within Nigeria's software development ecosystem, the study also explores how local educational and industrial factors influence RE preparedness. The insights generated are expected to inform curriculum improvement, teaching strategies, and industry engagement, thereby contributing to the development of graduates better equipped for AI-driven software development challenges.

The remainder of this paper is organised as follows. Section II presents the background and related work, highlighting previous studies on RE education, student readiness, and industrial competence requirements. Section III describes the research methodology, including the research design, instrument, data collection, and analysis procedures. Section IV presents the results of the study, while Section V discusses their implications for curriculum design and professional readiness. Finally, Section VI concludes the paper and outlines directions for future research.

II. BACKGROUND AND RELATED WORK

Requirements Engineering (RE) is a critical phase in software development, encompassing the elicitation, specification, validation, and management of software requirements. Historically, RE education has emphasized conceptual understanding and exposure to conventional tools and methods. The increasing complexity of software systems, coupled with the emergence of transformative technologies, has introduced new challenges that require enhanced skills and competencies to meet evolving industry demands.

The adoption of artificial intelligence in software development has further reshaped RE activities. Automated and intelligent techniques for requirements elicitation, prioritization, and analysis are becoming common in industry. Tools leveraging natural language processing, machine learning, and predictive analytics provide efficiency and accuracy, yet their integration into undergraduate curricula remains limited, leaving a gap between academic training and practical industry expectations.

Previous research has documented a persistent discrepancy between RE practices prescribed in the Software Engineering Body of Knowledge (SWEBOK) and those applied in modern industry contexts. While several studies have examined RE

competencies among professional engineers and explored educational challenges, few have investigated the preparedness of final-year computer science students for AI-augmented RE tasks. Understanding this readiness is critical to aligning academic programs with the skills demanded by contemporary software development environments.

Daneva et al. [9] analyzed three major job portals to investigate the market expectations of requirements engineers in the Netherlands. The study examined required backgrounds, job titles, tasks, and competency levels. "Product owner" and "data analyst" were commonly associated with RE roles, encompassing quality assurance, project management, and product deployment in addition to core RE tasks. Soft skills, including proficiency in local and English languages, analytical ability, and communication, were considered critical, as were professional experience and expertise in RE.

Calazans [10] investigated the competencies, skills, knowledge, and attitudes expected of requirements engineers in Brazilian and Mexican IT companies. Higher education emerged as the most sought-after qualification. Key skills included communication, proficiency in RE methods, and competence in RE tools and techniques. Desired attitudes included strong interpersonal skills, organization, analytical thinking, and information-sharing capabilities.

Canadian industry expectations were explored through an analysis of 109 RE-related job adverts [11]. The findings indicated that practical experience and skills in requirements management and related techniques were emphasized by the majority of employers.

Tenbergen et al. [16] conducted a ten-year review of RE research, identifying cross-domain collaboration as a major accomplishment. The study emphasized AI, cybersecurity, and Big Data as drivers of new challenges and opportunities, recommending enhanced education and training to prepare RE practitioners for evolving technological contexts.

In a study of the Chinese IT market, Wang et al. [8] investigated the most sought-after RE skills by Chinese software companies from the SWEBOK perspective. Analysis of 235 job adverts revealed that requirements elicitation is the most in-demand RE task, while requirements specification and editing are the most frequently required activities.

Bassey and Asuquo [17] examined the challenges and growth potential of Nigeria's software industry. The study identified inadequate government policies, low local software adoption, and a low innovation index as major challenges, while noting that continuous professional training and certification have enhanced engineers' competencies.

In contrast to existing studies, this research focuses on Nigeria, where limited empirical evidence exists regarding RE education and industry practice. This study aims to identify RE knowledge and skills gaps among final-year computer science students, evaluate their preparedness for AI-assisted RE tasks, and propose strategies and best practices to strengthen RE competencies in Nigeria's evolving software industry.

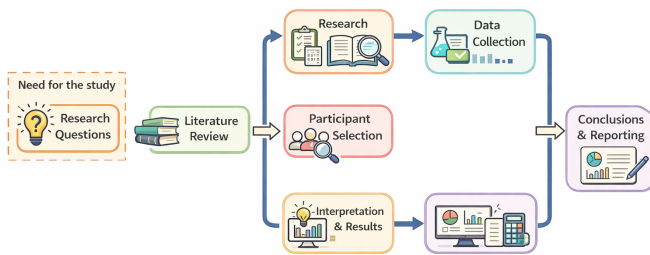


Fig. 1. Overview of the quantitative research process

III. RESEARCH DESIGN

This section outlines the research design, population, sampling approach, instrument development, data collection procedures, and data analysis methods employed in this study.

A. Research Design

A quantitative survey design was employed for this study to facilitate the systematic measurement and analysis of students' knowledge, skills, and perceptions regarding requirements engineering. This approach enables the collection of standardised data across a relatively large sample, facilitating comparisons and statistical analysis of trends in RE preparedness. Figure 1 depicts the steps involved in quantitative survey design.

B. Population and Sample

The target population for this study comprised final-year computer science students at Ahmadu Bello University, Zaria, Nigeria. This group was selected because they are nearing the completion of their undergraduate program and are expected to possess foundational knowledge of software engineering, including RE concepts.

A purposive sampling approach was employed to ensure that participants had completed core RE courses and relevant software engineering modules. The final sample size was determined based on the total number of eligible students who consented to participate.

C. Instrument and Survey Implementation

A structured questionnaire was developed as the primary instrument for this study to assess Requirements Engineering preparedness among final-year computer science students at Ahmadu Bello University, Zaria. The instrument was designed to capture four key dimensions of RE competence. Table I summarises the structure of the questionnaire and the items used to measure each dimension.

Specifically, the questionnaire assessed the following dimensions:

- **Knowledge of RE concepts:** Understanding of requirements elicitation, specification, validation, and management.
- **Familiarity and usage of RE tools:** Exposure to and practical experience with commonly used RE software tools.

TABLE I
SURVEY INSTRUMENT STRUCTURE AND SAMPLE ITEMS

Sec.	Focus Area	Description	Scale
1	RE Concepts	Understanding of elicitation, specification, validation, and management processes	5-point Likert
2	RE Tools	Familiarity with tools (e.g., JIRA, DOORS, RequisitePro)	MCQ / Likert
3	AI-assisted RE	Awareness of AI-driven RE techniques (NLP, ML, automation)	5-point Likert
4	RE Confidence	Self-rated ability to perform RE tasks effectively	Likert / Open-ended

- **Awareness of AI-assisted RE practices:** Knowledge of AI-driven techniques such as natural language processing, machine learning, and predictive analytics applied in RE.
- **Confidence in applying RE techniques:** Self-reported ability to perform RE tasks effectively in practical contexts.

Questionnaire items were developed based on established literature and validated RE frameworks. The instrument incorporated Likert-scale, multiple-choice, and selected open-ended questions to capture both quantitative and qualitative insights.

The survey was administered online using Google Forms. Survey links were distributed via email and student social media groups. Participants provided informed consent, and confidentiality and voluntary participation were assured. The survey remained open for four weeks, with reminder messages sent to improve response rates. Responses were exported, checked for completeness, and securely stored to ensure data integrity.

D. Data Collection and Analysis

Collected survey data were analysed primarily using descriptive statistical techniques to provide an overview of students' demographic characteristics, levels of understanding, tool familiarity, confidence, and training needs in Requirements Engineering. Frequencies and percentages were computed for all survey items, particularly those measured using five-point Likert scales, to summarise response distributions across the different RE preparedness dimensions.

Visual analytics, including bar charts and stacked bar charts, were employed to enhance the interpretation of Likert-scale responses and to facilitate comparison across RE knowledge areas, tool familiarity, usage patterns, and perceived training needs. These visualisations supported the identification of trends and gaps in students' preparedness for both traditional and AI-assisted RE practices.

In addition, an exploratory analytical approach was adopted to examine patterns and potential associations among related variables, such as prior exposure to RE tools and self-reported confidence in performing RE activities. Rather than formal hypothesis testing, comparisons across response distributions were used to identify meaningful relationships and contrasts

among key RE preparedness dimensions. The findings were subsequently interpreted in relation to the study objectives and existing literature on Requirements Engineering education and emerging AI-supported software engineering practices.

IV. RESULTS

A total of 124 final-year Computer Science students participated in the study. As presented in Table II, the majority of respondents were between 24–26 years of age (62 students; 50%), followed by those aged 27–29 years (37 students; 30%). No respondents fell within the 18–20 age group. This distribution aligns with the typical age profile of final-year undergraduates in the institution. Furthermore, respondents confirmed that Requirements Engineering is not taught as a standalone course but rather incorporated as a topic within the “Introduction to Software Engineering” course, alongside Agile Software Development content.

TABLE II
AGE DISTRIBUTION OF RESPONDENTS

Age Range	Frequency
18–20	0
21–23	13
24–26	62
27–29	37
30+	12

Regarding conceptual understanding of RE processes, Figure 2 shows that students reported comparatively strong familiarity with traditional RE activities. Approximately 69% of the respondents indicated that they understood the specification of functional and non-functional requirements “well” or “very well,” with a similar proportion reporting adequate understanding of validation and verification processes. In contrast, understanding of requirements traceability and prioritization was considerably weaker, with only 40% rating their understanding as “well” or “very well,” while 60% reported only slight-to-moderate familiarity. Likewise, familiarity with Agile-based RE activities such as user stories and backlog grooming remained limited, with only 39% indicating high or very high understanding.

As shown in Figure 3, familiarity with industry-standard RE tools was generally low. A substantial proportion of respondents reported that they had never heard of widely used tools such as IBM Rational DOORS (50%), Jira/Confluence (69%), and ReqView/Helix RM (69%). Moderate familiarity was observed primarily for Microsoft Visio, with 78 students (63%) indicating some level of familiarity (somewhat or very familiar). In contrast, familiarity with AI-based tools, such as ChatGPT, was markedly higher, with 84 respondents (68%) reporting that they were very familiar or at an expert level. This suggests a preference for readily accessible, general-purpose AI tools over specialised RE tools, likely driven by informal exposure rather than structured instruction.

Usage patterns, presented in Figure 4, reflect these familiarity trends. More than 80% of respondents reported never using

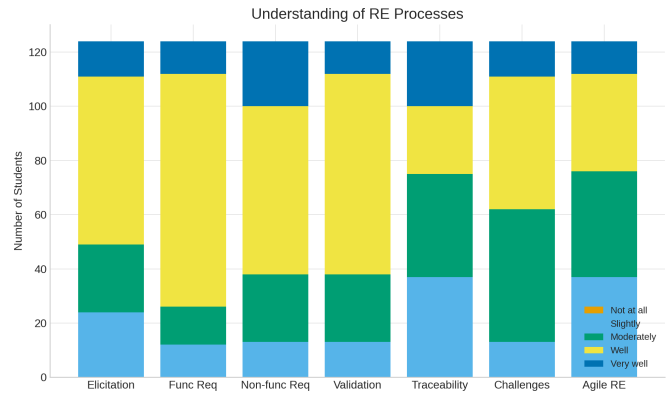


Fig. 2. Conceptual understanding of RE processes

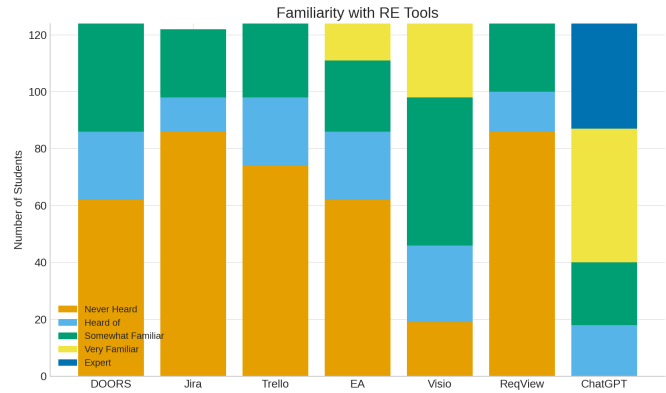


Fig. 3. Familiarity with industry-standard RE tools

traditional RE tools in coursework, projects, or internships, indicating minimal practical engagement with such tools during their courses. By contrast, AI-based tools showed substantially higher adoption: 46 students (37%) reported using them in personal or group projects, while 35 students (28%) applied them during internships or real-world projects. Notably, only 9 respondents (7%) indicated that they had never used AI tools for RE-related tasks, underscoring their widespread informal use despite limited formal integration into the curriculum.

Students’ perceived readiness for performing RE activities, as presented in Figure 5, shows stronger confidence in traditional RE tasks than in tool-supported and emerging practices. A majority of respondents reported high confidence (ratings 4–5) in gathering and eliciting requirements (58%) and in specifying functional and non-functional requirements (57%), reflecting solid conceptual preparedness in core RE activities. In contrast, confidence levels were noticeably lower for practice-oriented and technology-driven tasks. Approximately 38% of respondents reported low confidence (ratings 1–2) in applying RE tools effectively, while an even higher proportion (42%) indicated low confidence in applying AI-assisted RE techniques. Confidence in agile-based RE activities was moderate overall, with 43% reporting high confidence and nearly 30% indicating only moderate confidence. Overall, the results

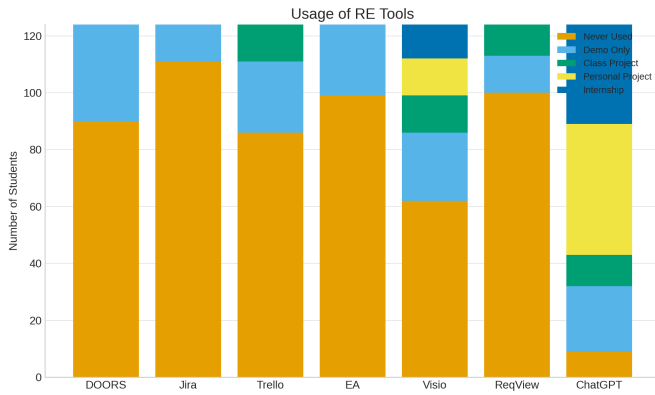


Fig. 4. Stacked distribution of students’ usage of requirements engineering tools

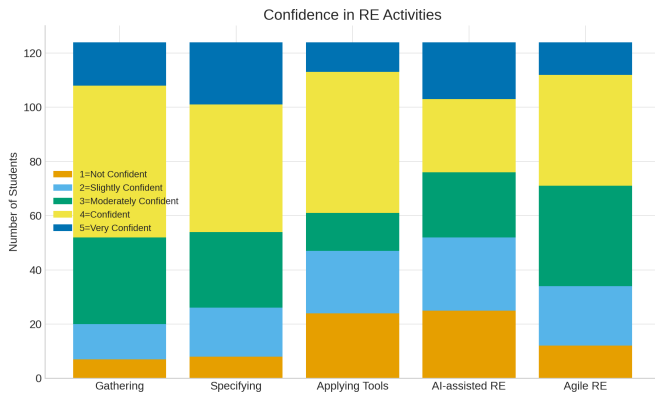


Fig. 5. Students’ perceived readiness and confidence in performing RE activities

suggest adequate preparedness for conventional RE tasks but reduced confidence in agile, tool-based, and AI-assisted RE contexts, highlighting the need for increased practical and technology-focused training.

Perceived need for additional training was strongly expressed across all RE competence areas. As shown in Figure 6, between 47% and 56% of respondents indicated a “high” or “critical” need for improvements in gathering and eliciting requirements, specifying requirements, applying RE tools, applying AI-assisted RE techniques, and participating in agile-based RE activities. These findings indicate that more than half of the respondents perceive substantial gaps in their RE preparedness and are aware of deficiencies in practical and process-oriented RE skills.

Finally, challenges encountered in applying RE knowledge in practice, summarised in Table III, further contextualise these findings. Limited practical experience or project exposure was the most frequently reported challenge, cited by 119 respondents (96%). Other prominent challenges included insufficient understanding of AI-assisted RE techniques (63%), limited institutional or laboratory support (63%), lack of familiarity with RE tools (56%), and difficulty linking theoretical knowledge to real-world problems (54%). Collectively, these challenges

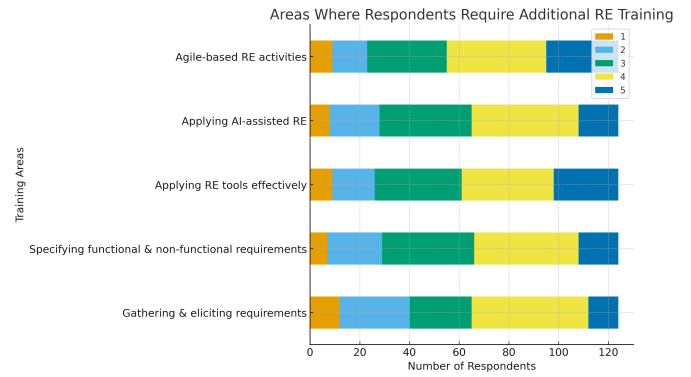


Fig. 6. Perceived need for additional training across RE competence areas

point to systemic gaps in practical learning opportunities and infrastructure, which may hinder students’ ability to translate RE theory into effective professional practice.

TABLE III
CHALLENGES REPORTED IN APPLYING RE KNOWLEDGE IN PRACTICE

Challenge	Frequency
Limited practical experience	119
Lack of familiarity with RE tools	70
Insufficient understanding of AI-assisted RE	78
Difficulty linking theory to real-world problems	67
Limited institutional or laboratory support	78
Time constraints during coursework/projects	60
Lack of collaboration or teamwork experience	60

V. DISCUSSION

The findings of this study offer important insights into the preparedness of final-year Computer Science students for contemporary Requirements Engineering practice. The relatively strong understanding of traditional RE concepts, indicated in Figure 2, suggests that foundational theoretical aspects are adequately introduced within the current curriculum. However, the noticeably lower understanding of requirements traceability, prioritization, and Agile-based RE processes demonstrates insufficient exposure to modern RE practices that increasingly dominate industry workflows. This imbalance reflects the curriculum’s stronger focus on classical software engineering methodologies and insufficient emphasis on iterative, agile, and tool-supported RE approaches.

The limited familiarity with industry-standard RE tools, as shown in Figure 3, and the minimal tool usage documented in Figure 4 indicate a significant gap between academic preparation and industry expectations. Tools such as Jira, DOORS, and ReqView are widely used in contemporary RE workflows, yet their near absence in students’ academic experience reflects a lack of hands-on laboratory opportunities and insufficient tool integration within the curriculum. Consequently, students reported lower confidence in applying RE tools effectively, as reflected in Figure 5.

An interesting pattern emerges with the widespread adoption of AI-based tools such as ChatGPT, which demonstrated the

highest levels of familiarity and usage across all tools assessed. Although students appear to rely on such tools to support RE tasks informally, their moderate confidence in applying AI-assisted RE techniques suggests that usage remains exploratory rather than grounded in structured methodology. This underscores the need for pedagogically sound integration of AI-assisted RE approaches within the curriculum.

The strong demand for additional training across all assessed RE areas (Figure 6), combined with the challenges identified in Table III, highlights systemic limitations in both curriculum design and instructional support systems. Limited practical exposure, cited by 96% of respondents, emerged as the most critical barrier. Additional constraints such as limited institutional support, low familiarity with RE tools, and difficulty linking theory to practical application illustrate the need for structured, tool-based, and experiential learning strategies. These findings align with broader evidence from software engineering education, where practical exposure is essential for skill acquisition.

VI. CONCLUSION AND FUTURE WORK

This study examined the understanding, preparedness, and practical competence of final-year Computer Science students in Requirements Engineering at Ahmadu Bello University, Zaria. The findings show that while students possess reasonable theoretical grounding in conventional RE principles, their practical skills, particularly in modern, tool-driven, and AI-supported RE environments remain limited. Low familiarity with industry-standard RE tools, restricted hands-on exposure, and moderate confidence in agile and AI-assisted RE techniques collectively highlight notable gaps in the curriculum and supporting infrastructure.

To address these deficiencies, curriculum reforms are recommended, including the introduction of a dedicated RE course, integration of practical tool-based laboratory sessions, and structured incorporation of AI-assisted RE methodologies. Enhancing laboratory facilities and promoting real-world, industry-linked RE projects would further strengthen students' preparedness for professional practice.

Future work will focus on evaluating the impact of revised pedagogical strategies, such as tool-integrated coursework and AI-supported instructional modules on students' RE competence. Longitudinal studies examining skill development across multiple cohorts, as well as investigations into best practices for embedding AI into RE education, will provide valuable insights for strengthening software engineering education in emerging contexts. Additionally, we plan to expand the study to other universities across Nigeria to obtain a broader perspective and ensure more representative insights into the state of RE education nationally.

VII. THREATS TO VALIDITY

Construct validity may be affected by the use of self-reported data to assess students' RE knowledge, confidence, and preparedness. Such measures are subjective and may not accurately reflect actual competence, particularly for practical

and AI-assisted RE skills. To reduce this risk, the survey covered multiple RE dimensions and was informed by established literature.

Internal validity is subject to potential self-selection bias, as participation was voluntary. The descriptive and exploratory nature of the study also limits the ability to draw causal conclusions regarding the impact of curriculum design on RE preparedness.

External validity is limited by the study's focus on a single university and a specific student cohort. Consequently, the findings may not be directly generalisable to other institutions or contexts with different curricula and resources, although they provide indicative insights into RE education in a Nigerian public university.

Conclusion validity is constrained by the reliance on descriptive statistics rather than inferential analysis. The results therefore highlight observed trends and patterns without claiming statistical significance.

Reliability may be influenced by respondents' interpretation of survey items and varying familiarity with technical terminology. Clear explanations were provided to mitigate ambiguity, but future work could strengthen reliability through pilot studies or complementary qualitative methods.

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