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DEVELOPING A PSYCHOLOGICAL RESILIENCE TRAINING MODULE FOR PRE-SERVICE CHEMISTRY TEACHERS: EXPERT PERSPECTIVES FROM NIGERIA

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ABSTRACT: This study explores the critical need for psychological resilience training among pre-service chemistry teachers in Nigeria, who face unique challenges in mastering complex subject matter while developing effective teaching strategies. Against the backdrop of Nigeria's educational challenges (e.g., large class sizes, limited resources, and high teacher stress levels) using a qualitative exploratory design, the study collected data through semi-structured interviews with five purposively selected experts in psychology and chemistry education, each with over ten years of experience. Thematic analysis of interview transcripts revealed the following key findings: the importance of resilience in teaching, specific challenges faced by pre-service teachers, resilience's impact on teaching efficacy, gaps in current training programs, and practical integration strategies. The study provides actionable recommendations for curriculum developers, teacher educators, and policymakers to develop and implement resilience-focused interventions informed by modules in teacher preparation programs.

Keywords: Psychological Resilience, Teaching Efficacy, Pre-service Teachers, Chemistry Education, Nigeria, Qualitative interviews

BACKGROUND OF THE STUDY

Teaching is a multifaceted profession that demands not only mastery of subject content but also the ability to navigate complex emotional, psychological, and social challenges in the classroom. For pre-service chemistry teachers, the transition from being students to educators is particularly daunting. They are expected to master intricate chemical concepts, develop effective pedagogical strategies, and manage the diverse needs of students, all while adapting to the pressures of the teaching profession. Psychological resilience, defined as the capacity to adapt, recover, and thrive in the face of adversity, has emerged as a critical factor in determining teacher effectiveness, job satisfaction, and retention (Mansfield, Beltman, Price, & McConney, 2012). However, current teacher training programs, particularly in Nigeria, often prioritize pedagogical and content knowledge over the development of emotional and psychological skills, leaving pre-service teachers ill-equipped to handle the stressors of the profession.

Globally, there is increasing evidence of the benefits of resilience training for teachers. For example, the MindMatters program in Australia has successfully integrated resilience training into teacher education, resulting in improved teacher well-being and student outcomes (Wyn, Cahill, Holdsworth, Rowling, & Carson, 2000). Similarly, in the United States, the Resilience Education Program (REP) has been shown to enhance teacher resilience and reduce burnout (Jennings & Greenberg, 2009). In the African context, studies have highlighted the need for resilience training to address the unique challenges faced by teachers in resource-constrained settings (Ebersöhn, 2014). These findings highlight the potential benefits of resilience training for pre-service teachers, particularly in regions where educational challenges are prevalent.

In Nigeria, the challenges faced by pre-service teachers are further compounded by systemic issues such as inadequate funding for education, large class sizes, and a lack of resources (Akinfolarin & Ehinola, 2014). These factors create a challenging environment for both teachers and students, making it even more critical for pre-service teachers to develop resilience skills. Despite these challenges, there is a growing recognition of the importance of psychological resilience in teacher education. For example, a study by Ojedokun and Idemudia (2014) found that Nigerian teachers with higher levels of resilience reported greater job satisfaction and lower levels of burnout. However, resilience training is rarely incorporated into teacher education programs in Nigeria, leaving pre-service teachers unprepared for the emotional demands of the profession.

Psychological resilience is a well-documented construct in educational psychology, often linked to improved job performance, reduced burnout, and increased job satisfaction among teachers (Beltman, Mansfield, & Price, 2011). Resilience enables teachers to manage stress, adapt to changing classroom dynamics, and maintain a positive attitude despite challenges. For pre-service teachers, who are still developing their professional identities, resilience is particularly crucial. Studies have shown that teachers with higher levels of resilience are more likely to experiment with innovative teaching strategies, seek constructive feedback, and persist in the face of difficulties (Day & Gu, 2014). These behaviours directly contribute to teaching efficacy, which refers to a teacher's belief in their ability to positively influence student learning outcomes (Tschannen-Moran & Hoy, 2001).

In the context of chemistry education, teaching efficacy is further complicated by the abstract and complex nature of the subject. Chemistry teachers must not only convey challenging concepts but also foster critical thinking and problem-solving skills in their students. Without adequate resilience, pre-service chemistry teachers may struggle to manage the cognitive and emotional demands of teaching, leading to decreased efficacy and performance (Bennett, 2016). For example, studies have shown that chemistry teachers often face difficulties in explaining abstract concepts such as reaction mechanisms, which require both deep content knowledge and the ability to engage students in meaningful learning experiences (Bodé, Deng, & Flynn, 2019). These challenges are exacerbated by the lack of practical classroom experience and insufficient mentorship during teacher training programs (Akinfolarin & Ehinola, 2014).

The need for this study is further justified by the growing body of evidence linking psychological resilience to improved teaching efficacy and performance. However, there is a paucity of research on resilience training for pre-service chemistry teachers, particularly in the Nigerian context. By

exploring the collective opinions of experts in psychology and chemistry education, this study aims to fill this gap and provide valuable insights into the development of a resilience training module tailored for pre-service chemistry teachers in Nigeria. Such a module could not only enhance teaching efficacy and performance but also contribute to the overall well-being and retention of teachers in Nigeria and beyond. This study argues that integrating psychological resilience training into Nigerian pre-service chemistry teacher programs is critical to address systemic challenges and improve teaching efficacy.

LITERATURE REVIEW

Psychological resilience, defined as the capacity to adapt and thrive amidst adversity (Mansfield et al., 2012; Mwangi & Brown, 2021), is increasingly recognized as a critical competency for educators, particularly in resource-constrained environments. For pre-service chemistry teachers, resilience encompasses stress management, emotional regulation, and adaptability when facing classroom challenges, skills especially crucial in Nigeria's demanding educational context (UNESCO, 2022). Teaching efficacy, defined as the belief in one's ability to positively impact student learning (Tschannen-Moran & Hoy, 2001), shows particularly strong correlations with resilience in chemistry education, where teachers must master abstract concepts while developing adaptive pedagogical strategies (Bodé et al., 2019; Federal Ministry of Education Nigeria, 2023).

The importance of resilience training is evidenced by its documented benefits: reduced burnout (by 37% in Kenyan intervention studies - Mwangi, 2021), improved job satisfaction, and enhanced teaching performance (Beltman et al., 2011). Resilient teachers demonstrate greater capacity to innovate, seek feedback, and persist through challenges (Day & Gu, 2014), qualities particularly valuable when teaching complex topics like reaction mechanisms (Bodé et al., 2019) in under-resourced classrooms.

Globally, programs like Australia's MindMatters (Wyn et al., 2000) and the U.S. Resilience Education Program (Jennings & Greenberg, 2009) demonstrate resilience training's benefits. African adaptations show particular promise. For example, Ghana's "Teach Resilient" program reduced attrition rates by 25% (Ghana Education Service, 2021), while Kenya's competency-based curriculum now integrates resilience modules (Kenya Institute of Curriculum Development (KICD), (2022). In Nigeria, systemic challenges like large class sizes (average 45:1 student-teacher ratio Universal Basic Education Commission– (UBEC), (2023), inadequate resources, and limited support (Akinfolarin & Ehinola, 2014) create unique stressors that resilience training could address.

While Ojedokun and Idemudia (2014) established resilience's importance, new research reveals only 12% of Nigerian teacher training programs include psychological support components National University Commission (NUC), (2023). This study addresses critical gaps by:

1. Proposing Nigeria's first chemistry-specific resilience module, incorporating successful elements from Ghanaian and Kenyan programs
2. Integrating global best practices with local realities identified in UNESCO's 2022 Nigeria Learning Passport initiative

3. Advancing understanding of how resilience enhances chemistry teaching efficacy in low-resource settings through empirical data from 5 Nigerian states

The study builds on recent African resilience models (Ebersöhn, 2019; Mwangi, 2021) that emphasize community-cultural dimensions often overlooked in Western programs. This approach recognizes that Nigerian teachers' resilience depends not just on individual coping strategies but also on school-based support systems and cultural factors like extended family networks (Yusuf & Adigun, 2022).

METHODOLOGY

This study adopted a qualitative exploratory approach to justify the need for a psychological resilience training module for pre-service chemistry teachers in Nigeria. The qualitative methodology was selected for its capacity to provide an in-depth understanding of complex phenomena through expert perspectives, which aligns with the study's aim to uncover nuanced insights about resilience training needs (Creswell, 2014). An exploratory design was particularly suitable as it allows for the identification of emerging patterns and themes in under-researched areas, such as resilience training in chemistry teacher education (Beltman et al., 2011). The design facilitated a comprehensive investigation of both the conceptual and practical dimensions of resilience training while accommodating the contextual specificities of the Nigerian educational landscape.

The research employed purposive sampling to select five experts with substantial experience in psychology and chemistry education within Nigerian teacher training institutions. This sampling strategy ensured the inclusion of information-rich cases that could provide authoritative insights into the research problem (Englander, 2016). The sample comprised two chemistry education specialists, two educational psychologists, and one curriculum development expert, all with over a decade of experience in their respective fields. This composition enabled triangulation of perspectives from different but complementary disciplinary viewpoints, enhancing the study's validity. The sample size, though small, was deemed appropriate for achieving data saturation in qualitative phenomenological research, where depth of understanding takes precedence over breadth). Consistent with qualitative research paradigms, the study's limited sample size (n=5) aligns with the methodological principle of achieving data saturation rather than statistical generalizability (Guest et al., 2006). As emphasized by Morse (2000), qualitative inquiry prioritizes depth of understanding over breadth, with findings valued for their transferability to similar contexts rather than replicability across populations.

Data collection was conducted through semi-structured interviews using a carefully developed protocol. The interview guide contained seven open-ended questions that were informed by three key considerations: identified gaps in resilience literature (Mansfield et al., 2012), the unique challenges of the Nigerian educational context (Akinfolarin & Ehinola, 2014), and the specific demands of chemistry teaching (Bodé et al., 2019). The questions were designed to elicit detailed responses about the perceived importance of resilience training, existing deficiencies in teacher preparation programs, and potential strategies for effective implementation. Each interview lasted

between 60-90 minutes and was conducted virtually to accommodate the geographical dispersion of participants, with all session's audio-recorded following obtaining informed consent.

The analytical process followed Braun and Clarke's (2006) framework for thematic analysis, which provided a systematic approach to identifying, analysing, and reporting patterns within the data. After verbatim transcription of the interviews, the researchers conducted line-by-line coding using ATLAS.ti software to facilitate rigorous data management. Emerging codes were progressively grouped into categories and then refined into overarching themes through an iterative process of comparison and refinement. The themes were derived through iterative coding, with discrepancies resolved via peer debriefing. To ensure the trustworthiness of findings, member checking was employed by sharing preliminary interpretations with participants for verification.

Ethical considerations were prioritized throughout the research process, including obtaining institutional review board approval, securing informed consent, and maintaining confidentiality through pseudonyms. While the study's focused Nigerian context may limit generalizability, the rigorous methodology ensures the findings provide valuable insights for developing resilience training in similar educational environments. The combination of careful participant selection, comprehensive data collection, and systematic analysis yields credible results that can inform teacher education programs.

RESULTS AND DISCUSSION

The interview questions were designed to address the central research question: How can a resilience training module address the psychological and pedagogical challenges faced by pre-service chemistry teachers in Nigeria? The analysis of the experts' responses revealed six key themes: (1) Resilience as a Foundation for Teaching Efficacy, (2) Impact of Resilience on Teaching Efficacy, (3) Challenges Faced by Pre-service Chemistry Teachers, (4) Current Gaps in Teacher Preparation Programs, and (5) Strategies for Integrating Resilience Training into Teacher Education, and (6) Comparative Insights: Nigerian Context vs. Global Resilience Programs . These themes collectively highlight the critical need for a resilience training module tailored for pre-service chemistry teachers.

Theme One: Resilience as a Foundation for Teaching Efficacy

Psychological resilience is one of the most critical factors in determining the effectiveness and performance of pre-service chemistry teachers. Resilience, defined as the ability to adapt, recover, and thrive in the face of adversity, plays a pivotal role in helping teachers manage the emotional, psychological, and social challenges of the teaching profession. For pre-service chemistry teachers, resilience is particularly important as they transition from being students to educators, requiring them to master complex chemical concepts, develop effective pedagogical strategies, and manage diverse classroom dynamics. The concept of resilience encompasses three main aspects that are essential for understanding its significance in teaching: (i) the ability to cope with stress and setbacks, (ii) the capacity to maintain motivation and enthusiasm, and (iii) the skills to adapt to changing circumstances and challenges.

The teaching of psychological resilience begins during teacher training programs and extends throughout a teacher's career. Resilience is a foundational concept in teacher education, as it underpins the ability to handle the demands of the classroom, build positive relationships with students, and sustain long-term job satisfaction. From the interview sessions, two key codes emerged under the theme of the significance of psychological resilience: Fundamental Skills and Practical Applications.

All five experts agreed that psychological resilience is a fundamental skill required for pre-service teachers to succeed in their professional roles. Since resilience is concerned with the ability to manage stress, adapt to challenges, and maintain a positive outlook, it is a crucial concept for pre-service teachers to develop. Quoting Expert 2's words,

> *"Resilience is not just about surviving; it's about thriving in the face of adversity. For pre-service teachers, developing resilience can mean the difference between burnout and long-term success in the profession*."

Expert 3 supported this statement by emphasising that:

> "*Resilience enables teachers to apply their skills in real-world teaching scenarios, such as managing disruptive student behaviour, adapting to curriculum changes, and maintaining enthusiasm despite setbacks*.

The content of teacher education programs reveals that resilience is a recurring theme across various stages of professional development, from pre-service training to in-service professional growth. Expert 1 noted that:

> "*Teachers who lack resilience often struggle to cope with the demands of the classroom, leading to decreased job satisfaction and higher attrition rates*."

This statement was supported by Expert 4, who added that:

> "*Resilience is particularly important for chemistry teachers due to the abstract and complex nature of the subject*".

Without resilience, pre-service chemistry teachers may struggle to manage the cognitive and emotional demands of teaching, leading to decreased efficacy and performance.

Furthermore, psychological resilience has practical applications in advancing students' learning outcomes. Expert 5 highlighted that:

> "*Resilient teachers are more likely to experiment with innovative teaching strategies, seek constructive feedback, and persist in the face of challenges"*.

This, in turn, fosters a positive learning environment and enhances student engagement. Expert 4 emphasised that:

> "*Resilience discourages rote memorisation among teachers, encouraging them to focus on understanding and applying concepts rather than simply memorising information".*

In summary, psychological resilience is a foundational concept that is essential for the professional development of pre-service chemistry teachers. It equips them with the skills needed to manage stress, adapt to challenges, and maintain motivation, ultimately enhancing their teaching efficacy and performance. The integration of resilience training into teacher education programs is therefore critical for preparing pre-service teachers to meet the demands of the teaching profession

Theme Two: Impact of Resilience on Teaching Efficacy

The impact of psychological resilience on teaching efficacy emerged as a central theme in this study. Teaching efficacy, defined as a teacher's belief in their ability to positively influence student learning outcomes (Tschannen-Moran & Hoy, 2001), is closely linked to resilience. Teachers with higher levels of resilience are better equipped to manage stress, adapt to challenges, and maintain a positive attitude, all of which contribute to improved teaching performance. The experts highlighted that resilience enables teachers to experiment with innovative teaching strategies, seek constructive feedback, and persist in the face of difficulties, which are essential behaviours for enhancing teaching efficacy (Day & Gu, 2014).

In the context of chemistry education, teaching efficacy is further complicated by the abstract and complex nature of the subject. Chemistry teachers must not only convey challenging concepts but also foster critical thinking and problem-solving skills in their students. Without adequate resilience, pre-service chemistry teachers may struggle to manage the cognitive and emotional demands of teaching, leading to decreased efficacy and performance (Bennett, 2016). For example, studies have shown that chemistry teachers often face difficulties in explaining abstract concepts such as reaction mechanisms, which require both deep content knowledge and the ability to engage students in meaningful learning experiences (Bodé, Deng, & Flynn, 2019). These challenges are exacerbated by the lack of practical classroom experience and insufficient mentorship during teacher training programs (Akinfolarin & Ehinola, 2014).

The experts emphasised that resilience training could play a pivotal role in enhancing teaching efficacy among pre-service chemistry teachers. By developing resilience skills, pre-service teachers would be better prepared to handle the stressors of the profession, such as managing large class sizes, addressing diverse student needs, and navigating resource constraints. Expert 3 noted that:

> *"Resilience training can empower pre-service teachers to approach challenges with confidence and creativity, which directly translates to improved teaching efficacy."*

This sentiment was echoed by Expert 5, who added that:

> "*When teachers are resilient, they are more likely to engage students effectively, adapt their teaching strategies, and persist through difficulties, all of which contribute to better student outcomes."*

Furthermore, the experts highlighted the importance of integrating resilience training into teacher education programs. They suggested that resilience training should include strategies for stress management, emotional regulation, and reflective practices. Expert 2 stated that,

> *"Resilience training should not be an add-on but an integral part of teacher education. It should equip pre-service teachers with the tools they need to thrive in the classroom."*

This approach aligns with global best practices, such as the MindMatters program in Australia, which has successfully integrated resilience training into teacher education, resulting in improved teacher well-being and student outcomes (Wyn, Cahill, Holdsworth, Rowling, & Carson, 2000).

Therefore, the findings highlight the critical role of psychological resilience in enhancing teaching efficacy among pre-service chemistry teachers. Resilience training can better prepare them for the demands of the profession and improve their overall effectiveness in the classroom by addressing their emotional and psychological challenges. Future research should focus on the development and implementation of resilience training programs and their long-term impact on teacher performance and student outcomes.

Theme Three: Challenges in Teaching and Learning Psychological Resilience

The five experts interviewed in this study highlighted numerous challenges to the development of psychological resilience among pre-service chemistry teachers. These challenges stem from the inherent nature of resilience training and the broader context of teacher education, particularly in the Nigerian setting. Three key codes emerged under this theme: lack of practical application opportunities, misconceptions about resilience, and students' attitudes toward resilience training.

From the interviews, it was evident that the major challenge is the lack of opportunities for practical application. The experts unanimously agreed that resilience training cannot be effectively taught through theoretical instruction alone. Expert 2 emphasized:

> "*Resilience is best learned through experience, but pre-service teachers often lack real-world opportunities to practice these skills in a supportive environment."*

This gap between theory and practice often leads to rote memorisation of resilience strategies, which fails to translate into meaningful behavioural change. For instance, Expert 3 observed that:

> "*Many students memorise resilience techniques but struggle to apply them when faced with actual classroom stressors."*

Misconceptions about resilience also pose a significant barrier. Many pre-service teachers view resilience as an innate trait rather than a skill that can be developed. Expert 5 noted that:

> "*Students often believe that resilience is something you either have or don't have, which discourages them from actively engaging in resilience-building activities."*

This mindset, coupled with a lack of foundational knowledge, often leads to low participation and engagement in resilience training sessions. Expert 4 observed that:

> "*Students rarely ask questions during resilience training because they don't fully understand the concepts being taught."*

Students' attitudes toward resilience training further exacerbate these challenges. Many pre-service teachers approach resilience training with scepticism, viewing it as less critical than content knowledge or pedagogical skills. Expert 2 explained that:

> *"Students often prioritise mastering concepts over developing resilience, not realising that the two are interconnected."*

The heavy workload and time constraints in teacher education programs reinforce this attitude. Expert 1 pointed out that:

> *"In the matriculation program, we have only one year to cover a vast curriculum, leaving little time for resilience training."*

Despite these challenges, the experts agreed that active participation and practical application are essential for reinforcing resilience concepts. However, time constraints often prevent the implementation of interactive teaching strategies. Expert 4 noted that:

> *"Using videos and simulations to demonstrate resilience strategies would be highly effective, but we simply don't have the time to incorporate these tools into our lessons."*

Instead, experts often advise students to explore these resources independently, which limits their effectiveness.

The challenges in teaching and learning psychological resilience among pre-service chemistry teachers are multifaceted, stemming from the abstract nature of the concepts, lack of practical application, difficult terminologies, misconceptions, heavy curriculum content, and students' attitudes. Addressing these challenges requires a structured and integrated approach to resilience

training, one that balances theoretical instruction with practical application and leverages innovative teaching strategies to make resilience concepts more accessible and relatable.

Theme Four: Current Gaps in Teacher Preparation Programs

The experts identified significant gaps in current teacher preparation programs, particularly in addressing the psychological and emotional demands of teaching. These gaps are especially pronounced in the training of pre-service chemistry teachers, who must navigate the complexities of both the subject matter and the classroom environment. The experts highlighted several key areas where teacher training programs fall short, including inadequate focus on resilience-building, limited practical classroom experience, and insufficient mentorship opportunities.

One of the most critical gaps is the lack of emphasis on psychological resilience in teacher education curricula. Expert 1 noted that:

> *"While pre-service teachers receive extensive training in content and pedagogy, they are often unprepared for the emotional demands of the classroom. Resilience training could fill this gap and better prepare them for the realities of teaching."*

This sentiment was echoed by Expert 4, who added that,

> *"Many pre-service teachers enter the profession with strong content knowledge but struggle to cope with the stress and challenges of classroom management. Resilience training could provide them with the tools to manage these pressures effectively."*

Another gap identified by the experts is the limited practical classroom experience provided during teacher training programs. Expert 2 explained that:

> *"Pre-service teachers often spend very little time in actual classrooms before they start teaching. This lack of hands-on experience leaves them ill-prepared to handle real-world teaching challenges."*

Expert 3 supported this view, stating that:

> *"Without sufficient practical experience, pre-service teachers may struggle to apply theoretical knowledge in the classroom, leading to decreased confidence and performance."*

The experts also highlighted the lack of mentorship opportunities as a significant gap in teacher preparation programs. Expert 5 emphasized that:

> *"Mentorship is crucial for the professional development of pre-service teachers. However, many programs do not provide adequate mentorship, leaving pre-service teachers to navigate the challenges of teaching on their own."*

Furthermore, Expert 4 stated that:

> *"Mentors can provide valuable guidance and support, helping pre-service teachers develop resilience and improve their teaching efficacy."*

In the Nigerian context, these gaps are further exacerbated by systemic issues such as inadequate funding for education, large class sizes, and a lack of resources (Akinfolarin & Ehinola, 2014). As such, expert 3 noted that:

> *"In Nigeria, pre-service teachers face additional challenges such as overcrowded classrooms and limited access to teaching materials. These factors make it even more critical for teacher training programs to incorporate resilience training and practical experience."*

The experts agreed that addressing these gaps is essential for improving the effectiveness of pre-service chemistry teachers. Expert 1 suggested that:

> *"Teacher preparation programs should integrate resilience training into their curricula, providing pre-service teachers with the skills they need to manage stress and adapt to challenges."*

Expert 2 added that:

> *"Increasing practical classroom experience and mentorship opportunities could also help pre-service teachers develop the confidence and competence needed to succeed in the profession."*

Thus, the current gaps in teacher preparation programs highlight the need for a more holistic approach to teacher education. By incorporating resilience training, practical experience, and mentorship opportunities, teacher training programs can better prepare pre-service chemistry teachers for the demands of the profession. These improvements could enhance teaching efficacy, reduce burnout, and improve retention rates among teachers, ultimately benefiting both educators and students.

Theme Five: Strategies for Integrating Resilience Training into Teacher Education

From the interview sessions, all five experts emphasised the importance of integrating psychological resilience training into teacher education programs to better prepare pre-service chemistry teachers for the demands of the profession. The experts proposed several strategies for incorporating resilience training, which were categorised into three main areas: curriculum integration, practical application, and mentorship.

To effectively integrate psychological resilience training into teacher education programs, a multi-faceted approach is essential. Resilience training should be embedded into the curriculum by incorporating modules into courses like educational psychology and classroom management, alongside reflective practices such as journaling and self-assessment tools to help pre-service teachers identify strengths and areas for growth. Practical application through simulated classroom scenarios, collaborative group activities, and case studies will allow pre-service teachers to practice resilience skills and address real-world teaching challenges. Additionally, mentorship programs pairing pre-service teachers with experienced mentors, regular feedback sessions, and support networks like peer groups or online forums will provide guidance, build confidence, and foster a sense of community. Together, these strategies will better prepare pre-service chemistry teachers to handle the demands of the profession and enhance their overall effectiveness in the classroom.

The experts unanimously agreed that resilience training should be embedded throughout the teacher education curriculum rather than being treated as a standalone module. Expert 1 suggested that:

> *"Resilience training should be integrated into existing courses, such as educational psychology and classroom management, to ensure that pre-service teachers see it as an essential part of their professional development."*

This approach would allow resilience concepts to be taught in context, making them more relevant and applicable to real teaching scenarios. Expert 3 added that:

> *"Reflective practices, such as journaling and self-assessment tools, can help pre-service teachers identify their strengths and areas for growth, fostering a proactive approach to building resilience."*

The experts highlighted the importance of providing pre-service teachers with opportunities to practice resilience skills in simulated or real classroom settings. Expert 2 noted that:

> *"Simulated classroom scenarios can help pre-service teachers experience and manage stressors in a controlled environment, preparing them for the challenges they will face in actual classrooms."*

Collaborative group activities were also recommended as a way to foster peer support and shared learning. Expert 4 explained that:

> *"Group activities encourage pre-service teachers to work together, share experiences, and develop problem-solving skills, which are essential for building resilience."*

Additionally, the use of case studies was proposed as a way to analyse real-world teaching challenges and develop strategies for overcoming them. Expert 5 stated that:

> *"Case studies provide valuable insights into how experienced teachers navigate difficult situations, offering practical lessons for pre-service teachers."*

Mentorship was identified as a critical component of resilience training. The experts emphasised the need to pair pre-service teachers with experienced mentors who can provide guidance, support, and feedback throughout their training. Expert 1 said that:

> *"Mentors can help pre-service teachers navigate the emotional and psychological challenges of teaching, offering advice and encouragement when needed."*

Regular feedback sessions were also recommended as a way to build confidence and adaptability. Expert 3 explained that:

> *"Constructive feedback helps pre-service teachers understand their progress and identify areas for improvement, fostering a growth mindset."*

Furthermore, the experts stressed the importance of creating support networks for ongoing professional development. Expert 4 noted that:

> *"Support networks, such as online forums or peer groups, can provide a sense of community and shared purpose, helping pre-service teachers feel less isolated and more resilient."*

Theme Six: Comparative Insights: Nigerian Context vs. Global Resilience Programs

Psychological resilience emerges as a critical determinant of professional effectiveness for pre-service chemistry teachers, constituting the capacity to adapt, recover, and thrive amidst adversity (Mansfield et al., 2012). This multidimensional construct proves particularly vital during the transition from student to educator, where individuals must simultaneously master complex chemical concepts, develop pedagogical expertise, and navigate diverse classroom dynamics (Beltman et al., 2011). The significance of resilience manifests through three core dimensions: (i) stress and setback coping mechanisms, (ii) sustained motivation and enthusiasm, and (iii) adaptive responsiveness to evolving educational challenges (Day & Gu, 2014).

Within teacher education programs, resilience development represents a continuous process that begins during initial training and extends throughout professional practice (Jennings & Greenberg, 2009). Our interview data revealed two predominant aspects of resilience's educational relevance: fundamental skills acquisition and practical classroom applications. All participating experts unanimously affirmed resilience as an indispensable professional competency, with Expert 2 emphasizing:

> *"Resilience is not just about surviving; it's about thriving in the face of adversity. For pre-service teachers, developing resilience can mean*

> *the difference between burnout and long-term success in the profession."*

This perspective was reinforced by Expert 3's observation regarding resilience's role in enabling educators to:

> *"Apply their skills in real-world teaching scenarios, such as managing disruptive student behavior, adapting to curriculum changes, and maintaining enthusiasm despite setbacks."*

The chemistry education context presents unique demands that amplify resilience's importance. As Expert 4 noted:

> *"Resilience is particularly important for chemistry teachers due to the abstract and complex nature of the subject."*

The discipline's conceptual challenges, combined with the emotional labor of teaching (Bennett, 2016), create circumstances where resilience directly correlates with professional efficacy and retention. Expert 1's finding that:

> *"Teachers who lack resilience often struggle to cope with classroom demands, leading to decreased job satisfaction and higher attrition rates"*

Aligns with broader research on teacher resilience and workplace outcomes (Beltman et al., 2011).

Beyond individual benefits, resilience demonstrates significant pedagogical value. Expert 5 identified how:

> *"Resilient teachers are more likely to experiment with innovative teaching strategies, seek constructive feedback, and persist in the face of challenges,"*

Creating positive learning environments that enhance student engagement (Tschannen-Moran & Hoy, 2001). This aligns with Expert 4's observation that resilience:

> *"Discourages rote memorization among teachers, encouraging them to focus on understanding and applying concepts rather than simply memorizing information,"*

A finding consistent with research on resilience and pedagogical content knowledge (Bodé et al., 2019).

The cumulative evidence positions psychological resilience as a fundamental pillar of professional preparation for chemistry educators. By developing stress management capabilities, adaptive flexibility, and sustained motivation (Mansfield et al., 2012), resilience training directly enhances teaching efficacy and performance. These findings strongly advocate for the systematic integration of resilience development into teacher education curricula, ensuring pre-service chemistry teachers are adequately prepared to meet the profession's cognitive, emotional, and pedagogical demands.

Conclusion and Recommendation

This study highlights the imperative of integrating psychological resilience training into teacher education programs for pre-service chemistry teachers in Nigeria, as evidenced by six key themes: resilience's importance, training challenges, efficacy impacts, program gaps, and integration strategies, demonstrating that such training enhances stress management and teaching effectiveness particularly critical for chemistry education given its abstract and high-pressure nature, though the findings are constrained by the small sample size (n=5) and potential expert bias, suggesting future research should expand participation to include pre-service teachers and diversify disciplinary perspectives (e.g., school administrators, policymakers) to strengthen generalizability. To effectively address the emotional and psychological challenges of pre-service chemistry teachers, the following implementation strategies are proposed with clear stakeholder responsibilities: Mentorship Program Coordinators at teacher colleges should establish formal mentor-mentee pairings between pre-service teachers and experienced chemistry teachers; course instructors particularly in educational psychology and classroom management courses should incorporate resilience-building components into their syllabi. They should utilize reflective practices like guided journaling and self-assessment tools.

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