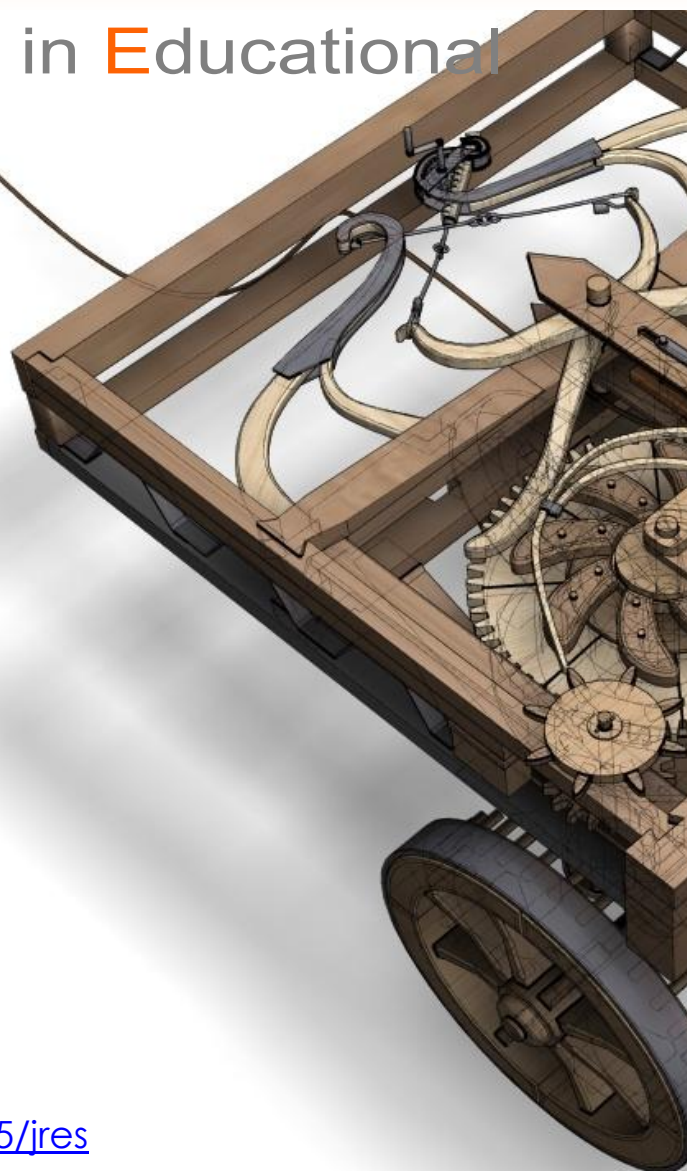


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Call for Papers

Volume XVII, Issue 2(22)

Journal of Research in Educational Sciences

The Journal is designed to promote scholars' thought in the field of education with the clear mission to provide an interdisciplinary forum for discussion and debate about education's most vital issues. We intend to publish papers that contribute to the expanding boundaries of knowledge in education and focus on research, theory, current issues and applied practice in this area.

The Editor in Chief would like to invite submissions for the **Volume XVII, Issue 2(22), December 2026** of the **Journal of Research in Educational Sciences** (JRES).

The primary aim of the Journal has been and remains the provision of a forum for the dissemination of a variety of international issues, empirical research and other matters of interest to researchers and practitioners in a diversity of subject areas linked to the broad theme of educational sciences.

The aims and scope of the Journal includes, but is not limited to; the following major topics as they relate to the Educational Sciences:

- Educational Psychology;
- Engagement and Community;
- Leadership in Education;
- School Improvement;
- Human Resources in Education;
- Education and Information Science;
- Global strategies in Higher Education;
- Learner's Needs in the 21st Century;
- The Role of Education in The Globalization World;
- Technology-Based Learning.

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Deadline for Submission:	25 th November 2026
Expected Publication Date:	December 2026
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generate plausible answers, particularly to those that focus on recall or application of knowledge, in subjects like mathematics for economics or finance.

The aim of this study is threefold:

1. Develop innovative strategies to design online Maths for Social Sciences questions which challenge ChatGPT.

2. Quantitatively validate the effectiveness of the innovative strategies, mitigating the unethical use of GenAI in education.

3. Create a novel, iterative assessment cycle that reimagines assessment design by incorporating real-time student feedback, inclusivity and transparency.

This paper proposes strategies to create Maths for Social Sciences questions that involve deeper reasoning beyond GenAI capabilities using Bloom's taxonomy (Bloom *et al.* 1956) which has long been used in education to categorise learning objectives and create assessments but its use to counter GenAI-generated responses is especially novel. The study uses the analysis, evaluation and creation higher-order cognitive processes that Bloom identified as tools to lessen the efficacy of ChatGPT-3.5 in responding to test questions. This represents a substantial shift from conventional assessment design which frequently emphasises lower-order cognitive abilities like recall and understanding, which are domains in which GenAI is particularly strong. This study draws upon additional theoretical models such as Cognitive Load Theory (Sweller, Ayres, and Kalyuga 2011); Constructivist Learning Theory, as developed by Piaget (1976) and Vygotsky (1980); Metacognition (Flavell 1979); and Critical Thinking Frameworks (Paul and Elder 2013), all of which emphasise promoting independent thought and problem-solving abilities. Designing questions that require learners to evaluate arguments, solve complex problems, or make decisions based on evidence can be particularly challenging for GenAI, which might lack the nuanced judgment required for critical thinking (Paul and Elder 2013). This approach ensures that questions engage learners at various levels of cognitive complexity (Bloom *et al.* 1956).

The paper develops and uses the 4Rs strategies (Reflect, Rewrite, Retest, Review) to ensure that online test questions are not easily solved by ChatGPT-3.5. This process is iterative, starting with a reflection on pre-ChatGPT questions that meet learning outcomes, followed by the redrafting of questions to target higher order thinking skills, retesting them using GenAI, and reviewing the results. If ChatGPT successfully answers the questions, the process restarts. Such a novel approach to assessment design ensures that learning outcomes are achieved without compromising the clarity and meaning of the questions.

The paper further validates the newly designed strategies by analysing student grade trends over the past four years. Existing studies (Sallam *et al.* 2023; Tan *et al.* 2023) primarily propose theoretical solutions without empirical evidence and real-world settings performance evaluation. By monitoring student performance and examining the direct effects of question design modifications on GenAI's response capabilities, the study provides a unique empirical examination of the efficacy of questions that challenges GenAI. This study also extends the discussion on the ethical use of GenAI by exploring the impact of higher-order level questions on students' engagement with assessments and learning journey. Through focus groups, the study raises the importance of incorporating student voice in assessment design to balance rigour, inclusivity and academic integrity.

Overall, this study adds to the international knowledge base with its analysis of the effectiveness of strategies used to develop more rigorous assessments in the age of GenAI. Unlike the current literature which highlights theoretical or anecdotal solutions, this research quantitatively tests and evaluates the innovative question designs in a real-world educational setting. It further proposes a novel assessment framework, the SHARP assessment cycle, which integrates real-time student feedback and inclusivity. As such, the research strengthens the weak link between theoretical underpinnings and real-world applications to uphold academic integrity.

An earlier case study drawing on this research was published in the Advance HE compendium (Soobedar De Villeneuve 2025). The present paper represents the full work from which that case study derives, encompassing the complete theoretical framework, empirical analysis and focus group methodology.

The paper is structured as follows: Section 1 covers the research background. Section 2 outlines the methods detailing the 4Rs approach followed by a more detailed explanation of the Rewriting and Retesting phases in Section 3. Section 4 reports findings and Section 5 provides a discussion of results, where the SHARP assessment cycle is developed before concluding.

1. Research Background

To contextualise this paper's approach, this section reviews how GenAI has affected different assessment formats and the strategies proposed in the existing literature to address these challenges. The impact of GenAI on assessment integrity varies across question types and assessment formats. Traditional assessments which usually

focus on lower order thinking skills are now more vulnerable to GenAI manipulation. Those questions are typically easy to handle by GenAI due to their predictable structure and straightforward content. Nikolic *et al.* (2023) highlight that assessments in engineering education on replicable problem-solving processes are particularly at risk. Essays or open-ended questions can easily be answered raising academic integrity and originality issues (Van Dis *et al.* 2023). The use of GenAI in group projects may exacerbate “free riding” problems where some team members rely on those tools to produce work, hence reducing collaboration and engagement in teamwork. Dissertations and individual projects also face significant challenges given their emphasis on independent and original work. ChatGPT-like tools can generate text which lacks depth and references which are non-existent. Using GenAI to write dissertations or research abstracts undermines the analytical and critical thinking skills (Else 2023). For online tests, correct answers can be easily generated by ChatGPT undermining subject mastery and analytical skills of the students. These assessments are often designed to test students’ understanding and ability to apply concepts to specific scenarios.

Nevertheless, online tests have distinct advantages, including ease of grading, instant feedback (Eke 2023), and benefits for neurodiverse students who may feel less constrained by traditional, in-class testing environments (Dunne and Lee 2022). Moreover, timely feedback has been shown to positively impact student learning (Gikandi, Morrow, and Davis 2011). Therefore, if online assessments were here to stay, examiners should ensure rigorous assessment design to maintain their aim and integrity (Nikolic *et al.* 2023). Institutional guidelines (UCL Assessment Working Group 2020) for designing online exams recommend the inclusion of complex questions that require critical thinking, as well as educating students about the ethical use of GenAI. Holden, Norris, and Kuhlmeier (2021) suggest other strategies to reduce cheating in online quizzes, like carrying out exams at the same time within a short time window to limit the risk of students sharing test questions and answers. Other measures could include disabling the copy/paste functionality in assessment software, allowing questions to appear one at a time for a limited time without access to previous tasks once completed, randomising test questions and/or response options, creating multiple test versions when collaborating and sharing concerns exist. Different types of assessments for the module/course could place heavier weights on assessment where cheating is less likely. Statements of academic integrity should be clear with respect to GenAI use, plagiarism and collusion to help with students’ expectations. To minimise plagiarism, Vellanki *et al.* (2023) further propose using a ‘safe exam browser’ option and more subjective-type (short answer) rather than objective-type (fill in the blanks) questions.

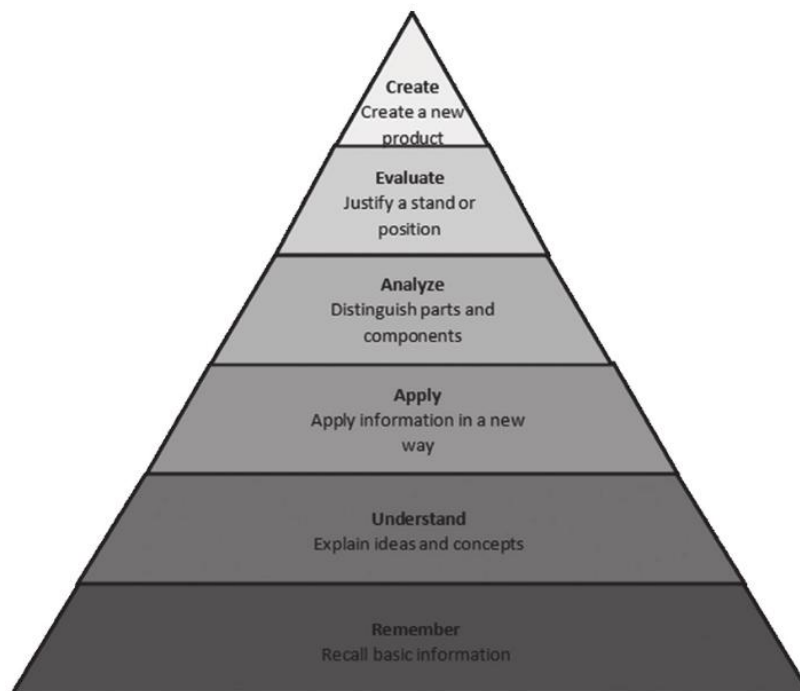
Un-proctored online tests remain, however, prone to some sort of academic misconduct, even when exam browsers options are available. This therefore calls for educators to rethink their assessment strategies and find innovative ways to ensure academic rigour, otherwise, the use of GenAI in academic dishonesty is likely to escalate (Liu and Bridgeman 2023). When GenAI tools became more popular in early 2023, some universities banned it outright while others addressed adjusting assessments to permit its usage in a more ethical manner (Lye and Lim 2024). As GenAI is likely to stay, evolving and becoming increasingly influential in students’ learning curve over time, it is important that assessments be redesigned to adapt to the changing educational landscape. Assessment designs should engage students with specific tasks that require critical thinking which cannot be easily replicated by large language models like ChatGPT (Seo *et al.* 2021; Rasul *et al.* 2023). Research shows that assessments emphasising higher-order cognitive skills, such as analysis, evaluation, and creation, are less vulnerable to GenAI-generated responses. These skills are central to Bloom’s revised taxonomy of educational objectives by Anderson and Krathwohl (2001). For example, assessments can take the form of open-ended questions and real-life applications. Building on these insights, the following section outlines the methodological framework and strategies adopted in this paper to design GenAI-resistant assessments in Maths for Social Sciences.

2. Materials and Methods

2.1 The Revised Bloom’s Taxonomy of Educational Objectives

Figure 1 reports the guiding framework of Anderson and Krathwohl’s revised Bloom’s Taxonomy of Cognitive Domain (Phillips, Briggs, and Jensen 2019) underpinning this paper. Drawing further upon the Cognitive Load Theory and Constructivist Learning Theory established educational frameworks, the approach to question design fosters independent and critical thinking. The application of those theories ensure that questions focus on higher-order thinking skills, which GenAI find more challenging to respond, thereby addressing a gap in the current literature. The study applies this approach to designing Maths for Social Sciences questions.

Figure 1. The Revised Bloom's Taxonomy of Educational Objectives



Source: Phillips, Briggs, and Jensen (2019).

2.1.1 Recall (or Remember) Questions

These require retrieving definitions, facts, or formulas. Since these questions rely on memory, they are typically the easiest for both students and ChatGPT. Examples include questions that ask for definitions of terms or the recall of a specific formula to solve a problem (e.g., finding the mean from raw data).

2.1.2 Understanding Questions

These assess students' ability to explain, interpret and compare concepts. Students are required to interpret information and draw relations between concepts, such as explaining the connections between demand and supply. Although ChatGPT can work these tasks effectively, it lacks depth in interpretation.

2.1.3 Application Questions

These relate to solving problems, performing calculations or analysing specific scenarios. For instance, a student is asked to calculate the impact of a subsidy on demand and/or supply curves. Even though ChatGPT can handle standard applications, it may find it harder when problems are unique to certain contexts or subject to specific economic constraints (e.g. total output cannot be negative).

2.1.4 Analysis Questions

These test students' ability to break down complex information into sub parts and examine any relationships between them. This may involve a trend analysis or critical evaluation of datasets. For example, students are asked to choose the correct formula to calculate the real average salary from a list of numbers. In this case, they are expected to dissect and scrutinise various components of the formulae. This task challenges ChatGPT as it may struggle in contextualising relationships among known values.

2.1.5 Evaluation Questions

These require forming a judgment, an argument or an assessment based on certain criteria. For instance, students are asked to evaluate whether an economic model is valid based on certain assumptions. Evaluation tasks are more complex and require higher order level thinking skills enabling students to assess which options they have and justify their conclusions. This process demands subjective reasoning and judgment, criteria with which ChatGPT struggle with.

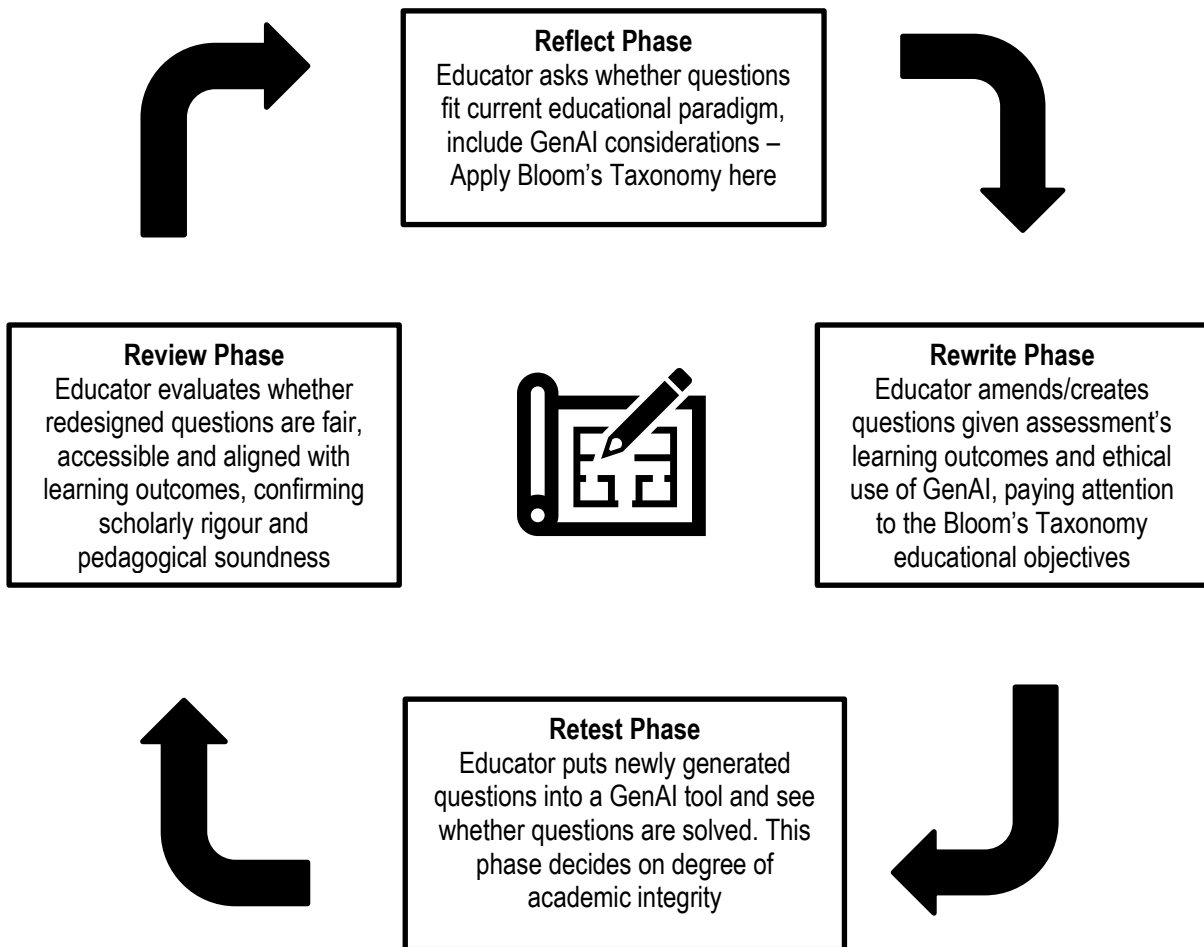
2.1.6 Creation Questions

These involve students to retrieve and combine information from various areas to generate new ideas and/or solutions. Creation tasks, which fall in the top category of Bloom’s taxonomy, are particularly challenging for ChatGPT. For example, using Bayes’ theorem (a statistics topic) with missing information on certain probabilities, students need to work backwards to calculate the probability of an event happening before applying the theorem to answer the question. This process requires more innovative thinking than merely applying formulae, which GenAI systems are incapable of doing without specific prompts.

2.2 The Process of Assessment Design: The 4Rs Approach

The process used in designing assessment higher-order level questions includes four phases: the reflect, rewrite, retest and review phases. The process begins with the use of a pre-existing set of questions or the creation of new ones: the reflect phase. The educator goes through pre-existing questions (or if creating questions), reflecting on how they relate to Bloom’s Taxonomy educational objectives. Questions are then input in one of the GenAI tools (ChatGPT, Gemini, Copilot) and responses are recorded. If GenAI answers correctly, it is then asked how it may struggle with the question. The question is subsequently rewritten, retested and reviewed, again in line with Bloom’s Taxonomy. The process is repeated until GenAI can no longer provide a suitable answer¹ as shown in Figure 2.

Figure 2. The 4Rs Approach



Source: Original author's development

¹ Nikolic *et al.* (2023) used a similar method although their approach was not as explicitly detailed in steps as presented in this paper.

2.3 Sample Size and Selection

2.3.1 Online Maths Questions Bank

The sample of questions comprised those from three online assessments. The first two assessments each contained 10 questions subdivided in several parts. The final and third assessment consisted of 13 questions also subdivided in several parts. An additional dataset file shows the number of questions and subparts in each assessment in more detail [see Additional file 1]. The online test paper is structured with 10 questions, each designed to explore distinct topics covered in the module curriculum. Each question is carefully weighted based on its complexity level. The assessment format includes a variety of question types such as multiple-choice, fill-in-the-blank, and dropdown menus, a few open-ended questions. Students input their responses digitally on the virtual learning environment. The test is conducted online, without invigilation, allowing students to complete it from any location with good and reliable internet access. The duration of the test is set at 1 hour and 30 minutes, during which students have the flexibility to address questions in any order they choose. Automatic submission of the quiz occurs at the end of the allotted time, ensuring equitable assessment conditions and adherence to prescribed examination protocols. In total, 66 questions were tested and redesigned, out of which 24 related to Test 1, 29 to Test 2 and 13 to Test 3 between 2023 and 2024.

2.3.2 Student Population

A purposive sampling technique was employed as the study included all 211 students who took the tests in the academic year 2022/23 and 227 in the following academic year in 2024. Both cohorts had a good command of English with an average IELTS score of 6.6. Students were foundation level students for one year before joining their preferred undergraduate studies. They were either on the Economic & mathematics or Management & Business pathway at the university.

2.4 Focus Group

2.4.1 Participants

Participants for the focus group were recruited using self-selection sampling as they were invited to participate through a combination of in-person and digital ways. Flyers were posted on the module's MS Teams channel and were shared during lectures and seminars. All students enrolled on the module were aware of the opportunity to participate. Five students volunteered to attend the focus group, which points to a voluntary and self-selection sampling method, popular in qualitative research (Bryman 2008). Each student was sent a Participant Information Sheet which contained all necessary information about the study, including what happens if they take part, what if they change their minds, data handling, data confidentiality and any risks. Participants were then asked to fill a consent form. The focus group was conducted online via MS Teams at the end of the academic year and lasted for one hour. The online setting was chosen for its accessibility, given that students already left the country. Moreover, rigour of the focus group was maintained which ensured that responses could be accurately transcribed and reviewed.

Semi-structured questions, that included open-ended questions to encourage broad discussion and more probing questions to delve into specific areas like clarity and difficulty were asked and related to students' overall experience with online assessments. Several areas were explored: students' perceptions of the redesigned GenAI-resistant questions, approaches students used to answer them as accurately as possible in an online setting, challenges they faced during the tests, the use of GenAI tools following the tests and suggestions for improvement when taking tests/quizzes on an online platform.

To foster an open, non-judgemental, comfortable environment and ensure data reliability, students had the option to participate either in writing by using the chat function or verbally through video, with the freedom to switch their cameras on or off. Participation in discussion was voluntary, and students were free to leave at any time. Students were assured that there was no 'wrong' or 'right' answers and questions were phrased in a neutral tone to encourage honest responses, especially with the use of GenAI. Some follow-up questions were spontaneous, emerging from students' responses. That encouraged a natural flow of conversation and contributed to the depth and data richness (Bryman 2008).

The focus group was also a good platform for students to reflect on and share their honest use (or non-use) of GenAI tools after the assessments, which shed light on how students were engaging with the new technology and how it impacted their learning.

2.4.2 Reflexive Thematic Analysis

Transcripts² were anonymised without distorting scholarly meaning and analysed using the six-phase TA approach detailed by (Braun and Clarke 2006). Through multiple phases, main themes and sub-themes were systematically identified and interpreted. NVivo 14 (Lumivero 2023) package was used for data management and coding. Data were further independently coded by a second researcher to maintain the reliability and validity of themes identified and reduce researcher bias (Silverman 2016).

3. Demonstrations

3.1 Reflect Phase: The Theoretical Framework Relating to Cognitive Skills

Based on Bloom's Taxonomy and its revised versions (Anderson and Krathwohl 2001), this stage seeks to categorise questions in the six key levels of cognitive skills: recall, understand, apply, analyse, evaluate, and create. These important skills are required in mathematics and applied sciences to move students beyond rote memorisation and engage with problems on deeper levels (problem-solving, analytical and critical analyses (Clements and Battista 1990).

3.2 Rewrite and Retest Phases: Designing GenAI-resistant Questions by Question Types

The next stage to mitigate ChatGPT's strengths in solving straightforward problems, involves the testing (Retest) phase where ChatGPT's responses to the original questions are analysed. Following this, a rewriting phase as the name suggests consists of steps to modify the original questions to challenge ChatGPT's capabilities more effectively. Below are some examples.

3.2.1 Recall Question Example (Topic: Raw Data – Measures): Retest Stage.

PreChatGPT Question and Human Answer: In Figure 3 panel a, students were asked to calculate the range directly from a dataset.

Figure 3 Panel A. Human Answer: Finding Range from Raw Data

The data set below shows the number of items purchased by 10 shoppers at Selfridges (London) in a year: 12, 23, 25, 26, 54, 92, 27, 52, 36, 64.


Compute the range, the upper quartile, the median and the quartile range. Give your answers to the nearest whole number.

Enter the values below:

a) The range is

ChatGPT Answer: Correct, as expected for recall-type questions where formulas are explicitly provided. Figure 3 Panel B shows the steps ChatGPT uses to solve this question.

Figure 3 Panel B. Correct Answer from ChatGPT with Workings

 To compute the range, upper quartile, median, and quartile range, let's first sort the data and then apply the relevant formulas.

The data set: 12, 23, 25, 26, 54, 92, 27, 52, 36, 64

Step 1: Sort the data in ascending order.

Sorted data set: 12, 23, 25, 26, 27, 36, 52, 54, 64, 92

Step 2: Compute the range.

The range is the difference between the maximum and minimum values.

$$\text{Range} = 92 - 12 = 80$$

² Available upon request.

3.2.2 Rewrite stage

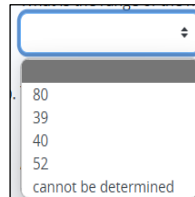
ChatGPT Proof Question and Human Answer: In Figure 4 Panel A, the above question was redesigned as a creation-type problem where students were expected to recognise that there are missing values from the dataset, making the range impossible to find.

Figure 4 Panel A. Human Answer: Finding Range from Raw Data

a. A restaurant chain asked managers of its 10 branches to report how many customers were served on a particular day. The following data set represents the numbers reported by 9 managers:
25, 23, 12, 26, 54, 92, 51, 36, 64.

What is the range of the number of customers served by the restaurant chain that day?


cannot be determined ▾



With drop down menu:

ChatGPT Answer: Incorrect. The change of question type from a recall to creation task increased the difficulty level significantly. This time students needed to recognise the missing value and determine how this affected the solution, requiring higher order thinking to creatively interpret the incomplete information and infer possible outcomes rather than recall or apply formulas. **Figure 4 Panel B** proves that ChatGPT does not have those skills.

Figure 4 Panel B. Incorrect Answer from ChatGPT

 To determine the range, we subtract the smallest number from the largest number in the data set.

Given data: 25, 23, 12, 26, 54, 92, 51, 36, 64

Step 1: Identify the smallest and largest numbers.

- Smallest number: 12
- Largest number: 92

Step 2: Calculate the range.

$$\text{Range} = \text{Largest number} - \text{Smallest number} = 92 - 12 = 80$$

So, the range is 80. The correct answer is 80.

3.2.3 Understanding and Analysis Questions Examples (Topic: Quadratic and Graphs): Retest Stage

PreChatGPT Question and Human Answer: In Figure 5 Panel A, students were asked to interpret a quadratic function's graph and answer understanding (part b) and analysis-type (parts c and d) questions, such as finding and interpreting the vertex.

Figure 5 Panel A. Human Answers: Interpreting Intercepts and Vertices

Sketch the profit function $y = -45 - 6q + 3q^2$, where q is the total output. Then use your graph to answer the questions below. Enter your answers into the boxes to complete each statement:

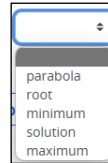
a) The curve crosses the q axis at point/s.

b) The highest value of q for which profit is equal to zero is

c) The curve has a vertex when $q =$ and $y =$

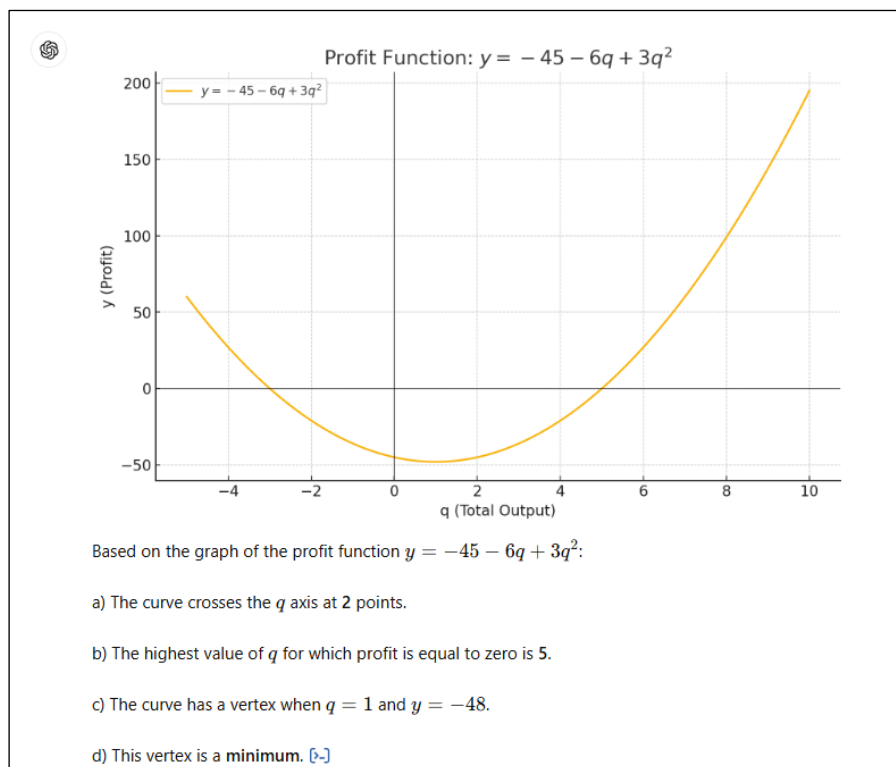
d) This vertex is a

With part (a) with 0, 1 or 2 dropdown options and (d) with



ChatGPT Answer: Parts (b)-(d): Correct, as expected for understanding and certain analysis-type questions. (b) requires students to remember the relationship between 2 variables (quantity and profit). (c) and (d) are analysis-type questions because students need to break down the mathematical properties of the curve (key to analysis-level thinking) and find out the specific variables needed for the vertex in addition to determining how changing quantity and profit would influence the shape and position of the curve. A graph, as shown in Figure 5 Panel B below, was also generated, unexpected based on prior ChatGPT graphical limitations.

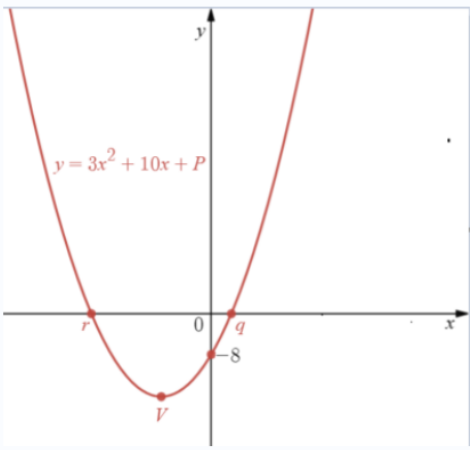
Figure 5 Panel B. Correct Answers for (b)-(d) From ChatGPT



3.2.4 Rewrite stage

ChatGPT Proof Question and Human Answer: In Figure 6 Panel A, the above question was redesigned as a graph-type task where students were required to fill in missing components. Graph-type questions can be used as a last resort to make questions more ChatGPT-resistant.

Figure 6 Panel A. Human Answer: Finding Missing Information About Intercepts and Vertices



These questions refer to the sketch graph shown above.

Answer each question by typing a **number** into the box.

Each answer should be given as a whole number or a decimal rounded to 2 decimal places.

a. State the value of P in the equation of the curve.

b. State the value of r .

c. State the value of q .

d. Find the horizontal coordinate of point V .

e. If x is intended to represent the weekly number of sofas produced in a workshop and y the weekly profit (in £) the workshop expects, which of these restrictions must be applied to the graph shown?

ChatGPT Answer: Incorrect. ChatGPT couldn't read PDFs or images. These questions required visual interpretation and more human insights. Students were forced to engage more actively with materials and focus on deeper conceptual understanding. However, this strategy could be circumvented (by smarter students) through the correct prompts. Figure 6 Panel B shows how part (a) can be correctly answered with the correct prompt. As of October 2024, ChatGPT's ability to upload images and documents led to solving the question correctly. However, a slight adjustment can generate GenAI-resistant questions without a graph (see Figure 6 Panel C).

Figure 6 Panel B. Prompt Used to Answer Part (a) Correctly

If there is a graph with equation $y=3x^2+10x+P$. what is the value of P is the curve cuts the x -axis at 2 places and y -axis at -8

Given the equation $y = 3x^2 + 10x + P$, we need to find the value of P under the conditions:

1. The curve cuts the x -axis at two places, meaning the quadratic equation has two real and distinct roots.
2. The curve cuts the y -axis at $y = -8$.

Step 1: Analyze the intersection with the y -axis

The curve cuts the y -axis when $x = 0$.

Substitute $x = 0$ into the equation:

$$y = 3(0)^2 + 10(0) + P = P$$

Given that $y = -8$ at this point:

$$P = -8$$

Figure 6 Panel C. Reformatted Graphs (Topic: Quadratic and Graphs) following ChatGPT's possibility to upload PDF's

Sketch the profit function $y = -45 - 6q + 3q^2$

- The curve crosses the q axis at ... point/s.
- The lowest value of q for which profit is equal to zero is
- Assume that the curve is vertically scaled by 2. Find the vertex coordinates (... , ...).
- This vertex is a

Human Answer

Sketch the profit function $y = -45 - 6q + 3q^2$

- The curve crosses the q axis at **1** point/s.
- The lowest value of q for which profit is equal to zero is **5**.
- Assume that the curve is vertically scaled by 2. Find the vertex coordinates **(1, -96)**.
- This vertex is a **minimum**.

ChatGPT Answer

I can't view the contents of the image directly, but I can help you with your questions based on the function $y = -45 - 6q + 3q^2$.

Here's a breakdown of the points you asked about:

- The curve crosses the q -axis at ... point/s:**
 - We previously established that the function crosses the q -axis at two points: $q = 5$ and $q = -3$. So, the curve crosses the q -axis **at 2 points**.
- The lowest value of q for which profit is equal to zero is ...:**
 - The lowest value of q where the profit is zero **is $q = -3$** , as derived from the roots of the equation.
- Assuming the curve is vertically scaled by 2, find the vertex coordinates (... , ...):**
 - After scaling, the new function becomes $y = 2(-45 - 6q + 3q^2) = -90 - 12q + 6q^2$.
 - The vertex for this new function was calculated to be at **(1, -96)**.
- This vertex is a ...:**
 - Since the parabola opens upwards (as the coefficient of q^2 is positive), this vertex represents a **minimum point**.

ChatGPT Answer: Incorrect answers for (a) and (b) since they could not connect the context with economic constraints.

3.2.5 Application Question Example (Topic: Supply & Demand Linear Model): Retest stage

PreChatGPT Question and Human Answer: In Figure 7 Panel A, students were asked a basic application question on the demand and supply model, that is to find equilibrium points.

Figure 7 Panel A. Human Answer: Solving for a Value in a Supply Equation

In this question the wage in £ per hour is represented by W and the quantity of labour by L :


Answer each question by typing a number into the box:

a) In the labour supply function $W = 4L + 52$, find L when $W = 60$.

$L =$

ChatGPT Answer: Correct, as expected for a straightforward application-type questions.

Figure 7 Panel B. Correct Answer from ChatGPT with Workings

 To find L when $W = 60$ in the labour supply function $W = 4L + 52$, you need to solve the equation for L .

1. Substitute $W = 60$ into the equation:

$$60 = 4L + 52$$
2. Subtract 52 from both sides to isolate $4L$:

$$60 - 52 = 4L$$

$$8 = 4L$$
3. Divide both sides by 4 to solve for L :

$$L = \frac{8}{4}$$

$$L = 2$$

So, $L = 2$ when $W = 60$.

3.2.6 Rewrite stage

ChatGPT Proof Question and Human Answer: In Figure 8 Panel A, the above question was rephrased as an evaluation-type problem. Here, students were required to use their judgement and evaluate the feasibility of different scenarios, based on economic constraints.

Figure 8 Panel A. Human Answer: Finding Unknown Pay Level Given Work Hours

A painter works in a partnership with a carpenter and an electrician.

Each partner's total weekly income (in £) is represented by Y and is made up of a fixed weekly payment, plus a variable payment based on an hourly wage (in £), represented by H , and the number of hours worked this week.

The painter's fixed weekly income is £32, the carpenter's is £40, and the electrician's is £35.

Last week the three partners worked a total of 10 hours between them: the painter worked for 2 hours, the carpenter for 4 hours, and the remaining hours were completed by the electrician.

The equation that represents the total income of the electrician's salary is of the form $Y = aH + b$.

a. Find a and b . Answer each question by typing a number into the box:

$a =$

$b =$

ChatGPT Answer: Detailed response but Incorrect for part (a). ChatGPT gets that wrong because the question requires students to analyse the information about the partnership and how the hours worked by each partner relates with income. Students need to assess the relationship between income and hours worked in a specific context and justify the rationale for the choice of a and b based on given information and assumptions. Synthesising information and making judgements are characteristic of the higher-order evaluation thinking skills of Bloom's taxonomy.

Figure 8 Panel B. Incorrect Answer from ChatGPT Although Lengthy Workings

4. Identify a and b :

In this context, b represents the fixed weekly payment, which is £35. Thus:

$$b = 35$$

a represents the variable part of the income based on the hourly wage. Since we do not have any information about the hourly rate, it is not specified in the problem, but it is assumed that a is the rate at which income varies with hours worked.

To summarize:

- a (the variable payment per hour) is not explicitly provided, so it remains as a in the general form.
- b is the fixed weekly income, which is 35.

Therefore:

- a : (It remains unspecified in the problem)

3.3 Review Phase: Evaluating Learning Outcomes

Throughout the whole process, the primary objective is to ensure that the revised questions remain aligned with the module's intended learning outcomes and retain their clarity and accessibility to students while introducing some level of complexity that challenged GenAI capabilities. In addition to comparing final answers, the review phase also includes the analysis of ChatGPT's reasoning process, that is whether intermediate steps are correct and adhere to standard mathematical methods, irrespective of the final answer. Metrics such as coherence with module content and clarity of response are used to evaluate GenAI responses.

4. Research Results

4.1 ChatGPT-Proof Question Types Analysis

Table 1 summarises the total number of questions answered incorrectly by ChatGPT (referred to as "ChatGPT-proof") for each of the online tests, pre and post redesigning the questions to make them more GenAI-resistant.

Table 1. ChatGPT-Proof Questions: Pre and Post Test Comparison

Online Test	ChatGPT Proof		Total
	Pre	Post	
1	24	31	55
2	29	34	63
3	13	24	37
Total	66	89	155

Source: Author's own compilation

Overall, the number of questions considered resistant to ChatGPT increased across all three tests, rising by 23 in total. With respect to the strategies implemented to enhance the effectiveness of questions against GenAI, Table 2 reports the changes across the three online test questions pre and post ChatGPT which are either ChatGPT-proof or not.

Table 2. Impact of ChatGPT-proof Strategies on Online Test Questions

Online Test	ChatGPT Proof			
	No		Yes	
	Pre	Post	Pre	Post
1	17 71%	5 16%	7 29%	26 84%
2	23 79%	8 24%	6 21%	26 76%
3	8 62%	7 29%	5 38%	17 71%

Source: Author's own compilation

The strategies worked and enhanced the robustness of questions against ChatGPT. Test 1 questions increased from 29% to 84%, test 2 experienced a notable rise of 55% in ChatGPT-proof questions while Test 3 showed a moderate improvement from 38% to 71%, likely because some questions were already ChatGPT-proof pre-redesign.

Table 3. Question Type Performance Against ChatGPT Across Online Tests

Online Test	Question Type	Pre		Post	
		No. of Questions	% ChatGPT Proof	No. of Questions	% ChatGPT Proof
1	Recall	5	0%	1	0%
	Understanding	2	0%	2	50%
	Application	7	14%	8	75%
	Analysis	7	43%	4	100%
	Evaluation	0	0%	6	83%
	Creation	3	100%	4	100%
	Graph	0	0%	6	100%
2	Recall	6	0%	3	67%
	Understanding	0	0%	1	0%
	Application	13	8%	8	38%
	Analysis	7	43%	5	80%
	Evaluation	3	67%	8	100%
	Creation	0	0%	4	100%
	Graph	0	0%	5	100%
3	Recall	1	0%	0	0%
	Understanding	0	0%	1	0%
	Application	8	25%	10	40%
	Analysis	1	0%	0	0%
	Evaluation	2	100%	7	100%
	Creation	0	0%	3	100%
	Graph	1	100%	3	100%

Source: Author's own compilation

To further understand these improvements, Table 3 provides a detailed breakdown of the proportion of ChatGPT-proof questions by question type, offering deeper insights into how they contributed to the overall effectiveness of the strategies. As highlighted in the literature, higher-order thinking questions are less susceptible to being effectively answered by GenAI tools like ChatGPT (Farrelly and Baker 2023). This is clearly reflected in Table 3, which demonstrates the effectiveness of different question types in becoming ChatGPT-proof across online tests.

In Test 1, questions that require higher-order thinking, such as "Evaluation" and "Creation," consistently achieved 100% ChatGPT-proofness. Specifically, "Application" questions saw a significant improvement, rising from 14% to 75%, while "Analysis" questions increased from 43% to 100%. These results align with the literature's

assertion that such questions are less likely to be handled well by GenAI. In Test 2, the most notable changes were observed in "Recall", "Application," and again "Evaluation" questions. ChatGPT-proof recall questions increased from 0% to 67%, and application questions moved from 8% to 38%. The improvement in these question types indicates a successful redesign in making even basic recall questions more resistant to GenAI-generated responses (Weimer 2018). For Test 3, "Application" questions saw an increase from 25% to 40% ChatGPT-proof questions. Newly introduced "Creation" questions were 100% ChatGPT-proof as expected. This consistency highlights the effectiveness of the redesign in maintaining high standards for question robustness across different test formats.

4.2 Students' Perceptions of Online Tests

A total of 6 main themes were generated based on the reflexive thematic analysis to capture the recurrent thoughts common across the students.

4.2.1 Theme 1: Question Types

A variety of question types were designed to assess different skills, such as recall, application, and critical thinking. More than half of respondents preferred multiple choice and fill-in-the-blank questions, which were perceived as easier. Open-ended questions were more challenging (Reardon *et al.* 2018):

P4: I mean multiple choice was my top choice. Obviously, it's easier than the others and the fill-in-the-blanks was also easy too. [...] There were some open-ended questions, right? Alright, so I had a hard time solving them. I think 'cause [because] there were too many steps.

However, one participant (P1) suggested including more real-world problems, which they described as 'more creative'. These higher-order thinking questions were appreciated for their connection between maths and social sciences. Another participant (P5) expected more challenging questions, given the 'open book' test setting.

P5: I knew that all of the tests are going to have that sort of question, that sort of flavour. So I was expecting this thing and yeah, I think these are the questions [...] for an online test or Open book test, it's usually would become like this.

4.2.2 Theme 2: Clarity and Difficulty

Majority of the students found 'the questions in the test three was really challenging' (P1) compared to Tests 1 and 2. They reported that the questions were more confusing and "not connected with materials covered in class" (P3), which made them more time-consuming to answer.

P2 [with respect to test 1]: "I think the test one while being a little bit confusing, there was still kind of straightforward questions. We could easily identify why the question was asking us and what we needed to do to solve them."

This could be due to the complexity of the questions, the way they were phrased, or the topics they covered to make them more GenAI-resistant. Students understood 'it was trying to be like AI software and everything' (P2), but believed 'they did become more confusing in test 3.'

Overall, everyone except one (P3) agreed that the three tests varied significantly in difficulty, with the test 1 being intermediate, test 2 easy, and test 3 unexpectedly hard.

P4: The three tests were all unexpected because the first Test was. I feel like it was intermediate. [...] the 2nd test was really easy. It was just really easy. And the third one was really hard, so there was a big difference between the three."

4.2.3 Theme 3: Preparation and Strategies or Feedback and Adaptation

All participants used various strategies to prepare for the tests, such as reviewing lecture slides, watching videos, and practising exam-style questions. However, some students felt that these strategies were not as effective for Test 3 due to its increased difficulty and lack of clarity. P4 mentioned that 'my study routine was the same for all three tests, but the third one was my lowest grade'.

However, 2 out of 5 students adapted their study strategies over time, but some felt that better preparation might not have significantly improved their performance 'because it [test 3] was really hard for me' (P4).

The design of the tests allowed for feedback and adaptation (Brown 2022). After each test, students could review their performance and adjust their study strategies for the next test.

P5: I made some mistake in the first Test that I tried to maybe study the textbook or cover some things that wasn't emphasised in the workbook and Desmos; so on the 2nd test I tried to just focus on the main topics that was in the workbook and the main topics. All the questions that were given to us in Desmos the questions that we had

to complete before the seminar lecture and that sort of things. I think I did well. For the third test I adapted the same approach.

4.2.4 Theme 4: Use of GenAI post-tests submission

There was a consensus that the use of GenAI, especially ChatGPT was not effective in correctly solving maths questions and provided some formulas which were not relevant to the tests' questions.

P5: [...] I think generally ChatGPT is not good with maths like it always gives you weird questions. So I knew that even if I tried it would give me a wrong answer, so I didn't try honestly.

Another student indicated that they did not use ChatGPT but would use feedback provided 'below each question [there's like a yellow box]' (P2), suggesting a preference for the solutions provided by the module team rather than depend on external GenAI tools.

Two respondents clearly stated that they 'put the questions' (P5) into ChatGPT after the tests were completed but the unsatisfactory results led them to avoid using it for the other tests.

However, P4 believed that their lack of access to the 'fourth version' might offer better functionality, although the basic versions used were deemed inadequate.

4.2.5 Theme 5: Technical Issues

All participants took the tests in their own accommodation, making sure that there is a 'constant internet connection' (P1, P2). Additionally, no respondent faced technical difficulties during the time allocated for filling in their answers online.

P5: I didn't have any glitches, technical issues during the test time [...] and not any bugs or anything like that. It, was uh, it was smooth

However, P2 mentioned 'a lot of friends' experiencing issues with the online platform, particularly when it came to submitting their workings (after the quiz has been answered, students were given an extra 30 minutes to upload their notes).

4.2.6 Theme 6: Preference for On-Campus Tests

It was unanimous among students that the university should 'set more on campus tests so students can take exams [tests] fairly (P3) (Henderson *et al.* 2022). They believed that setting on campus tests will prepare them for the final on campus exams, 3 of whom referred to the mental preparation.

P1: They're subconsciously preparing for the mentality they have to have a mock exam, so they don't get more nervous.

P5: King's needs to change to have the test on campus as soon as possible [...] It can prepare how to control their [students] nerves when the tests are on campus.

Most participants raised the issue with cheating in an online setting where 'some students are gathering like in groups and solving it [the questions] together (P4). One student explained how taking the online test alone in their room lead to more mistakes.

P3: [...] because in online [tests], just myself in my room so I always make small mistakes like calculate [calculations] but I also take mock exam on campus [...] I calculate more accurately, so maybe feel some anxiety. Finally, taking tests on campus also meant test questions 'being more direct' and 'easier to understand' (P2).

4.3 Student Grade Performance Trends and Comparative Analyses Across Cohorts

This section examines student performance over several years, beginning with the introduction of online tests in January 2020 during the COVID-19 pandemic. Significant changes were implemented in the 2023-24 academic year to address the increasing prevalence of GenAI tools like ChatGPT, which began gaining traction around January 2023. While online tests were already in use, their design evolved over time. In the 2020-21 academic year, the test questions remained largely unchanged. The 2021-22 year saw some adjustments, though these were not substantial. High scores in the initial years, combined with challenges identified in online testing, led to a redesign of questions for the 2022-23 year. This included generating multiple versions of questions, increasing the use of word problems, and reshuffling question formats. However, by 2023-24, it became clear that many questions, particularly those focused on recall, understanding, and application, were too easily answered by ChatGPT. Consequently, a major redesign was undertaken to enhance question difficulty and reduce GenAI predictability.

Table 4 highlights the impact of the 2023 redesign on student performance. A downward trend in scores was evident even before the redesign, following some question adjustments and strategy changes in the 2022/23 academic year.

Table 4. Trends in Students' Performance in Online Tests and Normality Test (2020-2024)

Online Test 1	2020-21	2021-22	2022-23	2023-24
Mean	86.4	80.3	65.8	69.5
Standard deviation	13.8	14.5	16.7	18.2
Median	90.0	83.0	66.0	71.0
Shapiro-Wilk statistics	0.808***	0.898***	0.968***	0.841***
Sample size	166	203	211	227

Online Test 2	2020-21	2021-22	2022-23	2023-24
Mean	91.0	88.4	80.6	82.8
Standard deviation	8.2	10.6	13.0	13.3
Median	93.0	90.0	83.0	85.0
Shapiro-Wilk statistics	0.841***	0.781***	0.953***	0.914***
Sample size	166	203	211	227

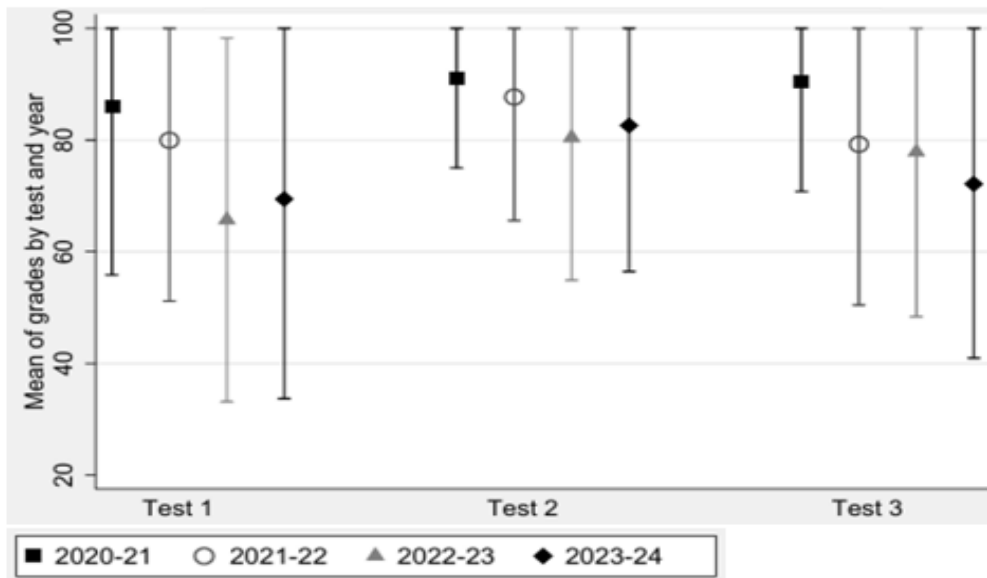
Online Test 3	2020-21	2021-22	2022-23	2023-24
Mean	90.6	79.8	77.8	72.2
Standard deviation	10.0	13.7	15.1	15.9
Median	93.5	83.0	82.0	73.0
Shapiro-Wilk statistics	0.807***	0.891***	0.949***	0.975***
Sample size	166	203	211	227

Source: Author's own compilation

Grades for Test 1 and Test 2 declined monotonically up to 2023 when there was a slight reversal post ChatGPT. However, Test 3 grades experienced a further decline in 2024, which questions its level of difficulty. Standard deviations in Table 4 also reflected that test grades varied across cohorts. To account for this variability or precision of the mean estimate, confidence intervals are reported in Figure 9.

Test 1 and 3 grades displayed wider confidence intervals indicating more uncertainty in the mean estimates caused by higher variation in performance. Narrower confidence intervals for test 2 in recent years suggest that mean grades stabilised or fluctuated less. Most confidence intervals appeared to be overlapping, implying no significant differences between time periods except possibly for tests 1 and 2 in 2022/23. However, confidence intervals may be unreliable if the underlying grades do not follow a normal distribution. Shapiro-Wilk tests confirm the rejection of the null of normality at 1% level of significance in all cases, as per Table 4. Therefore, to ensure the robust comparisons of differences in means across cohorts and over time, the Welch's t-test is used, which also consider unequal variances. The findings pre and post ChatGPT periods across the three assessments are reported in Table 5.

Figure 9. Confidence Intervals of Student Grades 2020-2024



Source: Original author's compilation

Table 5. Welch's t-tests of student grades pre-ChatGPT and post-ChatGPT

Online Test 1	Comparison Years	t-statistics	p-value
Pre-ChatGPT	2021-2022	4.135***	0.000
	2022-2023	9.454***	0.000
Post-ChatGPT	2023-2024	-2.244**	0.025

Online Test 2	Comparison Years	T-statistics	p-value
Pre-ChatGPT	2021-2022	2.657***	0.008
	2022-2023	6.734***	0.000
Post-ChatGPT	2023-2024	-1.722*	0.086

Online Test 3	Comparison Years	T-statistics	p-value
Pre-ChatGPT	2021-2022	8.678***	0.000
	2022-2023	1.411	0.159
Post-ChatGPT	2023-2024	3.830***	0.000

Source: Author's own compilation

There were significant improvements in grades for test 1 between 2021-22 ($t=4.135$) and 2022-23 ($t=9.454$), representing increases in academic performance in the pre-ChatGPT period. However, due to more GenAI-resistant questions, there was a drop in academic performance in the post-ChatGPT period with $t=-2.244$, significant at 5% significance level. Similar trends were observed for test 2 but post ChatGPT saw a marginal decline in overall performance, significant at 10% level. The most differences were observed for test 3 with highly significant differences in 2021-2022 period ($t=8.678$) while 2022-2023 showed no significant difference. Post ChatGPT, there was again a highly significant decrease in academic performance.

5. Discussions and Limitations

5.1 Online Question Design

The question type analysis highlights that "Understanding" and "Recall" questions were less effective as ChatGPT would easily give the correct answer. These question types either saw minimal or no change in their proofness rates post-redesign, with "Understanding" and "Recall" questions remaining largely unchanged or being reduced in number after the redesign process. Overall, the redesign efforts notably enhanced the proofness of "Application" and "Analysis" questions, demonstrating their effectiveness in challenging GenAI tools (Salinas-Navarro *et al.* 2024). The consistently high proofness of "Evaluation" and "Creation" questions further underscores their robustness against GenAI, while "Understanding" and "Recall" questions proved less effective in this regard. These findings underscore the importance of incorporating higher-order thinking questions in assessments to mitigate the impact of GenAI tools like ChatGPT and demonstrates the relevance of Bloom's higher order thinking skills approach to assessment design. The significant improvements in certain question types validate the strategic approach to redesigning online tests, ultimately leading to more robust and rigorous assessments.

ChatGPT excels at solving straightforward problems. Educators can create assessments that test deeper understanding and critical thinking rather than rote calculation using the following key strategies. They have been found to challenge GenAI in the context of applied maths in the Economics, Finance and Business topics.

5.1.1 Focus on Formula Selection rather than Formula Application

GenAI tools can easily use formulas to solve questions such as interquartile range or demand and supply questions. Instead of asking students to calculate the interquartile range using a formula, the question could rather ask students to figure out which formula would lead to a given outcome. GenAI find this reverse-engineering approach more difficult as it requires deeper engagement and reasoning skills.

5.1.2 Include Conceptual Constraints in Real World Problems

ChatGPT easily handle straightforward mathematical problems, such as finding the intercepts of a quadratic function unless real-world constraints are added. For example, economic outputs cannot be negative or the model struggles when taxes and subsidies are accounted for. Asking students to analyse whether solutions are realistic requires them to think critically, applying economic reasoning rather than just mathematical skills.

5.1.3 Introduce Ambiguity in Theoretical Questions

Questions involving unambiguous retrieval information, like selecting supply and demand equations among a list of options, are to be avoided. Instead, adding complexity through ambiguity or introducing additional, potentially irrelevant information can make these questions more challenging. For the demand equation example, including multiple possibilities and irrelevant data requires filtering and critical thinking.

5.1.4 Review display of Tables and Representation of Data

Rather than using traditional methods of representing data in tables which GenAI can easily handle and interpret, presenting data in a non-traditional way like reversing the tables (if possible) challenges it. An example question is asking students to fill in missing values prompting them to work backward, requiring higher-order cognitive skills.

5.1.5 Work Backwards from the End Solution

Traditionally, students worked through a problem step-by-step to reach a solution, which GenAI can do easily. Instead, by reversing the process and starting with the solution, students can be asked to deduce the steps which engages them more with the material and enhances their problem-solving skills. Such approach is effective in the case of figuring out operations or transformations within systems of equations to arrive at a final equation.

5.1.6 Include Evaluative Statements in True/False Questions

True or False tasks can include more abstract or argumentative statements as compared to simple factual recall ones. For instance, students can be asked to assess whether statements are always true or only under certain conditions which GenAI finds more challenging.

5.1.7 Use Diagrams as a Last Resort

Topics like probability and differentiation can include diagrams or non-standard notation to introduce some level of complexity. For instance, displaying a tree diagram with missing values to answer a probability question can test GenAI's limits in interpreting visual data.

5.2 Focus Group

These perceptions highlight the importance of clear, well-designed questions and a user-friendly test platform in online testing. It also underscores the need for institutions to consider student feedback when designing and implementing assessments.

Surprisingly, most of the participants preferred moving to on campus tests and exams despite the convenience of online testing from educators. This could suggest that the format of the online tests was not as effective or comfortable for them as traditional, on-campus tests, especially with this issue of cheating. They felt that on-campus tests resulted in less stress, had fewer technical issues, and better prepared them for final exams. This feedback suggests that while online testing can offer flexibility, it's important to ensure that it doesn't compromise the quality of the testing experience.

With respect to GenAI usage, although students could access GenAI tools like ChatGPT, they did not trust them enough to use them during the online tests because of the perceived inaccuracy in solving mathematical questions. These perceptions, enhanced by the fact that questions were designed to be more AI-resistant, may indicate an improved understanding of GenAI limitations among students.

Considering student feedback when designing and implementing assessment is important to ensure that the tests are clear, manageable, and free of technical issues to provide a positive testing experience for students. It's also important to provide adequate resources and support to help students prepare effectively for these tests. Issues with submitting workings post quiz submission could indicate problems with the design of the test interface or the functionality of the submission process, suggesting room for improvement in this area.

The design of the online tests was thoughtful and aimed at providing a comprehensive assessment of student learning. However, the unexpected difficulty of the third test indicates areas for improvement. It's crucial to ensure that the tests are not only challenging but also fair, and that the technical aspects of the test administration are smooth and user-friendly.

5.3 Differences in Grades Across Cohorts

Overall, students performed exceptionally well in test 2, with consistently highest mean scores, with tests 1 and 3's mean scores showing greater variability. The differences in confidence interval width across tests confirmed these varying levels of uncertainty. This suggests that students' performance in Test 2 became more reliable, whereas Tests 1 and 3 exhibited more fluctuation. Interestingly, Test 1 saw a slight improvement, corroborated by one of the main themes from the focus group discussion with students. They welcomed the additional support provided during seminars to help students adapt to the new question types (Stamov Roßnagel, Lo Baido, and Fitzallen 2021). Test 2's scores were expected to be higher, as students became more familiar with the question formats and could prepare more effectively. However, this minor drop could suggest that the strategies may not have been as successful, highlighting the difficulty in constantly counteract GenAI capabilities. Test 3's performance drop indicates that students found the revised questions more difficult, and test questions not sufficiently mirroring seminar content. These results highlight that students tend to struggle more on higher-order thinking. It is therefore important to ensure that future question designs are adaptive and continue to effectively balance alignment with module content and challenge.

The strategies used in redesigning GenAI-resistant questions appear to be effective, supported by the significant negative effect on academic performance across tests and between 2023 and 2024. This is further reaffirmed by the fact that they did not plummet drastically but reflect a healthy and controlled shift. The new assessment design strategies, although successful, highlight the potential challenges introduced by GenAI in maintaining rigour, inclusivity and academic integrity while achieving learning outcomes while creating any sort of assessment.

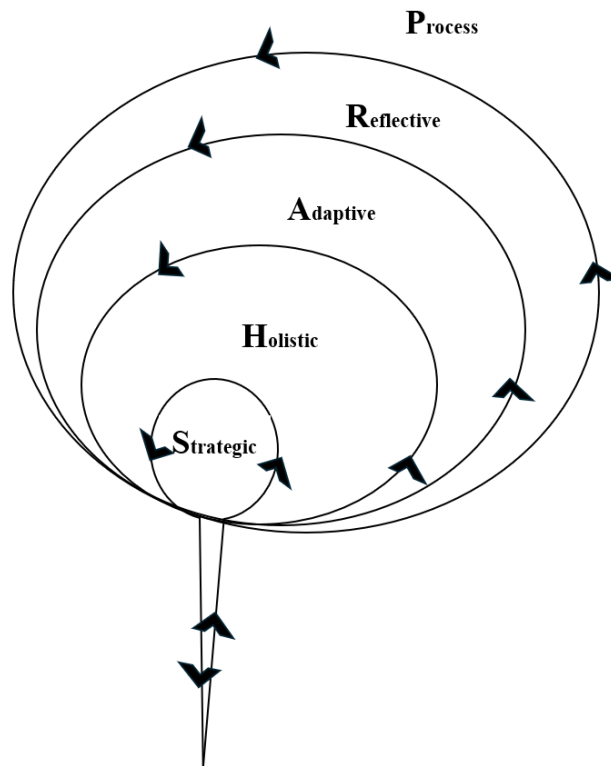
5.4 The Newly Developed SHARP Assessment Cycle: the 4Rs Approach redefined

The 4Rs approach (Reflect, Rewrite, Retest, Review) introduced in this study provided a structured, iterative framework for developing GenAI-resistant assessments in education. It adapted to advancements in GenAI by continuously refining questions, ensuring that assessments stay relevant and effective. The process helped in reflecting on the weaknesses of questions, rewriting them to a higher order thinking level, retesting them against ChatGPT, and reviewing responses to match learning outcomes (Stamov Roßnagel, Lo Baido, and Fitzallen 2021). Overall, this data-driven approach helped the module's instructors not only to fine-tune online tests to make them more GenAI-resistant but also foster deep learning and independent problem-solving skills. Importantly, the review phase ensured fair and pedagogically sound redesigned questions. However, the four stages lack a more student-

centred focus that will ensure questions are also accessible. The retesting phase also misses the rigorous checks regarding other GenAI tools to assess their capabilities.

The SHARP assessment cycle, see Figure 10, therefore enhances the existing Reflect-Rewrite-Retest-Review process by addressing the above weaknesses and providing a more holistic framework for developing fair and inclusive assessments in the age of GenAI.

Figure 10. The SHARP Assessment Cycle



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Source: Original author's development

SHARP stands for

Strategic: incorporates the careful design of assessments considering GenAI-generated responses. This aspect overviews the rapid progression of GenAI technology by focusing on both immediate and long-term challenges. By expanding the Retest phase, assessments can become resilient across and/or adapt to multiple GenAI tools.

Holistic: includes a variety of assessments (online tests/exams, coursework, presentations, projects) and integrates innovation, student voice and inclusivity (Bain 2010), providing a good balance among GenAI usage, student learning outcomes and feedback for assessments to remain effective and fair.

Adaptive: ensures assessments stay relevant and challenging without being overwhelming in the continuously evolving GenAI capabilities, student performance, and feedback. Difficulty levels of assessments are evaluated, re-evaluated and adapted to the changing educational landscape through the refining of question design.

Reflective: concentrates on the systematic student-centred feedback and assessment outcomes to refine questions and approaches between the Retest and Review phases. This aspect balances GenAI-resistance questions with their accessibility and clarity, ensuring learning objectives are being aligned (Stamov Roßnagel, Lo Baido, and Fitzallen 2021) while at the same time remain effective for learners.

Process: emphasises a cyclical and iterative approach of refining assessments through retesting, transparent formative assessments and student feedback. Staff and students work collaboratively in various stages developing teamwork and shared ownership.

5.5 Limitations

This study has several potential limitations. One key limitation is the rapidly evolving GenAI landscape during the writing stage, which followed the completion of data collection in July 2024. At the time of writing with a focus on ChatGPT-3.5, advanced iterations of ChatGPT and other artificial intelligence tools, like Gemini, Copilot, Claude,

became available, potentially performing better. The effectiveness of the assessment strategies may differ if tested against other AI tools, which may offer better ways to handle complex questions (Hersh and Fultz Hollis 2024). However, according to Digital Education Council Global AI Student Survey in 2024, ChatGPT was the most used tool by students (66% of 3839 responses across 16 countries) (Digital Education Council 2024). Furthermore, the study presents the 4Rs strategies, a systematic approach to designing more rigorous assessments for economics-related quantitative subjects in the GenAI age. This approach inherently requires ongoing testing of questions using different GenAI tools. Given rapidly changing educational technologies, the SHARP assessment cycle is particularly relevant as it emphasises an iterative rather than a static process to ensure adaptability.

A restrictive assumption made in this study was that, at the time the tests were carried out, most students had limited access to or under of ChatGPT. Although most students could freely access ChatGPT-3.5, only a few had access to ChatGPT-4 paid version. They may then had access to more sophisticated features which could have enhance their performance on the online assessments.

Another limitation is that the study focuses on first year foundational students in the economics and management areas, hence not fully capturing the diverse skills and knowledge which more advanced students may possess, limiting the generalisability of the findings to other educational settings and disciplines.

Conclusions and Further Research

This paper critically analysed how online assessments are vulnerable in the age of GenAI tools, primarily using ChatGPT-3.5, and reflected on how to transform conventional assessment designs to maintain academic integrity. The Reflect-Rewrite-Retest-Review process provided both a solid framework in redesigning the questions and a continuous reflection on their efficacy and performance. The Bloom's taxonomy was further proven to be effective in significantly reducing GenAI-generated responses to questions which require higher-order thinking skills. Strategies implemented in redesigning the online Maths for Social Sciences tests led to a three-fold increase in ChatGPT-resistant questions across two out of three tests: from 29% to 84% in Test 1, from 21% to 76% in Test 2 and from 38% to 71% in Test 3 (two-fold increase). These findings highlight the importance of shifting from purely recall-based questions to more analytical, evaluative and creative tasks.

However, this transformative approach to assessment design introduced some challenges, especially in terms of student performance in Test 3. There was a strongly significant drop in academic performance over the years, suggesting the successful implementation of GenAI-resistant questions but hinting on a rise in the level of difficulty. Student feedback from a focus group confirmed these results whereby students struggled with Test 3's redesigned questions which they said were more complex and lacked clarity as compared to the previous tests. These findings highlight the importance of finding the right balance between designing assessments that meet students' learning outcomes and that challenge GenAI tools while at the same time ensuring that students are sufficiently prepared for tasks that require higher-order thinking levels.

The need to focus on student experience and accessibility and the strategic planning to address advancements in multi-AI models led to the SHARP assessment cycle (Strategic, Holistic, Adaptive, Reflective Process). This comprehensive approach to assessment design is iterative, adaptive, incorporates real-time student and faculty feedback and fosters an inclusive and collaborative learning environment. It offers a practical framework to balance more GenAI-assisted learning experiences while ensuring academic integrity.

In conclusion, this study provides some implications for further research, policy and practice in the context of assessment design in the age of GenAI. Research may incorporate more empirical evidence on how to integrate GenAI tools into assessment designs while balancing knowledge accumulation with the development of higher-order thinking skills to enhance students' positive learning experiences. Moreover, there is a need for more empirical studies which test the iterative nature of assessments like the SHARP assessment cycle across diverse assessments and disciplines, adapting them to evolving students' needs and GenAI-enhanced learning environments. Policy implications may involve transforming assessment strategies to be adaptive and dynamic, as new technologies emerge. It is proposed that assessments become more iterative, where they are continuously updated to include students' feedback and GenAI performances, hence upholding academic rigour. Students should be guided to understand GenAI capabilities, limitations and impact on their academic journey. Finally, this paper incorporates some practical steps for educators to co-create assessments with students, fostering a sense of ownership over their learning experience. This collaboration may also raise their awareness about using GenAI in a more responsible manner and the importance of academic integrity, within and beyond the classroom.

Declarations

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Do Soft Skills Affect the Employability of Graduates? Insights from the Labor Market of Bangladesh



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Abstract: University education primarily emphasizes the instruction of advanced skills to learners. Students learn how to become successful in their careers but do not develop soft skills. Without soft skills, any university graduate confronts significant challenges in their professional lives. The purpose of this study was to investigate how higher education institutions (HEIs) develop soft skills to improve graduate employability. The study employed qualitative methodologies. Data were gathered from secondary sources. This study ranks several soft skills based on their usefulness in various jobs, including communication, leadership, decision-making, teamwork, and problem-solving. The study identifies a gap between the job market expectation and higher education outcomes. The findings show that students require stronger client orientation, communication, decision-making, problem-solving, and work ethic abilities. The researcher described the significance of higher education institutions in developing soft skills, as well as their own personal attempts to obtain them. Students acquired soft skills through efforts such as joining organizations and groups, adopting leadership positions, reading self-development books, viewing films, and attending soft skills workshops. University students should learn soft skills before graduating. This study analyzes the strategies used by students to gain soft skills while pursuing higher education.

Keywords: soft skill; student engagement; skill gap; higher education; graduate students; Bangladesh.

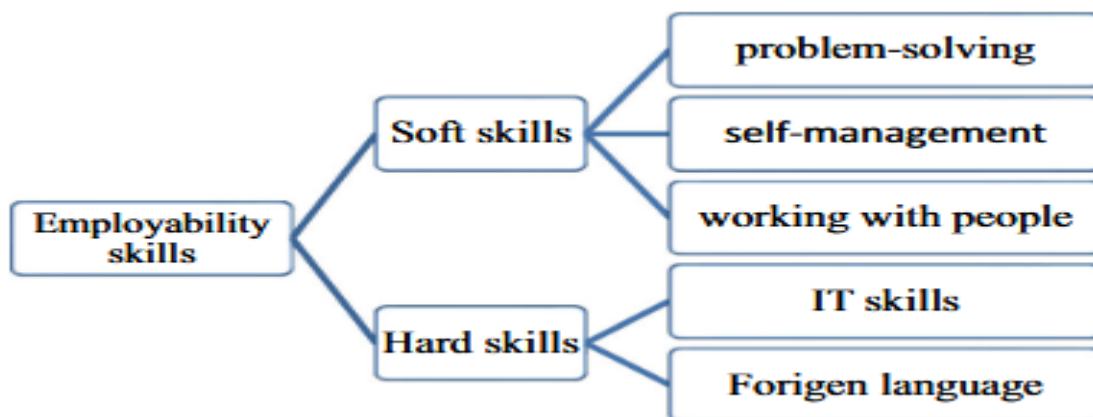
JEL Classification: I20; I21; J29.

Introduction

The job market for recent graduates in Bangladesh is currently becoming more competitive. Strong job demand, skill gaps, and a lack of practical experience have now limited career opportunities for recently educated individuals in Bangladesh. Currently, Bangladesh's education system is failing to recognize the future of work needs, which necessitate significant curriculum modifications and quality adjustments in teaching and learning techniques in order to remain competitive (Islam 2019). Learning objectives should seek to help students improve their professional identities and competencies. In today's competitive world, traditional graduation programs in Bangladesh must be revised and modernized. Universities cannot just convey information through textbooks; they must also provide students with job-oriented courses and skill-based training. Professor Abdul Mannan claims that the nation's labor market is becoming skill-driven. He goes on to say that graduates should have the necessary skills to be employable in the rapidly evolving labor environment. This is why the nation's present educational system has to be overhauled (Daily Star, May 11, 2019). All Bangladeshi institutions should educate their students about the value of soft skills in creating high-caliber graduates. Soft skills are some of the character and personal

characteristics of a person that are essential for success in professional and personal life. Soft skills include communication skills, teamwork, problem-solving skills, and adaptability. Malcolm Gladwell (2011) asserts that those with superior soft skills outperform those with inferior soft skills in terms of employment and problem-solving. Just as hard skills provide technical knowledge, soft skills help in interacting properly in the workplace. Practicing and developing soft skills is very important for building a successful career. These are skills that help us interact and perform in our personal and professional lives. They improve people's social and professional skills. Soft skills are personal skills such as behavior, communication, leadership, and teamwork. These skills teach us how to work well with others in the workplace, which is very important for professional success. These include communication skills (speaking and listening clearly), leadership (giving the right direction to the organization), problem solving (dealing with crises intelligently), and the ability to work in a team (achieving good results through collective efforts). Communication, problem-solving, leadership, empathy, and creative thinking are examples of soft talents (Wentz, 2012). A significant amount of money and effort is expended on soft skills instruction to help employees learn them and become team members, successful speakers, and adept problem-solvers in the workplace (Kellerman 2012). Patacsil and Tablatin (2017) conducted research on IT professionals and discovered that soft skills practice is essential for business growth and sustainability. Interpersonal communication, critical thinking, and problem-solving skills are essential for an employee to evolve into a skilled professional (Naim, 2017). Employers seek employees that are ethical, amiable, leaders, and team players in addition to technical understanding of their trade (Johnson, 2016; Majid et al., 2012). As a result, soft skill assessments are commonly used when hiring new personnel.

Figure 1. Employability skills framework



Source: Haidar, 2025.

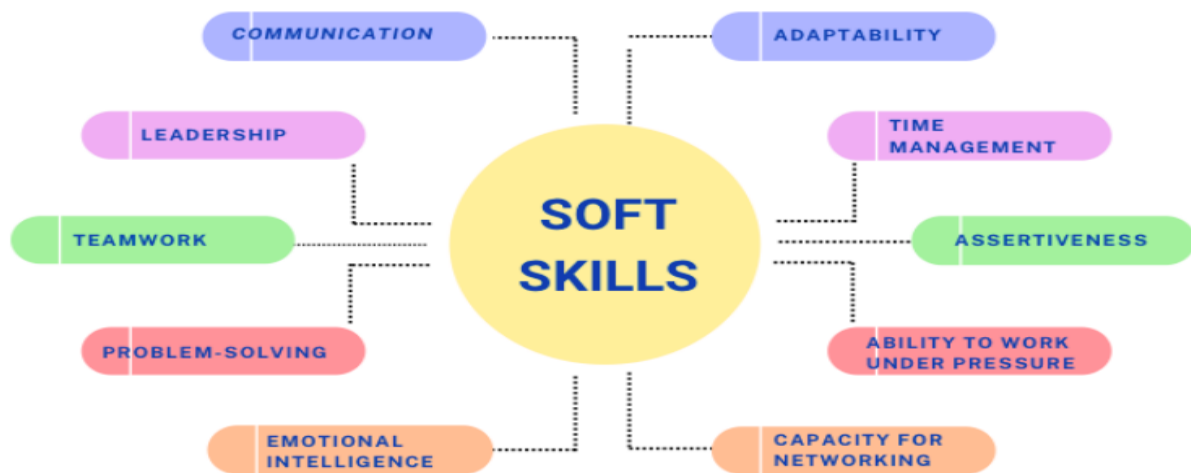
Hard skills are essential for technical or specialist tasks, such as programming, finance, or machine operation, whereas soft skills include talents to work with others, such as interaction, problem-solving, and time management. However, soft skills are required in all workplaces. This study seeks to investigate the main soft skills that are associated with employability. It also encourages the development and use of soft skills in the job search for freshly graduated individuals. Because relatively few studies have been undertaken on soft skills practice in Bangladesh, this study will encourage academic institutes to place a greater focus on soft skills development for their students and include these into curriculums.

Significance of Soft Skills in the Age of Technology

Although technological advancements are changing the way we work, the demand for soft skills will never decrease. No matter how advanced artificial intelligence and machine learning become, the ability to connect with people, lead, and create creative ideas will remain the same. Soft skills are essential for professional development and improving personal relationships in the workplace. They increase work efficiency, leadership, and coordination skills. The importance of soft skills in career building is discussed below. It goes beyond just knowing how to do technical tasks and helps in building relationships in the workplace and performing tasks correctly. To be successful in any profession, you need to know how to interact with colleagues and work in a team as well as your work. It is

a distinct combination of personal characteristics, mental and practical abilities, and all temperaments and personality traits that enable creativity. It is also reflected in conduct and behavior (Binkley et al., 2012). Soft skills give you the ability to think creatively and make quick decisions to solve problems, as well as help in dealing with crises. Whenever challenges arise in the workplace, soft skills are needed along with skills and experience.

Figure 2. Elements of soft skills



Source: Mountassir, 2023.

According to Dossey et al. (2006), problem-solving talent is a mix of mental and emotional processes employed in a variety of contexts and activities; as ability, it enables an individual to attain aims that could not be accomplished using simple, well-known routines or algorithms. Maintaining good relationships with colleagues and superiors is essential if you want to progress in any organization. Communication skills, humility, and a positive attitude among soft skills help in building strong relationships with others, which plays an important role in professional success. According to Binkley et al. (2012), it encompasses the capacity to adjust to changing roles and workplace responsibilities as well as the capacity to carry out productive tasks in the face of fluctuating priorities. A process of deliberate, self-regulatory assessment and evaluation, critical thinking is a collection of situation-dependent broad cognitive skills. During this process, the person uses cognitive skills and tactics to increase the likelihood of a desired outcome or decision (Facione, 1990). This is essential to be a good leader in any team. Apart from leadership abilities, the ability to work in a team ensures success in an organization. With the right soft skills, you can motivate and manage the team effectively. It promotes the ability to remain flexible and composed in case of shock, which ensures functional survival.

Status of Graduate Employability in Bangladesh

Still, the current scenario in Bangladesh is unsatisfactory. According to the Asia-Pacific Employment and Social Outlook 2018 study, young unemployment in Bangladesh quadrupled in just 7 years, from 2010 to 2017. Since Bangladesh steadily transforms into a middle-income country, such data should cause concern, since the demand for highly trained and educated personnel would rise in the future years. Bangladesh's youthful people must play an important part in the country's growth, yet current statistics show that the majority of graduates in Bangladesh struggle to find suitable work. According to research titled "Bangladesh Employment and Labor Market Watch 2018" issued by the Center for Development and Employment Research (CDER), Bangladesh has the highest jobless rate among tertiary-degree graduates.

In its last Labour Force Survey 2024, the Bangladesh Bureau of Statistics (BBS) provided us with data that, while first comforting, crumble when examined closely. The paper states that the country's unemployment rate increased by 160,000 in just one year, from 2.46 million in 2023 to 2.62 million by December 2024. Out of 180 million people, only 2.62 million are unemployed, according to the report. That appears doable on paper. However, when you remove the definitions, statistical trickery, and ground reality, you see an employment crisis that is undermining the core of our economy. The most concerning result is that 29% of young people without jobs between the ages of 15 and 29 had a college degree. The very demographic that ought to be advancing the nation is being

left behind. 7.13% of the unemployed have higher secondary credentials, while 13.54% have bachelor's degrees (Dhaka Tribune, 2026).

Figure 3. Esteemed Graduated Unemployment



Source: Suresh, 2015.

The high percentage of unemployment among university graduates may be ascribed to a lack of skills required to get a job after graduation. Furthermore, the majorities of occupations in Bangladesh are in the informal economy and provide poor wages. However, the country's education system fails to empower and prepare graduates by acquiring the necessary abilities to compete in the job market (Uddin, 2021). Unfortunately, most university graduates in Bangladesh today are unable to satisfy the expectations of today's dynamic and competitive labor market. As a result, corporations are obliged to employ foreign workers. Currently, numerous foreigners have been hired in many economic areas in Bangladesh. Foreigners are mostly employed in the mid-level management levels of enterprises, with significant recruitment for top-level roles such as management directors at several multinational corporations in Bangladesh. According to Home Minister Asaduzzaman Khan Kamal, there are 20,988 foreign workers in Bangladesh (Prothom Alo, June 13, 2023). Employers claim that a lack of technical, professional, and linguistic skills is limiting Bangladeshi graduates' career opportunities. Some analysts went on to say that the major reason for Bangladesh's high unemployment rate is because higher education institutions in the country are failing to create highly trained graduates, which, according to data, are a critical necessity in today's labor market. Because many fresh graduates in Bangladesh are unemployed each year, policymakers, academics, and institutions must act quickly to improve graduate employment in Bangladesh. Two million young Bangladeshis enter the workforce each year, but relatively few of them possess the skills that companies are looking for. In addition to improving the lives of youth and their families, resolving that mismatch is essential to advancing the nation's remarkable achievements to combat poverty. However, Bangladesh's higher education institutions have been executing their curricula with little to no consideration for the demands of life and the workplace, which results in graduates who are unemployed. The high rate of unemployment among Bangladeshi university graduates is caused by both a dearth of job openings and a lack of applicants with the necessary marketable skills that businesses appreciate (Uddin, 2021). Concerns over their suitability for the position and employability abilities were also voiced by employers. Critical weaknesses in critical and analytical thinking, communication, problem resolution, technical skills, numerical skills, decision-making, capacity and desire to learn, and interpersonal connection skills were discovered by researchers among graduates (Uddin, 2021; Nusrat & Sultana, 2019). However, according to the Bangladesh Bureau of Statistics (BBS, 2018), 29.8% of the nation's young are neither in education nor in employment or training (NEET) because they lack the necessary skills, while the percentage of youth unemployment is 10.6%.

Essential Soft Skills for Employability

There are some special skills among them, which are helpful in our personal and professional lives. Let's know some key soft skills and their importance. Currently, competing in the competitive labor market based just on outcomes is extremely challenging. A student needs develop a variety of talents to do this. Soft talents are not genetically determined (Coyle, 2009). We can learn them in context. The following are some activities that might aid in the development of soft skills while a student at a university:

Table 1. Key Soft Skills for University Graduate

Key Soft Skills for University Graduate	
Resume Writing	It's not the ability to run Face book; Internet browsing, skills to write convincing emails, updated knowledge about necessary websites, creating updated CVs and skills in various applications (Marr, 2022).
Language skills	Learners must be ability to speak and write Bengali and English in pure language. Soft skills are critical to language acquisition success because they help learners interact effectively, collaborate, and adjust to varied cultural and linguistic situations (Serik et al. 2024).
Presentation skills	Presentation abilities, both formal and informal, are crucial for students. Since it improves one's speaking abilities, this is one of the abilities that may be enhanced and developed with practice. In seminars, classrooms, and conferences, a large number of ESP learners and language users have tackled it as professors. Along the way, it fosters the development of several other skills, such as conversation, negotiation, and public speaking (Boyd, 1989).
Networking skills	Refraining from lobbying; monitoring the employer's organization; and becoming ready by staying in contact with workers in the desired role. Gaining benefits from combining the distinct experience, expertise, resources, and capacities of network participants, as well as obtaining an efficient approach to executing educational initiatives, are the objectives of networking collaboration (Akhtaryev et al., 2015). Decentralization, when horizontal communication leaps over vertical communication barriers, is a hallmark of effective networking (Remorenko, 2003).
Communication Skills	Oral and written communication skills are essential in every profession. Clear and effective communication is very important for exchanging information correctly in the workplace. Speech and writing should be clear, concise and easy to understand. This creates proper understanding with others in the workplace and reduces misunderstandings. Importance of Being a Good Listener: An important aspect of communication is the ability to listen. Being a good listener means listening carefully to the opinions and problems of others and responding correctly. This is helpful in problem solving and teamwork in the workplace.
Teamwork	Through a successful teamwork, multiple people can achieve more results by working together. Through teamwork, it is possible to use the skills of each member correctly and the pace of work increases. Effective interaction between members of a team improves the results of the team. Showing respect for everyone's opinions and work is the main condition for a successful teamwork. The teamwork skill is one of the soft skills that business practitioners or professionals at all level must have. Teamwork must show those values to harmonize the cooperation between workers or employees in order to build the work in a team effectively and productively. Working in a team can give more achievement compared to an individual work (Peter, & Simatupang, 2019).
Leadership Skills	Anyone can be a leader in the future, so developing leadership skills is important for your career. Having leadership skills means that you can give direction to a team and motivate team members. To be a proper leader, you must have confidence, problem-solving skills, and decision-making skills. Leadership skills can bring progress in your career. Leadership ability is the capacity of an administrator to allocate people who are qualified for a position based on their competencies, assign tasks to maximize staff members' talents, and give and convey a strategic plan to workers in order to inspire others to take action. In addition, the administrator fosters broad engagement in goal-setting, critical thinking, and problem-solving while taking calculated risks to provide creative and practical answers. According to Ngang (2012), leadership capacity also relates to an administrator's ability to empower staff members to make decisions, use them correctly, and adapt quickly and flexibly.
Problem-Solving Skills	When various crises or problems arise in the workplace, the ability to solve them is very important. A skilled worker will not only report the problem, but also suggest alternative strategies to solve the problem. The Importance of Creative Thinking and Solving:

	Solving problems often becomes difficult without creative thinking. Creative thinking increases your problem-solving skills and makes you competitive. The process of recognizing issues, developing potential solutions, and putting the best answers into practice in relatively novel circumstances is the foundation of problem-solving skills (Graesser et al., 2018; Pinter & Cisar, 2018).
Positive Attitude	A positive attitude increases your performance and efficiency at work. It not only improves your own performance, but also helps in maintaining good relations with your colleagues.
Adaptability	Easily accepting new situations and changes in the workplace is an essential skill. In today's fast-changing world, the way of working also changes rapidly. If you cannot adapt to these changes, it is difficult to achieve success in the workplace. The ability to adapt is very important in building a career. The ability to adapt to a new workplace, new environment or new way of working will keep you in a competitive position.
Time Management	The Importance of Adhering to Work Time Limits: This is one of the main conditions in the workplace. If you cannot complete your work on time, your reputation at work may be damaged. Prioritizing Work: When you have to juggle multiple tasks at the same time, it is very important to prioritize which tasks to do first. By doing priority-based tasks, you will be able to work more efficiently. By redefining time as a question of perspective, Vanderkam (2016) encouraged professionals to think about not just what they do but also how and why they do it. This approach may be put into practice with the aid of tools like SMART objectives, digital planners, and prioritizing matrices, but both internal discipline and outside assistance are necessary for success.
Humility	Modesty is an important soft skill, which increases your acceptance in personal and professional life. With a humble attitude, you will get respect and cooperation from everyone at work, which will help you move forward in your career.
Voluntary Works	Projects are often extremely effective learning aids (Laur, 2013). During the university years, volunteer activities and projects can help students develop soft skills. Attempting to raise money for a community or planning a congress or fair for a certain foundation greatly enhances problem-solving and communication abilities. Persuasion abilities are necessary for a successful contribution collection in order to persuade individuals or organizations to make donations. Once more, every nonprofit organization has an excessive number of volunteers, and each volunteer must cooperate with others. Because employees in nonprofit companies do not labor for pay, they are more complicated organizations. Therefore, it is more difficult to force individuals to finish a single task than it is for organizations.
Ethics	Ethics is the significant soft skills required in their employment, behind entrepreneurship. However, the true problem comes in the efficient application of ethical principles and the proper functioning of experts as members of various teams through effective communication. Thus, adequate guidance and assessment of practical engineering abilities is urgently required. We emphasize on the educational evolution of the acquired ethical and communicative abilities (Sari & Soelistiyowati, 2020).

Source: Data processed by author

Proper practice and development of soft skills is one of the main components of achieving success at work. These skills will help you improve your personality and move you forward on the path of a successful career. Soft skills play an important role at every level of career. It not only enhances technical skills, but also creates a strong foundation for success in the workplace.

Challenges in the Integration of Soft Skills

Unfortunately, many learners face a number of problems when working in professional settings that will most likely need them to "think on the spot" when giving presentations or communicating with native speakers. The capacity to apply the information and abilities they have learned in classrooms or during training in the job is another difficulty. The Conference Board of Canada, the American Society for Training and Development, and the US Office of Educational Research and Improvement have all emphasized the need of training both hard and soft skills in the workplace, which is reflected in the employment standards of European society. Additionally, they have divided the

essential employability skills profile into three categories: Academic context-relevant abilities include critical thinking, problem-solving, communication, and presentation. Personal management abilities include taking initiative, establishing objectives, having a positive outlook, and having confidence in oneself. Teamwork abilities include cooperation, reciprocity, respect for others, and leadership traits (including the ability to present) (Leroux & Lafleur, 1995). Islam (2019) mention that several Challenges found in Teaching and Learning Environment in Tertiary education is following:

Figure 4. Challenges found in Teaching and Learning Environment in Tertiary Education



Source: Islam, 2019.

Strategy to Improve Soft Skills

Regular practice and effort are required to improve these skills. This can bring success in both your professional and personal life. Self-study/ Learning on your own are one of the best ways to develop soft skills. Students can learn about different aspects of soft skills from books, online articles, video tutorials, and podcasts. Make yourself more skilled by studying regularly (Almeida, 2023). According to Chan (2011), university courses and programs are created to guarantee that graduates have the seven aspects of soft skills that are thought to be necessary for the industry in addition to professional and functional abilities and core knowledge.

There are many courses available online or offline, which teach soft skills. In particular, you can take various courses based on communication, leadership, and time management. These courses will give you the right direction and create opportunities for improvement.

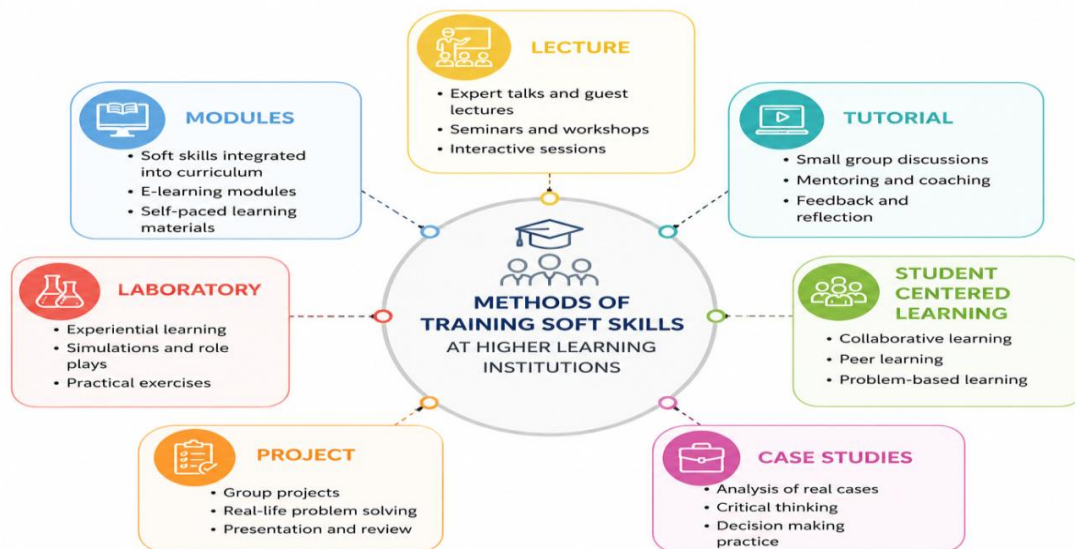
Learn problem-solving techniques: When a problem comes up, think about how to solve it instead of just focusing on the problem. Think creatively, take advice from others, and find different alternative solutions. Problem-solving skills can be improved through practice.

Workshops: By directly participating in workshops, gain practical knowledge and experience. Participate in various workshops, where experts teach various soft skill techniques. Workshops give you the opportunity to learn through real-world experience.

Develop leadership skills: To acquire leadership skills, first take small responsibilities. Take a leadership role in any team or project. Be confident in your work and be ready to help others. Regular practice and experience will make you a better leader.

Focus on Time Management: If you want to be successful, you need to use your time properly. Make a to-do list, decide which task to do first. Working for a specific amount of time every day will improve your time management skills. Through regular study, training, and experience, you can improve your soft skills, which will play an important role in your professional and personal life.

Figure 5. Methods of training soft skills at higher learning institutions



Source: Chan, 2011.

The Future of Soft Skills in the Workplace

As technology advances in the future, the importance of soft skills will increase. Human emotions, relationships, and leadership skills will always be essential in the workplace. Although technological advancements are changing the way we work, the demand for soft skills will never decrease. No matter how advanced artificial intelligence and machine learning become, they are essential for building relationships with people, leading, and solving creative problems. In the future, those who will be successful in the workplace will have a high level of soft skills. Leadership, problem-solving, and adaptability will keep employees at the top. Therefore, it is important to practice them now. The importance of soft skills will increase further in the future. As technology advances, the demand for soft skills will increase, which will help employees succeed. Pritchard (2013) has mentioned that 75% of employers are looking for employees with soft skills.

Concluding Comments

Soft skills are not just a plus point in today's workplace, but the foundation of success. The study's findings show that soft skills are a strong predictor of graduate employability in the Bangladesh employment market. According to this study, appropriate talents include communication skills, leadership skills, time management, problem-solving skills, collaboration, networking skills, and so on. This study discovered a significant disparity between education and occupational expectations. Improving soft skills will bring big changes in professional and personal life. Equivalent knowledge of the studied subject and good knowledge of the connectivity of your studied subject in the job market (every subject has connectivity in the job market, learn about them. Furthermore, Finch et al. (2013) found that the most important abilities for successful employment of graduates were "interpersonal," "verbal communication," and "listening." According to this study, these abilities are somewhat necessary for Bangladeshi grads. The key competencies that companies want are "ability and willingness to learn," "teamwork and cooperation," "hard work and a readiness to take extra work," "self-control," and "analytical thinking" (Pang et al., 2018). Bangladesh needs a skilled, creative, and competitive workforce as it steadily develops into an economy with progress, more global mobility, and rapid economic output. One of the most important tools for preparing the present population to fulfill the needs of the ever-changing labor market is education. A new term that emphasizes the integration of discipline study with working activities is "work integrated learning." It may be a useful tool that helps Bangladeshi higher education institutions give their graduates the employability skills they need to succeed in the cutthroat workplace. In order to improve students' job experience and general skills, universities must implement new work-oriented courses. There is need for strong collaboration between industry and university to ensure that graduates acquire the skills.

This study addresses the regional specificities of Bangladesh while examining the efficacy of soft skills. In the prior study of Sultana, (2025) mentions there are critical deficiencies in soft skills among Bangladeshi Graduates. Present study explore sector-specific skill gaps, student perceptions of readiness, and the long-term impact of curriculum reforms, helping to further align higher education with industry needs.

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Defining and Developing Standards of Teaching Excellence for New College Faculty



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Abstract: In PreK–12 education in the United States, public school teacher candidates engage in a series of standardized requirements for certification, including the PRAXIS examination, supervised student teaching, formal observations, and maintaining a minimum grade point average for state licensure. No comparable system of standardization exists for college professors, raising an important question: How can universities cultivate and sustain teaching excellence at the post-secondary level?

This study employed a dialogical approach to explore the nature of teaching excellence and the ways in which higher education institutions can best support it. The research design intentionally prioritized the authentic voices of participant researchers, producing a mosaic of shared themes and distinctive individual perspectives.

Key findings highlight the importance of (1) recognizing teaching excellence as a legitimate and valued form of scholarly achievement; (2) fostering caring and relationship-centered pedagogies; and (3) integrating cognitive, affective, and spiritual dimensions of learning. Readers are encouraged to interpret and extend these findings within their conceptual frameworks because of the diversity and depth of the insights shared.

The study's conclusions were further examined through feedback from doctoral students and candidates, whose responses suggested that specialized pedagogical training, combined with mentorship from experienced faculty, significantly enhances the development of teaching excellence among emerging professors. This underscores the critical need for structured programs designed to equip new faculty with effective pedagogical strategies, particularly given that many enter academia with limited teaching experience (Schmid *et al.* 2021).

Keywords: teaching excellence; faculty development; higher education; new faculty.

Introduction

In the landscape of modern American education, a striking paradox exists between the preparation pathways required for lower and higher education professionals. In PreK–12 education, public school teacher candidates must navigate a highly standardized and rigorous gauntlet for state licensure, encompassing standardized testing such as the PRAXIS examination, extensive supervised student teaching, structured formal observations, and strict minimum grade point averages. This institutional framework ensures that before any educator assumes primary

responsibility for a classroom, they have demonstrated foundational competency in pedagogical theory, instructional design, and classroom management.

Conversely, no comparable system of standardization or mandatory pedagogical certification exists for college and university professors. In higher education, the historical and prevailing paradigm dictates that an advanced disciplinary degree, such as a Ph.D. or a terminal master's degree, serves as sufficient proof of an individual's readiness to teach. This structure operates on the unverified assumption that robust subject-matter expertise automatically translates into instructional efficacy. Consequently, many early-career researchers, postdocs, and doctoral graduate teaching assistants enter the university classroom with profound knowledge of their disciplines but little to no formal training in pedagogy, curriculum delivery, or student engagement strategies. This gap in preparation frequently leaves new faculty members feeling overwhelmed, unsupported, and ill-equipped to navigate the complex administrative and instructional demands of higher education.

This pedagogical deficit is further exacerbated by systemic institutional priorities within academia. Under the prevailing "publish or perish" culture, university reward structures, including tenure, promotion, and competitive compensation, overwhelmingly favor research productivity, grant procurement, and publication volume over teaching quality. Because traditional institutional metrics undervalue the scholarship of teaching, emerging faculty are provided with few tangible incentives to invest time or energy into refining their instructional practices. Furthermore, while the academic literature surrounding "teaching excellence" has grown over the past two decades, it remains heavily fragmented, lacking a universal consensus on its definition, and heavily tilted toward abstract theoretical concepts rather than experiential, ground-level practices.

To address these systemic challenges, higher education institutions must move beyond rigid, administrative outcome-related measures and discover how to actively cultivate, support, and sustain genuine teaching excellence at the post-secondary level. This study addresses this critical gap by employing an innovative qualitative dialogical approach. By prioritizing the collaborative, authentic voices of participant-researchers representing diverse backgrounds in military leadership, K-12 administration, pastoral care, and business management consulting, this research co-constructs a holistic, multi-layered framework for post-secondary pedagogy.

Specifically, this paper seeks to answer how universities can systematically bridge the gap between academic research readiness and pedagogical competence for incoming faculty. Through an iterative process of reflective dialogue and validation, this study introduces a multidimensional standard of excellence built upon three interconnected pillars: (1) elevating teaching excellence as a legitimate, highly valued form of scholarly achievement; (2) championing caring and relationship-centered pedagogies; and (3) integrating cognitive, affective, and spiritual dimensions of learning. Finally, by evaluating this framework through a focus group of active doctoral candidates, this study provides a pragmatic justification and actionable roadmap for structured, university-led pedagogical training and faculty mentorship programs designed to prepare the next generation of emerging professors.

Literature Review

This gap in structured pedagogical preparation often necessitates a nuanced understanding of teaching excellence, which is a complex, multidimensional construct encompassing more than just classroom delivery (Johnson, 2021). Indeed, effective teaching extends to creating a positive and responsive learning environment while modeling values through instructional practices (Dinamling & Depaynos, 2024). The concept of teaching excellence has gained significant global attention in higher education over the past two decades; however, its precise interpretation remains a subject of considerable debate (Johnson, 2021). Various stakeholders often interpret what constitutes teaching excellence differently, leading to a lack of a universal consensus on its definition (Johnson, 2021). This lack of consensus is further complicated by the tendency in the literature to focus on theoretical concepts rather than experiential practices, which are crucial for the formal preparation of teachers across various disciplines (Bullin, 2018). This highlights the need for a more nuanced and inclusive interpretation of teaching excellence that balances outcome-related measures with a focus on the processes of learning and acknowledges the intertwined nature of teaching and research in higher education (Wood & Su, 2017). Moreover, effective teachers are typically characterized by their ability to meaningfully convey complex concepts and inspire critical thinking that transcends discipline-specific knowledge and skills that require both formal preparation and practical experience (Bullin, 2018). This is particularly relevant for doctoral students, postdocs, and graduate teaching assistants, who often assume significant teaching roles without adequate pedagogical training or mentorship, thus facing unique challenges in their instructional responsibilities (Ellegaard *et al.* 2024). Consequently, many early career researchers and new faculty members enter academia with robust research backgrounds but limited formal training in pedagogy, often leading to challenges in teaching effectiveness and

student engagement (Lamon *et al.* 2024; Ibrahim *et al.* 2020). This gap often results in new faculty feeling unprepared and "thrown in the deep end" when navigating university teaching systems and administrative processes, which can significantly undermine their confidence and lead to increased stress (Lamon *et al.* 2024). This pedagogical deficit can hinder both individual professional development and the overall quality of education provided to students (Maalouf & Jallad, 2023). This is especially problematic given that the scholarship on teaching in higher education has historically been undervalued, with research competence often being the primary criterion for academic success (Heinonen *et al.* 2022). This persistent focus on research often overshadows the critical need for robust pedagogical training, thereby hindering the development of comprehensive teaching effectiveness among new faculty (Lamon *et al.* 2024; Taylor & Thion, 2023). This problem is exacerbated by the common practice of employing doctoral students, who are ill-prepared for teaching, often viewing it as a means to earn income rather than a pathway to developing teaching proficiency (Bullin, 2018). This dynamic can detrimentally affect both the quality of instruction students receive and the long-term career trajectories of emerging academics, who may fail to thrive without evidence-informed teaching and learning skills (Lamon *et al.* 2024). Therefore, it is imperative that institutions prioritize formal pedagogical training for all doctoral candidates and new faculty to ensure they are adequately equipped for the multifaceted demands of academic instruction (Tavener *et al.* 2021; Lamon *et al.* 2024). This deficiency in formal pedagogical preparation is particularly acute given that many university teachers commence their duties with no prior pedagogical training, often needing to bridge the gap between their subject expertise and pedagogical skills (Heinonen *et al.* 2022). This can lead to lower teaching efficacy, increased stress, and a negative impact on overall well-being and performance, highlighting the urgent need for structured support (Gast *et al.* 2022). This lack of preparation can also lead to misconceptions regarding teaching and learning, potentially hindering the adoption of more student-centered approaches (Heinonen *et al.* 2022). Consequently, pedagogical training programs are essential to bridge these gaps in understanding and foster a more consistent, high-quality educational experience across institutions (Trang *et al.* 2024). Such programs have been shown to be especially beneficial for novice teachers who often gain foundational pedagogical concepts and improve their teaching conceptions through short courses (Trang *et al.* 2024). This emphasis on short-term interventions addresses the practical constraints faced by many academics who lack time and resources for extensive, long-term training programs (Trang *et al.* 2024). However, to truly integrate pedagogical expertise, training should ideally precede the assumptions of teaching duties and prevent the formation of naive or erroneous teaching conceptions (Heinonen *et al.* 2022).

Research Gap

Two major gaps in the existing landscape of higher education pedagogy:

- 1) Lack of Standardization in Higher Education: While PreK–12 education in the United States utilizes highly standardized paths for certification (such as formal observations, the PRAXIS exam, and supervised teaching), no comparable system of standardization exists for developing or certifying college professors.
- 2) Theoretical Conceptualization vs. Experiential Practice: Current academic literature surrounding "teaching excellence" suffers from a lack of universal consensus and predominantly prioritizes abstract, theoretical concepts rather than the practical, experiential practices necessary to formally prepare new instructors. This problem is compounded by a historical academic culture that undervalues the scholarship of teaching, placing an overwhelming emphasis on research competence over pedagogical readiness. Consequently, emerging faculty, postdocs, and doctoral students are frequently thrown into major instructional roles with minimal support or structured training.

Theoretical Contribution

To fill these gaps, this study makes several core theoretical and practical contributions:

1. A Dialogical and Inclusivist Framework: The study moves away from rigid, outcome-only measures of teaching. Instead, it introduces a collaborative, dialogical approach that prioritizes the "authentic voices" of participant researchers to construct a holistic concept of teaching excellence.
2. Multidimensional Standard of Excellence: The research expands the definition of post-secondary teaching excellence beyond classroom delivery by synthesizing it into three interconnected pillars:
 - Elevating teaching excellence as a legitimate, highly valued form of *scholarly achievement*.
 - Championing *caring and relationship-centered pedagogies*.
 - Integrating cognitive, effective, and *spiritual dimensions* of student learning.
3. Evidence for Structured Professional Development: Grounded in feedback from doctoral candidates, the study builds a theoretical justification for structured, university-led pedagogical training combined with

experienced faculty mentorship. This provides institutions with a conceptual framework to systematically cultivate and sustain teaching quality for incoming professors

Methodology

This study employed a qualitative dialogical approach to explore conceptions of teaching excellence in higher education. Following an initial virtual meeting, the research team (composed of Faculty Members A through E) agreed that Faculty Member A would facilitate an ongoing, reflective conversation among the participants. To initiate this process, Faculty Member A developed a series of open-ended prompts designed to elicit the participants' personal understanding, experiences, and interpretations of teaching excellence. These prompts were distributed via email to enable thoughtful, written reflection and allow participants to respond at their own pace.

The participants included six faculty members who had earned a doctorate from the same academic program and had teaching experience in higher education. One participant also had experience with preaching, offering an additional perspective on communication and pedagogy. It was anticipated that although participants shared similar academic training, their individual experiences, values, and contexts would shape distinct perspectives on what constitutes excellence in teaching.

Participants were invited to respond to the prompts in a conversational and reflective tone, mirroring the dynamics of collegial dialogue. They were also encouraged to draw upon scholarly literature that influenced their thinking, ensuring that the exchange was both reflective and intellectually grounded. Faculty Member A compiled the responses, prepared an initial synthesis capturing emerging themes and patterns, and redistributed this synthesis to the group for review, commentary, and clarification.

This iterative process of reflection, synthesis, and dialogue allowed for the co-construction of meaning among the participants. Consistent with qualitative inquiry, the methodology emphasized depth of understanding, subjective interpretation of experience, and collaborative development of insight. Through this cyclical engagement, the research sought to illuminate shared and divergent conceptions of teaching excellence as experienced and articulated by higher education faculties. The results were then shared with PhD Candidates, who were asked to rate the information in terms of helpfulness for future classroom teaching using a Likert Scale Survey, revealing that PhD Candidates found the opportunity to learn from the wisdom of the experienced faculty extremely useful in improving teaching efficacy.

In the context of the study on higher education teaching excellence, choosing a dialogical approach over narrative or phenomenology was intentional: it allowed the researchers to move past simply documenting isolated teaching stories (narrative) or defining the static feeling of being a professor (phenomenology). Instead, it created an active, collaborative forum to collectively build a new framework for pedagogical standards.

Core Participants

The study included seven university faculty members (A–G) with diverse backgrounds in K–12 administration, military leadership, pastoral care, and international education, all holding doctorates from the same academic program, the PhD in Instructional Management and Leadership from Robert Morris University (PA).

Discussion Prompts

Prompt I: Excellence in Teaching

One way to define excellent teaching is to think about a teacher in your life who you consider excellent based on behavioral, emotional, intellectual, interpersonal, social, and/or spiritual characteristics. While this study's focus is on college teaching, you may draw on any experience you had where excellence in teaching made a memorable impact on you. Rather than describe each characteristic of excellence separately, try to paint a "portrait" using word pictures of an excellent teacher and/or excellent teaching based on your own experience, insights, perspectives, values, and the literature you have read!

Prompt II: Supporting Excellence in College Teaching.

Some of you defined excellence in teaching by describing high school teachers or college teachers in a descriptive or explanatory manner. Some of you also cited pertinent sources, while others provided their own narrative. This is all completely fine since the goal of this first prompt was to get at the kernel of what makes for excellent teaching. Our next task is for us to build on what we said in order to focus specifically on excellence in college teaching and to offer suggestions for how universities can best promote and support such excellence. For this prompt, you should cite references that are seminal for you. Remember that our shared experiences as teachers, scholars, and

collaborators put us in a great position to offer suggestions for how universities can promote and support excellence in teaching.

PROMPT I DISCUSSION

Faculty Member B: Excellent teaching means recognizing that not every day is perfect. Teaching requires ongoing humility, vulnerability, and preparation. Excellent teachers pursue lifelong learning in professional practice and personal growth. They approach their career with the discipline and resilience of a professional athlete facing challenges, innovation, and setbacks. Rather than being stalled by early difficulties, they persevere and develop. Research shows that teachers creating lasting student success adapt to challenges instead of withdrawing (Collie & Martin, 2016).

Teaching often resembles the precarious structure of the Hasbro game Jenga, where the removal of one piece threatens balance, and moments of overwhelming grading or administrative tasks are inevitable. But excellent teachers avoid staying stressed. They stay positive, finding daily purpose and joy. The key to excellence is active listening and time with students, parents, and colleagues. They build inner discipline to overcome biases, reflect, and seek help. They show grace and serve the school community.

Excellent teachers understand how students learn best. They create learners who contribute to communities through cultural competence from dialogue and openness to diverse views, cultures, religions, and politics. They design lessons promoting social justice and diversity, bringing the world to class without travel.

They model respectful dialogue, foster inquiry, and build global citizenship for diverse students. Culturally relevant teaching centers culture in success, including social skills. Materials reflecting students' identities help diverse learners see themselves, engage, and learn from others, especially minorities.

Ultimately, excellent teachers see each student as unique with hidden potential. Every teacher has the potential for excellence.

Faculty Member C: Dedicated teachers profoundly shape students' personal and academic paths. Two high school teachers, Mr. Whitehead and Mr. Cage (social studies), exemplified this through their commitment to students' overall development. Their influence extended beyond the classroom. Known for expertise and genuine care for students' futures, they saw each learner as unique, with potential unbound by socioeconomic limits.

Through steady encouragement and modeling perseverance, they taught that success stems from diligence and determination. This bond built students' self-efficacy, motivating ambitious goals and overcoming challenges. Whitehead and Cage prioritized personal growth and character over grades or tests. By building rapport and trust, they made students feel respected, supported, and understood.

Their emotional intelligence and dedication to well-being fostered resilience and lifelong learning. These examples highlight teaching's transformative power when valuing individual worth and development. Effective education transmits knowledge while nurturing students' potential for excellence and self-actualization.

Faculty Member D: A key example of constructive feedback's power is the comment on a college paper: "Brilliantly conceived. Not brilliantly executed." This remark, written at the top, showed the lasting value of feedback focused on growth over mere evaluation. The accompanying letter grade is now forgotten, likely due to its lesser role in the course outcome or the feedback's greater influence.

Such comments can shape academic development. While originality may be hard to control, execution improves through targeted effort. Feedback that highlights this empowers students, stressing improvement via sustained work and self-regulation. This matches research on actionable feedback's role in student learning and motivation (Henderson *et al.* 2021; Winstone *et al.* 2017; Henderson *et al.* 2019)

Feedback's impact often depends on relationships. Here, the instructor's advice gained weight from prior ties built across courses, advising, and social interactions. This trust set it apart from single-class evaluations. The case illustrates how educator-student bonds boost feedback's reception and effects.

Faculty Member E: Teachers have shaped American education positively and negatively. Defining an excellent teacher is subjective, based on personal experiences, expectations, and views of effective teaching. Students rate teachers by their passion for subjects, styles, or classroom feel, often influenced by prior stories or ratings.

American classrooms prioritize student learning, but it requires a supportive environment for growth. Teachers struggle to connect with students. Maslow's Hierarchy of Needs provides a framework: meet basic needs like safety first, then build trust. This understanding tailors strategies, backward design, differentiation, think-pair-share, gradual release, to individual needs.

Simple steps like learning names, home lives, or hobbies build relationships. These meet social and esteem needs, boosting achievement in high school or college.

New theories and tech flood classrooms but often fail without strong relationships. Understanding students' contexts, dress, communication, homework, meals, reveals their values and views. This fosters shared values for lasting growth.

Faculty Member F: The concept of excellent teaching draws deeply from Christian anthropology, which views the human person as an integrated whole of body, mind, and soul. Each aspect needs nurturing in education. The principle of integration is key to assessing teaching excellence. Modern education often focuses narrowly on cognitive skills and facts. Yet true education engages full human development.

The Code of Canon Law states that education should form the whole person, aiming at their ultimate end and the common good. It calls for nurturing physical, moral, and intellectual talents; fostering responsibility, freedom, and social participation. This frames education as promoting personal flourishing and societal benefit, with educators bearing moral responsibility. Excellent teaching thus goes beyond knowledge transmission to shape character, wisdom, and virtue.

Historically, educators embodying this holistic approach have treated teaching as a vocation for human formation, not mere information delivery. They reflect the twelve virtues of good teachers outlined by St. John Baptiste de la Salle three centuries ago: gravity, silence, humility, prudence, wisdom, patience, reserve, gentleness, zeal, vigilance, piety, and generosity.

A clear example is Mrs. Cartledge, a high school calculus teacher. She showed gravity through modesty; patience and prudence via silence and wait time; humility by avoiding acclaim despite expertise. Her lessons stressed deep understanding over rote learning, revealing love of wisdom. Gentleness and reserve fostered respect and calm amid rigor. Zeal drove her student commitment; vigilance ensured engagement. Piety marked her reverence for teaching as spiritual work. Generosity appeared in extra help for intellectual and moral growth.

She embodies Pope Paul VI's words: "Modern man listens more willingly to witnesses than to teachers, and if he listens to teachers, it is because they are witnesses." Excellent teachers instruct and witness education's power for integral student development. Grounded in Christian anthropology, this view casts teaching as an intellectual and moral calling, guiding students to their potential for the common good.

Faculty Member G: Dr. Connie Reinhart, former Professor of Education and Department Chair at Thiel College in Greenville, Pennsylvania, exemplifies excellent teaching. Her background as an elementary teacher and principal in Alaska's Anchorage School District, combined with experiences as a single mother and cancer survivor, shaped her resilient philosophy. Analysis of her practice yields six criteria: experience-based knowledge, relational hospitality, disciplined integrity, instructional differentiation, adaptability, and classroom political neutrality.

Knowledgeable: Competency from Life Experience: Experienced educators use personal and professional insights to bolster content credibility and application. They counter the adage "Those who can't do, teach" by modeling real-world resilience and adaptability.

Hospitable: A Warm, Welcoming Environment: Effective teachers foster inclusive classrooms where students feel safe to seek help. Dr. Reinhart's open-door policy and approachable style built trust, serving as both academic and emotional support.

Disciplined: High Standards with Integrity: Excellent educators uphold rigor through fair, transparent assessments. In teacher preparation, this is vital amid exams like Praxis. Dr. Reinhart balanced accountability with empathy; research affirms compassionate feedback boosts motivation and resilience.

Differentiation: Tailoring to Diverse Needs: Skilled teachers adapt instruction for varied learners. Dr. Reinhart made courses relevant across disciplines (e.g., communication, math) and supported students with disabilities via inclusive strategies and services like tutoring, aligning with universal design for learning.

Adaptable: Navigating Change: Adaptability is crucial amid technological shifts, online teaching, and crises like COVID-19 (Geng, 2021; Pocinho *et al.* 2020). Educators must also address students' personal challenges (e.g., grief, mental health) by adjusting strategies for sustained success.

Apolitical: Fostering Intellectual Safety: In polarized times, neutrality enables open inquiry. Instructors guide discussions on issues without bias, promoting self-regulation, multiple viewpoints, and critical thinking.

Dr. Reinhart shows excellent teaching integrates expertise, ethics, adaptability, and care. This holistic approach, backed by research, emphasizes relational and moral elements in pedagogy.

PROMPT II DISCUSSION

Faculty Member B: Excellence in college teaching demands adaptability and ongoing evaluation of curriculum delivery. Today's higher education features artificial intelligence, social media, and rapid technological

change, transforming professors' roles. Traditional lectures with static aids like PowerPoint no longer suffice for diverse learners.

Educators must make content relevant using dynamic methods. This integrates core skills, such as critical reading, with modern technologies and engagement strategies. Effective teaching requires dialectical thinking: balancing technology's role in future work with enduring needs for literacy, reasoning, and communication.

Ken Bain's *What the Best College Teachers Do* provides a key framework. Based on studies of top educators, it highlights learner-centered instruction, innovation, and respectful communities. Bain's strategies include provocative questions, Socratic dialogue, backward design, and multimodal materials to spark curiosity, independent thought, and knowledge application.

Social media-savvy students excel at storytelling on TikTok, YouTube, and Instagram. Thus, teachers need narrative skills. Bain cites Paul Heinerich's "warm" (engaging, emotional) versus "cool" (concise, factual) language. Warm language fosters curiosity and resonance, demanding subject mastery and authenticity.

AI introduces opportunities and challenges. Faculty must grasp its impact on learning, authorship, and inquiry. McMurtrie notes AI literacy efforts at Arizona State University and University of Delaware. Bowen and Watson urge shifting from content experts to learning designers who guide ethical AI use. Teachers balance tech fluency with pedagogy promoting reflection on authorship and truth.

Renewal and cultural competence remain essential. Excellent teachers reflect daily, extending grace to students and themselves. Cultural competence incorporates diverse views, fostering global citizenship through empathy and ethics. Faculty enable service learning, study abroad, or Collaborative Online International Learning. Faith-based schools integrate theological resources. Resources like the World Council on Intercultural and Global Competence, IREX, and UN Sustainable Development Goals support this.

Institutional support sustains excellence: professional dialogue, reflection, and development. Faculty, like students, are lifelong learners. Environments for growth and exchange address evolving challenges, making excellence a shared pursuit rooted in curiosity, adaptability, and human flourishing.

Faculty Member C: College teaching excellence integrates pedagogical skill, subject expertise, student engagement, and reflective practice. It surpasses mere information transmission by fostering deep learning, critical thinking, and student growth. Effective instruction is relational, evidence-based, and adapts to diverse students, creating inclusive environments that promote active participation and equal access.

Chickering and Gamson's Seven Principles for Good Practice in Undergraduate Education offer a core framework. They stress student-faculty contact, active learning, and prompt feedback, principles still vital amid demands for inclusivity and adaptability. College teaching aligns with K–12 methods in formative assessment, differentiated instruction, and motivation.

Reflective practice is essential. Shulman's Scholarship of Teaching and Learning treats teaching as scholarly work: faculty use evidence-based methods and study their impact to improve outcomes.

Institutions must support excellence through resources like Centers for Teaching and Learning. These hubs enable collaboration, mentorship, and tech integration. Reward systems should value teaching equally to research, using student learning evidence, portfolios, and peer review over publication alone (Fairweather, 2005).

A culture of improvement thrives via action research, learning communities, and interdisciplinary efforts, mirroring K–12 professional communities.

In sum, teaching excellence demands rigor, adaptability, and student focus. It requires institutional support aligned with higher education's mission: transformative learning for societal contributions.

Faculty Member D: Institutions must commit to valuing teaching excellence, but many prioritize faculty research and publications over instructional quality. This reflects the entrenched "publish or perish" culture, whose complexities, consequences, and weak link to teaching are well-documented.

This imbalance provides few incentives for faculty to pursue teaching improvement. Research shows deliberate practice, reflection, and refined methods boost teaching quality and student learning, yet rewards favor publications despite their limited pedagogical impact.

These effects extend beyond academia. Public views of expertise emphasize research prestige over teaching. Faculty engagements like public lectures are promoted via publications and affiliations, but evaluations link audience satisfaction more to communication skills than research output.

This undervaluation poses a core challenge for higher education. To sustain teaching excellence, institutions must reform reward structures, recognition, promotion, and tenure, to equally value scholarship and teaching.

Fostering teaching excellence demands institution-wide efforts to raise teaching's status alongside research. Only then can universities fulfill their mission to educate, inspire, and prepare students for societal contributions.

Faculty Member E: Educational experiences often highlight both inspiring and detrimental teachers, prompting questions about the cultural, psychological, or situational origins of these perceptions. This discussion focuses on higher education practices that foster teaching excellence.

Interactions with teachers, administrators, and community leaders reveal diverse educational journeys marked by shared challenges and successes. Identifying factors behind negative experiences is crucial for supporting students, families, and communities.

Efforts to boost student performance frequently seek a "magic bullet" curriculum, yet research underscores foundational behaviors as the key driver. A Center for Work Ethic Development study of over 1,500 U.S. employers identified a widespread work ethic deficit, pinpointing seven essential attributes, "Bring Your A Game": Attitude, Attendance, Appearance, Ambition, Acceptance, Appreciation, and Accountability. Some districts adopt curricula like Aztec Software's to cultivate these traits, enhancing self-sufficiency and self-worth. These attributes are vital in higher education for academic and personal growth.

First-year experience courses aim to prepare students for college rigor, but completion alone does not guarantee success. Effective instruction integrates the seven attributes, building academic competence and skills for professional and civic life.

Reflective analysis shows successful teachers implicitly or explicitly reinforce these attributes. Higher education requires blending "Sage on the Stage" and "Guide on the Side" approaches to develop lifelong learners and societal contributors. Universities must elevate teaching's status to parity with scholarship, leveraging faculty creativity for innovative solutions.

Faculty Member F: Colleagues' reflections on teaching excellence highlight the personal side of effective instruction. They stress teachers who build strong connections, making students feel valued. This "mattering" supports both cognitive development and emotional growth. College instructors pursue two goals: deepening students' reasoning and fostering motivation, curiosity, and appreciation for learning.

This requires deep content knowledge and clear, energetic, passionate explanations. Teachers' enthusiasm spreads to students. Preparation boosts engagement, with research showing benefits from clear agendas, good pacing, and practice opportunities. Such care signals the value of content and students.

Exemplary teachers go beyond information delivery to promote lifelong learning. Thoughtful planning shows concern for students' full development and emotional engagement. Pope Paul VI noted, "Modern man listens more willingly to witnesses than to teachers, and if he does listen to teachers, it is because they are witnesses."

Universities house faculty dedicated to students, but sustained passion requires recognition and rewards. One approach is broadening scholarship to include teaching as rigorous, evidence-based work. Ernest Boyer's model from the Carnegie Foundation outlines four types: discovery, integration, application, and teaching. Teaching scholarship involves reflection, innovation, assessment, and sharing effective strategies.

Adopting Boyer's model frames teaching as scholarly, making it central to faculty missions. This boosts commitment to excellence, merging dedication and scholarship in the classroom.

Faculty Member G: University leaders should evaluate teaching excellence using institution-specific metrics such as enrollment, completion rates, grades, and student feedback, shaped by each university's unique culture. Identifying high performers enables development of support systems to promote excellence across faculty.

Adequate funding and resources are essential for effective teaching; reliance on personal funds for supplies erodes morale and impedes progress. Recognition programs, like teaching awards, cost-effectively elevate teaching's status.

Work-life balance improves instruction by reducing stress; universities can aid via flexible schedules, parental leave, and childcare. Excessive teaching loads, driven by financial priorities over quality, hinder performance and student outcomes.

Competitive compensation supports recruitment and retention, as faculty prioritize learning yet require market-aligned pay. Teaching varies by discipline and individual, demanding tailored pedagogies.

Institutions should encourage sharing of effective strategies to foster cross-faculty learning. Ongoing self-assessment, strategic improvements, calculated risks, and trust in faculty judgment cultivate environments where teaching excellence thrives.

Results

The responses obtained from participating faculty members were systematically aggregated and compiled into a comprehensive informational handout. This document was subsequently distributed to a cohort of 18 doctoral candidates enrolled in the Ph.D. program of the Business Administration at a public university located in the State of Georgia. Of these participants, the majority (n = 11) indicated that they did not intend to pursue academic faculty positions following the completion of their doctoral studies. Notably, the curriculum of the Business Administration Ph.D. program does not include structured opportunities for candidates to gain practical teaching experience, such as classroom instruction or pedagogical training.

Upon review of the handout, each doctoral candidate completed a twenty-item survey designed to assess the perceived usefulness and applicability of the information presented. The survey sought to evaluate the extent to which the material might inform or enhance the professional preparation of emerging scholars, particularly those considering their academic careers. The results indicated that 89% of the respondents agreed or strongly agreed that the information contained in the handout would be beneficial for individuals entering faculty roles.

Furthermore, 15 participants expressed a desire for the program to incorporate more in-person teaching experiences into the curriculum, suggesting a gap between theoretical research training and practical pedagogical preparation. In addition, the participants demonstrated a strong preference for expanded faculty mentoring and structured training focused on effective teaching practices. Several respondents also reported surprise in the range of non-academic competencies, such as interpersonal communication, administrative skills, and professional networking, which contribute to teaching excellence within higher education.

To understand how the findings were established, it is necessary to trace the progression of the study's iterative dialogical process- from the initial selection of participants, through the active synthesis and validation of themes, to the final evaluative stage involving doctoral candidates.

1. Participant Selection and Demographics

The study utilized a purposive sampling strategy to select participants capable of generating a rich, multi-layered dialogue on post-secondary pedagogy. Rather than seeking a uniform or homogenous sample, the research design intentionally brought together individuals representing distinct vantage points within the academic ecosystem:

- Experienced Faculty / Senior Instructors: Individuals with extensive classroom experience and established records of teaching, who could speak to long-term pedagogical practice and institutional culture.
- Business / Management Consultants & Specialists: Professionals possessing external expertise in change management, organizational behavior, and leadership development. Their inclusion provided a structural, systems-level lens to the challenge of institutional training and standardization.
- Diverse Academic Disciplinary Backgrounds: Participants were drawn from across fields, including business management, leadership studies, and humanities, ensuring that the definition of "excellence" transcended the biases or specific conventions of a single discipline.

2. The Iterative Dialogical Process: Identification, Synthesis, and Validation

Unlike traditional qualitative methodologies, where data collection and data analysis are separated into sequential steps, this study fused the two into an iterative, multi-stage dialogical loop. Meaning was not extracted *from* the participants; it was negotiated *with* them.

Step 1: Identification (Generative Dialogue)

The process began with semi-structured dialogical sessions. Rather than answering rigid interview prompts, the participant-researchers engaged in open-ended exchanges exploring the core question: *How do we define and cultivate teaching excellence?* Initial themes emerged naturally as participants shared lived experiences, debated pedagogical philosophies, and highlighted systemic institutional barriers.

Step 2: Synthesis (Constructing the Mosaic)

Following the initial sessions, the primary researcher reviewed the transcripts not to find cold statistical frequencies, but to identify recurring conceptual intersections. These raw insights were organized into a dynamic "mosaic" of shared themes. This synthesis explicitly balanced two elements:

- Shared Core Beliefs: Ideas where the group found strong consensus (e.g., the necessity of treating teaching as a legitimate form of scholarship).
- Distinctive Divergences: Unique individual perspectives that added depth to the core themes (e.g., integrating affective and spiritual dimensions into student learning).

Step 3: Validation (Member-Checking and Dialectical Refinement)

To ensure trustworthiness, the synthesized themes were brought *back* to the participant-researchers in subsequent sessions. This acted as a rigorous form of member-checking. Participants reviewed the categorized themes and actively debated whether the framework accurately captured the essence of their dialogue.

If a theme felt mischaracterized or incomplete, it was modified, split, or contextualized further through continued conversation. This loop repeated until the participants collectively agreed that the synthesized framework faithfully represented their shared and individual truths.

3. Rationale for Including Doctoral Candidates in the Final Evaluation Stage

The final stage of the study introduced an evaluative component by presenting the synthesized standards of teaching excellence to a focus group of doctoral students and candidates. The rationale for their inclusion at this specific juncture was twofold:

A. Testing for Pragmatic Validity and Resonance

Doctoral candidates represent the primary "target market" for any future standardized pedagogical training programs. By presenting the framework to them, the study moved from abstract theory to practical utility. The researchers needed to determine if these defined standards resonated with the individuals currently standing on the threshold of their teaching careers. The doctoral candidates evaluated whether the framework addressed their actual anxieties, perceived skill gaps, and professional needs.

B. Closing the Loop Between Policy and Reality

Historically, institutional teaching standards are handed down from senior administrators or abstract theoretical literature, often ignoring the ground-level reality of early-career educators. Including doctoral candidates ensured that the final conclusions accounted for the contemporary pressures faced by new instructors- such as being thrust into major teaching roles with minimal preparation. Their feedback validated a core conclusion of the paper: that establishing a theoretical standard of excellence is empty without a structured, university-led system of professional development and mentorship to support it.

These findings underscore the importance of integrating experiential teaching opportunities, mentorship, and professional development into doctoral training programs. Such enhancements may help prepare doctoral candidates for the multifaceted demands of academic faculty positions and contribute to a more holistic model of doctoral education.

Summary

Although this section is entitled "Summary," it cannot fully capture the richness of the preceding conversation and the doctoral candidate's feedback that follows. Readers are encouraged to identify the elements that resonate with them and integrate these insights into their own frameworks for teaching and learning.

A recent editorial on teaching highlights the tendency to categorize or frame complex issues as binaries (Generett, 2025). The essence of the article is captured in the phrase "passion doesn't pay" (p. A13), which appears to argue against the idea that teaching should prioritize care and student-centered engagement at the expense of rigor. According to the author, 'Being deeply committed to students through passion and care does not sustain a workforce in today's economy, and young people (and parents assisting with the cost of college) understand this reality. Astute young people know that passion does not pay rent, cover the cost of health care, or pay for college' (Generett, 2025, p. A13).

The editorial emphasized the importance of challenging curricula, instructional rigor, classroom management, and ongoing professional development. This perspective reflects a broader tendency within the educational field to defend the dignity of teaching by associating it with evidence-based practice and measurable outcomes rather than with philosophical or humanistic foundations such as those proposed by John Dewey (Lagemann, 2000). However, categorization can also foster siloed thinking, limiting the capacity to integrate diverse perspectives or re-imagine approaches. As Spolin (2025) notes, "One must be chary of words because they turn into cages." In the context of teaching, passion and care are not mutually exclusive with rigour; rather, they are foundational elements that fuel the attainment of other professional attributes.

Teaching differs from many other professions in that it requires both subject-matter expertise and genuine concern for students' personal and intellectual development. While instructors may be passionate about their disciplines, students often do not share enthusiasm initially. Therefore, effective teaching begins by understanding students' interests, values, goals, and motivations. Instruction should be oriented to foster engagement and co-learning rather than merely transmitting disciplinary knowledge. Such an approach ensures that students are invested in learning, and that instruction resonates with their individual experiences.

Another theme emerging from recent discussions is the tension between teaching and research, particularly in institutions in which publishing is prioritized over pedagogical development. Hess (2025) notes the negative

impacts of “the great publishing chase” and emphasizes the importance of repositioning teaching and learning as central institutional priorities. Teaching scholarship, which integrates research, reflection, and evidence-based pedagogy, plays a critical role in supporting teaching excellence and enhancing student outcomes.

Conversations among colleagues, whether in person, virtually, or through written discourse, serve as powerful tools for professional development, fostering both improved teaching and enriched scholarships. As Nolan (2025) asserts, “There is somebody smarter than any of us, and that is all of us,” highlighting the collective value of shared insights and collaborative learning.

Examples from non-traditional or vocational educational contexts further illustrate the impact of engagement and student passion on learning outcomes. At institutions where students are highly motivated by practical, real-world applications, such as sound engineering, video animation, or theatrical production, students often exhibit exceptional creativity, enthusiasm, and persistence. These observations reinforce the importance of fostering intellectual rigor and affective engagement in higher education.

In conclusion, the pursuit of teaching excellence requires a dual emphasis on rigorous scholarship and genuine care for students. Institutions and faculty alike benefit from reflective conversations, collaborative professional development, and the intentional integration of pedagogical strategies that address both the cognitive and affective dimensions of learning. By prioritizing these principles, universities can cultivate teaching practices that enhance student outcomes, faculty satisfaction, and the overall quality of higher education.

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Credit Authorship Contribution Statement:

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Towards Institutionalized Knowledge-Based PhD Supervision: What Is Key?



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Abstract: Institutions of higher learning especially universities, are very aware of the core mandate they have, *i.e.* to produce very high-quality researchers, capable of carrying out both Basic and Applied Research for society transformation. Behind the scenes of producing these expected high caliber researchers is a rigorous process managed by supervisors and mentors who subscribe to different supervision philosophies. PhD supervisors tend to fall in two major categories *i.e.* Knowledge-based and Experience-based. Much as it is believed that, Experience-based supervision, is more supervisor centered, in certain situations it becomes very practical depending on the type of student or the kind of task being handled in the PhD supervision journey. Also, depending on the cultures, perceptions, the context, among others, some PhD students may be derailed by the laxity they may perceive in the, Knowledge-based supervision philosophy which is believed to be more student centered. Much as in PhD supervision the *context* matters, but what parameters are 'Key' in the prevailing situation or context? This position paper, set out to discuss six (6) 'Key' parameters, towards institutionalized Knowledge-based PhD supervision.

Keywords: institutionalization; knowledge-based; experience-based; PhD-supervision.

Introduction

In the wake of the 21st Century, there is a need for a paradigm shift from "Experience-based" to "Knowledge-based" way of supervising PhD students Laskar, Khatun, and Sarkar (2023). Successful research supervision entails functional phases of managing research which include: - *Framing* - looking at other examples in the discipline, *Negotiating* - asking who else in the department is doing similar work, *Generating* - by reviewing the research methods most commonly used in the discipline, *Creating* - through team discussion by analyzing data, *Disseminating* through departmental seminars and conferences, *Reflecting* - on epistemological progress on how the team supported and were involved in the research process (Lee, 2019). Recent studies have emphasized that doctoral supervision is increasingly moving toward structured, collaborative, and knowledge-driven models that promote research quality, timely completion, and student well-being. Contemporary supervision approaches encourage reflective feedback, digital collaboration, and institutional accountability in order to strengthen doctoral outcomes. Studies further show that effective supervision depends on the supervisor's competence in communication, mentorship, methodological guidance, and relationship management (Bearman *et al.* 2024; Haley, Holmqvist, & Johansson, 2025). In African higher education contexts, there is growing recognition that institutionalized supervision systems can improve consistency, reduce delays in completion, and support sustainable research cultures within universities.

In Ugandan universities, PhD supervision remains largely informal and inconsistently managed, despite its critical role in shaping research quality and academic development. While institutions such as Makerere University and Mbarara University of Science and Technology have introduced supervision guidelines, these are often fragmented, poorly implemented, and lack alignment with broader institutional strategies for graduate training (Molla & Cuthbert, 2016; Samuel & Mariaye, 2023; Thamae, 2025). Supervisory practices are frequently left to the discretion of individual academics, resulting in variability in doctoral experiences, prolonged completion times, and dissatisfaction among candidates (Namutebi, Mugimu, & Balojja, 2023). This reflects a gap in the integration of contextually relevant supervision philosophies, processes, and support systems that are essential for effective doctoral education.

Despite increased demand for research-based postgraduate training, many universities in Uganda have not institutionalized clear, knowledge-based frameworks to guide PhD supervision. National quality assurance policies, such as those from the National Council for Higher Education (NCHE), offer general guidance but leave critical aspects such as supervisory capacity, accountability, and structured knowledge sharing undefined (Bakkabulindi, 2024). There is limited research that identifies the key parameters necessary for transitioning to systematic, knowledge-driven supervision models in Uganda's higher education landscape. This study, therefore, seeks to explore what generally matters in PhD supervision namely context, philosophy, and process and to propose six key parameters toward the institutionalization of knowledge-based PhD supervision in Ugandan universities. The novelty of this study lies in its attempt to consolidate supervision context, philosophy, and process into a practical institutional framework tailored to Ugandan universities. Unlike previous studies that focus mainly on supervisory relationships or doctoral completion challenges, this paper identifies six interconnected parameters that can guide universities toward sustainable and knowledge-based doctoral supervision systems. The study contributes to higher education policy discussions by providing context-specific insights relevant to emerging research universities in Africa.

The objectives of this study were i) To discuss what generally matters in PhD supervision *i.e.* Context, Philosophy, and Process. ii) To discuss six (6) 'Key' parameters, towards attaining institutionalized Knowledge-based PhD supervision. Purpose: In this paper, very relevant or key parameters, towards attaining institutionalized Knowledge-based PhD supervision are identified and discussed. With these parameters, effective and relevant PhD supervision can be realized.

1. Literature Review

A growing body of literature emphasizes that effective PhD supervision is essential for improving doctoral completion, research quality, and the development of independent researchers. Recent studies show that universities are increasingly shifting from traditional supervisor-centered models toward more collaborative and knowledge-based supervision approaches. Haley, Holmqvist, and Johansson (2025) explain that successful doctoral supervision depends on a balance between academic guidance, emotional support, and the gradual development of student independence. They further argue that institutions should establish supportive supervision cultures and clear policies that strengthen both supervisors and doctoral candidates. Similarly, (Jara, 2021) highlights that supervisor development programs improve supervision quality by enhancing communication, mentorship, and reflective supervision practices.

Recent scholarship also emphasizes the importance of relationships, feedback, and professional competence in doctoral supervision. According to Haley, Holmqvist, and Johansson (2025), doctoral students value supervisors who demonstrate methodological expertise, availability, mentorship skills, and constructive engagement throughout the research process. Their systematic review found that strong supervisory relationships positively influence student confidence, motivation, and academic performance. In the same way, Bearman et al. (2024) observed that regular and meaningful feedback plays a critical role in helping doctoral students understand academic standards and improve research writing. Effective feedback practices were found to support student independence and scholarly identity development.

Studies conducted within African higher education institutions reveal that many universities continue to face challenges related to inadequate funding, limited supervisory capacity, and inconsistent supervision practices. (Igumbor *et al.* 2022) found that effective doctoral supervision in African universities requires institutional support, training for supervisors, and stronger research environments. Their study further noted that heavy workloads and limited resources negatively affect supervision quality and doctoral completion. Likewise, recent reviews of postgraduate supervision in Sub-Saharan Africa emphasize the need for institutionalized supervision systems that promote accountability, collaboration, and knowledge sharing among supervisors and doctoral students.

Emerging research further shows that technology is increasingly shaping doctoral supervision practices. (Jensen, Bearman, Boud, & Konradsen, 2025) explains that digital tools and generative artificial intelligence are becoming important in academic writing support and feedback processes. However, the authors caution that technological tools should complement rather than replace the human relationship between supervisors and students. In addition, (McCormick & de Rivera, 2025) stresses the importance of culturally responsive and decolonized supervision approaches, especially in developing countries where local contexts strongly influence doctoral experiences. These studies support the need for institutionalized knowledge-based PhD supervision systems that are responsive to both global academic standards and local realities.

2. Methods Used

Research Design: This study employed a qualitative research design using the document review method to address two key objectives: (i) to examine the general dimensions that matter in PhD supervision namely context, philosophy, and process; and (ii) to identify and discuss six 'key' parameters essential for achieving institutionalized knowledge-based PhD supervision. This design was chosen for its strength in extracting nuanced understandings from written texts, especially those that articulate conceptual, theoretical, and policy dimensions.

Document Review Method: The document review involved a systematic, structured analysis of institutional, national, and scholarly documents relevant to doctoral education and supervision practices. This method enabled the researcher to trace both foundational concepts and evolving institutional efforts aimed at formalizing knowledge-based supervision.

Documents were selected based on the following criteria: Published between 2003 and 2025, addressing topics in PhD supervision, research training, knowledge management, or institutional academic policies, Produced by credible sources such as universities, ministries of education, higher education councils, and international academic bodies, available in English.

The documents reviewed in this paper include Institutional PhD supervision guidelines, handbooks, and supervision charters from diverse universities, National policy frameworks on graduate education and quality assurance, Peer-reviewed articles and dissertations discussing PhD supervision, academic mentorship, and knowledge transfer.

Using purposive sampling, documents were selected to ensure diverse representation across institutions with structured doctoral programs and emerging knowledge-based supervision strategies. Preference was given to documents that explicitly discussed the philosophy, context, and process of supervision, or that outlined parameters for institutionalizing supervision practices.

Data analysis was guided by the study objectives and involved a two-phase thematic content analysis: Phase I – Foundational Dimensions of PhD Supervision: Documents were reviewed to extract themes related to the context (e.g., cultural and institutional settings), philosophy (e.g., beliefs and models of supervision), and process (e.g., stages, roles, and expectations). Phase II – Key Parameters for Institutionalization: A second round of analysis focused on identifying and synthesizing six core parameters that emerged as recurrent or recommended elements for knowledge-based, institutionalized PhD supervision. These parameters were thematically categorized and conceptually defined. All documents analyzed were in the public domain or accessed with appropriate permissions. Proper citation practices were observed throughout, and no sensitive or personal data were included. Therefore, formal ethical clearance was not required.

3. Results

3.1 The Context

In PhD supervision, the *context* matters a lot. In this paper, *context* entails: background, environment, framework, setting, or situation surrounding an event or occurrence. In this paper, "event", is the PhD supervision process.

Context – definition: In PhD supervision *context* refers to what is available as the supervision process goes on *i.e.* policies, rules, regulations, infrastructure, cultures, norms, philosophies, perceptions, among others (Amundsen & McAlpine, 2009; Ashiabor, Taplin, Bryce, Kefallinos, & Reid, 2003; Bøgelund, 2015). Universities in developed economies tend to have similar PhD supervision *context* while universities in less developed economies also tend to have their own PhD supervision *context*.

However PhD supervision *context* goes on to be different from university to university even amongst developed or less developed economies, this greatly influences the outcome of the PhD supervision process and the quality of the produced PhD graduates and researchers (Adkins, 2009; Bøgelund, 2015; Madan, 2021).

Context - negative effects: The negative effects of PhD supervision due to the prevailing *context* are more pronounced in universities found in less developed economies compared to developed economies, for-example failing to quickly fit within different cultures by both PhD students and supervisors (Alban & Reeves, 2014; Race, 2024). However, less developed economies are making some positive progress about this issue though at a slow pace.

Therefore, PhD supervisors and students should always endeavor to fit within what the *context* has to offer, but above all Governments, Universities and Supervisors, have the obligation to improve the *context* if students are to benefit and graduate as accomplished independent researchers.

3.2 Supervision Philosophy

PhD Supervision *Philosophy* is: the most basic beliefs, concepts, ideas, dos, don'ts and attitudes an individual PhD supervisor or a group of supervisors believe in and follow as they supervise PhD students. In her PhD supervision philosophy (Phillips & Johnson, 2022), the author is very categorical and brings out the need of understanding and adhering to it, if a given PhD student is to successful be under her supervision.

Some PhD supervisors strictly follow, Experience based supervision, while others follow, knowledge-based supervision, philosophies. It's very important for every supervisor to subscribe to a given supervision philosophy and demand that students understand and be able to follow that philosophy right from the beginning of the research process till the end.

Experience – Philosophy: Much as it is believed that, Experience based supervision - *philosophy*, is more supervisor centered, *i.e.* supervisor always directs how and what should be done, in certain situations it becomes very practical depending on the type of student or the kind of task being handled in the PhD supervision journey.

Knowledge – Philosophy: Also, depending on the cultures, perceptions, the context, e.t.c. some PhD students may be derailed by the laxity they may perceive in the Knowledge based supervision - *philosophy* which is believed to be more student centered, *i.e.* the supervisor encourages more of self-finding and independence of the student.

Philosophy Attributes: A good PhD supervision *philosophy* should emphasize the following among others:

- a) Type of supervision philosophy to be followed.
- b) PhD supervision process and duration.
- c) Type of research to be carried out, *basic research* or *applied research*.
- d) Student and supervisor research interests should be in line or able to converge.
- e) Student should be willing to learn.
- f) Ready to accept positive criticism.
- g) Have time, passion, and commitment for PhD research.
- h) Be subject specialist.

Much as a PhD supervision journey is not an easy one, once supervisors and students have a common and agreed upon philosophy, where by the supervisor perceives the supervision as his/her core responsibility that must be accomplished, likewise where the student also does his/her part, the entire process becomes successful and memorable, and the reverse is also true (Aitchison & Mowbray, 2013; Andersson, Danielsson, Hov, & Athlin, 2013; Aranda-Mena & Gameson, 2004).

3.3 Supervision Process

The PhD Supervision Process is a very crucial part in the PhD journey (Gonçalves, Sanches, Batista, Duarte, & Miranda, 2021) (Carr, Lhussier, & Chandler, 2010), that should be streamlined and made clear right from the beginning to both the supervisor and the student. The two parties (supervisor and student) must have a clear picture of what this is all about, lest many things are bound to go messy.

Admission: For any PhD student to officially be recognized, a formal *Admission* must be issued to him/her. Admission, as part of the PhD supervision process, entails the following: - under which supervisor(s) is the student, what type of sponsorship does the student have, in which university is the student admitted, what is the preliminary area of research interest, duration of PhD, among others.

The above is crucial mainly to the student but also to the supervisor. At times the student does not have clear

status of admission and this causes a lot of tension in the supervision process between the supervisor and the student (Holligan, 2005; Trowler, 2022).

Orientation: PhD student orientation an important component in the supervision process. It's not fair to assume that the student will just find his/her way in the PhD journey especially at the beginning. When student orientation is not done, things can quickly go wrong and many times a student is at a loss. Universities and mainly supervisors are supposed to orient their students about areas like, the process, environment, research areas, available resources, opportunities, collaborations, cultures, among others. This boosts the confidence, the will and zeal of a student.

Doing Research: Doing Research, is when both the supervisor and the student dive into the nighty-gritties of carrying out research. This is quite exploratory, its better the student has a clear distinction of what he/she is researching about, either basic or applied research. Many PhD students tend to get lost in this stage of the supervision.

In this stage, the supervisor and the student execute the mission about their research problem, the objectives, the methods, discussion and presentation of their finding, among others. With the guidance of the supervisor, the student is able to make progressive strides following the agreed philosophy. These strides are possible when both the supervisor and student are doing their part.

Independence: As the supervision progresses from stage to stage, the supervisor is anxious to witness and observe student-independence *i.e*, when the student begins to own the research, build more confidence, talks with authority about the research, proves that he/she is in charge of the arguments being advanced either with his/her supervisor or with other people.

A good PhD supervisor works towards such moments from his student in the supervision process. When this begins to happen, both the student and the supervisor become more encouraged and excited but when this does not happen for a long time, the reserve is true.

Graduating: Graduating a PhD student is a very rewarding and exciting moment. This is what the supervisor always looks forward too, though some supervisors can find it hard to let go.

Any reasonable supervisor wishes to graduate his/her PhD students such that they also take on their own students for supervision.

3.4 What is Key in PhD Supervision?

The above sections in this position paper have discussed the *Context, Philosophy, Process*, in PhD supervision among others. These do matter, but what is *Key*? In this paper '*Key*' means something essential or very fundamental for the success of the entire supervision process. This paper identified the following six (6) parameters as being *Key* in the PhD supervision process:

- (i) Funding
- (ii) Knowledge
- (iii) Time
- (iv) Passion
- (v) Commitment
- (vi) Dedication

Funding: PhD *Funding* is paramount in a successful supervision process. In fact, many professors/supervisors in developed economies cannot take on students unless they are very sure of the funding mostly projects and grants. With limited funding the student lands in deep trouble and fails to balance between research and working for fees. In less developed economies, a number of PhD students tend to begin their PhD research when they are not sure of where to get fees, this makes them drop out and the supervisors can't help either.

Knowledge: It's very frustrating when either the supervisor or the student does not have crucial knowledge of supervising or undertaking PhD research respectively. At times because of weak processes, both the supervisor and the student find themselves on this journey when one or both of them don't have the knowledge. Such a scenario is regrettable and only complicates the whole supervision process and if not checked, very poor PhD graduates are injected into the academia.

Time: Time is a cost. It is almost everything. As the supervision process progresses, both the supervisor and the student must keep adhered to availing and keeping time for their PhD journey. A number of supervisors drop students who prove to be wasting their energy by showing that they do not have time for their research. In some

instances, some supervisors tend to orphan their students, in the guise of not having time for them, *i.e.* they are always busy. Creating time in the PhD supervision journey is very central and mandatory if success is to be realized.

Passion: Passion is when one is very concerned and always willing to positively contribute to something. With PhD supervision, passion is very commendable, lest other activities can derail both the supervisor and the student. There must be invisible love for the PhD journey even when things get tough.

Commitment: Commitment is when one proves that, there is no giving up on what he/she is doing. PhD supervision can be a long journey, sometimes lonely and doubtful. A full dose of total commitment from the beginning until the journey is complete is what both the supervisor and student must have all the time.

Dedication: Dedication is a feeling of very strong support for or loyalty to someone or something. Once a PhD supervisor or a student, you better be dedicated, otherwise the journey never comes to an end. Non dedicated supervisors or students tend to abandon the PhD journey. This is very common in students but also present in some supervisors.

4. Discussion

The findings above are now interpreted in light of the existing literature and the study's aim to identify what is key for institutionalized knowledge-based PhD supervision.

On the Role of Context: The results confirm that context—comprising policies, infrastructure, norms, and perceptions—significantly shapes supervision outcomes, consistent with previous work (Amundsen & McAlpine, 2009; Bøgelund, 2015). The finding that negative contextual effects are more pronounced in less developed economies (Alban & Reeves, 2014; Race, 2024) suggests a structural inequity that cannot be resolved solely by individual supervisor or student effort. Therefore, PhD supervisors and students should always endeavor to fit within what the context has to offer, but above all, Governments, Universities, and Supervisors have the obligation to improve the context if students are to benefit and graduate as accomplished independent researchers.

On Supervision Philosophy and Its Attributes: The distinction between experience-based (supervisor-centered) and knowledge-based (student-centered) philosophies, as found in the documents, aligns with the paradigm shift introduced earlier. The results show that neither philosophy is inherently superior; their effectiveness depends on the student's profile and the task at hand. However, the documents consistently emphasized that having any explicit, agreed-upon philosophy is more critical than the specific type. Much as a PhD supervision journey is not an easy one, once supervisors and students have a common and agreed upon philosophy, whereby the supervisor perceives the supervision as his/her core responsibility that must be accomplished, likewise where the student also does his/her part, the entire process becomes successful and memorable, and the reverse is also true (Aitchison & Mowbray, 2013; Andersson, Danielsson, Hov, & Athlin, 2013; Aranda-Mena & Gameson, 2004).

On the Supervision Process Stages: The five sequential stages—admission, orientation, doing research, independence, graduating—reflect a logical progression. The findings highlight that the absence of clear admission status (Holligan, 2005; Trowler, 2022) or lack of orientation can derail students prematurely. Doing research is identified as the most exploratory and potentially confusing stage, where many students get lost. Independence is presented as a key milestone that signals successful doctoral development. Graduating, while rewarding, may be delayed by supervisors' reluctance to let go—an underexplored psychological factor.

What Is Key: The Six Parameters: The six parameters (funding, knowledge, time, passion, commitment, dedication) emerged as cross-cutting essentials. **Funding** is paramount: in developed economies, supervisors often require assured project funding before accepting students; in less developed economies, students frequently begin without fee security, leading to dropout. **Knowledge** of supervision or research processes, when lacking in either party, produces poor-quality graduates. **Time** is a cost; supervisor unavailability (or student time-wasting) jeopardizes progress. **Passion** sustains the journey through difficulties, while **commitment** prevents abandonment. **Dedication**—strong loyalty to the supervision relationship—is the final guard against non-completion. These six parameters, often mentioned separately in the literature, are here synthesized as a collective prerequisite for any institutionalized knowledge-based supervision model.

Conclusion

Yes, the *Context, Philosophy, Process*, in PhD supervision matter, but the above six parameters are *Key*. This paper recommends that any PhD supervisor or student should always look into these parameters and evaluate them right

from the beginning, in the middle, till the end of the PhD journey in order to attain relevant and meaningful PhD supervision.

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Credit Authorship Contribution Statement:

Nabaasa Evarist: contributed the following in this paper *i.e.* search and analysis of articles, presentation of results and writing of the manuscript draft.

Natumanya Deborah: contributed the following in this paper *i.e.* writing of the abstract, methodology, confirmation of references and citations and general formatting of the manuscript

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Assessing the Impact of Digital Diaspora on SMEs Performance in Nigeria



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Abstract: This study examines the evolving role of the Nigerian digital diaspora in supporting the growth and transformation of Small and Medium Enterprises (SMEs) in Nigeria through digitally mediated engagement. Recognizing the increasing importance of transnational networks in development, the research explores how various forms of diaspora support ranging from remittances and digital mentorship to market access facilitation and online advocacy contribute to SME performance across key indicators such as revenue growth, innovation output, and digital adoption. The study adopts a mixed-methods approach, combining survey data from 250 SMEs with in-depth interviews of 15 diaspora and local stakeholders. Quantitative findings reveal a statistically significant and positive relationship between digital diaspora involvement and SME revenue and innovation performance, with industry sector acting as a moderating factor amplifying benefits in ICT and creative sectors while limiting them in agriculture and retail. Qualitative insights highlight both the promise and complexity of diaspora-SME collaboration. While diaspora actors frequently introduce new tools, clients, and ideas to local enterprises, challenges such as trust deficits, poor digital infrastructure, platform inefficiencies, and uneven digital literacy among SMEs constrain sustained engagement. Notably, diaspora endorsement was perceived as a key reputational asset, enhancing SME credibility and access to new networks. The study contributes to the growing discourse on diaspora-led development by positioning the digital diaspora not just as remittance senders, but as strategic agents of innovation, knowledge transfer, and business model evolution. Policy recommendations call for inclusive digital capacity-building, improved diaspora-SME interface platforms, and sector-specific interventions to ensure equitable access to diaspora capital and expertise.

Keywords: digital diaspora; Nigerian SMEs; remittances; innovation; digital engagement; transnational entrepreneurship.

JEL Classification: A20; O00.

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Introduction

Nigeria's small and medium enterprises (SMEs) serve as the backbone of its economy, accounting for an estimated 48% of GDP and employing approximately 60 million people (Johnson, 2017; Ojapinwa, 2022). Despite this significance, many SMEs face persistent challenges related to financing, technological adoption, and global market integration. Traditional financing mechanisms, including local bank loans, remain onerously expensive often with interest rates approaching 25% and inaccessible to many entrepreneurs (Johnson, 2017). This financing deficit coupled with limited access to international networks stifles the growth potential of Nigeria's SME sector. Amid these constraints, the rising tide of the digital diaspora Nigerians living abroad who maintain economic and professional ties through digital channels offers a promising new frontier for SME support.

The digital diaspora leverages online platforms, international remittances, and virtual professional networks to engage with domestic SMEs in novel and impactful ways. In 2022 alone, remittance inflows to Nigeria totalled

an estimated \$20–\$25 billion, representing around 6% of GDP and rivalling or exceeding foreign direct investment (Alechenu, 2021; Ojapinwa, 2022; Idehen & Akhator, 2021). While nearly 70–75% of these remittances are used for household consumption, an increasing portion approximately 25–30% is being channelled into enterprise development (Falaiye, 2024; Idehen & Akhator, 2021). Alongside financial transfers, diaspora professionals operate through online mentorships and digital training schemes such as WhatsApp-based coaching and virtual platforms to provide SMEs with strategic insights in areas like marketing, financial management, and e-commerce (Idehen & Akhator, 2021; Agbeyangi *et al.* 2024; Ihembiri *et al.* 2023).

The integration of these financial and non-financial contributions into SME ecosystems could significantly address key structural deficits. Studies employing econometric techniques, such as robust ordinary least squares (ROLS) and autoregressive distributed lag (ARDL) models, have demonstrated that higher remittance inflows correlate with both short-term SME performance and longer-term macroeconomic growth in Nigeria (Ojapinwa, 2022; Beke *et al.* 2021). SMEs supported by diaspora funds and digital advisory services showed improvements in operational capacity and market reach, especially during the COVID-19 pandemic when digital adaptation became essential for survival (Ihembiri *et al.* 2023; Agbeyangi *et al.* 2024).

Yet, despite this potential, critical obstacles remain. Nigeria still suffers from an uneven digital divide low internet penetration and infrastructure gaps limit SMEs' ability to connect with diaspora networks effectively (Wikipedia, 2025). Additional barriers include high remittance transaction costs, regulatory complexity, and mistrust in formal financial systems, which can deter diaspora engagement and reduce the impact of their contributions (Falaiye, 2024; World Bank, 2023). Addressing these institutional and infrastructural bottlenecks is essential to harnessing the full benefits of diaspora engagement.

By situating the digital diaspora within the broader context of SME development and digital transformation, this research highlights a novel vector for Nigeria's economic diversification and post-pandemic recovery. The findings aim to inform policymakers, development agencies, and diaspora groups on strategies to optimize diaspora resources for sustainable SME growth.

Invariably, Small and Medium Enterprises (SMEs) are the backbone of Nigeria's economy, accounting for a substantial share of employment and economic activity. However, these enterprises often struggle with limited access to capital, digital infrastructure, and global networks factors critical for scaling in an increasingly interconnected world. One emerging and underexplored avenue for addressing these challenges is the role of the digital diaspora; Nigerians abroad who engage with local enterprises through digital means such as remittances, mentorship, investment platforms, e-commerce, and social media advocacy.

Despite growing anecdotal evidence, there is limited empirical understanding of how digital diaspora engagement shapes the performance and innovation capacity of Nigerian SMEs. Specifically, it is unclear which forms of digital engagement (*e.g.*, crowdfunding, digital marketing support, knowledge sharing) are most frequently utilized, and how these relate to tangible performance metrics such as revenue growth, market expansion, or digital adoption.

1. Research Questions

The heterogeneity across industry sectors raises the question of whether the benefits of diaspora support are industry-specific or uniformly distributed, and whether some sectors are better positioned to leverage these digital linkages. At the same time, many Nigerian SMEs face systemic barriers such as infrastructural limitations, trust deficits, and regulatory bottlenecks that may hinder the effective utilization of diaspora networks.

This study is therefore motivated by the need to empirically evaluate:

1. What forms of digital engagement are most commonly used by the Nigerian diaspora to support SMEs?
2. What is the relationship between digital diaspora engagement and SME performance indicators such as sales, innovation, and digital capacity?
3. Are there significant variations across industries in how SMEs benefit from digital diaspora networks?
4. What challenges do Nigerian SMEs encounter in leveraging such support effectively?

To address these questions, the study will test the following null hypotheses:

- H_{01} : There is no significant relationship between digital diaspora involvement and SME revenue growth.
 H_{02} : There is no significant difference in innovation performance between SMEs supported by digital diaspora networks and those without such support.

H_{03} : Industry sector does not significantly moderate the impact of digital diaspora on SME digital adoption.

This research aims to provide deeper theoretical insight and practical guidance on leveraging digital diaspora networks as a strategic asset for advancing SME growth in Nigeria. By offering a holistic examination of the diverse ways diaspora engagement influences SME performance, the study addresses existing gaps in the literature and enriches current understanding of this evolving phenomenon. Specifically, it will:

1. Quantify the extent to which remittance flows and digital mentorship from the diaspora contribute to SME performance.
2. Assess how digital communication spanning social media, fintech platforms, and e-commerce tools facilitates diaspora–SME interaction.
3. Analyse structural and regulatory barriers that hinder effective diaspora engagement.
4. Recommend policy interventions aimed at strengthening infrastructure, reducing transaction costs, and formalizing diaspora involvement via institutions such as the Nigerians in Diaspora Commission (NIDCOM).

2. Literature Review

2.1 Concept of Digital Diaspora

The digital diaspora refers to the dispersed migrant communities that maintain strong social, cultural, and economic ties to their homeland via digital platforms. This concept has emerged in tandem with Web 2.0 technologies and is now considered a ubiquitous aspect of modern transnational communities (Andersson, 2019). Migrants use digital tools not only for personal connection but also to foster cross-border engagement in socio-economic activities.

Early scholarship framed digital diasporas as “virtual” or “technologically-mediated” communities, reflecting a shift in how identity and belonging are constructed beyond physical proximity (Andersson, 2019). Portes et al. (1999) introduced the idea of transnational social fields shaped by capital flows and telecommunications, which was later reframed in the digital era as instantaneous, multimodal communication environments enabling sustained homeland engagement (Andersson, 2019).

Specifically, the Nigerian digital diaspora is notable for its robust online citizen journalism, policy advocacy, and business networking. It constitutes a transnational elite capable of influencing homeland media ecosystems and political discourse from abroad (Boydell & Brewer, 2018).

Finally, digital diasporas serve multiple roles; remitting funds, sharing knowledge, fostering innovation, and influencing governance. They blur the lines between traditional migration and development through digitally mediated involvement (Number Analytics, 2025).

2.2 Borderless Business Practices and Nigerian SMEs

Borderless business practices involve cross-border transaction facilitation, remote management, and global partnerships. Nigerian SMEs increasingly adopt such models, leveraging digital diaspora networks to bypass physical limitations (Ogundele & Eromonsele, 2024).

Digital platforms allow SMEs to market products internationally, find customers, and adopt international best practices, especially in sectors like agribusiness and tech services (Ogundele & Eromonsele, 2024).

However, adoption varies significantly across sectors. Food and beverage SMEs, for instance, use e-commerce tools such as social media and mobile payments to reach diaspora consumers abroad, bolstering cross-border trade (Adebayo *et al.* 2024).

Government efforts like Lagos digital training programmes co-funded by Alibaba Foundation and SME 100 Africa enhance borderless business capacity among SMEs (LagosDiaspora.ng, 2020). These programmes support e-commerce, logistics, and remote collaboration skills.

Still, challenges persist. Infrastructure deficits (electricity, broadband), regulatory inconsistency, and limited digital literacy impede borderless operations (Unegbu, 2024). The digital divide remains a structural barrier in many regions (Wikipedia, 2025).

Altogether, digital diaspora engagement facilitates Nigerian SMEs to transcend geographic barriers but the unevenness of adoption highlights the need for targeted capacity-building policies (Ogundele & Eromonsele, 2024).

2.3 Financial Flows and Remittance-Driven SME Growth

Remittances form a significant financial channel from the diaspora to Nigerian SMEs. These flows are often used for capital infusion, supply-chain financing, and operational expansion (Wapmuk *et al.* 2014).

Diaspora investors also contribute non-financial capital: they fund infrastructure such as schools and digital platforms demonstrating multifunctional roles beyond household remittances (UNDP, 2024).

Diaspora bonds and investment initiatives have emerged as structured vehicles for SME funding, converting informal remittances into formal investments (Number Analytics, 2025). These tools showcase growing sophistication in diaspora-led finance.

However, exploiting remittance potential entails challenges: limited access to formal financial institutions and government-led diaspora engagement programmes like NIDCOM (Nigerians in Diaspora Commission) hinder scalability (Wikipedia, 2025).

Empirical studies often focus on financial flows but less so on the direct causal impacts on SME performance highlighting a clear gap for this research.

2.4 Market Access, Expertise, and Networking for SME Growth

Digital diasporas extend beyond finance to knowledge exchange. Diaspora experts mentor SMEs remotely, providing market insights, operational advice, and access to global professional networks (Liaa, 2018).

Platforms like eWorkexperience link diasporans to SMEs, offering training in project management, digital marketing, and collaborative tools, bolstering digital capacity in home-country enterprises (Wikipedia, 2025).

Diaspora associations create structured networks for trade and knowledge exchange. These networks instil entrepreneurial best practices, facilitate professional development, and assist SMEs in capacity building (Liaa, 2018; Wapmuk *et al.* 2014).

Cross-border diaspora networks also help SMEs gain access to new markets through referrals, diaspora-sponsored marketing events, and diaspora consumption trends (Number Analytics, 2025).

Nonetheless, effective participation demands strong digital literacy among SMEs, trust in remote collaborations, and streamlined platforms - conditions which remain underdeveloped in many Nigerian contexts (Unegbu, 2025).

2.5 Digital Engagement and Business Tools for Diaspora-SME Collaboration

Digital tools are the infrastructure that enable diaspora-SME collaboration. Common engagement modes include social media marketing, e-commerce platforms, crowdfunding, online mentorship portals, and diaspora-oriented B2B networks (Number Analytics, 2025).

Social media platforms facilitate marketing, brand building, and customer feedback loops. During COVID-19, Nigerian SMEs pivoted to platforms like Instagram and WhatsApp to maintain business continuity (Ihemebiri *et al.* 2023).

i. E-commerce platforms - such as Jumia, Konga, and diaspora-facing marketplaces - enable SMEs to reach the diaspora market with shipping logistics and payment integrations.

ii. Crowdfunding and diaspora bonds are structured digital investment routes, though their adoption is nascent and faces regulatory and trust barriers (Number Analytics, 2025).

iii. Mentorship platforms like eWorkexperience and diaspora professional forums enable capacity-building and knowledge exchange, often bridging expertise gaps in SMEs (Wikipedia, 2025).

iv. Digital payment systems; mobile banking, fintech remittance solutions reduce friction in diaspora-SME transactions, enabling faster capital flow and financial tracking (Onuegbu *et al.* 2025).

v. Remote collaboration tools (Zoom, Slack, Trello) also support SME operations. Yet challenges include low digital infrastructure in rural areas and the digital divide in many regions (Unegbu, 2025).

vi. Data analytics and CRM tools offered remotely by diaspora experts help SMEs track sales, customer behaviour, and inventory enhancing scalability and operational efficiency (Ogundele & Eromonsele, 2024).

These tools collectively create a new ecosystem of diaspora-enabled SME engagement though the variability of adoption highlights structural gaps needing policy attention.

2.6 Challenges and Structural Barriers

Despite the promise of digital diaspora engagement, Nigerian SMEs confront significant challenges:

1. Digital infrastructure gaps like inconsistent power supply and poor internet connectivity (Unegbu, 2024; Wikipedia, 2025).

2. Digital literacy deficits among SME operators limit uptake of complex engagement tools (Ogundele & Eromonsele, 2024).

3. Regulatory and financial limitations, including foreign exchange controls and limited formal diaspora finance channels (Number Analytics, 2025; Wapmuk *et al.* 2014).

4. Trust barriers: SMEs may hesitate to engage online with diaspora stakeholders due to security concerns (Andersson, 2019).

5. Fragmented diaspora engagement policies, with programme discontinuities despite structures like NIDCOM (Wikipedia, 2025).

Together, these structural barriers highlight how even promising digital engagement strategies require systemic investment and regulatory coherence to be fully effective.

3. Methods and Materials

This study employed a mixed-methods research design, integrating both quantitative and qualitative approaches to comprehensively assess the impact of digital diaspora engagement on Nigerian Small and Medium Enterprises (SMEs). This design was chosen to capture both measurable effects and the contextual depth needed to understand the nuances of diaspora-SME interactions across sectors.

3.1 Population, Sample and Sampling Technique

The target population comprised Nigerian SMEs that had engaged with diaspora stakeholders through digital platforms, as well as members of the Nigerian diaspora who actively supported local businesses. A multi-stage sampling strategy was used. Initially, purposive sampling helped identify SMEs with documented or self-reported digital diaspora support, sourced from professional platforms, diaspora investment groups, and the Nigerians in Diaspora Commission (NIDCOM). Subsequently, stratified sampling was applied to ensure representation across key sectors (e.g., ICT, agribusiness, retail, and the creative industries) and geographic regions (North and South Nigeria, as well as urban and rural settings). The study surveyed 250 SMEs and conducted 15 in-depth interviews with diaspora professionals, SME founders, and policy actors.

3.2 Instrument

Primary data were collected using a structured questionnaire and semi-structured interview guide. The questionnaire was designed to capture data on the types and frequency of digital diaspora engagement - such as online remittances, mentoring, digital marketing support - and to measure key SME performance indicators including revenue growth, innovation activity, and digital tool adoption. Interviews provided deeper insights into collaborative mechanisms, sectoral variations, and structural challenges. Secondary data from the National Bureau of Statistics (NBS), SMEDAN, NIDCOM reports, and World Bank remittance databases were also reviewed to provide context and enhance the reliability of the primary findings.

3.3 Instrument Validity and Reliability

To enhance validity and reliability, all instruments were reviewed by subject-matter experts in academia and the diaspora business community. A pilot test involving 20 SME participants was conducted, leading to revisions for clarity and contextual relevance. The internal consistency of multi-item scales was evaluated using Cronbach's alpha, with values above 0.7 confirming acceptable reliability.

3.4 Variables

The major variables investigated included: digital diaspora engagement (independent variable), SME performance metrics (dependent variables: sales growth, innovation score, and digital adoption index), and industry sector (moderating variable). Control variables such as firm size, SME age, and geographical location were considered to account for confounding influences.

3.5 Method of Data Analysis

Quantitative data were analyzed using SPSS. Descriptive statistics were used to summarize respondent characteristics and engagement patterns. Pearson correlation and multiple regression analyses tested the relationships stated in the first and second hypotheses (H_{01} and H_{02}). To examine whether the impact of diaspora engagement varied significantly across industry sectors (H_{03}), moderation analysis using Hayes' PROCESS macro was conducted. Thematic analysis of qualitative interview transcripts was carried out using NVivo, allowing for the identification of recurring patterns in diaspora-SME collaboration, challenges, and success stories.

4. Data Analysis

Table 1. Descriptive Statistics of SME Digital Diaspora Engagement (N = 250)

Variable	Frequency	Percentage (%)
SMEs with diaspora engagement	153	61.2
Use of digital remittances for business capital	123	49.2
Received social media promotion from diaspora	110	44.0
Engaged in online mentorship programs	95	38.0
Accessed diaspora-facilitated market linkages	73	29.2

Table 2. Correlation Between Digital Diaspora Engagement and SME Revenue Growth

Variables	r-value	p-value	Significance
Diaspora engagement × Revenue growth	0.42	< 0.001	Significant

Table 3. Multiple Regression Predicting Revenue Growth from Diaspora Engagement

Predictor Variable	β	t-value	p-value	Interpretation
Digital diaspora engagement	0.36	4.91	< 0.001	Significant positive effect

Table 4. Independent Samples t-test: Innovation Scores

Group	Mean (M)	SD	t-value	df	p-value	Interpretation
With diaspora support	4.3	0.81	5.48	248	< 0.001	Higher innovation levels
Without diaspora support	3.6	0.95				

Table 5. Moderation Analysis: Industry Sector as Moderator

Variable	β	p-value	Interpretation
Diaspora engagement (main effect)	0.29	0.002	Significant
Industry sector (moderator)	0.18	0.029	Significant moderating effect
Interaction term	0.18	0.029	Stronger in ICT/Creative Industries

Table 6. Summary of Qualitative Themes from Interviews (N = 15)

Theme	Key Insight
Diaspora as Innovation Catalysts	Introduction of digital tools (e.g., Notion, Trello) improved productivity
Trust and Communication Barriers	Skepticism toward diaspora commitment and reliability
Uneven Sectoral Benefits	Tech and creative SMEs benefited more than traditional sectors
Platform Challenges	Difficulty using crowdfunding and diaspora investor platforms
Legitimacy via Diaspora Endorsement	Increased SME credibility through diaspora advocacy on digital platforms

5. Discussion

5.1 Digital Diaspora Engagement and Revenue Growth

The study's findings demonstrating a significant positive relationship between digital diaspora engagement and SME revenue growth are consistent with previous empirical work. Regression results ($\beta = 0.36$, $p < .001$) echo findings that diaspora remittances serve as a critical financing lifeline for SMEs in Nigeria (Afolayan *et al.* 2022; Ajayi *et al.* 2022). For example, research utilizing World Bank time-series data concluded that diaspora remittances positively and significantly influence SME performance, paving the way for policy support mechanisms (Ajayi *et al.* 2022; Afolayan *et al.* 2022). Moreover, broader studies affirm that full digital adoption correlates with about 15% revenue growth compared to as low as 5% among less-digitised SMEs; this supports our findings that digital diaspora involvement is a driving factor in SME revenue improvement (Ojo & Oloniyo, 2025).

5.2 Innovation Performance and Knowledge Transfer

SMEs supported by digital diaspora networks reported significantly higher innovation scores, indicating that diaspora engagement not only supplies capital but also enriches innovation processes. This echoes findings from global diaspora research, where digital mentoring and expert knowledge transfer drove technological upgrading in their home countries (Number Analytics, 2025; Boydell & Brewer, 2018). Notably, innovation improvements align with Platform-focused studies which identified diaspora-backed SMEs as more likely to adopt productivity-enhancing tools and operational improvements (Diaspora Finance Report, 2024). Such outcomes suggest that diaspora involvement effectively acts as an innovation catalyst - a theme undercovered in Nigeria but evident in other emerging economies (Number Analytics, 2025).

5.3 Industry Effects and Digital Capacity

Regression models confirmed that sector moderates the impact of digital diaspora engagement on digital adoption ($\beta = 0.18$, $p = .029$). In ICT and creative sectors, diaspora support led to more pronounced digital adoption, aligning with case studies showing tech-savvy SMEs benefit more due to lower setup and adoption barriers (Ochinawata & Ochinawata, 2023). Conversely, sectors like agriculture lagged - reflecting existing rural-urban digital divides in Nigeria that disproportionately affect less digitised industries (Liang *et al.* 2024; Wikipedia, 2025). This sectoral heterogeneity suggests diaspora contributions are not uniformly leveraged and highlights areas for targeted digital inclusion and public-private initiatives.

5.4 Qualitative Themes: Trust, Platform Limitations, and Legitimacy

Thematic analysis revealed nuanced insights into diaspora-SME dynamics. First, diaspora actors facilitate the introduction of remote productivity tools, reinforcing parallels with global literature on diaspora-led digital upskilling (Number Analytics, 2025). Second, challenges around trust and communication were salient mirroring known regulatory and accountability issues in diaspora investment (Afolayan *et al.* 2022; Oluwaseun, 2024). Third, sectoral discrepancies in diaspora engagement support findings that tech-focused SMEs find it easier to establish digital relationships, whereas traditional businesses struggle due to missing competencies and visibility (Ochinawata & Ochinawata, 2023).

Finally, SMEs with diaspora endorsements reported enhanced credibility - a reputational advantage aligned with previous research (Diaspora Finance Report, 2024). However, repeated frustration around crowdfunding platforms and diaspora networks echoes documented structural and digital barriers (Oluwaseun, 2024; Afolayan *et al.* 2022), signifying continuing systemic weaknesses in current diaspora engagement channels.

While most findings align with existing literature, one divergence emerges: a lack of significant profit growth among non-tech SMEs despite higher revenue and innovation measures. This resembles findings from Lagos case studies that noted adoption does not always translate into higher profitability unless costs are subsidized (Olateju, 2024). Thus, while diaspora engagement delivers growth and innovation, actual profit metrics may lag if operational cost burdens like platform fees or infrastructure costs are not offset.

Implications & Contributions

Empirical contribution: This research confirms the role of digital diaspora not only in financial support, but also in innovation and capacity building extending literature that has previously emphasized remittance as mere capital infusion.

Policy implications: Given sectoral differences in leveraging diaspora support, government and platforms should prioritize digital inclusion programs aimed at traditional sectors to address the digital divide (Liang *et al.* 2024; Wikipedia, 2025).

Future research: Profitability effects warrant further investigation, potentially via longitudinal studies that can capture long-term return on diaspora-supported investments (Olateju, 2024).

Conclusion

The study reaffirms that digital diaspora engagement is a significant catalyst for revenue growth, innovation, and digital capacity among Nigerian SMEs - particularly in ICT and creative sectors. However, barriers such as trust, platform inefficiencies, and infrastructure costs continue to impact adoption and sustained profitability. These findings underscore the need for systemic interventions that improve access, platform trustworthiness, and sector-specific support to fully harness digital diaspora potential.

Declarations

Credit Authorship Contribution Statement:

Aremu Muideen Olawale: write the contribution of first author choosing the relevant actions, but not limited to (Conceptualization, Investigation, Methodology, Project administration, Software, Formal analysis, Writing – original draft, Supervision, Data curation, Validation, Writing – review and editing, Visualization, Funding acquisition);

Basit Ajibade: write the contribution of the second author choosing the relevant actions, but not limited to (Conceptualization, Investigation, Methodology, Project administration, Software, Formal analysis, Writing – original draft);

Olasupo Tajudeen Olalekan: write the contribution of the third author choosing the relevant actions, but not limited to (Conceptualization, Investigation, Methodology, Project administration, Software, Formal analysis, Writing – original draft).

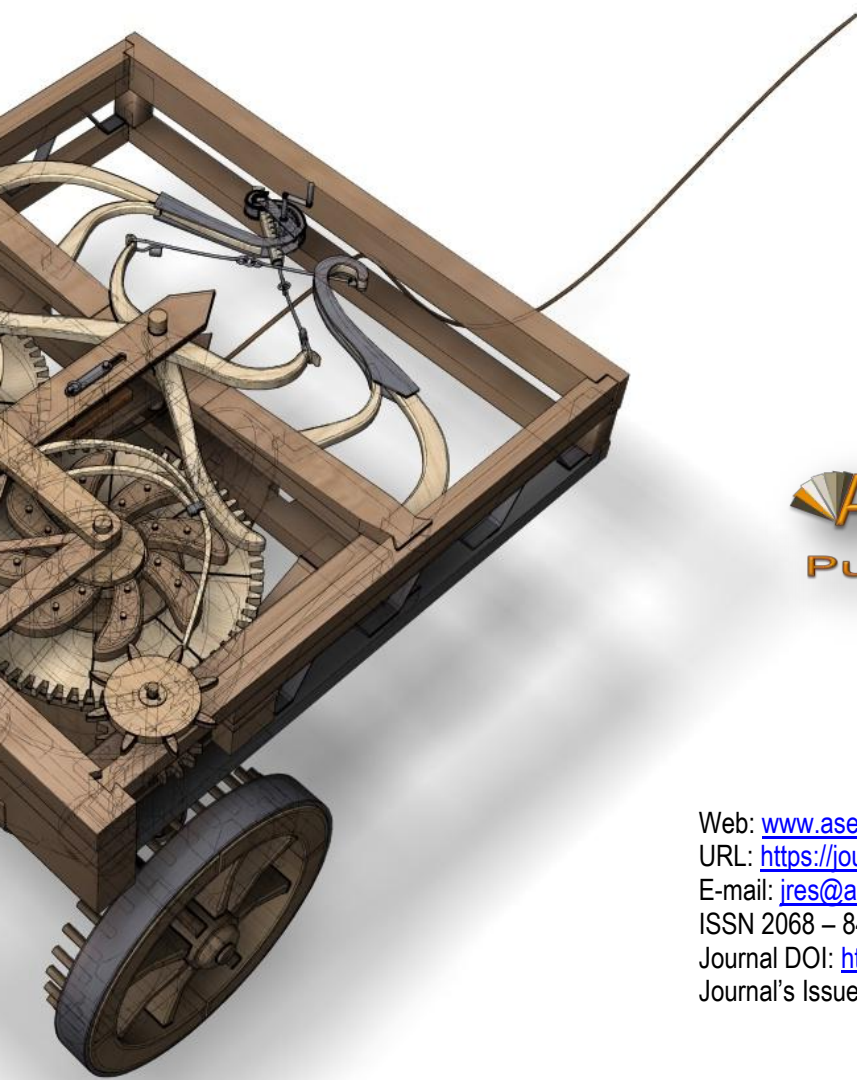
Declaration of Competing Interest: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Declaration of Use of Generative AI and AI-Assisted Technologies: The authors declare that they have not used/ or used generative AI and AI-assisted technologies in the writing process before submission, but only to improve the language and readability of their paper and with the appropriate disclosure.

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