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Bi-Annual Journal

Would like to appeal to the learned readers to send us their views, counter views, suggestions, comments, and observations etc. via “Letters to Editor” (which will be published in the next Issue) on the articles published in this Journal so that an academic discussion may start and our efforts may become more participative and thereby more meaningful and interesting.

Editor-in-Chief

The Themes for the next Issue July-2026

Section I.

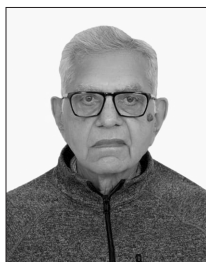
1. Valuing professionalism and training in Teacher Education courses.
2. Changes in perspectives on areas of research in Teacher Education.
3. Perspectives on how learning in Curriculum and Pedagogy are demonstrated in Teacher Certification Programs.
4. Perspectives on effective Evaluation Practices in Teacher Education Programs.
5. Innovations and Innovative practices in Teacher Education Programs.
6. Diversity and Inclusion: Different International perspectives.
7. Ensuring access and equity in high quality Teacher Education programs.
8. ICT-related Innovations and practices in Teacher Education Programs.
9. Policy Perspectives in Teacher and School Education.
10. Reports on related conferences, seminars and workshops, including International offerings.
11. The Prolonged Online Mode of Teaching-learning - Challenges, Innovative experiments, Findings.
12. Tailored Interventions in Learner-centered Education.
13. Blended Learning as an outcome of Online Learning during the ongoing pandemic.
14. Scope of starting B. Ed for Vocational Teachers (B.Ed.Voc.)
15. Artificial Intelligence in Teacher Education: Preparing Future Teachers for AI-Enabled Classrooms

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1. Teachers’ Professional Growth
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6. Solving School Problems through Action Research
7. Measuring Students’ all-round Achievements through Ensemble assessments.
8. Literacy and Numeracy Challenges and their Remedies in schools
9. Integrating the inputs of Arts, Music and Play during the classroom teaching-learning processes
10. Starting Job-linked Courses in Schools at the Secondary Level

Thanks and Regards
Editor-in-Chief
Dr. S.K. Bhatia

Editorial



I begin the January 2026 editorial with a very heavy heart, remembering the immense hard work and deep devotion of **Dr. Sushil Dhiman**, one of our Associate Editors and a valued member of the Advisory Board, who left for her heavenly abode on **23rd July 2025**, soon after completing her editorial work for the July 2025 issue of our journal. Persons of such scholarship, dedication, and sincerity are truly rare. Alongside her other academic responsibilities as a teacher educator, she remained wholeheartedly committed to the editorial duties of the *Journal of Teacher Education and Teaching*, and hardly any paper published in this journal ever escaped her meticulous attention. Her passing has created a void that perhaps can never be filled. We, the staff of this journal, together with the authors whose work she refined with care and the readers and subscribers who benefited from her editorial insight, offer our heartfelt respects to her memory and pray to the Almighty to grant her soul eternal peace. As we present the January 2026 issue, we do so with a deep sense of gratitude for the enduring standards she set and the spirit of integrity she embodied. This issue stands as both a continuation of her vision and a humble tribute to her abiding commitment to academic excellence. We hope that the contributions included here will reflect the same rigor, sincerity, and purpose that she championed throughout her tenure.

In continuing the academic tradition upheld by our editorial team, the January 2026 issue offers insightful papers and studies that explore both foundational and emerging areas in teacher education and teaching. In preparing this issue, I examined the nature of the papers and articles we received and found that they may be broadly grouped into three categories. The first category is distinct and straightforward, consisting of articles written in a largely expository or compositional style. The second—and largest—category includes papers submitted by authors who are currently engaged in research studies. These contributors often use the opportunity to refine their research skills, sharpen their methodological approaches, and fulfill their academic requirements. The third category comprises authors who closely follow emerging trends and innovations in the field, responding to them with thoughtful analyses and forward-looking perspectives in their papers and articles. Our editorial team warmly welcomes contributions from all these groups, and we take pride in presenting a balanced and diverse selection of work.

The aforesaid categories of papers and articles are well represented in the present issue of the journal. Our editors have also placed on record their appreciation for several noteworthy publications, such as *Experiential Learning for Economic Participation: Skill Needs for Employability and Entrepreneurship at MKRI*, *Teachers' Professional Growth: Pathways to Excellence in Education*, and *TRACK as a Transformative Model for Preparing 21st-Century Teachers: Relevance and Implications for the Ethiopian Landscape*, among others. While the issue presents a commendable variety of scholarly contributions, submissions related to school-based experiments and studies focusing on Artificial Intelligence in education were significantly fewer than anticipated.

We intend to approach school principals and encourage them to articulate their views on the initiatives undertaken in their institutions—particularly those that demonstrate the effectiveness of their administrative styles, highlight success stories from their supervisory roles in enhancing teachers' professional skills, strengthening school discipline, and fostering students' willing participation in aptitude-based co-curricular activities. Teachers, too, should be motivated to experiment with innovative pedagogical methods and to

examine their impact on student learning. Both principals and teachers are encouraged to document their innovative practices and contribute these experiences to the pages of our journal.

As the 21st century progresses, developments in artificial intelligence continue to accelerate, often faster than society's ability to fully comprehend their implications. While AI inspires great enthusiasm for its transformative potential, it also evokes understandable concerns about misuse, disruption, and ethical uncertainty. Its constructive applications—ranging from enhanced healthcare and scientific discovery to personalized learning and sustainable development—may prove to be a remarkable boon for humanity. Yet its irresponsible or uninformed use can be equally consequential, contributing to issues such as digital manipulation, over-dependence on devices, erosion of critical thinking, and the displacement of meaningful human engagement, particularly among children and youth. Educational institutions, from schools to universities, are likewise navigating both the opportunities and challenges that AI brings to teaching, learning, and assessment.

In this context, we invite scholarly articles and research papers that explore the constructive, responsible, and innovative uses of AI across domains. Submissions may address themes such as AI-augmented pedagogy, ethical and policy frameworks, AI for social good, community empowerment, creativity and research, technological literacy, and strategies to minimize risks while maximizing human benefit. Contributions that offer empirical studies, conceptual insights, best practices, or interdisciplinary perspectives are especially welcome.

A humble request to all our esteemed authors who patronize this Journal: you are welcome to choose any area for your scholarly writing. A broad list of suggested topics has been provided on the page preceding this Editorial, though you are equally free to explore any other area of your interest. We encourage you to adopt a utilitarian approach—one that considers the beneficiaries and practical impact of your research. It would be truly valuable if your findings contribute to the welfare of society, the national economy, or to the advancement of teacher education and school education. The purpose of academic writing should extend beyond adding to one's literary portfolio; it should strive to create meaningful, constructive change.

With these thoughts, I extend my warm wishes for a prosperous and fulfilling year 2026 to all the stakeholders associated with this Journal.

Dr. S. K. Bhatia
Editor-in-Chief

In Memoriam:



Dr. Sushil Dhiman

(May 15, 1950 – July 23, 2025)

Advisory Board Member & Associate Editor, [International Journal of Teacher Education and Teaching]

It is with profound sorrow that we announce the passing of Dr. Sushil Dhiman, a dedicated member of our Advisory Board and one of the Associate Editors of *our journal*. A sincere, hardworking, and deeply committed academician, she made a lasting impact on every institution she served.

Dr. Dhiman excelled in all her professional roles—whether as an Associate Professor, Principal of a Teacher Training College, or in various other academic and administrative positions. Her leadership, integrity, and unwavering dedication to the cause of quality education inspired colleagues, students, and scholars across the field.

Her insightful guidance and scholarly contributions played a significant role in strengthening the academic standards and vision of our journal. She will be remembered not only for her achievements but also for her warmth, humility, and generous spirit.

We extend our heartfelt condolences to her family, friends, students, and all who had the privilege of knowing her.

May her noble soul rest in eternal peace.

Team IJTET



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RESEARCH ARTICLES

Experiential Learning for Economic Participation: Assessing Skills Needs for Employability and Entrepreneurship at MKRI

Dr. Thandeka Ellenson

Abstract

This study investigates the skills needs of interns at the Moses Kotane Research Institute (MKRI) to inform the design of a structured experiential learning programme that enhances economic participation through employability and entrepreneurship. Although interns enter the programme with academic qualifications, they display varying levels of practical, interpersonal, self-management, and entrepreneurial skills essential for workplace success or enterprise creation. A quantitative survey was administered to 34 respondents, comprising 28 Experiential Learners (82.4%) and 6 Research Assistants (17.6%), capturing self-reported confidence levels, existing competencies, and perceived development needs across interpersonal, professional, and entrepreneurial domains.

Results indicate that interns possess moderate-to-high confidence in teamwork, listening, and responsibility, but lower confidence in verbal communication, conflict resolution, time management, initiative, and opportunity identification. Development needs were highest in entrepreneurial skills, including innovation, planning and managing resources, risk awareness, and opportunity recognition. Paired samples t-tests confirmed statistically significant skills gaps in interpersonal and self-management domains, while entrepreneurial confidence closely aligned with perceived development needs. Priority skills for programme focus were communication (64.7%), teamwork (52.9%), and opportunity identification (50%).

The study concludes that MKRI requires a structured, non-negotiable experiential learning framework, incorporating targeted skills modules, practical project-based learning, mentorship, and measurable assessments. Implementing this approach will strengthen interns' employability and entrepreneurial readiness, improve research output quality, and contribute to sustainable economic participation. These findings highlight the importance of systematic experiential learning as a tool for capacity building in early-career research and public sector development initiatives.

Keywords: Experiential Learning, Employability, Entrepreneurship, Workforce Readiness, Public Sector Internships, Economic Participation

Introduction

Experiential learning has emerged as a critical pedagogical approach for bridging the gap between academic knowledge and practical workplace competencies, particularly in contexts where employability and entrepreneurship are central to economic participation (Kolb, 2015; Beard & Wilson, 2013). The Moses Kotane Research Institute (MKRI) provides a structured internship programme aimed at capacitating early-career graduates through two-year experiential placements. While interns enter the programme with formal academic qualifications, there is considerable variation in the practical and soft skills they possess, such as communication, teamwork, problem-solving, and entrepreneurial capabilities. This variation may constrain

Dr. Thandeka Ellenson, Chief Executive, Moses Kotane Research Institute, 190 KE Masing Road, Durban, 4001, South Africa

their ability to fully engage in the labour market or pursue self-employment opportunities, highlighting a critical need for a structured skills development framework.

Despite the recognised importance of experiential learning, MKRI currently lacks an official, systematic programme that identifies priority skills, prescribes methods for skill development, and measures outcomes. This gap limits the organisation's ability to optimise interns' economic participation and may result in missed opportunities for both personal and organisational growth. Understanding the skills gaps and learning needs of interns is therefore essential for designing a targeted experiential learning framework that enhances employability and entrepreneurial readiness.

This study seeks to assess the existing competencies and development needs of MKRI interns and research assistants, identify priority skills for economic participation, and provide evidence-based recommendations for structuring a non-negotiable experiential learning programme. The research addresses key questions regarding current skills, perceived skill gaps, and strategies to effectively cultivate capabilities that enable interns to contribute meaningfully to the economy through employment or enterprise creation.

Theoretical Framework

The study is grounded in Experiential Learning Theory (ELT) (Kolb, 1984), Human Capital Theory, and the Employability Skills Framework. Together, these theories help to conceptualise how interns at MKRI acquire and apply the skills necessary for labour-market participation and entrepreneurship.

Experiential Learning Theory (ELT)

Experiential Learning Theory posits that learning occurs through a cyclical process involving concrete experience, reflective observation, abstract conceptualisation, and active experimentation (Kolb, 1984). Internships and workplace-based learning environments are central to this cycle because they provide real-world exposure that transforms theoretical knowledge into practical competence.

For MKRI interns, the absence of a structured programme limits their progression through the experiential learning cycle. A structured learning framework ensures that learners receive guided experiences, opportunities for reflection, and structured feedback, enabling deeper learning and development of workplace skills (Kolb & Kolb, 2017).

Human Capital Theory

Human Capital Theory argues that investment in skills through education and training increases individuals' productivity, employability, and earning potential (Becker, 1993). Soft skills, such as communication, teamwork, and problem-solving—constitute key elements of human capital that are critical for both employment and entrepreneurship (Heckman & Kautz, 2012). This theory supports the rationale for developing a structured experiential learning programme at MKRI, as such investment enhances interns' economic participation and contributes to broader workforce development objectives in the province.

Employability Skills Framework

Employability is understood as a combination of knowledge, skills, behaviours, and attributes that enable individuals to secure and sustain employment (Yorke, 2006). Employability models emphasise transferable skills such as interpersonal communication, self-management, and cognitive abilities. Within the South African context, the DHET and the National Skills Development Plan (NSDP) highlight experiential learning as essential for bridging the gap between education and labour-market readiness (DHET, 2020). Thus, designing an MKRI-specific framework aligns with national priorities to capacitate young graduates.

Entrepreneurship Competence Theory

Entrepreneurial competences, such as opportunity recognition, creativity, resilience, and risk-taking, are developed through practice and exposure rather than theory alone (Mitchelmore & Rowley, 2010). Experiential learning provides the space to practise these competencies through real projects and mentorship. This theoretical lens supports the study's focus on identifying entrepreneurial skill needs for interns who wish to pursue self-employment or venture creation.

Literature Review

Experiential Learning and Skills Development

Experiential learning plays a critical role in preparing graduates for the labour market. Research consistently shows that internships help develop workplace-relevant skills, improve job readiness, and reduce the mismatch between qualifications and employer expectations (Tymon, 2013). However, the effectiveness of internships depends on their structure, mentorship quality, and alignment with learning outcomes (Patrick et al., 2009). In many African contexts, the lack of structured experiential learning contributes to youth unemployment, despite increasing levels of tertiary education attainment (Cloete, 2015). Structured experiential programmes therefore bridge the skills gap by offering guided, real-world learning experiences.

Soft Skills for Employability

Soft skills, also known as transferable or non-technical skills, are increasingly recognised as essential for employability (Robles, 2012). Employers globally report deficits in communication, teamwork, emotional intelligence, and problem-solving among young graduates (World Economic Forum, 2020). Studies confirm that graduates who possess strong interpersonal and communication skills are more likely to secure employment, adapt to workplace cultures, and perform effectively in teams (Andrews & Higson, 2008). In the South African labour market, soft skills gaps remain a persistent barrier to youth employment, particularly in public-sector workplaces that require professionalism, communication, and administrative competence (CHE, 2016).

Skills for Entrepreneurship and Economic Participation

Entrepreneurship has been promoted as a key driver of economic participation for youth in South Africa. Entrepreneurial success requires competencies such as creativity, innovation, opportunity recognition, financial literacy, and resilience (Fatoki, 2014). Although universities offer entrepreneurship education, many graduates lack the practical experience, confidence, and applied skills required to translate ideas into viable ventures (Herrington & Kew, 2018). Workplace-based experiential learning provides a platform to develop

entrepreneurial thinking through exposure to project management, research, stakeholder engagement, and problem-solving, competencies relevant for enterprise creation.

Structured Internship Models

International literature emphasises that internships without structure result in inconsistent learning, limited skills transfer, and poor outcomes (Jackson, 2015). Effective models include Clearly defined competencies and learning outcomes, Mentorship and regular supervision, Assessment frameworks, Reflection activities and Project-based assignments. Such structured models increase interns' confidence and facilitate the development of employability skills (Smith et al., 2014). This supports the study's hypothesis that structured mentorship positively influences interns' confidence in skill development.

South African Policy Context

South Africa's National Development Plan (NDP 2030) emphasises skills development, experiential learning, research capacity, and entrepreneurship as key pathways to economic inclusion. Similarly, the National Skills Development Plan (NSDP 2030) prioritises work-integrated learning (WIL) as essential for transition into employment (DHET, 2020). Public entities like MKRI therefore play a critical role in implementing structured experiential programmes aligned with national agendas.

Identified Gaps

The literature reveals several gaps that justify the study (i) interns often enter workplaces with academic knowledge but limited practical skills. (ii) Soft skills are insufficiently taught at tertiary level. (iii) Entrepreneurship education lacks practical, experiential components. (iv) South Africa's public sector lacks structured frameworks for experiential learning within research institutions. This highlights the need for MKRI to design a structured skills programme informed by evidence of interns' current competencies and learning needs.

Methodology

Research Design

This study adopted a quantitative research design to assess the skills, competencies, and development needs of Experiential Learners and Research Assistants at the Moses Kotane Research Institute (MKRI). A quantitative approach was appropriate because the study sought to measure interns' confidence levels, identify skills gaps, and determine priority learning needs through numerical data that could be statistically analysed. The design enabled the researcher to examine patterns across interpersonal, self-management, and entrepreneurial skill domains and to draw objective conclusions that inform the development of a structured experiential learning programme for economic participation.

Population and Sampling

The target population consisted of 44 participants, including Experiential Learners and Research Assistants enrolled in MKRI's early-career development programmes. Given the relatively small population size, the study adopted a census sampling approach, inviting all 44 individuals to participate. This approach ensured

comprehensive coverage of the programme's participants and strengthened the representativeness of the findings.

A total of 34 respondents completed the survey, representing a response rate of 77%. The remaining 10 potential respondents were unavailable due to fieldwork commitments, leave, or limited access during the data collection period. Despite this, the achieved sample provided adequate representation for deriving insights into the current skills profile and learning needs of MKRI interns.

Data Collection Instrument

Data were collected using a structured, self-administered questionnaire designed by the researcher. The instrument consisted of four main sections: (i) Demographic Information (e.g., age, gender, qualifications, field of study, unit placement). (ii) Interpersonal and Communication Skills (confidence and development needs). (iii) Self-Management and Professional Skills (confidence and development needs). (iv) Entrepreneurial and Economic Participation Skills (confidence and development needs). Items assessing confidence and perceived development needs were measured using a five-point Likert scale, where respondents rated the extent of their confidence (1 = Not Confident to 5 = Very Confident) and development needs (1 = Not Needed to 5 = Very Needed). The survey was administered electronically to facilitate ease of access and timely responses.

Data Collection Procedure

Following ethical approval and internal clearance, the questionnaire link was disseminated to all targeted participants via email and WhatsApp communication channels. Respondents were informed of the purpose of the study, the voluntary nature of participation, and assurances of anonymity and confidentiality. Participation required approximately 10–15 minutes. Data collection occurred over a two-week period to allow for sufficient follow-up and accommodate interns involved in fieldwork assignments.

Data Analysis

Data were exported into Microsoft Excel and analysed using descriptive statistical methods. Analysis involved computation of frequencies, percentages, mean scores, and comparative summaries across the three skill domains. These descriptive statistics were used to: (i) assess interns' confidence in their existing skills, (ii) identify the skills they consider most important for employability and entrepreneurship, and (iii) determine priority development areas for MKRI's experiential learning programme. The analysis focused on identifying gaps between interns' current competencies and the skills they wished to develop, thereby generating evidence to inform the design of a structured skills development framework.

Ethical Considerations

The study adhered to standard ethical guidelines for research involving human participants. Informed consent was obtained electronically before respondents commenced the survey. Participation was voluntary, and respondents could withdraw at any point without penalty. No personal identifiers were collected, ensuring anonymity and confidentiality. Data were securely stored and used solely for the purposes of this research.

Analysis of Survey Results

A total of 34 respondents participated in the survey out of the 44 Experiential Learners and Research Assistants targeted. The difference is due to several individuals being unavailable because of leave, fieldwork activities, or limited contact during the data-collection period.

Of the respondents, 82.4% (n = 28) were Experiential Learners, while 17.6% (n = 6) were Research Assistants. This distribution reflects MKRI's staffing composition, where Experiential Learners form the majority of early-career personnel. The results therefore predominantly reflect their experiences and development needs, which is an important consideration for programme planning.

Most respondents fell within the 25–34-year age group (67.6%, n = 23), consistent with the typical age range of young professionals participating in MKRI's development programmes. The 18–24 age group accounted for 14.7% (n = 5), representing recent graduates. Respondents aged 35–44 comprised 11.8% (n = 4), and only 5.9% (n = 2) were in the 45–54 age bracket. This distribution aligns with the youth-focused nature of the Experiential Learning and Research Assistant initiatives.

Male respondents represented 61.8% (n = 21) of the sample, while females accounted for 38.2% (n = 13). This pattern mirrors trends in MKRI's early-career workforce, particularly in technical and research-oriented roles. Notwithstanding this imbalance, the strong representation of female respondents reflects reasonable gender diversity across the programme.

Respondents demonstrated high levels of post-school educational achievement. The largest proportion held a Diploma (44.1%, n = 15), followed by those with a Bachelor's Degree (17.6%, n = 6). A notable number had postgraduate qualifications: (i) Honours: 11.8% (n = 4), (ii) Masters: 11.8% (n = 4), (iii) Doctoral/PhD: 5.9% (n = 2). This means 29.5% of respondents possessed postgraduate degrees, reflecting a strong academic foundation. Smaller proportions held Matric (2.9%, n = 1) or a Certificate (5.9%, n = 2). Overall, the qualifications profile indicates that MKRI's early-career staff are well-positioned to support research and analytical functions.

All respondents (100%, n = 34) reported that they do not identify as persons living with a disability. Although no disability representation was captured in this sample, the finding underscores the importance of ensuring that MKRI's internship and employment processes remain inclusive and accessible.

Geographic Distribution (District of Birth)

Most respondents were born in KwaZulu-Natal, with a small proportion (8.8%, n = 3) originating outside the province, specifically Gauteng (City of Tshwane), Mpumalanga, and the Alfred Nzo District in the Eastern Cape. This suggests that MKRI's programmes attract young professionals from both within and beyond KZN, contributing to a broader diversity of experiences and perspectives.

Academic Fields of Study

Respondents came from a wide range of academic fields. The most represented disciplines were: Business, Commerce & Management: 32.4% (n = 11), Information Technology, Data & Computer Science: 29.4% (n = 10), and Economics & Finance: 17.6% (n = 6). Smaller proportions came from Public Administration, Social

Sciences, Education, Engineering, and Law. These patterns align with MKRI's multidisciplinary research needs while highlighting strong representation in business, IT, and economics—fields essential for research, analytics, and development work.

Distribution by MKRI Services Unit

Respondents were spread across several units. The majority (61.8%, $n = 21$) were placed within the Research Services Unit, demonstrating its reliance on interns and research assistants for core project delivery. The Development Services Unit accounted for 23.5% ($n = 8$), while Finance Services (11.8%, $n = 4$) and Governance Services (2.9%, $n = 1$) were less represented. This distribution reflects MKRI's operational focus on research and development activities.

Confidence Analysis

Respondents reported moderate to high confidence across interpersonal, self-management, and entrepreneurial skills, with mean scores ranging between 3.41 and 4.12. Interpersonal and communication skills and the strongest confidence areas were: Teamwork ($M = 4.09$), Listening ($M = 4.06$) and Responsibility & Accountability ($M = 4.12$). Comparatively lower confidence was observed in Clear verbal communication ($M = 3.79$) and Conflict resolution ($M = 3.79$). These results suggest a solid interpersonal foundation but potential need for support in communication clarity and conflict-handling skills. Self-Management & Professional Skills.

High confidence was recorded in adaptability & Flexibility ($M = 3.94$) and Organisation & Planning ($M = 3.85$). Lower relative confidence appeared in time management ($M = 3.74$), Initiative & Proactiveness ($M = 3.65$), Entrepreneurial & Innovation Skills. Confidence in entrepreneurial skills was generally moderate. Stronger areas included understanding economic impact ($M = 3.65$) and innovation for project/business ideas ($M = 3.62$), while lower confidence areas included risk awareness & calculated risk-taking ($M = 3.41$) and identifying opportunities ($M = 3.50$). These indicate limited exposure to entrepreneurial environments and practical innovation scenarios.

Confidence in Interpersonal & Communication Skills

Most respondents reported moderate to high confidence in writing, teamwork, and listening. Clear verbal communication and conflict resolution had the highest proportion of moderate and low confidence ratings, indicating key areas where further support is needed.

Confidence in Self-Management Skills

Respondents expressed strong confidence in responsibility, adaptability, and organisation. However, time management and initiative showed weaker confidence levels, with some respondents indicating challenges in task prioritisation, workload management, and proactive behaviour.

Confidence in Entrepreneurial & Economic Participation Skills

Moderate confidence levels were reported across entrepreneurial competencies. The weakest confidence appeared in opportunity identification and risk-taking, highlighting a need for exposure to business thinking, innovation processes, and project viability assessment.

Development Need Analysis

Development needs were generally high across all assessed skills, with mean scores ranging between 3.15 and 3.65. The strongest development needs were concentrated in entrepreneurial skills: innovation for project/business ideas ($M = 3.65$), planning and managing resources ($M = 3.59$), risk awareness & calculated risk-taking ($M = 3.56$) and identifying opportunities ($M = 3.53$). Conflict resolution ($M = 3.53$) also emerged as a notable development need, consistent with the low confidence reported earlier. The lowest development need was for responsibility and accountability ($M = 3.15$), which aligns with high confidence levels in this skill.

Development Needs in Interpersonal & Communication Skills

Clear verbal communication and conflict resolution were the areas with the highest development need, with most respondents indicating that these skills are either Needed or Very Needed. Writing and listening also showed moderate development need, while teamwork presented the lowest need due to respondents' existing confidence in collaborative settings.

Development Needs in Self-Management Skills

The strongest need in this domain was for Organisation and Planning, followed closely by Initiative and Proactiveness. Time management also reflected substantial development need, reinforcing the pattern seen in the confidence results. Adaptability recorded moderate need, whereas responsibility and accountability remained the lowest need.

Development Needs in Entrepreneurial & Economic Participation Skills

This domain recorded the highest development needs in the survey. Respondents expressed particularly strong demand for support in: innovation and creative problem-solving, resource planning and project management, risk assessment and decision-making, opportunity identification and understanding project economic impact. These patterns highlight significant gaps in entrepreneurial readiness and suggest priority areas for MKRI's capacity-building programmes.

Conclusion

This study set out to assess the skills, competencies, and developmental needs of Experiential Learners and Research Assistants at the Moses Kotane Research Institute (MKRI) to inform the creation of a structured experiential learning programme that enhances employability and entrepreneurship. The findings revealed that while interns possess strong foundational interpersonal and self-management skills, significant gaps exist in entrepreneurial competencies, communication clarity, conflict resolution, and proactive behaviors. These gaps indicate that interns require more targeted, practical, and systematic support to fully participate in the labour market and to meaningfully engage in entrepreneurial activities.

The results further demonstrated that interns' desire for development in key skill areas is consistently higher than their current confidence levels, suggesting a clear demand for structured capacity-building interventions. High development needs were particularly pronounced in opportunity identification, innovation for business or project ideas, resource planning, and risk assessment. These areas are essential for economic participation

in both employment and enterprise creation, reinforcing the importance of a deliberate learning structure within the internship programme.

Overall, the study concludes that MKRI would benefit from implementing a comprehensive experiential learning framework that integrates technical skills, soft skills, and entrepreneurial development. Such a framework should prioritise practical training, mentorship, reflective learning, and hands-on project experience to bridge the gap between academic knowledge and workplace readiness. By institutionalising a clear skills development pathway, MKRI can enhance the effectiveness of its internship programme, improve youth employability, and cultivate future-oriented skills that empower interns to contribute meaningfully to the economy—either as employees or as emerging entrepreneurs.

The research therefore provides evidence-based guidance for MKRI to establish a non-negotiable, structured experiential learning programme that is aligned with organisational needs, labour market demands, and broader national objectives for youth economic participation. Future research may explore longitudinal tracking of interns to measure the long-term impact of such a programme on employment outcomes, career progression, and entrepreneurial success.

Recommendations

Based on the findings of this study, several recommendations are proposed to MKRI to enhance the effectiveness of its experiential learning programme and ensure that interns are adequately prepared for employability and entrepreneurship:

Develop a Structured Experiential Learning Programme

Establish a formal, non-negotiable skills development framework that integrates the core competencies identified as priorities: communication, teamwork, opportunity identification, innovation, and critical thinking. Design modular training sessions that combine theoretical knowledge with practical, hands-on exercises to reinforce learning.

Implement Targeted Skill Development Modules

Communication & Professional Writing: Focus on verbal articulation, presentation skills, report writing, and business correspondence. **Conflict Resolution & Interpersonal Skills:** Provide scenario-based simulations and role-playing exercises to build negotiation and collaboration capabilities. **Self-Management & Professional Skills:** Include planning, organisation, time management, adaptability, and proactive decision-making workshops. **Entrepreneurial & Innovation Skills:** Introduce modules on opportunity recognition, resource planning, risk assessment, and understanding the economic impact of projects.

Enhance Mentorship and Coaching Opportunities

Pair interns with experienced researchers and managers for guidance, feedback, and reflection on practical assignments. Facilitate peer-to-peer learning sessions to foster collaborative problem-solving and knowledge sharing.

Incorporate Practical, Project-Based Learning

Assign mini-projects, rotations across units, and entrepreneurial simulations to provide real-world exposure and reinforce applied skills.

Establish a Measurable Skill Development Pathway

Conduct pre-assessments, mid-term evaluations, and final assessments to monitor progress, identify gaps, and adjust the programme accordingly.

Promote Inclusive Recruitment and Participation

Continue efforts to attract a diverse pool of interns, including individuals from underrepresented backgrounds and those with disabilities, to strengthen equity and broaden perspectives within the programme. Implementing these recommendations will enable MKRI to cultivate a workforce of well-rounded, confident, and economically active early-career professionals, aligning with the organisation's mandate to contribute to socio-economic development in KwaZulu-Natal.

References

- Andrews, J., & Higson, H. (2008). Graduate employability, 'soft skills' versus 'hard' business knowledge: A European study. *Higher Education in Europe*, 33(4), 411–422.
- Becker, G. S. (1993). *Human capital: A theoretical and empirical analysis with special reference to education* (3rd ed.). University of Chicago Press.
- CHE. (2016). *South African higher education reviewed: Two decades of democracy*. Council on Higher Education.
- Cloete, N. (2015). The South African higher education system: Performance and policy. *Studies in Higher Education*, 40(4), 735–752.
- DHET. (2020). *National Skills Development Plan 2030*. Department of Higher Education and Training.
- Fatoki, O. (2014). The entrepreneurial intention of undergraduate students in South Africa: The influences of entrepreneurship education and previous work experience. *Mediterranean Journal of Social Sciences*, 5(7), 157–167.
- Heckman, J., & Kautz, T. (2012). Hard evidence on soft skills. *Labour Economics*, 19(4), 451–464.
- Herrington, M., & Kew, P. (2018). *Global Entrepreneurship Monitor: South Africa report*. University of Cape Town.
- Jackson, D. (2015). Employability skill development in work-integrated learning: Barriers and best practice. *Studies in Higher Education*, 40(2), 350–367.
- Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Prentice Hall.
- Kolb, A. Y., & Kolb, D. A. (2017). Experiential learning theory as a guide for experiential educators in higher education. *ELTHE: A Journal for Engaged Educators*, 1(1), 7–44.
- Mitchelmore, S., & Rowley, J. (2010). Entrepreneurial competencies: A literature review and development agenda. *International Journal of Entrepreneurial Behavior & Research*, 16(2), 92–111.
- Patrick, C. J., Peach, D., Pocknee, C., Webb, F., Fletcher, M., & Pretto, G. (2009). *The WIL report: Work-integrated learning—A national strategy for universities*. Queensland University of Technology.
- Robles, M. M. (2012). Executive perceptions of the top 10 soft skills needed in today's workplace. *Business Communication Quarterly*, 75(4), 453–465.
- Smith, C., Ferns, S., & Russell, L. (2014). Conceptualising and measuring 'quality' in work-integrated learning. *Higher Education Research & Development*, 33(1), 123–136.
- Tymon, A. (2013). The student perspective on employability. *Studies in Higher Education*, 38(6), 841–856.
- World Economic Forum. (2020). *The future of jobs report 2020*. World Economic Forum.
- Yorke, M. (2006). Employability in higher education: What it is – what it is not. *Higher Education Academy*.

TRACK as a Transformative Model for Preparing 21st Century Teachers: *Relevance and Implications for the Ethiopian Landscape*

Ashenafi Tsegaye Tegegn

Abstract

This review and reflection explores the Technological Pedagogical Content Knowledge (TPACK) framework as a transformative model for preparing 21st-century teachers, with a specific focus on its relevance and implications for the Ethiopian education system. As digital technologies redefine pedagogical landscapes globally, there is an urgent need for teacher education systems—especially in developing contexts like Ethiopia—to adopt integrated approaches that foster technological fluency alongside sound pedagogical and content knowledge. The TPACK framework, which emphasizes the interplay between technology, pedagogy, and subject content, offers a comprehensive paradigm for teacher preparation in digital age classrooms. This paper critically reviews the theoretical underpinnings of TPACK, international and African implementation experiences, and the critical gaps in Ethiopia's teacher training institutions. It further discusses implementation challenges, presents practical strategies for TPACK integration, and outlines implications for curriculum developers, policymakers, and teacher educators. The review concludes with a roadmap for embedding TPACK in Ethiopian teacher education institutions, supporting lifelong learning and technology-enabled instruction aligned with Sustainable Development Goal 4.

Key Words: Digital Age Classrooms, Lifelong Learning, Sustainable Development Goal 4, Teacher Education, TPACK, 21st-Century Teachers.

Introduction and Background

In the 21st century knowledge society, the role of teachers has expanded significantly—from being conduits of information to becoming designers of learning environments, facilitators of inquiry, and mediators of technology-enhanced pedagogy. The increasing integration of digital technologies into all aspects of life and work necessitates that schools not only teach technological skills but also use technology to deepen learning, personalize instruction, and prepare students for complex problem-solving and collaboration in digitally connected contexts (Voogt, Fisser, Good, Mishra, & Yadav, 2015). As such, effective teaching in the digital age requires more than technical proficiency; it calls for a nuanced pedagogical vision that leverages technology to foster engagement, creativity, differentiation, and student agency.

To support this shift, the Technological Pedagogical Content Knowledge (TPACK) framework, introduced by Mishra and Koehler (2006), has emerged as a widely accepted theoretical model guiding the integration of technology in teacher education. Building upon Shulman's (1986) notion of Pedagogical Content Knowledge (PCK), TPACK identifies the complex interplay between three core knowledge domains—content knowledge (CK), pedagogical knowledge (PK), and technological knowledge (TK)—that teachers must draw upon to deliver effective, digitally mediated instruction. The framework emphasizes that technology integration is

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not a one-size-fits-all process; rather, it is deeply contextual, learner-centered, and pedagogically driven (Koehler, Mishra, & Cain, 2013).

Globally, teacher education institutions are increasingly incorporating TPACK into both pre-service training and in-service professional development. Countries such as the United States, Singapore, and Finland have embedded TPACK-based competencies into national standards, curriculum frameworks, and teacher accreditation systems, with positive outcomes for digital pedagogy and student engagement (Chai, Koh, & Tsai, 2013; Rosenberg & Koehler, 2022). These experiences underscore the importance of grounding technology integration not merely in tool acquisition, but in pedagogical intentionality and subject-specific instructional design.

Nonetheless, in the context of Ethiopia, teacher education programs have been slow to adapt to the demands of the digital era. While significant progress has been made in expanding access to teacher education and emphasizing pedagogical theory and subject mastery, the integration of educational technologies into teaching practice remains minimal (Semela, 2014; MoE, 2020). Many pre-service teachers graduate with limited exposure to digital tools, and in-service teachers often lack the professional development support needed to implement technology effectively in their classrooms (Haile & Asrat, 2021). The recent push for ICT in education under Ethiopia's **Education and Training Roadmap (2018–2030)** highlights a policy-level recognition of this gap, but implementation has been inconsistent and hampered by infrastructure limitations, inadequate training, and insufficient alignment with curriculum reforms (MoE, 2018; Gebremedhin & Fenta, 2015).

This review argues that systematically embedding the TPACK framework within Ethiopia's teacher education curricula can serve as a transformative strategy to enhance the digital readiness, instructional quality, and professional confidence of both pre-service and in-service teachers. By grounding technology integration in sound pedagogy and subject matter expertise, TPACK offers a coherent, context-sensitive model that aligns with Ethiopia's broader goals of educational equity, quality, and 21st century relevance. The ensuing sections explore global best practices, regional trends, and contextual challenges, and propose a set of actionable recommendations for implementing TPACK in the Ethiopian teacher education system.

Conceptual and Theoretical Foundations of TPACK

The TPACK framework is grounded in the foundational work of Shulman (1986), who introduced the concept of *Pedagogical Content Knowledge (PCK)* to emphasize the importance of teachers possessing not only deep subject matter knowledge but also the ability to translate that knowledge into effective instructional practices. Shulman's work highlighted the need for a nuanced understanding of how specific content could be taught in ways that are comprehensible and engaging to learners.

Building on this premise, Mishra and Koehler (2006) proposed the TPACK framework, which introduced *Technological Knowledge (TK)* as an essential third domain alongside content and pedagogy. They argued that in the 21st century educational landscape, effective teaching requires an integrated understanding of content knowledge, pedagogical strategies, and the dynamic capabilities of technology. This extension of Shulman's model responds to the growing demand for digital competence in teaching, where educators are expected to meaningfully incorporate technology into curriculum and instruction (Mishra, Koehler, & Cain, 2013).

The TPACK framework comprises seven interrelated knowledge domains:

- **Content Knowledge (CK):** Mastery of the subject matter, including key concepts, theories, and evidence-based practices.
- **Pedagogical Knowledge (PK):** Knowledge of teaching strategies, learning theories, classroom management, and student assessment.
- **Technological Knowledge (TK):** Familiarity with various digital tools, platforms, and their affordances for enhancing teaching and learning.
- **Pedagogical Content Knowledge (PCK):** The intersection of pedagogy and content, focusing on how to teach specific subject matter effectively.
- **Technological Content Knowledge (TCK):** Understanding how technology can support and transform content representation and learning.
- **Technological Pedagogical Knowledge (TPK):** Insight into how technological tools can support specific pedagogical approaches.
- **Technological Pedagogical Content Knowledge (TPACK):** The integrated knowledge domain where content, pedagogy, and technology converge to enable innovative, effective, and context-responsive teaching.

The strength of the TPACK model lies in its recognition that effective technology integration is not merely about the use of digital tools in isolation. Instead, it involves strategic and thoughtful selection, adaptation, and application of technology to support pedagogical goals and enhance content delivery in ways that align with students' learning needs and contexts (Koehler, Mishra, & Cain, 2013; Voogt et al., 2013). As such, TPACK serves as a conceptual lens for teacher educators, curriculum designers, and teachers to critically reflect on and refine their practices in a digitally-mediated educational environment.

Recent studies further validate TPACK as a vital framework for teacher professional development, especially in the context of remote learning, blended instruction, and emerging technologies such as artificial intelligence and virtual reality (Chai et al., 2020; Rosenberg & Koehler, 2022). It underscores the dynamic, situated, and evolving nature of teacher knowledge as educators continuously adapt to technological advancements and changing learner expectations.

Global Practices in Implementing TPACK

Across the globe, many countries have recognized the transformative potential of the TPACK framework in preparing educators for the demands of 21st century teaching and learning. By embedding TPACK principles into national teacher education policies, professional standards, and institutional curricula, these nations have made significant strides in enhancing teacher digital literacy, instructional innovation, and learner engagement.

To begin with, in the United States, TPACK is widely integrated into teacher licensure requirements and accreditation standards. Many pre-service teacher education programs include structured coursework, practicum experiences, and reflective teaching assignments that promote the use of digital tools in

pedagogically sound ways (Harris, Mishra, & Koehler, 2009). As to these authors, institutions such as Michigan State University and the University of Central Florida have developed models where teacher candidates engage in designing technology-rich lessons aligned with content standards and student learning goals.

Singapore has also shown strong policy-level commitment through the implementation of successive national *Information and Communication Technology (ICT) Master Plans*, which explicitly embed TPACK-based competencies into both pre-service and in-service teacher professional development programs. The Ministry of Education, in collaboration with teacher education institutions, has emphasized the cultivation of digitally confident teachers who can meaningfully integrate technology into their pedagogical repertoires (Lim & Chai, 2008; Chai, Koh, & Tsai, 2013). Teachers are also supported through *Professional Learning Communities (PLCs)* that foster peer collaboration and continuous digital innovation.

In Finland, teacher education is strongly research-based, and TPACK is reflected in the pedagogical approaches of universities of education, where the development of teacher-researchers is a central goal. Finnish teacher candidates are encouraged to apply *design thinking and reflective inquiry* as they integrate digital technologies with curriculum content in iterative and learner-centered ways (Ilomäki & Lakkala, 2011). The emphasis on autonomy and creativity allows Finnish educators to experiment with emerging tools and adapt their practices to diverse classroom contexts.

Australia has institutionalized TPACK within the *Australian Professional Standards for Teachers*, recognizing it as a core competency necessary for delivering effective instruction in digitally-mediated learning environments. National teacher education programs have adopted technology integration frameworks aligned with TPACK to guide pre-service training and support in-service teachers in using digital tools to meet diverse student needs (Australian Institute for Teaching and School Leadership [AITSL], 2020).

Importantly, India has also begun integrating TPACK principles within its evolving teacher education landscape. *The National Education Policy (NEP) 2020* emphasizes the importance of digital literacy, blended learning, and technology-supported pedagogy. Initiatives such as *DIKSHA* (Digital Infrastructure for Knowledge Sharing) and *NISHTHA* (National Initiative for School Heads' and Teachers' Holistic Advancement) have been offering structured digital curricula that reflect TPACK-oriented design, equipping teachers with competencies to effectively blend content, pedagogy, and technology in diverse classroom settings (Ministry of Education, 2020). Indian teacher education institutions, including Regional Institutes of Education and Central Universities, are increasingly incorporating TPACK-based frameworks into pre-service curricula and promoting action research on technology integration (Mishra, 2021).

Collectively, these international experiences highlight that aligning teacher education policies, institutional curricula, and professional standards with TPACK not only fosters digital competence among educators but also significantly enhances student engagement, differentiated instruction, and lifelong learning. They demonstrate the importance of sustained policy support, professional development infrastructure, and a reflective teaching culture in realizing the full potential of TPACK.

Table 1 Comparative Overview of TPACK Implementation in Selected Countries					
Country	Policy Integration	Pre-Service Teacher Education	In-Service Teacher Development	Institutional Practices	Notable Initiatives / Programs
<i>United States</i>	Integrated into teacher licensure and accreditation standards (e.g., CAEP)	Emphasizes coursework and practicum with digital tool integration	Focused PD sessions, workshops, and blended learning models	University-based models (e.g., MSU's TPACK labs)	Learning Activity Types framework; ISTE Standards
<i>Singapore</i>	Embedded in national ICT Master Plans I-IV	TPACK competencies embedded in curriculum design	Continuous PD through Professional Learning Communities (PLCs)	Collaborative lesson planning and technology-rich microteaching	Future-Schools@Singapor, edu-Lab, iTEACH framework
<i>Finland</i>	Reflected in national teacher education policies	Strong research-based teacher training using TPACK and design thinking	Less centralized; strong emphasis on teacher autonomy and reflection	Universities promote iterative, inquiry-based integration	OPEKA (Teacher Digital Competence Tool), eNorssi network
<i>Australia</i>	Recognized in Australian Professional Standards for Teachers (AITSL)	TPACK principles guide curriculum in teacher education programs	PD aligned with national teaching standards; focus on digital pedagogy	Use of digital platforms for reflective practice and mentoring	Digital Technologies Hub; National Digital Learning Resources Network
<i>India</i>	Highlighted in NEP 2020; supports digital pedagogy integration	Some integration in pre-service programs via NCTE and central universities	Large-scale national PD through MOOCs and platforms like DIKSHA	Action research, pilot programs in RIEs and TEIs	NISHTHA, DIKSHA, PM eVidya, NCERT e-Content

Key: CAEP: Council for the Accreditation of Educator Preparation (U.S.); ISTE: International Society for Technology in Education; PLCs: Professional Learning Communities; NCTE: National Council for Teacher Education (India); RIEs: Regional Institutes of Education; TEIs: Teacher Education Institutions

TPACK in Sub-Saharan Africa: *Emerging Trends and Lessons*

The integration of the TPACK framework in Sub-Saharan Africa is still in its formative stages but shows promising signs of growth and contextual adaptation. As many African countries strive to reform their education systems to meet the demands of the digital age, TPACK is gradually being recognized as a valuable framework for guiding technology integration in teacher education and professional development.

In South Africa, the Department of Basic Education (DBE) has increasingly embedded digital literacy and pedagogical use of technology into its *Continuing Professional Teacher Development (CPTD)* initiatives. Professional development programs for in-service teachers now incorporate elements of TPACK to support teachers in integrating ICT tools in ways that align with curriculum content and pedagogical goals (Jita, 2016). Moreover, teacher education institutions are being encouraged to redesign curricula that foster the development of digital pedagogical competencies.

Kenya has also taken significant strides through its *Digital Literacy Program (DLP)*, a national initiative launched in 2016 that aims to equip teachers and learners with digital devices and skills. Teacher training under the DLP is informed by TPACK principles, ensuring that technology use in classrooms is not merely technical but meaningfully integrated into curriculum delivery (Makokha & Waweru, 2017). Pre-service teachers undergo modules on ICT pedagogy, and schools are gradually adopting lesson planning practices that reflect TPACK-informed design.

In Nigeria and Ghana, the adoption of TPACK has gained strong hold within selected teacher education institutions. For instance, universities such as the University of Ibadan in Nigeria and the University of Cape Coast in Ghana had already begun embedding TPACK concepts into pre-service teacher education curricula. These efforts are often supported by collaborative research projects and the development of *Professional Learning Communities (PLCs)* that focus on reflective practice and peer mentoring in digital pedagogy (Agyei & Voogt, 2012; Adovonou, 2022). Despite infrastructural challenges, educators are increasingly experimenting with blended learning environments that require an understanding of the intersections between content, pedagogy, and technology.

Emerging evidences across the region highlight several key lessons. First, successful TPACK integration necessitates the development of localized digital content that aligns with national curricula and cultural contexts. Imported educational technologies and resources must be adapted to meet local linguistic, pedagogical, and socio-economic realities (Oluoch & Gachago, 2023). Second, infrastructure readiness, including access to reliable internet, electricity, and digital devices, remains a significant barrier to scaling TPACK-aligned practices, particularly in rural and underserved areas. Finally, ongoing faculty development is crucial. Teacher educators themselves must be equipped with TPACK competencies to effectively model and scaffold technology integration for pre-service teachers (Boateng & Tindi, 2020).

In a nutshell, while TPACK implementation in Sub-Saharan Africa remains at an early stage, it is increasingly viewed as a viable and contextually adaptable framework for promoting digital transformation in teacher education. Continued investment in infrastructure, capacity building, and curriculum reform will be essential to unlocking the full potential of TPACK in advancing equitable, technology-enabled learning across the region.

Ethiopia's Teacher Education Reforms and Digital Readiness

Ethiopia's Education and Development Road-Map (2018–2030), the National Teacher Education Policy Framework (2018b), Education Sector Development Program-VI (2020–2025), the Higher Education Reform Agenda (2021–2030), and more recently, the Teacher Competency Framework (2023) all give due emphasis to and call for teachers' pedagogical excellence and professional standards. Programs such as the *Higher Diploma Program (HDP)* in the higher education institutions, and *Continuous Professional*

Development (CPD) in the primary and secondary schools have enhanced pedagogical skill-building. However, integration of technology remains minimal. Many teachers lack confidence in selecting and using educational technologies (Habtamu & Alemayehu, 2020).

As to existing literature and official documents (e.g., MoE, 2022, 2020; Gebremedhin & Fenta, 2015; Tadesse & Gillies, 2015), challenges include the following:

- **Infrastructure gaps:** Many Teacher Education Institutions (TEIs) lack reliable internet, functional computer labs, or access to educational software.
- **Capacity gaps:** Faculty often lack training in digital pedagogy or TPACK-based instructional design.
- **Curricular fragmentation:** Separate treatment of technology, pedagogy, and content undermines the integrated approach promoted by TPACK.
- **Policy-practice disconnect:** Despite ICT-for-Education policies, there is limited translation into teacher education practices.

Pathways to TPACK Integration in Ethiopian Teacher Preparation

To institutionalize TPACK, Ethiopia needs a multi-level approach:

- **Curriculum Redesign:** Develop modules that explicitly integrate CK, PK, and TK. This could include problem-based learning, co-teaching, and field-based digital projects.
- **Institutional Development:** Establish TPACK innovation labs in TEIs to support practice-based learning and instructional design.
- **Faculty Capacity-Building:** Offer certification programs and professional learning communities for teacher educators.
- **ICT Infrastructure Investment:** Prioritize digital inclusion by equipping TEIs with ICT tools and OER.
- **Policy Harmonization:** Align national ICT, teacher development, and curriculum policies under a unified TPACK-aligned implementation strategy.
- **Monitoring and Research:** Introduce TPACK competency frameworks in teacher assessment tools and promote design-based research in teacher training programs.

The Role of Digital Pedagogical Leadership

To sustain TPACK integration, Ethiopia must cultivate *digital pedagogical leadership* among teacher educators and policy-makers. These leaders can:

- Champion innovation in TEIs.
- Mentor novice teachers in technology-enhanced lesson planning.
- Influence curriculum review bodies.
- Collaborate with international networks on best practices.

This leadership is crucial for institutionalizing a culture of digital teaching and lifelong learning.

Conclusion

The TPACK framework offers a robust and integrative model for transforming teacher education in the digital era. By emphasizing the dynamic interplay among content knowledge, pedagogical expertise, and technological fluency, TPACK equips educators with the capacity to design and deliver learning experiences that are both contextually relevant and technologically enriched. For a country like Ethiopia—where efforts to modernize education are central to national development priorities—TPACK presents a timely and strategic opportunity to elevate the quality of teaching and learning across the education system.

The integration of TPACK into Ethiopia's teacher preparation programs can serve as a catalyst for educational innovation. It can help bridge the persistent digital divide by fostering a generation of teachers who are not only content experts and effective pedagogues, but also confident users of digital tools and platforms. This, in turn, can enhance student engagement, support differentiated instruction, and promote 21st century competencies such as creativity, collaboration, critical thinking, and digital literacy.

Notwithstanding, effective implementation of TPACK requires more than conceptual adoption; it calls for systemic and structural reforms. Key prerequisites include the renewal of pre-service teacher education curricula to reflect TPACK-informed competencies, substantial investment in digital infrastructure and connectivity—particularly in rural and underserved areas—and ongoing, context-specific professional development to support teachers' evolving technological and pedagogical needs. Moreover, education leaders and policymakers must foster a culture of innovation and reflective practice, ensuring that the use of technology is purposeful, inclusive, and aligned with national education goals.

By anchoring TPACK in Ethiopia's broader educational reform agenda, the country can move toward a more equitable, future-ready education system that meets the learning needs of all students in a rapidly digitizing global society. In doing so, Ethiopia can not only enhance its teacher quality and learning outcomes but also position itself as a forward-looking nation that leverages technology for inclusive and transformative education.

References

- Abebe, T., & Haile-Mariam, A. (2011). Teachers' perceptions of classroom instructional roles of computer technology in teaching. *Ethiopian Journal of Education and Sciences*, 6(1), 19–36.
- Adovonou, A. F. (2022). ICT Integration and TPACK Competence Development in Ghanaian Teacher Education, *Journal of Educational Technology Development and Exchange*, 15(2), 101–118.
- Agyei, D. D., & Voogt, J. (2012). Developing Technological Pedagogical Content Knowledge in pre-service mathematics teachers through collaborative design, *Australasian Journal of Educational Technology*, 28(4), 547–564.
- AITSL (2020). Australian Professional Standards for Teachers. Australian Institute for Teaching and School Leadership.
- Boateng, P., & Tindi, E. (2020). Building TPACK capacity among teacher educators in West Africa: Challenges and opportunities, *African Journal of Teacher Education*, 9(1), 45–60.
- Chai, C. S., Koh, J. H. L., & Teo, H. H. (2020). Enhancing and modeling teachers' technological pedagogical content knowledge (TPACK) in science education, *Asia-Pacific Journal of Teacher Education*, 48(5), 536–549.
- Gebremedhin, M. A., & Fenta, A. A. (2015). Assessing teachers' perception on integrating ICT in teaching-learning process: The case of Adwa College, *Journal of Education and Practice*, 6(4), 114–123.

- Habtamu, Y., & Alemayehu, T. (2020). Teachers' readiness for ICT integration in Ethiopia, *International Journal of Education and Development using ICT*, 16(1).
- Haile, T., & Asrat, D. (2021). ICT integration and teachers' professional development in Ethiopian schools: Current practices and future directions, *Ethiopian Journal of Education and Sciences*, 16(2), 56–70.
- Harris, J., Mishra, P., & Koehler, M. (2010). Teachers' Technological Pedagogical Content Knowledge and Learning Activity Types, *Journal of Research on Technology in Education*, 41(4), 393–416.
- Iilomäki, L., & Lakkala, M. (2011). Developing technology-rich teacher education: Two case studies from Finland, *Nordic Journal of Digital Literacy*, 6(4), 243–257.
- Jita, L. C. (2016). Pre-service teacher education and ICT integration in schools: An analysis of prospects and challenges in South Africa, *Perspectives in Education*, 34(3), 20–33.
- Koehler, M. J., Mishra, P., & Cain, W. (2013). What is Technological Pedagogical Content Knowledge (TPACK)? *Journal of Education*, 193(3), 13–19.
- Koehler, M. J., & Mishra, P. (2009). What is Technological Pedagogical Content Knowledge? *Contemporary Issues in Technology and Teacher Education*, 9(1), 60–70.
- Lim, C. P., & Chai, C. S. (2008). Teachers' pedagogical beliefs and their planning and conduct of computer-mediated classroom lessons, *British Journal of Educational Technology*, 39 (5), 807–828.
- Makokha, G. L., & Waweru, M. (2017). Teacher ICT Competency and Integration in Kenyan Public Primary Schools, *International Journal of Education and Development using ICT*, 13 (2).
- Ministry of Education, Ethiopia (2023). Teacher Competency Framework
- MoE (2022, 2020, 2021). Annual Education Statistics Abstracts. Ministry of Education, Ethiopia.
- MoE (2020). Evaluation of the Postgraduate Diploma in Teaching (PGDT) Program in Ethiopia. Addis Ababa.
- MoE (2020). Education Sector Development Program- VI. Addis Ababa: Federal Democratic Republic of Ethiopia.
- MoE (2020). Competency-Based Teacher Education Framework. Addis Ababa: Federal Ministry of Education.
- MoE (2020). Teacher Education Reform: Strategic Framework and Implementation Plan.
- MoE (2018a). Education Development Roadmap (2018–2030): An Integrated Executive Summary. Addis Ababa, Ethiopia.
- MoE (2018b). National Teacher Education Policy Framework. Addis Ababa, Ethiopia.
- MoE (2017). Teacher Policy Development Guide.
- MoE (2018). Education and Training Roadmap 2018–2030. Addis Ababa, Ethiopia.
- MoE (2020). ICT for Education Strategy in Ethiopia. Addis Ababa, Ethiopia.
- Ministry of Education, Government of India. (2020). *National Education Policy 2020*.
- Mishra, R. (2021). Integrating TPACK in Indian teacher education: Opportunities and challenges, *Journal of Education and Practice*, 12(3), 45–58.
- Mishra, P., & Koehler, M. J. (2006). Technological Pedagogical Content Knowledge: A new framework for teacher knowledge, *Teachers College Record*, 108 (6), 1017–1054.
- Oluoch, J. O., & Gachago, D. (2023). Contextualizing digital pedagogy in East African classrooms: Insights from localized TPACK implementation, *E-Learning and Digital Media*, 20(1), 5–22.
- Rosenberg, J. M., & Koehler, M. J. (2022). The future of TPACK: Implications for teacher education and research, *Contemporary Issues in Technology and Teacher Education*, 22(1), 1–21.
- Semela, T. (2014). Teacher preparation in Ethiopia: A critical analysis of reforms, *Cambridge Journal of Education*, 44 (1), 113–145.
- Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching, *Educational Researcher*, 15(2), 4–14.
- Tadesse, T., Mengistu, M., & Astatke, M. (2022). Revisiting TPACK and teacher digital literacy in Ethiopian teacher education: Challenges and innovations, *Ethiopian Journal of Educational Sciences*, 18(2), 45–61.
- Tessema, K. A., Asgedom, A., & Waktola, D. (2021). Teacher Education Reforms in Ethiopia: Review of Practices and Implications, *Journal of Education and Practice*, 12(4), 14–26.
- Voogt, J., Fisser, P., Good, J., Mishra, P., & Yadav, A. (2013). Technological pedagogical content knowledge—A review of the literature, *Journal of Computer Assisted Learning*, 29(2), 109–121.

Teachers' Professional Growth: Pathways to Excellence in Education

Dr. Mukta Bakshi

Abstract

Teacher professional growth is central to the advancement of educational quality and student outcomes. This paper examines the pathways through which educators achieve professional excellence, emphasizing the role of structured training, reflective practices, mentorship, and evidence-based pedagogical innovations. Drawing on both empirical research and insights from *Elevating Education – From Chalk to Change* (Bakshi, 2023), this study highlights strategies for fostering teacher development in diverse educational contexts. Implications for school leadership, policy-making, and curriculum design are discussed, offering a framework for sustainable professional growth that aligns with contemporary educational standards.

Keywords: Professional Development, Teacher Growth, Reflective Practice, Mentorship, Educational Leadership, Pedagogy

Introduction

The quality of education in any system is inextricably linked to the continuous development of its teachers. As student needs evolve, teachers must adapt, innovate, and refine their practices to meet the demands of 21st-century learning. Professional growth encompasses not only the acquisition of new skills and knowledge but also the cultivation of reflective practices, collaborative engagement, and leadership capabilities (Darling-Hammond et al., 2017).

Research indicates that structured professional development, when aligned with school vision and student learning outcomes, produces measurable improvements in teacher efficacy and student achievement (Desimone, 2009). *Elevating Education – From Chalk to Change* (Bakshi, 2023) emphasizes that professional growth is most impactful when it is personalized, iterative, and integrated into daily teaching practice, rather than treated as a series of isolated workshops.

This paper explores the multiple pathways through which teachers can achieve professional excellence. It examines evidence-based practices, leadership strategies, and systemic approaches that support educators in achieving sustained growth. By doing so, it provides a framework that educational institutions can adopt to foster teacher development effectively.

Literature Review

Teacher professional growth has long been recognized as a cornerstone of effective education. Extensive research highlights that sustained, high-quality professional development (PD) positively impacts instructional practices, teacher efficacy, and student learning outcomes (Guskey, 2002; Darling-Hammond et al., 2017).

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The literature emphasizes several key themes: the importance of reflective practice, collaborative learning communities, mentorship, and alignment with broader educational goals.

Reflective Practice

Reflective practice is widely acknowledged as a critical component of teacher growth. Schön (1983) posits that reflective practitioners engage in continuous self-assessment and critical thinking about their instructional strategies, enabling adaptive and responsive teaching. Bakshi (2023) reinforces that reflection is most effective when embedded in daily teaching routines and complemented by actionable feedback.

Collaborative Professional Learning

Professional growth is amplified in collaborative learning environments where teachers engage in peer observations, co-planning, and knowledge-sharing. Wenger (1998) describes these “communities of practice” as central to developing expertise and sustaining motivation. Research indicates that collaboration fosters the exchange of innovative pedagogical ideas, supports problem-solving, and enhances the collective capacity of teaching teams (Vescio, Ross, & Adams, 2008). Bakshi (2023) emphasizes the role of structured collaboration, advocating for school-wide frameworks that integrate departmental goals with the institution’s overarching vision.

Mentorship and Coaching

Mentorship is another pivotal pathway for teacher development. Experienced educators act as guides, modeling effective practices, offering constructive feedback, and supporting novice teachers through the complexities of classroom management and curriculum implementation (Ingersoll & Strong, 2011). Bakshi (2023) highlights that mentorship programs are most effective when personalized, goal-oriented, and complemented by ongoing monitoring to track progress over time.

Alignment with Institutional Goals

Professional development initiatives are most impactful when aligned with school-wide objectives, curricular priorities, and policy frameworks. Research demonstrates that ad hoc workshops or generic training sessions have limited efficacy unless embedded within a coherent strategic plan (Desimone, 2009). Bakshi (2023) underscores the importance of integrating professional growth within a school’s vision, fostering a culture where continuous learning is valued, measurable, and directly linked to student success.

Digital and Innovative Practices

Contemporary research increasingly highlights the role of technology in teacher professional growth. Digital tools, online learning communities, and simulation-based training provide educators with access to diverse pedagogical resources and global best practices (Trust & Horrocks, 2019). Bakshi (2023) suggests that digital integration should be complemented by reflective and collaborative elements, ensuring that innovation does not become an isolated or superficial endeavor but enhances teaching effectiveness substantively.

Synthesis

The literature collectively indicates that effective teacher professional growth is multidimensional. It requires reflective practice, collaboration, mentorship, alignment with institutional goals, and thoughtful integration of technology. These dimensions provide a foundation for sustainable teacher development, enhancing both instructional quality and student outcomes.

Methodology/Research Approach

This study employs a qualitative-interpretive research approach to explore pathways for teacher professional growth, combining insights from empirical research, case studies, and reflective practitioner accounts. The objective is to identify effective strategies that promote sustainable development in teaching practice while aligning with school goals and student learning outcomes.

Research Design

A qualitative framework was chosen to capture the nuanced experiences, perceptions, and professional practices of educators. This approach allows for in-depth exploration of the processes, challenges, and enablers associated with teacher growth, emphasizing context-specific insights over purely quantitative measures (Creswell & Poth, 2018).

Data Sources

The study draws on multiple data sources to triangulate findings:

1. **Literature Review:** Existing scholarly work on teacher professional development, reflective practice, collaborative learning, mentorship, and innovation in education.
2. **Practitioner Insights:** Reflections and case examples from practicing teachers, school leaders, and education consultants, including examples from *Elevating Education – From Chalk to Change* (Bakshi, 2023).
3. **Institutional Case Studies:** Illustrative examples from schools implementing structured professional development programs, highlighting successful strategies and common obstacles.

Analytical Approach

Data were analyzed thematically, focusing on recurring patterns, challenges, and evidence of successful practices in teacher professional growth. Key themes were identified, including reflective practice, mentorship, collaborative learning, alignment with institutional goals, and integration of digital tools. Each theme was examined to determine its impact on teaching efficacy and student outcomes, guided by principles outlined in Bakshi (2023) and contemporary research on professional learning (Darling-Hammond et al., 2017; Desimone, 2009).

Ethical Considerations

All data referenced from practitioners and case studies were anonymized to protect confidentiality. The study adheres to ethical research principles, ensuring respect for participants' perspectives and accurate representation of their experiences.

Limitations

While the qualitative approach allows for rich, context-sensitive insights, it may limit the generalizability of findings across all educational contexts. However, the integration of literature, practitioner reflections, and case studies provides a robust foundation for identifying best practices in professional growth.

By combining literature analysis, practitioner insights, and real-world case studies, this research provides a comprehensive framework for understanding teacher professional growth. The methodology emphasizes both the theoretical underpinnings and practical applications of development strategies, offering actionable guidance for school leaders, educators, and policymakers.

Key Pathways to Professional Growth

Teacher professional growth is a multifaceted process that combines skill development, reflective practice, collaborative learning, and leadership engagement. This section identifies and discusses the principal pathways that enable teachers to achieve sustained professional excellence.

1. Continuous Professional Development (CPD)

Continuous Professional Development is the cornerstone of teacher growth. CPD encompasses workshops, seminars, certification programs, and in-school training initiatives aimed at expanding pedagogical knowledge and practical skills (Avalos, 2011). Effective CPD is aligned with teachers' individual goals, school priorities, and emerging educational trends. Bakshi (2023) emphasizes that CPD programs are most impactful when teachers actively engage with content, apply learnings in the classroom, and receive structured feedback to guide improvement.

2. Collaborative Learning Communities

Communities of practice (Wenger, 1998) foster peer learning, shared problem-solving, and co-creation of instructional strategies. By participating in collaborative planning, peer observations, and discussion forums, teachers can innovate and refine their practice collectively. Research shows that collaborative professional learning improves teacher efficacy, reduces isolation, and strengthens school culture (Vescio, Ross, & Adams, 2008). Bakshi (2023) underscores that integrating collaboration within departmental and school-wide frameworks amplifies its effectiveness, ensuring alignment with institutional objectives.

3. Mentorship and Coaching

Mentorship provides structured guidance from experienced educators, facilitating knowledge transfer, emotional support, and professional modeling. Ingersoll and Strong (2011) note that mentorship enhances teacher retention and accelerates professional growth. Bakshi (2023) emphasizes the value of goal-oriented,

personalized mentorship programs, which combine regular observations, feedback sessions, and reflective dialogues to develop both pedagogical and leadership competencies.

4. Leadership Engagement and Role Expansion

Active engagement with leadership roles, such as department coordination, curriculum development, or action research projects, contributes significantly to teacher growth. Such roles expand teachers' perspectives, build strategic thinking, and strengthen problem-solving skills (Fullan, 2014). Bakshi (2023) highlights that leadership pathways foster a sense of ownership and accountability, encouraging teachers to drive innovation within their classrooms and across the institution.

5. Technology Integration and Innovation

Digital literacy and integration of technology in pedagogy are increasingly critical to professional development. Trust and Horrocks (2019) emphasize that technology enhances instructional delivery, provides access to global best practices, and supports differentiated learning. Bakshi (2023) recommends that technological tools should complement reflective and collaborative practices, rather than being employed in isolation, to ensure meaningful professional growth and improved student outcomes.

6. Evidence-Based Practice and Action Research

Engaging in action research allows teachers to systematically investigate their own practice, test interventions, and make data-informed decisions (McNiff, 2017). Evidence-based teaching fosters a culture of inquiry and continuous improvement. Bakshi (2023) advocates integrating assessment data, classroom observations, and reflective journals as part of structured action research initiatives, promoting both individual and collective professional development.

Role of Leadership and Mentorship

Effective teacher professional growth is closely linked to the quality of school leadership and the presence of structured mentorship. Leadership and mentorship serve as catalysts, creating an environment that nurtures continuous learning, innovation, and reflective practice.

1. Visionary Leadership

School leaders play a critical role in shaping a culture that values professional growth. Visionary leaders communicate clear expectations, provide strategic guidance, and foster a supportive environment where teachers feel empowered to innovate and take professional risks (Fullan, 2014). Bakshi (2023) emphasizes that aligning professional development initiatives with the school's vision ensures coherence, relevance, and sustained impact. Leaders who model lifelong learning encourage teachers to pursue excellence and integrate best practices into their pedagogy.

2. Structured Mentorship Programs

Mentorship provides teachers, particularly novices, with targeted guidance, emotional support, and professional modeling. Ingersoll and Strong (2011) demonstrate that structured mentorship reduces teacher attrition and

enhances instructional quality. Effective mentorship includes goal-setting, classroom observation, feedback, and reflective dialogue, allowing mentees to internalize constructive feedback and develop professional autonomy. Bakshi (2023) highlights that personalized mentorship, responsive to teachers' strengths and areas for improvement, yields the most significant gains in both confidence and competence.

3. Distributed Leadership and Peer Support

Distributed leadership encourages shared responsibility, enabling teachers to take on roles such as department coordinators, instructional leaders, or action research facilitators (Spillane, 2006). This approach empowers educators, builds leadership capacity, and fosters a collaborative culture. Peer mentoring and professional learning communities further enhance this process by providing ongoing support, idea-sharing, and problem-solving networks. Bakshi (2023) notes that a culture of shared leadership strengthens teacher engagement, accountability, and commitment to continuous improvement.

4. Feedback and Performance Review

Constructive feedback and performance evaluation are integral to professional growth. Leaders and mentors must provide timely, specific, and actionable feedback to guide teachers' development. Research indicates that feedback is most effective when it is dialogic, reflective, and linked to clear performance indicators (Hattie & Timperley, 2007). Bakshi (2023) recommends integrating formal and informal feedback mechanisms, ensuring teachers can assess their progress and set meaningful professional goals.

5. Fostering Innovation and Risk-Taking

Leadership and mentorship also play a pivotal role in encouraging experimentation and innovation in teaching practices. By cultivating a psychologically safe environment, leaders allow teachers to test new pedagogical strategies, explore digital tools, and engage in action research without fear of negative consequences (Edmondson, 2019). Bakshi (2023) stresses that supportive mentorship and visionary leadership together foster creativity, resilience, and adaptive expertise, which are essential for professional excellence in rapidly evolving educational contexts.

Leadership and mentorship are inseparable from effective teacher professional growth. Visionary leaders, structured mentorship programs, distributed leadership models, robust feedback mechanisms, and encouragement of innovation collectively create a fertile environment for educators to thrive.

Impact on Student Outcomes

The ultimate measure of teacher professional growth is its effect on student learning. Research consistently demonstrates that when teachers engage in sustained professional development, reflective practice, and collaborative learning, students benefit academically, socially, and emotionally (Darling-Hammond et al., 2017).

1. Academic Achievement

High-quality professional growth directly enhances instructional effectiveness, which translates into improved student performance. Teachers who refine their pedagogical strategies, integrate evidence-based

practices, and adopt differentiated instruction are better equipped to meet diverse learning needs (Desimone, 2009). Bakshi (2023) highlights that continuous professional development, when strategically aligned with curriculum objectives, results in higher student engagement, deeper understanding, and measurable gains in learning outcomes.

2. Social and Emotional Development

Teacher growth also positively impacts students' social-emotional learning (SEL). Educators trained in mindfulness, life skills integration, and inclusive practices create supportive classroom environments where students feel valued, respected, and motivated to learn (CASEL, 2020). According to Bakshi (2023), teachers who engage in reflective practice and mentorship develop empathy and relational skills, which foster positive teacher-student interactions and a sense of belonging in the classroom.

3. Development of 21st-Century Skills

Professional development that emphasizes critical thinking, creativity, collaboration, and digital literacy equips teachers to foster these competencies in students. Action research, project-based learning, and innovative pedagogical strategies allow students to engage in authentic, skill-oriented learning experiences (Trilling & Fadel, 2009). Bakshi (2023) notes that teachers who embrace technology integration and evidence-based practices cultivate adaptable, resilient learners ready to thrive in complex, dynamic environments.

4. Inclusive and Equitable Learning

Teacher growth that incorporates training in differentiated instruction and inclusive education enhances accessibility and equity in classrooms. Teachers learn to identify and address diverse learning needs, ensuring that all students, including those with special educational needs, achieve meaningful progress (Tomlinson, 2014). Bakshi (2023) emphasizes that professional growth initiatives designed to promote inclusivity contribute to holistic student development, fostering confidence, independence, and self-efficacy.

5. Long-Term Educational Impact

Sustained teacher professional growth creates a culture of continuous improvement, with long-term benefits extending beyond immediate academic outcomes. Schools that prioritize teacher development see higher retention rates, more effective instructional teams, and enhanced institutional reputation, all of which indirectly benefit students by providing stable, high-quality learning environments (Fullan, 2014). Bakshi (2023) underscores that the cumulative impact of teacher growth is a generational investment, producing students capable of critical thinking, innovation, and lifelong learning.

Teacher professional growth has a direct and profound impact on student outcomes. From academic achievement to social-emotional development, 21st-century skills acquisition, and inclusive learning, the ripple effects of professional development extend throughout the educational ecosystem. By investing in teacher growth, schools not only enhance the quality of instruction but also empower students to reach their full potential in academic and personal domains.

Challenges and Solutions

While teacher professional growth is critical for educational excellence, various challenges can impede its effectiveness. Recognizing these barriers and implementing targeted solutions is essential for ensuring sustainable professional development outcomes.

1. Limited Time and Workload Pressures

Teachers often face heavy workloads, leaving little time for professional development. Excessive administrative duties, large class sizes, and curriculum demands can limit opportunities for reflective practice and collaborative learning (OECD, 2019).

Solution: Integrating professional development into the school schedule, such as through in-school workshops, structured reflection periods, and collaborative planning sessions, can mitigate time constraints. Bakshi (2023) advocates for a “professional growth embedded in practice” model, where learning occurs alongside daily teaching rather than as an external obligation.

2. Inadequate Access to Quality Training

Not all teachers have access to high-quality professional development programs, especially in under-resourced schools. Generic or outdated workshops may fail to address teachers’ specific needs (Desimone, 2009).

Solution: Schools should provide tailored, evidence-based training aligned with individual teacher goals, school priorities, and emerging educational trends. Mentorship, peer coaching, and digital learning platforms can supplement traditional PD to broaden access and relevance (Bakshi, 2023).

3. Resistance to Change

Some educators may resist adopting new practices due to comfort with established methods or fear of failure. Resistance can hinder collaboration, innovation, practice (Fullan, 2014).

Solution: Creating a supportive culture that values experimentation, constructive feedback, and professional autonomy encourages teachers to embrace change. Bakshi (2023) emphasizes the importance of leadership modeling, clear communication of benefits, and recognition of incremental improvements to overcome resistance.

4. Limited Mentorship and Leadership Support

Professional growth is less effective without guidance from mentors or leadership. Inconsistent feedback, lack of structured mentorship, or insufficient engagement from school leaders can impede teacher development (Ingersoll & Strong, 2011).

Solution: Implementing structured mentorship programs, regular feedback mechanisms, and distributed leadership opportunities strengthens support networks. Bakshi (2023) notes that personalized mentorship combined with visionary leadership fosters teacher confidence, resilience, and continuous learning.

5. Technology Integration Challenges

While technology offers powerful tools for professional growth, limited digital literacy, infrastructure constraints, or lack of relevant content can pose challenges (Trust & Horrocks, 2019).

Solution: Schools should provide targeted technology training, access to digital resources, and ongoing support to ensure teachers can effectively integrate technology into pedagogy. Combining digital learning with reflective and collaborative practices enhances both skill acquisition and instructional quality (Bakshi, 2023).

6. Measuring Impact

Assessing the effectiveness of professional growth initiatives can be difficult due to the qualitative nature of learning, delayed outcomes, and lack of standardized evaluation methods (Guskey, 2002).

Solution: Schools should implement multi-layered evaluation strategies, including classroom observations, student achievement data, teacher self-assessments, and peer feedback. Action research projects can serve as both development and assessment tools, ensuring professional growth translates into measurable improvements (Bakshi, 2023).

Challenges to teacher professional growth are multifaceted, encompassing time constraints, access, resistance, leadership gaps, technology integration, and measurement difficulties. However, these barriers can be effectively addressed through embedded, personalized, and collaborative professional development models supported by strong leadership, mentorship, and systematic evaluation.

Recommendations

Based on the literature, practitioner insights, and case studies, the following recommendations are provided:

1. Embed Professional Development in Daily Practice

Professional growth is most effective when it is integrated into teachers' regular responsibilities rather than treated as an isolated activity. Embedding reflection, collaborative planning, and skill application into daily teaching ensures continuous, contextually relevant learning (Bakshi, 2023). Schools should schedule dedicated time for peer observations, reflective journals, and action research within the academic calendar.

2. Foster Collaborative Learning Communities

Structured communities of practice encourage knowledge-sharing, peer mentoring, and collective problem-solving. Schools should create formal platforms for teachers to exchange ideas, co-design curricula, and engage in interdisciplinary projects. Bakshi (2023) emphasizes aligning collaborative initiatives with school vision and departmental objectives to maximize impact.

3. Implement Structured Mentorship Programs

Personalized mentorship enhances teacher confidence, efficacy, and leadership potential. Mentorship programs should include clear goals, regular observations, feedback cycles, and reflective dialogue. Experienced mentors can guide novice and mid-career teachers through challenges, supporting both professional skill development and personal growth (Ingersoll & Strong, 2011; Bakshi, 2023).

4. Promote Leadership Opportunities for Teachers

Encouraging teachers to take on leadership roles, such as curriculum coordinators, instructional coaches, or action research facilitators, develops strategic thinking and problem-solving skills. Distributed leadership strengthens teacher engagement and fosters a culture of shared accountability (Spillane, 2006). Bakshi (2023) notes that such experiences empower teachers to influence school-wide pedagogical practices and drive innovation.

5. Integrate Technology Effectively

Digital tools should be leveraged to enhance learning, collaboration, and professional development. Training programs should build digital literacy, provide access to global best practices, and integrate technology into reflective and collaborative exercises. This approach ensures that technology contributes substantively to teaching effectiveness (Trust & Horrocks, 2019; Bakshi, 2023).

6. Emphasize Evidence-Based Practice and Action Research

Teachers should be encouraged to engage in action research and data-informed reflection to continuously improve instructional practice. Schools can facilitate this by providing access to assessment data, research resources, and professional guidance. Bakshi (2023) highlights that action research cultivates critical thinking, innovation, and a culture of inquiry among educators.

7. Strengthen Leadership Support and Feedback Mechanisms

School leaders should provide clear vision, strategic guidance, and ongoing feedback. Performance review systems should be constructive, reflective, and linked to professional growth goals. Recognizing and celebrating teacher achievements reinforces motivation and fosters a culture of excellence (Fullan, 2014; Bakshi, 2023).

8. Prioritize Inclusive and Holistic Teacher Development

Professional growth initiatives should address pedagogical skills, social-emotional competence, and inclusive practices. By fostering empathy, cultural responsiveness, and adaptive teaching strategies, schools ensure that teacher development positively impacts diverse learners (Tomlinson, 2014; Bakshi, 2023).

These recommendations collectively provide a comprehensive roadmap for sustainable teacher professional growth. By embedding development into daily practice, fostering collaboration, leveraging mentorship, promoting leadership, integrating technology, emphasizing evidence-based practice, strengthening feedback, and prioritizing inclusivity, schools can cultivate a culture of continuous learning and educational excellence. Implementing these strategies not only enhances teacher efficacy but also directly improves student outcomes and institutional quality.

Conclusion

Teacher professional growth is fundamental to advancing educational quality, fostering innovation, and enhancing student outcomes. This paper has examined multiple pathways to professional excellence, highlighting reflective practice, collaborative learning communities, structured mentorship, leadership

engagement, technology integration, and evidence-based action research. Drawing on both scholarly literature and insights from *Elevating Education – From Chalk to Change* (Bakshi, 2023), the study emphasizes that sustainable growth is achieved when professional development is personalized, strategically aligned with school vision, and embedded within daily teaching practice.

The evidence presented demonstrates that teacher growth not only improves instructional effectiveness but also strengthens social-emotional learning, cultivates 21st-century skills, and promotes inclusive and equitable education. Leadership and mentorship emerge as critical enablers, providing guidance, constructive feedback, and opportunities for professional autonomy and innovation.

Ultimately, investing in teacher professional development represents a strategic and ethical imperative for educational institutions. By creating supportive, collaborative, and reflective environments, schools empower educators to reach their full potential, thereby fostering a generation of learners equipped with the skills, resilience, and curiosity necessary to thrive in a dynamic world. The framework and recommendations outlined in this paper offer actionable strategies for school leaders, policymakers, and educators committed to cultivating excellence and sustaining continuous improvement in teaching and learning.

References

- Avalos, B. (2011). Teacher professional development in teaching and teacher education over ten years. *Teaching and Teacher Education*, 27(1), 10–20. <https://doi.org/10.1016/j.tate.2010.08.007>
- Bakshi, M. (2023). *Elevating education – From chalk to change*. Entab Publications.
- CASEL. (2020). *What is SEL?* Collaborative for Academic, Social, and Emotional Learning. <https://casel.org/what-is-sel/>
- Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). Sage Publications.
- Darling-Hammond, L., Hyler, M. E., & Gardner, M. (2017). *Effective teacher professional development*. Learning Policy Institute. <https://learningpolicyinstitute.org/product/effective-teacher-professional-development-report>
- Desimone, L. M. (2009). Improving impact studies of teachers' professional development: Toward better conceptualizations and measures. *Educational Researcher*, 38(3), 181–199. <https://doi.org/10.3102/0013189X08331140>
- Edmondson, A. C. (2019). *The fearless organization: Creating psychological safety in the workplace for learning, innovation, and growth*. Wiley.
- Fullan, M. (2014). *The principal: Three keys to maximizing impact*. Jossey-Bass.
- Guskey, T. R. (2002). Professional development and teacher change. *Teachers and Teaching*, 8(3), 381–391. <https://doi.org/10.1080/135406002100000512>
- Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of Educational Research*, 77(1), 81–112. <https://doi.org/10.3102/003465430298487>
- Ingersoll, R., & Strong, M. (2011). The impact of induction and mentoring programs for beginning teachers: A critical review of the research. *Review of Educational Research*, 81(2), 201–233. <https://doi.org/10.3102/0034654311403323>
- McNiff, J. (2017). *Action research: All you need to know* (3rd ed.). Sage Publications.
- OECD. (2019). *Teaching and learning international survey (TALIS) 2018 results*. OECD Publishing. <https://www.oecd.org/education/talis/talis-2018-results.htm>
- Schön, D. A. (1983). *The reflective practitioner: How professionals think in action*. Basic Books.
- Spillane, J. P. (2006). *Distributed leadership*. Jossey-Bass.
- Tomlinson, C. A. (2014). *The differentiated classroom: Responding to the needs of all learners* (2nd ed.). ASCD.
- Trilling, B., & Fadel, C. (2009). *21st century skills: Learning for life in our times*. Jossey-Bass.

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- Trust, T., & Horrocks, B. (2019). *Amplifying professional growth through technology: Teacher learning in the digital age*. International Society for Technology in Education (ISTE).
- Vescio, V., Ross, D., & Adams, A. (2008). A review of research on the impact of professional learning communities on teaching practice and student learning. *Teaching and Teacher Education*, 24(1), 80–91. <https://doi.org/10.1016/j.tate.2007.01.004>
- Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity*. Cambridge University Press.

Relationship Between Teachers' Job Satisfaction and Students' Academic Performance in Building Technology Education in Colleges of Education in Kano State, Nigeria.

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Abstract

This study, "Relationship Between Teachers' Job Satisfaction and Students' Academic Performance in Building Technology Education in Colleges of Education in Kano State, Nigeria" was guided by purpose two research questions and two hypotheses. Correlation and descriptive survey research designs were adopted. The population comprised of Building Technology teachers and students in Colleges of Education in Kano state was used. Considering the manageable proportion of population size 62 in total the entire population was used, hence, there is no sampling that was involved. The instrument used for data collection was structured questionnaire developed by the researcher which was validated by three experts. To ensure the reliability of the instrument Cronbach Alpha method was used reliability coefficient of 0.84 was obtained. Mean and standard deviation was used to answer research questions while the hypotheses were tested using simple linear regressions, multiple linear regressions, and t-test. The study found that teachers are satisfied with some aspects of their job, Students performs well, teachers' job satisfaction has relationship with students' performance, age and working experience have impact on relationship between teachers' job satisfaction, and students' performance but gender don't have any relation with teachers' job satisfaction. Finally, from the study findings, there are strategies that can enhance teachers' job satisfaction and students' academic performance. Among the recommendations proffered are: Building Technology Teachers should strive to maintain good relationship with colleagues for better job satisfaction, students should be punctual, attentive and engage in class discussions to have good academic performance and management of colleges of education at school level should give more attention to teachers' job satisfaction for a better students' academic performance.

Keywords: Teachers' Job Satisfaction, Students' Academic Performance, Building Technology Education, Working Experience, Kano State

Introduction

Teachers play a crucial role in shaping students' academic performance, particularly in technical and vocational education, such as Building Technology Education. Teacher's job satisfaction significantly influences the quality of instruction, student engagement, and overall learning outcomes. According to Adebayo and Okonkwo (2020), job satisfaction among teachers is directly linked to their level of commitment, classroom performance, and effectiveness in knowledge transmission. According to Ekhsan (2019) Teacher's job satisfaction reflects an individual's feelings about their job, which can be seen in an employee's attitude towards their job and all aspects of the work environment. In technical education, where practical and theoretical knowledge must be effectively delivered, a motivated and satisfied teacher

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is essential. Job satisfaction is the happy emotional state that arises from believing that one's work either achieves or facilitates the realization of one's personal values. It is also "the extent to which people like or dislike their jobs. Teacher Job satisfaction is the positive feeling of an employee towards his job; it is the amount of happiness connected with the job. Cortini et al, (2019) defined Teacher's satisfaction as an attitude a teacher have about their work due to their perception of the work. It's also refers to the Teacher's general attitude towards a job, which shows the difference between the amount of rewards they receive and the amount they believe they should receive (Culibrk et al., 2018). As government and colleges of education management support teacher's well-being, creating positive production and delivery of quality teaching has effect on student academic performance

Student academic performance, often referred to as academic achievement, is a student's measure of how well they have met particular objectives. It also refers to how well educators, institutions, or students have met their learning objectives. Academic achievement is also thought to be a complex construct with many facets that encompasses several learning domains and a wide range of educational outcomes (Steve, 2021). Student academic performance in Building Technology Education (BTE) is a critical measure of the effectiveness of the educational system. Academic performance refers to students' ability to demonstrate understanding and competence in their courses as reflected in their grades, practical assessments, and overall knowledge retention (Okoro & Ibrahim, 2020). Multiple factors influence students' academic performance, include teaching quality, learning resources, motivation, and institutional support (Adeola et al., 2021). Teaching quality is one of the most significant determinants of student success. Studies have shown that students taught by highly satisfied and motivated teachers perform better academically than those taught by dissatisfied instructors (Obi & Chidiebere, 2019). Effective teaching strategies, coupled with a passion for the subject, enhance student engagement and learning outcomes (Adeyemi & Ojo, 2022). The availability of instructional materials and well-equipped laboratories is also a major factor in determining academic performance. BTE, being a practical-based course, requires hands-on training, yet many Colleges of Education in Nigeria lack adequate facilities for skill acquisition (Kazeem et al., 2023). Institutions that invest in modern workshops and technological tools report higher student success rates (Olawale et al., 2022). A supportive school culture and teacher perception and expectation student's well-being can help to mitigate any negative effects of gender dynamics

Gender has been widely studied in relation to students' academic performance across various disciplines, including technical education. Some studies suggest that male students perform better in Building Technology Education due to their early exposure to construction-related activities (Obi & Adeyemi, 2019). Others argue that gender disparities in performance are gradually diminishing due to increased female participation in technical fields (Okon, 2020). Research findings indicates that societal expectations and cultural perceptions play a role in gender-related academic outcomes. In Nigeria, for instance, male students have historically dominated Building Technology Education due to traditional gender roles (Eze, 2021). However, recent initiatives promoting gender inclusivity in technical education have helped bridge this gap (Bamidele & Okafor, 2022).

Gender differences in academic performance may also stem from variations in learning styles and interests. According to Adekunle (2023), male students are more inclined towards practical-based learning, whereas female students excel in theoretical comprehension. This distinction suggests the need for a balanced

instructional approach that caters to both genders effectively. Moreover, classroom dynamics and peer interactions often differ by gender. Research by Aluko and Ibrahim (2019) found that female students may face challenges in male-dominated technical programs, leading to lower participation rates and confidence levels. In contrast, supportive learning environment and educational institutions play a crucial role in supporting teachers working experiences.

Teacher's working experience is refers to the length of time a teacher has been teaching including their years of services, teaching assignment and professional development opportunities. Prior academic and practical experience can have a profound impact on students' academic performance in Building Technology Education. Experience, in this context, includes previous exposure to technical subjects, vocational training, and real-world construction practices. Studies indicate that students with hands-on experience perform better in technical subjects compared to those with purely theoretical backgrounds (Usman et al., 2016). According to Clotfelter et al (2007). Teacher's working experience is probably the key factor in personnel policies that affect current employees. It is a corner stone of traditional single-salary schedules, Teacher's show the greatest productivity gains during their first few years on the job, after which their performance tends to level off. Harris and Sass (2009) found that teacher's working experience or effectiveness is influences significantly by teacher personality, factors especially caring, intelligence, subject matter knowledge and teaching skills and working experience are essential component of education, particularly in colleges of education.

Colleges of education are tertiary educational institutions established to give professional training for the production of highly qualified classroom teachers (James et al., 2024; Federal Republic of Nigeria, 2004). College of Education is a higher institution of learning established to train teachers that will teach students at the basic and secondary levels of education. Colleges of Education provide learning opportunities for prospective teachers which leads to award of Nigeria Certificate in Education (NCE). According to Umaru and Danjuma (2017), the College of Education is an institution of higher learning that provides manpower needs of secondary education to advance national development. Colleges of Education is designed to enable prospective teachers acquire both physical and intellectual skills for training secondary school students to be self-reliant and useful members of the society. National Policy on Education. (2004), Noted that, Colleges of Education are among teacher education Institutions required to give professional training for the production of highly motivated, conscientious and efficient classroom teachers for the basic education levels of Nigerian educational system. Colleges of Education award the Nigerian Certificate in Education and are governed regulated and monitored by the National Commission of Colleges of Education (NCCE). The college of education plays a vital role in shaping the next generation of educators and among the courses offered by the college of education are building technology educations.

Building Technology Education in Colleges of Education is designed to equip students with the necessary skills, competencies, and knowledge required for careers in construction and allied industries. However, poor job satisfaction among teachers in this field may hinder effective teaching and learning. Studies such as Nwosu (2020) have shown that job satisfaction is influenced by several factors, including working conditions, remuneration, job security, professional growth opportunities, and institutional support.

The quality of education in Building Technology Education programs largely depends on the motivation and dedication of instructors. Studies by Yusuf (2022) highlight that satisfied teacher tend to be more innovative,

dedicated, and effective in classroom management, which in turn improves students' academic performance. On the contrary, dissatisfied teachers often demonstrate reduced enthusiasm, absenteeism, and a lack of engagement, which negatively impacts students' learning experiences and outcomes.

The Nigerian government and educational policymakers have made efforts to improve technical education by introducing reforms and policies aimed at enhancing teachers' welfare and satisfaction. However, the extent to which these policies have impacted teacher satisfaction and student performance in Building Technology Education remains underexplored, making this study relevant an imperative.

Building Technology Education in Kano state faces numerous challenges that affect both teacher satisfaction and student performance. These include inadequate infrastructure, lack of teaching materials, poor remuneration, and limited professional development opportunities. Research by Olawale and Adetunji (2021) indicates that when teachers in technical education experience job dissatisfaction, their instructional quality declines, leading to lower student performance.

Furthermore, teacher satisfaction has been linked to institutional policies and management practices. Schools that provide incentives, professional development opportunities, and a conducive working environment tend to have more satisfied teachers, as suggested by Bala and Adeyinka (2023). This, in turn, translates to better academic performance among students in technical fields.

Statement of the Problem

In Nigeria, particularly Kano state, the educational institutions sector faces numerous challenges including inadequate infrastructure, insufficient resources, and poor teachers' welfare and non benefit from ongoing professional development. These challenges can negatively impact teachers' job satisfaction and subsequently student academic performance. In Building Technology Education, where students are expected to acquire both theoretical knowledge and practical skills, the satisfaction and motivation of teachers are particularly critical. (Usman, 2021).

However, the current realities in many Colleges of Education in Kano State deviate significantly from this ideal. Teachers in Building Technology Education often face low job satisfaction due to poor working conditions, insufficient instructional resources, inadequate salaries, limited career advancement, and lack of institutional support (Eze, 2019). These challenges can result in low morale, reduced motivation, absenteeism, and diminished teaching effectiveness, all of which negatively affect students' academic achievement. The researcher's observations indicate that students in these institutions frequently struggle to grasp essential technical concepts, demonstrate weak academic performance, and lack competence in practical applications. These problems not only compromise the quality of graduates produced but also have long-term implications for the construction industry and national development (Ibrahim & Mohammed, 2019).

Although numerous studies have investigated teacher job satisfaction in general education and vocational contexts, there is a significant gap in research specifically addressing how job satisfaction among Building Technology Education teachers in Colleges of Education affects students' academic performance. This gap limits the understanding of the unique challenges and implications associated with teaching in this technical field. Therefore, this study seeks to bridge that gap by examining the relationship between teachers' job

satisfaction and students' academic performance, with the aim of informing evidence-based strategies to enhance both teacher motivation and educational outcomes in Building Technology Education.

Purpose of the Study

1. Examine the impact of teacher's working experience on the relationship between teachers' job satisfaction and academic performance in building technology education in colleges of education in Kano state, Nigeria
2. Determine strategies for enhancing teachers' job satisfaction and students' academic performance in building technology education in colleges of education in Kano state, Nigeria

Research Questions

1. What is the impact of teacher's working experience on the relationship between teachers' job satisfaction and academic performance in building technology education?
2. What are the strategies for enhancing teachers' job satisfaction and students' academic performance in building technology education?

Hypotheses

- H₀₁** There is no significant impact of teacher's working experience on the relationship between teachers' job satisfaction and academic performance in building technology education
- H₀₂** There is no significant difference on the opinion of respondents on strategies for enhancing teachers' job satisfaction and students' academic performance in building technology education.

Methodology

This study adopted correlational research design to examine the relationship between teachers' job satisfaction and students' academic performance. Correlational research is appropriate for identifying and assessing the strength and direction of relationships between variables without manipulating them (Creswell & Creswell, 2018). This design enabled the exploration of whether variations in teachers' job satisfaction levels are associated with changes in students' academic outcomes in Building Technology Education. In summary, the correlational research design is deemed suitable for this study as it facilitates the examination of the relationship between teachers' job satisfaction and students' academic performance in a natural educational setting, aligning with the study's purposes and research questions. The area of this study is Kano State, which is situated in North-Western part of Nigeria. Geographically, Kano state is approximately located between latitudes 11°30' and 12°30'N and longitudes 8° and 10°E. The city of Kano, which serves as the capital of Kano state, is situated approximately at latitude 12°N and longitude 8°30'E (Abubakar, 2021). Kano state has a total of forty-four (44) local governments and covers a total area of 20,131 square kilometers (7,773 square miles) (NBS, 2022). Kano State borders with Katsina State to the northwest for about 210 km (130 miles), Jigawa State to the northeast for 355 km (221 miles), Bauchi State to the southeast for 131 km (82 miles), and Kaduna State to the southwest for 255 km. The population for this study comprised of Building Technology Education lecturers and students within the Colleges of Education in Kano State, Nigeria. The

student population was encompass all individuals enrolled in Building Technology Education programs in the colleges. The choice of this population aligns with the study's objective to explore how lecturers' job satisfaction influences students' academic outcomes in Building Technology Education as presented. The entire population comprising of 23 and 37 students was used due to its manageable proportion. Hence there is no sampling in the study. This decision is in line with the opinion of Creswel (2012) who stated that where the size of the population is small, sampling might not be necessary indicating that the entire population would be used. The instrument for data collection in this study was a developed structured questionnaire by the researcher titled Teacher's Job Satisfaction and Students' Academic Performance Questionnaire (TJSSAPQ). A questionnaire is an effective tool for gathering quantitative data on the perceptions and experiences of respondents (Saunders, Lewis, & Thornhill, 2019). A five-point Likert scale ranging from "Strongly Disagree" (1) to "Strongly Agree" (5) was used in measuring responses, ensuring a standardized approach to data collection. The instrument was trial tested to assess clarity and reliability before full administration. To ensure the validity of the instrument, questionnaire was validated by two experts. The questionnaire was reviewed by experts in the Department of Technology Education, Modibbo Adama University, Yola to assess its content relevance and clarity (Fraenkel, Wallen, & Hyun, 2019). Their feedback was used in refining the wording of questions and removes any ambiguous or redundant items. Construct validity was carryout using factor analysis to determine whether the questionnaire items adequately represent the underlying constructs of job satisfaction and academic performance. The feedback on the comprehensibility and relevance of the items was considered for final adjustments. See appendix I . Reliability testing was conducted in Federal College of Education (Technical) Gombe, Gombe state and Federal College of Education (Technical) Potiskum Yobe state, which are both out of the researcher's study area but having the same characteristics with those in the study area to ensure consistency in responses. The internal consistency of the questionnaire was measured using Cronbach's alpha coefficient, which assesses the degree to which items within each section of the questionnaire correlate with one another (Tavakol & Dennick, 2019). A Cronbach's alpha value of 0.84 was obtained which is considered acceptable for reliability (Nunnally & Bernstein, 1994). An introductory letter was obtained from the Department of Technology Education; Modibbo Adama University Yola . Data collection was gathered in two phases. In the first phase, the researcher seeks permission from the management of the Colleges of Education involved in the study. Approval was obtained from the relevant institutional authorities, and ethical considerations were addressed, including informed consent from all participants. The second phase involved the distribution of questionnaires to selected lecturers and students. To ensure a high response rate, trained research assistants were engaged in administering the questionnaires. Respondents were given ample time (approximately two weeks) to complete the questionnaire, after which the completed questionnaires were retrieved. Anonymity and confidentiality were maintained throughout the process to encourage honest responses. The collected data was analyzed using both descriptive and inferential statistics. Descriptive statistics such as mean, standard deviation were used to answer research questions. For inferential analysis, simple regression analysis and multiple regression analysis was used in testing hypotheses 1 and 2 respectively at 0.05 level of significance and be conducted to determine the extent to which different dimensions of job satisfaction predict academic performance. Simple regression analysis is aims to predict the value of a dependent variable based on the value of an independent variable

and Multiple linear regression analysis is a powerful statistical for understanding complex relationship and making prediction based on multiple dependent variables. While hypothesis 2 was tested using t-test. These analyses were performed using Statistical Package for the Social Sciences (SPSS) version 25.0. Upper and lower real limits of numbers were used for decision making in answering the research questions. Sum of numerical value of responses $5+4+3+2+1 = 15/5 = 3.0$. Since the average of five point scales is 3.0 which coincides with neutral level on the scale, therefore the decision rule is that any item with mean above the point of 3.49 was considered agreed, and any item with mean below the cutoff point of 3.49 was considered disagreed and for testing the hypotheses is, if the computed P-value is greater than calculated, the null hypothesis would be accepted and conclude that the independent variable do not significantly predict the dependent variable and if the computed P-value is less than calculated, the null hypothesis would be rejected and conclude that the independent variable significantly predict the dependent variable.

Results

Research Question One

Table 1		Mean and Standard Deviation on Impact of Teacher's Working Experience on the Relationship Between Teachers' Job Satisfaction and Academic Performance in Building Technology Education				
Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	8.696	6.185		1.406	.165
	Job_Satisfaction	1.212	.177	.681	6.863	.000
	Teachers_Working_Experience	.162	.157	.102	1.030	.007

Table 1 showed the impact of teacher's working experience on the relationship between teachers' job satisfaction and academic performance in building technology education in Colleges of Education in Kano State. The respondents agreed that items 51 – 60 listed in Table 6 are the impact of teacher's working experience on the relationship between teachers' job satisfaction and academic performance in building technology education in Colleges of Education in Kano State with a mean value which ranged between 3.52 and 4.13. The grand mean of 3.75 also implies that, the respondents agreed that there is impact of teacher's working experience on the relationship between teachers' job satisfaction and academic performance in building technology education in Colleges of Education in Kano State.

Hypothesis One

H₀₁ There is no significant impact of teacher's working experience on the relationship between teachers' job satisfaction and academic performance in building technology education

Table 2a Model Summary of Relationship on Impact of Teacher's Working Experience on the Relationship Between Teachers' Job Satisfaction and Academic Performance				
Model	R	R Square	Adjusted R	Std. Error of the Estimate
1	.733 ^a	.537	.521	4.83751

Predictor: (Constant), teachers' job satisfaction, teacher's working experience

Table 2a highlights the model summary of relationship on impact of teacher's working experience on the relationship between teachers' job satisfaction and academic performance. The value of R represents the simple Pearson's correlation which is 0.733, indicating a strong correlation. The table also shows that the value of R^2 is 0.537 which means 53.7% variation in students' academic performance is explained by teachers' job satisfaction and teachers' working experience.

Table 2b Model Summary of Regression Analysis on Impact of Teacher's Working Experience on the Relationship Between Teachers' Job Satisfaction and Academic Performance						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1600.746	2	800.373	34.202	.000 ^b
	Residual	1380.689	59	23.402		
	Total	2981.435	61			

Table 11b show that $(F(2,59) = 34.202, p=0.000 < 0.05)$. This means that the teachers' job satisfaction and teachers' age are significantly related to students' academic performance. The null hypothesis is therefore rejected meaning there is significant relationship between teachers' job satisfaction and working experience and students' academic performance.

Table 2c Regression Coefficient Table of Models Parameters (Beta values) and Significance on Impact of Teacher's Working Experience on the Relationship Between Teachers' Job Satisfaction and Academic Performance					
Model	Unstandardized Coefficients B Stan Err.		Standardized Coefficients Beta	T	Sig.
1	8.696	6.185		1.406	.165
Teachers' job satisfaction	1.212	.177	.681	6.863	.000
Teachers' Age	.162	.157	.102	1.030	.007

Dependent Variable: Students' academic performance

Table 2c provides details of models parameters (Beta values) and significance of these values. The unstandardized Beta coefficient gives measures of the contribution of each variable to the model. All (1.212 and 0.162) are positive values, indicating positive relationship and also indicating that if the value of predictor variables increased by one unit each, there are 1.212 and 0,162 units increased in the dependent variable (students' job performance). The table also revealed that the variables teachers' job satisfaction $p (.000) < 0.00$; and teachers' age $p (.007) < 0.05$ are significant, this means that the teachers working experience has impact on the relationship between teachers' job satisfaction and students' academic performance.

Research Question Two

Table 3 Mean and Standard Deviation on Strategies for Enhancing Teachers' Job Satisfaction and Students' Academic Performance in Building Technology Education					
	Categories of Respondents	N	Mean	Std. Deviation	Std. Error Mean
Strategies_t_test	Teachers	23	39.6522	4.12981	.86113
	Students	39	40.9744	4.90696	.78574

Table 3 showed the strategies for enhancing teachers' job satisfaction and students' academic performance in building technology education in Colleges of Education in Kano State. The respondents agreed that items 61 – 70 listed in Table7 are the strategies for enhancing teachers' job satisfaction and students' academic performance in building technology education in Colleges of Education in Kano State with a mean value which ranged between 3.52 and 4.37. The grand mean of 4.05also implies that, the respondents agreed that the items are strategies for enhancing teachers' job satisfaction and students' academic performance in building technology education in Colleges of Education in Kano State.

Hypothesis Two

H_{02} There is no significant difference on the opinion of respondents on strategies for enhancing teachers' job satisfaction and students' academic performance in building technology education.

Table 4 Independent Sample t-test on the Opinion of Respondents on Strategies for Enhancing Teachers' Job Satisfaction and Students' Academic Performance							
Respondents	N	Mean	SD	t_{cal}	p-value	Sig. Level	Decision
Teachers	23	39.65	4.13	-1.085	.282	0.05	Accepted
Students	39	40.97	4.91				

$p > 0.05$, hence H_0 is Accepted

The result on Table 12 reveals a t_{cal} of -1.085with a p -value of .282. Since the p -value is greater than the alpha level of the test ($p > .05$), the null hypothesis tested is accepted. This means that there is no significant

difference on the opinion of respondents on strategies for enhancing teachers' job satisfaction and students' academic performance in building technology education.

Findings of the Study

1. Teachers' working experience has impact on the job performance as experience teacher improve students' attainability in the classroom, novice teachers tend to have more difficulty with classroom management, experience teachers have more opportunities for professional growth, have more effective classroom management strategies, working experience influences your relationship with students, experience teachers have higher job satisfaction, help the students to acquire more skill in practical aspect, be more open to new ideas, their job security depends on their level of experience and can be effective and satisfied in their jobs
2. strategies that can enhance teachers' job satisfaction and students' academic performance are: availability of modern teaching facilities, adequate salaries, opportunities for professional development, conducive working environment, effective classroom management, regular assessment, teachers' enthusiasm, use of practical and hands-on learning, adequate instructional materials and satisfying teacher's needs.

Conclusion

Based on the findings of this study, it is evident that teachers' job satisfaction significantly influences students' academic performance in Building Technology Education in Colleges of Education in Kano State. The results also showed that students generally perform well academically, particularly when guided by motivated and experienced teachers.

Furthermore, the study established a strong positive relationship between teachers' job satisfaction and students' academic performance. Among the demographic variables examined, age and years of teaching experience were found to significantly affect this relationship, with older and more experienced teachers demonstrating greater effectiveness in facilitating student learning. The study concludes that improving teacher satisfaction through targeted strategies—such as ensuring adequate teaching resources, providing fair and timely remuneration, and fostering professional development—can enhance the quality of instruction and, consequently, improve students' academic performance in Building Technology Education. Stakeholders in education, including policymakers, institutional leaders, and curriculum planners, should prioritize the welfare and motivation of teachers to achieve better outcomes in technical education.

Recommendations

1. As the teachers' working experience has impact on the job performance, Colleges of Education should give more attention to retaining experienced teachers. Government should give more special consideration to teacher's working experience when recruitment as it has impact on the relationship between teachers' job satisfaction and students' academic performance in building technology education
2. Government and other stake holders responsible, ministry of education should consider implementing the identified strategies that can enhance teachers job satisfaction and students' performance. Building

Technology teachers and students should cooperate when it comes to implementation of the identified strategies can enhance teachers job satisfaction and students' performance.

References

- Abubakar, A. (2021), Geospatial assessment of urban growth and expansion in Kano metropolis, Nigeria. *Journal of Environmental Management and Tourism*, 12(5), 106-109
- Adebayo, O. S. & Oke, O. A. (2020). Influence of teachers' motivation and satisfaction on students' learning outcomes in technical education. *African Journal of Educational Studies*, 18(4), 78-94.
- Adekunle, T. (2023) Gender disparities in technical education. *African Journal of Vocational Studies*, 27(2), 112-129.
- Adeyemi, J., & Ojo, K. (2022) Effective teaching strategies and student learning outcomes in vocational education. *International Journal of Educational Research*, 19(3), 101-115.
- Aluko, B. & Ibrahim, S. (2019). Gender inclusion in vocational education. *West African Journal of Educational Studies*, 16(3), 89-104.
- Clotfelter, Charles T., Helen F. Ladd, and Jacob L., (2009) "How and Why Teacher Credentials Matter for Student Achievement?" Working paper 2. Washington DC; The Urban Institute.
- Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research*. Boston: Pearson Education, Inc.
- Creswell, J. W., & Creswell, J. D. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Sage Publications.
- Ćulibrk, M. Delić, S. Mitrović, and D. Ćulibrk, (2018) "Job satisfaction, organizational commitment and job involvement: The mediating role of job involvement," *Front. Psychol.*, vol. 9
- Ekhsan, M (2019). Job satisfaction among employees: A study on attitudinal and environmental factors. *Journal of Workplace Psychology*, 14(1), 23-38.
- Ekhsan, M (2019). The influence job satisfaction and organizational commitment on employee turnover intention. *Journal of Business, Management, & Accounting*, 1(1). <https://e-journal.stiekusumanegara.ac.id/index.php/jobma/article/view/74>
- Eze, C. & Chukwu, P. (2019). Age and learning adaptability. *Educational Psychology Review*, 25(1), 102-118.
- Hariss, D., & Sass, T. (2009). What makes for a good teacher and who can tell? (CALDER working paper NO. 30). Retrieved from <http://www.urban.org/sites/default/files/alfresco/publication-pdfs/1001431-what-make-for-a-Good-Teacher-and-Who-Can-Tell-.PDF>
- Kazeem, Y., et al. (2023). The impact of workshop facilities on student performance in building technology education. *Journal of Engineering and Technical Studies*, 12(4), 122-136.
- Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric Theory*. McGraw-Hill.
- Obi, T., & Chidiebere, L. (2019). Teacher motivation and student engagement in Nigerian technical colleges. *Journal of African Studies in Education*, 14(1), 40-53.
- Olawale, F., et al. (2022). The relationship between technological advancement and student success in vocational education. *Journal of Industrial and Technical Education*, 15(3), 45-60.
- Tavakol, M., & Dennick, R. (2019). Making sense of Cronbach's alpha. *International Journal of Medical Education*, 2(1), 53-55.
- Usman, A., Rehman, M., Imran, M. K., & Muqadas, F. (2016). The Impact of Teacher Qualifications and Experience on Student Satisfaction: A Mediating and Moderating Research Model. *Pakistan Journal of Commerce and Social Sciences*, 10(3), 505-524
- Yusuf, B., & Ibrahim, M. (2022). The impact of teacher job satisfaction on instructional quality in technical colleges. *Journal of Teacher Effectiveness and Student Learning*, 14(3), 71-86.

Transformational Leadership and PLCs: Preparing Teachers as Leaders for Organisational Change through Innovative Teacher Education Practices

Miss Kerishka Govender

Abstract

This paper explores how transformational teacher leadership and Professional Learning Communities (PLCs) can support meaningful and lasting change in schools. It focuses on how the key traits of transformational leadership influence school culture by promoting collaboration, innovation, and professional growth. While school leadership is often associated with principals, this paper argues that teachers also play a critical role as leaders within their schools, especially when trusted and supported.

This paper is set within a South African context, where many schools continue to face the legacy of inequality, under-resourcing, and top-down structures, the paper highlights the need for leadership that is inclusive, people-centred, and responsive to local realities. PLCs are examined as practical spaces where teachers can reflect, share knowledge, and lead change through collaborative action.

Using a systematic literature review, the paper draws on recent research and national policy to show how Initial Teacher Education (ITE) programmes can better prepare pre-service teachers to take on leadership roles. It recommends embedding leadership development and collaborative practice into the curriculum so that future teachers are equipped to lead transformation from the start of their careers.

Keywords: Transformational Leadership, Teacher Leadership, Professional Learning Communities, Organisational Change, School Culture, Initial Teacher Education, South Africa

Introduction

A major element of the success of an organisation is dependent on leadership, organisational culture, and the willingness of its members to accept and enact organisational change. In schools, the organisational culture reflects the shared values, beliefs, and traditions held by its members, which influence the functioning of the school and its capacity to innovate and improve (Stolp, 1994; Engels et al., 2008). These ideas are deeply embedded and impact how school communities respond to change.

Teachers, as emerging leaders within the school system, are increasingly called upon to shape the organisational culture of schools. While school principals are traditionally recognised as formal leaders, the evolving demands of education position teachers as central figures in fostering collaboration, leading professional development, and promoting a culture of innovation and growth (Lezotte, 2001). The integration of Professional Learning Communities (PLCs) within school environments enables teachers to act as catalysts for change and development. In addition, Akinyemi et al. (2020) posit that positive professional relationships established through PLCs enable teachers to support one another in discussing and managing challenges.

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The South African Department of Basic Education is currently facing significant economic constraints, which directly impact the level of funding received by public schools. As a result, many school communities operate with limited physical and human resources (Plessis & Mestry, 2019). In addition, South African schools are frequently characterised by inadequate infrastructure, including overcrowded classrooms, deteriorating facilities, and insufficient teaching materials (West & Meier, 2020). These conditions place added pressure on teachers, who are increasingly expected to move beyond their traditional instructional roles to respond creatively and collaboratively to these challenges. In such environments, leadership must be distributed, and teachers must be empowered to lead school-based initiatives that improve both learning conditions and organisational culture.

Bourn (2016) argues that teachers have the power to act as agents of educational change. Beverborg et al. (2020) assert that teachers assist in fostering a shared vision, contribute to a climate of continuous professional development, and model behaviours that support a culture of teaching and learning, using social influence to motivate peers, learners, and parents toward shared goals. According to Philpott and Oates (2017), one approach that enables teachers to lead school-based change and promote professional collaboration is through the use of PLCs.

PLCs are not merely discussion forums; rather, they serve as structured platforms for action, reflection, and collective growth (Mundy, 2018). In PLCs, teachers collaborate to solve problems, share insights, and design strategies that respond to learners' needs (Linder et al., 2012; Mundy, 2018). This aligns with the principles of transformational leadership, which emphasise inspiration, motivation, and the empowerment of others.

The South African Department of Basic Education is currently facing economic constraints that affect the amount of funding received by schools. Therefore, many South African school communities lack physical and human resources (Plessis & Mestry, 2019). Furthermore, South African schools are commonly characterised by poor and inadequate infrastructure, which contributes to overcrowded classrooms (West & Meier, 2020). These contextual challenges force teachers to move beyond their traditional roles in order to overcome these issues.

As part of my own work with teacher training and mentoring in under-resourced schools, I have facilitated workshops that combined PLC-style collaboration with leadership simulation tasks. Teachers participated in reflective circles, examined school case studies, and designed actionable school improvement plans based on contextual challenges they had experienced. These experiences demonstrated that when teachers are positioned as reflective leaders, their confidence grows, and they begin to see themselves not only as implementers of policy but as agents of change who shape the direction of their schools. This practitioner-based insight reinforces the theoretical arguments that inform this paper.

Problem Statement

Research has long drawn a connection between leadership, organisational culture, and school improvement (Bass & Avolio, 1993; Peterson & Deal, 1998; Lee & Louis, 2019). Lucas and Valentine (2002) highlight that a weak link in this chain often contributes to school failure. South Africa's education system continues to grapple with the historical legacy of apartheid, which left many school communities with fragmented cultures and limited capacity for transformation (Bipath & Adeyemo, 2014). These structural issues are

further compounded by the Department of Education, current economic constraints, poor and inadequate infrastructure, and overcrowded classrooms, which continue to undermine efforts to improve teaching and learning environments (Plessis & Mestry, 2019; West & Meier, 2020). To meet the country's post-democratic goals for educational reform, teachers must be empowered to assume leadership roles that drive organisational change and improve teaching and learning outcomes.

The legacy of apartheid in South Africa created an educational history that resulted in a failed organisational culture, limiting school leaders' willingness or ability to enact meaningful change. This culture continues to impact how teachers view their roles within school change processes (Bipath & Moyo, 2016). A bureaucratic and hierarchical approach to leadership, common during apartheid, failed to nurture collaborative decision-making and professional autonomy. In contrast, democratic school transformation calls for a participative, inclusive, and innovative leadership style that places teachers at the centre of change.

Teachers are regarded as knowledge creators and agents of change, facilitating educational transformation (Bourn, 2016; Supermane et al., 2018). For this reason, there is a need for teacher education programmes that embed leadership development into their curriculum to create teachers with the skills needed to engage in school-based transformation (Ferreira et al., 2015; Xu et al., 2012).

Innovative teacher education practices that embed leadership development and support for PLCs are essential for preparing teachers to act as agents of change. While many policies call for teacher leadership, there remains a disconnect between pre-service training and the realities of school transformation (Ferreira et al., 2015; McGarr et al., 2017; Xu et al., 2012). The persistent gap between theory and practice raises important questions about the responsiveness of Initial Teacher Education (ITE) to the challenges of educational change, particularly in lower-income communities.

This paper responds to this challenge by situating teacher leadership within transformational leadership theory and PLCs, advocating for innovative approaches in Initial Teacher Education (ITE) to foster these capacities.

Statement of Objectives

The objective of this paper is to propose how ITE programmes can be strengthened to better prepare teachers to lead organisational change through transformational leadership and PLCs. The paper aims to highlight the leadership potential of teachers beyond administrative roles and to advocate for the intentional development of leadership competencies within their ITE training. Ultimately, the paper aims to contribute to the ongoing discourse on how innovative teacher education practices can produce reflective, transformational teacher leaders who are capable of shaping school culture and driving sustainable change from within.

The paper also aims to highlight the disjuncture between current ITE programmes and the leadership demands placed on new teachers, particularly in under-resourced and culturally diverse school contexts in South Africa. By analysing current scholarship and contextual challenges, the paper argues for the integration of leadership development and collaborative professional practices, like PLCs, to be incorporated within teacher education curricula.

Methodology

The methodology of this paper was informed by doing a systematic literature review, which focused on recent studies, policy documents, and theoretical frameworks related to transformational teacher leadership, PLCs and teacher education. Sources were selected based on their contribution to understanding how teacher leadership and PLCs support inclusive education, innovation, and organisational change. To ensure its relevance to current educational challenges and discourse, special attention was paid to literature published within the last five years. Furthermore, particular attention was paid to literature relevant to the South African schooling context to ensure contextual alignment. A thematic analysis was used to identify key patterns, recurring arguments, and conceptual gaps. This structured literature review forms the basis for a theoretically grounded and practice-oriented argument for enhancing ITE programmes.

Applying a Theoretical Lens

Transformational Leadership Theory

During apartheid, school leadership in South Africa functioned primarily to uphold a discriminatory curriculum and bureaucratic control. This rigid and hierarchical system was not designed to support innovation, shared decision-making, or equity. As such, it is no longer fit for purpose in a post-apartheid, democratic context. Therefore, post-democratic educational reforms have seen a shift towards transformational leadership, as it promotes teacher empowerment, collaborative decision-making, and school reform (Prasetia et al., 2020).

Transformational leadership theory centres on the capacity of leaders to inspire, motivate, and elevate others toward achieving shared goals. In a school setting, this involves fostering a culture of teaching and learning through a compelling vision that is co-constructed by staff, learners, and the broader community (Prasetia et al., 2020; Lucas & Valentine, 2002).

A transformational leader empowers staff to look beyond their own interests, encouraging them to commit to the collective mission of school improvement. According to Bass and Avolio (1993), four key traits define this leadership style. These traits are critical for building a school culture that supports sustained organisational change.

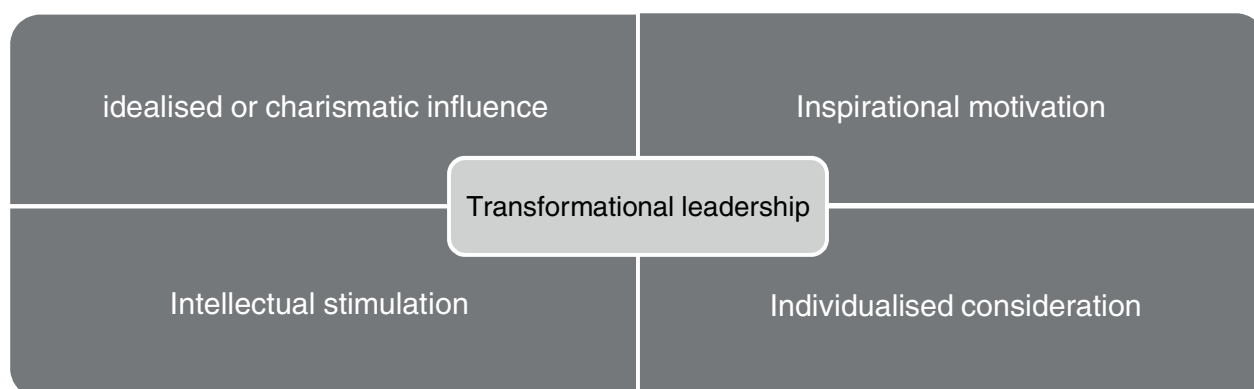


Diagram showing the 4 traits of transformational leader; adapted from Bass and Avolio (1993)

1. **Idealised Influence (II):** A teacher leader acts as a role model, demonstrating integrity, professionalism, and commitment. Their behaviour earns the trust and respect of colleagues, which in turn fosters unity and motivates others to adopt the shared vision (Lynch, 2012).
2. **Inspirational Motivation (IM):** The teacher leader communicates high expectations and articulates a compelling vision of the school's future. This motivates and energises staff, enhancing their sense of purpose and belonging (Alig-Mielcarek, 2003).
3. **Intellectual Stimulation (IS):** This trait encourages innovation and critical thinking. Teacher leaders who embrace IS promote professional autonomy, involve colleagues in problem-solving, and encourage them to challenge outdated practices (Lynch, 2012).
4. **Individualised Consideration (IC):** A transformational leader recognises the unique needs and potential of each staff member. Through mentorship, coaching, and personalised professional development opportunities, they build capacity and strengthen interpersonal relationships.

These four interconnected dimensions align with the goals of PLCs, where mutual respect, innovation, and shared leadership are core values (Huijboom et al., 2021). Teacher education programmes should therefore provide future educators with opportunities to practise these traits during training, particularly through experiential learning, reflection, and collaborative inquiry (Epstein, 2013).

The influence of transformational teacher leadership on organisational school culture

Each school possesses its own unique culture, which is shaped and maintained through leadership. According to Ngang (2011), an effective school leader promotes a culture of shared values and beliefs and encourages collaboration among staff. This is especially relevant in South Africa's education system, where schools are still navigating the transition from hierarchical, compliance-based leadership to one rooted in collaboration and shared purpose.

Scholars consistently assert that transformational leadership is one of the most effective styles for building a positive organisational culture (Bass & Avolio, 1993; Rashid et al., 2004; Alas & Vadi, 2016; Anderson, 2017). More recent research confirms this, showing that transformational leadership significantly improves teacher motivation, self-efficacy, and the organisational culture of the school, which in turn supports improved teaching and learning outcomes (Reid, 2023). Since culture is not static but constantly evolving, transformational leadership offers a framework for intentionally shaping it in positive ways.

Each of the four traits of transformational leadership plays a vital role in reshaping stagnant school cultures. This is especially important in the South African context, where issues of marginalisation and inequality continue to affect both teachers and learners (Masinire, 2015). Teachers who embody these traits can play a key role in creating more inclusive teaching and learning environments. As Donohue and Bornman (2014) explain, inclusivity in education is not just about placing learners in the same classroom. It's about building a system where all learners are able to participate meaningfully and feel a genuine sense of belonging.

II allows teacher leaders to act as role models, setting the standard for ethical behaviour and commitment to learner success. Their consistency in upholding values such as justice, transparency, and integrity builds

trust and cohesion among their peers. IM helps teacher leaders articulate a compelling shared vision. This provides direction and fosters buy-in among staff, aligning them to a common goal and purpose.

IS encourages innovation. Teachers are empowered to think critically, challenge outdated traditions, and collaboratively design strategies that better serve their learners. In many under-resourced schools, this approach sparks creativity and builds the confidence needed to experiment with new practices.

IC ensures that teachers feel seen, heard, and supported. Through acts of mentoring and peer support, teacher leaders cultivate spaces where vulnerability is not seen as a weakness but as a necessary part of growth.

According to Anderson (2017), transformational leadership works particularly well in schools because of its emphasis on influence rather than control. This aligns with the ethos of teacher leadership: leadership that is grounded in professional practice, not just formal authority. When teacher leaders use influence to disrupt entrenched norms and inspire new ones, they are engaging in cultural transformation that benefits the whole school community.

The influence of transformational teacher leadership on organisational change

For organisational change to succeed, the existing knowledge, beliefs, and attitudes of school members need to be unfrozen, altered, and refrozen. Staff must be involved in the process and encouraged to envision and embrace change, abandoning previous practices in favour of collective goals that improve school effectiveness (Özgür, 2016).

The transformational leadership style is frequently cited as the most effective for facilitating organisational change (Bass & Avolio, 1994; Shrestha, 2020; Rashid, Sambasivan, and Rahman, 2004; Anderson, 2017). According to Anderson (2017), transformational teacher leaders collaborate with their peers to identify what needs to change. They create a shared vision and execute changes in partnership with others.

Unlike hierarchical leadership styles, transformational teacher leaders listen to their colleagues and build mutual trust. They foster a collaborative spirit that supports, enacts, and sustains change (Shrestha, 2020). This approach is particularly suited to the dynamic demands of 21st-century education systems. This is especially true in resource-constrained schools, where formal leadership alone is often insufficient to address the daily demands of teaching and learning and the challenges associated with working in an under-resourced context.

Transformational leaders pay attention to the developmental needs of others and promote teacher leadership, empowering their peers to learn, grow, and improve (Prasetia et al., 2020; Lee & Louis, 2019).

The Role of PLCs in Driving Organisational Change in Schools

According to Lee and Louis (2019), PLCs are valuable tools to support teacher development and lead organisational change. Schools are continuously subjected to new challenges and reforms. Principals and teacher leaders must ensure that staff members are equipped with the skills and knowledge to cope with the rapid changes brought by technological advancements, curriculum reform, and globalisation. This constant evolution in the educational landscape calls for structures that promote continuous professional growth and shared learning. According to Rayiramkandath (2017), this can only be achieved through ongoing professional development initiatives that support reflection, collaboration, and innovation.

Organisational learning structures such as PLCs provide platforms for staff members to collaborate, share knowledge, and build capacity to enact and sustain change. These communities allow teachers to work together to analyse learner performance, explore teaching strategies, and co-construct solutions that respond to their contextual challenges. PLCs promote collective responsibility and provide a safe space where educators engage in professional dialogue aimed at improving teaching and learning.

According to Lee and Louis (2019), PLCs are not simply groups for discussion but function as structured forums for initiating professional conversations, critical reflection, and collaborative decision-making. In line with this, the Department of Basic Education presents PLCs as social and collaborative learning structures that support ongoing professional development across schools (Feldman, 2020). These spaces cultivate teacher agency and empower educators to challenge traditional approaches, engage with new ideas, and co-lead school improvement initiatives. PLCs are thus positioned as powerful drivers of organisational change in schools.

Rashid, Sambasivan, and Rahman (2004) highlight the importance of reflective practice in the success of organisational change. Leaders need to create and sustain opportunities for meaningful dialogue and reflection. PLCs provide this platform, enabling principals, staff, and other educational stakeholders to network and evaluate their practices. These reflective sessions foster trust, deepen relationships, and create shared ownership of school improvement efforts.

Yusof, Osman, and Noor (2016), along with Lewis, Asberry, Dejarnett, and King (2016), assert that collaborative cultures such as those nurtured in PLCs allow teachers to improve their instructional practices through ongoing organisational learning. These communities effectively dissolve the invisible barriers of isolation that often prevent collaborative teacher growth. By bridging this gap, PLCs support the development of a strong professional culture that embraces experimentation, peer learning, and innovation.

PLCs motivate teachers to collectively improve their knowledge and skills, ultimately enhancing learner outcomes and facilitating whole-school change. However, Yusof et al. (2016) caution against using PLCs as a forced or compliance-driven form of teacher development. For PLCs to be meaningful and sustainable, teachers must buy into the benefits of collaborative learning and willingly support the programme. A culture of trust and voluntary participation is essential if PLCs are to influence school change meaningfully.

Contemporary Relevance

The issues discussed in this paper are not just theoretical, as they speak directly to the current realities faced by South African schools and their teachers. Classrooms today are made up of a diversity of learners who speak different languages, have different learning needs, and come from varied cultural and economic backgrounds. Therefore, teachers need practical ways to respond to this diversity and ensure inclusivity in their classrooms.

However, despite strong policy frameworks guiding these practices, a recent study found that many South African teachers struggle with confidence in applying inclusion strategies (Malahlela & Johnson, 2024). Transformational teacher leadership practices create space for more inclusive approaches, where teachers support one another and focus on meeting the needs of all learners, not just those who fit the system (Supermane et al., 2018).

PLCs also support long-term change by encouraging teachers to keep learning, share ideas, and work together to solve everyday challenges (de Jong et al., 2018). This kind of collaboration makes it easier to try out new teaching methods, use technology meaningfully, and move away from one-size-fits-all approaches (Hallam et al., 2015).

At the heart of this is a shift towards a more learner-focused and democratic way of schooling. It positions teachers as agents of change who actively contribute towards sustainable school development and are able to respond to the needs of their learners and communities in ways that are both innovative and sustainable.

Conclusion

Given the ongoing challenges facing many South African schools, ITE programmes must be responsive to these realities and prepare teachers as leaders as a practical response to systemic constraints. ITE programmes must go beyond technical preparation and integrate leadership development from the outset. Future teachers must be equipped with the mindset, skills, and confidence to lead change, foster a collaborative culture, and respond to the evolving needs of diverse school contexts.

Transformational teacher leadership and the strategic use of PLCs are critical tools in the pursuit of organisational change. When aligned with a supportive school culture and underpinned by thoughtful initial teacher education, they hold the potential to transform schools into inclusive, collaborative, and learner-centred spaces.

References

- Akinyemi, A. F., Rembe, S., & Nkonki, V. (2020). Trust and positive working relationships among teachers in communities of practice as an avenue for professional development. *Education sciences*, 10(5), 136.
- Alas, R., & Vadi, M. (2006). The impact of organisational culture on organisational learning and attitudes concerning change from an institutional perspective. *International Journal of Strategic Change Management*, 1(1/2), 155. <https://doi.org/10.1504/ijscm.2006.011109>
- Alig-Mielcarek, M. J. (2003). A model of school success: *Instructional leadership, academic press, and student achievement*. (Doctoral Dissertation, Ohio State University). Retrieved from. <https://doi.org/10.16309/j.cnki.issn.1007-1776.2003.03.004>
- Anderson, M. (2017). Transformational Leadership in Education: A Review of Existing Literature. *International Social Science Review*, 93(1), 4. <https://digitalcommons.northgeorgia.edu/issr/vol93/iss1/4/>
- Bass, B. M., & Avolio, B. J. (1994). *Improving Organizational Effectiveness through Transformational Leadership*. Thousand Oaks, CA: Sage Publications.
- Bipath, K., & Adeyemo, K. S. (2014). The strength of organisational culture: Organisational performance in South African schools. *Mediterranean Journal of Social Sciences*, 5(23), 2405–2412. <https://doi.org/10.5901/mjss.2014.v5n23p2405>
- Bipath, K., & Moyo, E. (2016). Principals Shaping School Culture for School Effectiveness in South Africa. *Journal of Social Sciences*, 48(3), 174–186. <https://doi.org/10.1080/09718923.2016.11893581>
- Bourn, D. (2016). Teachers as agents of social change. *International journal of development education and global learning*, 7(3), 63–77.
- Burnes, B. (2004). Kurt Lewin and the planned approach to change: A re-appraisal. *Journal of Management Studies*, 41(6), 976–1002
- CLARIS D'SA. J. M. (2015). *Influence of school learning culture and leadership behaviour of heads of secondary schools on school effectiveness* [UNIVERSITY OF MYSORE]. <http://hdl.handle.net/10603/93682>

- Cummings, S., Bridgman, T., & Brown, K. G. (2016). Unfreezing change as three steps: Rethinking Kurt Lewin's legacy for change management. *Human Relations*, 69(1), 33–60. <https://doi.org/10.1177/0018726715577707>
- de Jong, L., Wilderjans, T., Meirink, J., Schenke, W., Sligte, H., & Admiraal, W. (2021). Teachers' perceptions of their schools changing toward professional learning communities. *Journal of professional capital and community*, 6(4), 336–353.
- Engels, N., Hotton, G., Devos, G., Bouckennooghe, D., Aelterman, A. (2008). Principals in Schools with a positive School Culture. *Educational Studies*, 3(34), 157–172.
- Esa, N. Muda, M. S. B., Ibrahim, M. Y. B., & Mansor, N. R. B. (2017). The Application of Kurt Lewin's Model of Change in the Implementation of Higher Order Thinking Skills in School. *International Journal of Academic Research in Business and Social Sciences*, 7(8), 109–115. <https://doi.org/10.6007/ijarbss/v7-i8/3212>
- Faupel, S., & Süß, S. (2019). The Effect of Transformational Leadership on Employees During Organizational Change—An Empirical Analysis. *Journal of Change Management*, 19(3), 145–166. <https://doi.org/10.1080/14697017.2018.1447006>
- Feldman, J. (2020). The role of professional learning communities to support teacher development: A social practice theory perspective. *South African Journal of Education*, 40(1), 1–8.
- Ferreira, J. A., Ryan, L., & Davis, J. (2015). Developing knowledge and leadership in pre-service teacher education systems. *Australian Journal of Environmental Education*, 31(2), 194–207.
- Grant, C. (Callie). (2017). Distributed leadership in South Africa: yet another passing fad or a robust theoretical tool for investigating school leadership practice? *School Leadership and Management*, 37(5), 457–475. <https://doi.org/10.1080/13632434.2017.1360856>
- Hallam, P. R., Smith, H. R., Hite, J. M., Hite, S. J., & Wilcox, B. R. (2015). Trust and collaboration in PLC teams: Teacher relationships, principal support, and collaborative benefits. *NASSP bulletin*, 99(3), 193–216.
- Huijboom, F., Van Meeuwen, P., Rusman, E., & Vermeulen, M. (2021). Professional learning communities (PLCs) as learning environments for teachers: An in-depth examination of the development of seven PLCs and influencing factors. *Learning, Culture and Social Interaction*, 31, 100566.
- Lee, M., & Louis, K. S. (2019). Mapping a strong school culture and linking it to sustainable school improvement. *Teaching and Teacher Education*, 81, 84–96. <https://doi.org/10.1016/j.tate.2019.02.001>
- Lee, M., & Louis, K. S. (2019). Mapping a strong school culture and linking it to sustainable school improvement. *Teaching and Teacher Education*, 81, 84–96. <https://doi.org/10.1016/j.tate.2019.02.001>
- Lewis, J., Asberry, J., Dejarnett, G., & King, G. (2016). The best practices for shaping school culture for instructional leaders. *Alabama Journal of Educational Leadership*, September(3), 57–63.
- Lezotte, L. (2001). Revolutionary and evolutionary: The effective school's movement. Retrieved from http://www.parentssee.org/_media/sess_1_the_effective_school_movement.pdf
- Lucas, S.E, V. J. (2002). Transformational Leadership: Principals, Leadership Teams, and School Culture Introduction. In *American Educational Research Association*. https://doi.org/10.1007/978-1-4842-3870-7_4
- Lynch, M. (2012). *A Guide to Effective School Leadership Theories* (1st ed.). Routledge. <https://books.google.co.id/books?id=Ppz8tgAACAAJ%5Cnhttps://books.google.co.id/books?id=j-qVQwAACAAJ%5Cnhttps://books.google.co.id/books?id=KQTJBQAAQBAJ%5Cnhttps://books.google.co.id/books?id=Mnres2PIFLMC>
- Masinire, A. (2015). Recruiting and retaining teachers in rural schools in South Africa: Insights from a rural teaching experience programme. *Australian and International Journal of Rural Education*, 25(1), 1–13.
- McGarr, O., O'Grady, E., & Guilfoyle, L. (2017). Exploring the theory-practice gap in initial teacher education: Moving beyond questions of relevance to issues of power and authority. *Journal of Education for Teaching*, 43(1), 48–60.
- Meier, C., & West, J. (2020). Overcrowded classrooms—the Achilles heel of South African education?. *South African Journal of Childhood Education*, 10(1), 1–10.
- Moyagabo, K. M., & Johnson, E. (2024). South African Teachers' Application of Inclusive Education Policies and Their Impact on Learners with Learning Disabilities: Implications for Teacher Education. *Education Sciences*, 14(7), 743.

- Mundy, J. A. (2018). Shared Voice and Vision: Fostering Professional Communities for Student Success. *Quandaries of School Leadership: Voices from Principals in the Field*, 157-179
- Ngang, T. K. (2011). The effect of transformational leadership on school culture in male' primary schools Maldives. *Procedia - Social and Behavioral Sciences*, 30, 2575–2580. <https://doi.org/10.1016/j.sbspro.2011.10.503>
- Oude Groote Beverborg, A., Slegers, P. J., Moolenaar, N. M., & van Veen, K. (2020). Fostering sustained teacher learning: a longitudinal assessment of the influence of vision building and goal interdependence on information sharing. *School Effectiveness and School Improvement*, 31(4), 576-604.
- Özgür, Ö. (2016). From Organizational Economics Theory to Theories of Organizations and Environments. *Elixir Organisational Behaviour*, 92, 39009–39029.
- Peterson, K. D., & Deal, T. E. (1998). How leaders influence the culture of schools. *Educational Leadership*, 56(1), 28–30.
- Philpott, C., & Oates, C. (2017). Professional learning communities as drivers of educational change: The case of learning rounds. In *Journal of Educational Change* (Vol. 18, Issue 2). <https://doi.org/10.1007/s10833-016-9278-4>
- Prasetia, I., Melfayetty, S., & Dewi, R. (2020). The effect of transformational leadership and academic optimism culture on teacher empowerment and motivation along its impact on the effectiveness of Medan state junior high school. *International Journal on Language, Research and Education Studies*, 4(2), 276-290.
- Prasetia, I., Melfayetty, S., Dewi, R. (2017). The effect of transformational leadership and academic optimism culture on teacher empowerment and motivation along its impact on the effectiveness of medan state junior high school indra. *International Journal on Language, Research and Education Studies*, 4(2), 276–290. <https://doi.org/10.30575/2017/IJLRES-2020050807>
- Rashid, Z. A., Sambasivan, M., & Rahman, A. A. (2004). The influence of organizational culture on attitudes toward organizational change. *Leadership & organization development Journal*.
- Rayiramkandath, R. (2017). Role of Leadership in Building an Organizational Culture and Effectiveness. *Pune Research Journal*, XIII(June), 20–25.
- Reid, K. (2023). The impact of transformational leadership style on educational stakeholders. In *Transformational leadership styles, management strategies, and communication for global leaders* (pp. 165-182). IGI Global.
- Reynolds, K. (2016). Creating Effective Professional Learning Communities (PLCs). *BU Journal of Graduate Studies in Education*, 8(2), 9-12.
- Sammons, P., & Bakkum, L. (2011). *Effective Schools, Equity and Teacher Effectiveness: A Review to the Literature*. 15(3). <https://recyt.fecyt.es/index.php/profesorado/article/view/41443>
- Shrestha, M. (2020). Transformational Leadership and its Dimensions : Contributions in Organizational Change among Schools. *Journal of Management*, 4(1).
- Stolp, S. (1994). Leadership for school culture. *Emergency Librarian*, 23(3), 30–31.
- Supermane, S., Tahir, L., & Aris, M. (2018). Transformational leadership in teacher education. *Behavioral & Social Sciences Librarian*, 8(3).
- Supermane, S., Tahir, L., & Aris, M. (2018). Transformational leadership in teacher education. *Behavioral & Social Sciences Librarian*, 8(3).
- Usman, M. (2020). Transformational Leadership and Organizational Change: In The Context of Today's Leader. *International Business Education Journal*, 13(1), 95–107.
- Wagstaff, R. (200). Reflecting on change. *Nursing Management*, 13(2), 12–17
- Weiner, B.J. (2009). A theory for organisational readiness for change. *Implementation Science*, 4(1), 4–67. <http://dx.doi.org/10.1186/1748-5908-4-67>
- Xu, Y., & Patmor, G. (2012). Fostering Leadership Skills in Pre-Service Teachers. *International Journal of Teaching and Learning in Higher Education*, 24(2), 252-256.
- Yusof, H., Osman, M. N. A.-H., & Noor, M. A. M. (2016). School Culture and Its Relationship with Teacher Leadership. *International Journal of Academic Research in Business and Social Sciences*, 6(11), 272–286. <https://doi.org/10.6007/ijarbss/v6-i11/2396>

IKS and Democratic Pedagogy: Beyond Heritage to Public Reasoning

Dr. Priyanka Sachdeva

Abstract

This paper reinterprets Indian Knowledge Systems (IKS) not as static cultural heritage but as a living tradition of dialogic and public reasoning with direct relevance for democratic pedagogy. Moving beyond content-centric approaches that reduce IKS to historical contributions, the study argues that its core value lies in practices such as *sastrartha*, Nyaya logic, and Buddhist deliberation, which cultivate structured debate, collective inquiry, and ethical reflection. Grounded in an interpretivist and critical framework, the paper brings IKS into dialogue with democratic and critical pedagogies to conceptualize classrooms as laboratories of democracy. Through philosophical analysis and illustrative lesson designs, it demonstrates how IKS-inspired methods can foster critical thinking, inclusivity, and shared reasoning in plural educational contexts. The paper also addresses ethical concerns regarding essentialism and politicization, emphasizing the need for adaptive, pluralist, and non-dogmatic integration of IKS. It concludes that approaching IKS as a method of public reasoning strengthens democratic education by training learners not merely to acquire knowledge, but to deliberate, listen across difference, and participate responsibly in collective truth-seeking.

Keywords: Indian Knowledge Systems (IKS), Democratic Pedagogy, Public Reasoning, *Sastrartha*, Dialogic Learning, Pluralism in Education, Critical Thinking, Ethical and Civic Education

Introduction

Every society carries within itself the seeds of wisdom. These seeds are not only found in books or archives, but also in the ways people have reasoned, debated, and taught across centuries. Indian Knowledge Systems (IKS) are one such reservoir of living wisdom. Too often, IKS is treated as heritage content- a static set of facts about Ayurveda, astronomy, or philosophy to be memorized and displayed as cultural pride. But to stop there would be to miss the real vitality of IKS. At its heart, IKS is not a museum piece but a method of reasoning, a practice of dialogue, and a habit of asking questions in community.

This paper asks: what happens if we bring IKS into the classroom not as frozen heritage but as a living practice of public reasoning? The proposal is simple yet radical. If democratic pedagogy is about building classrooms where students learn to deliberate, reason together, and listen to diverse voices, then IKS offers tools ready for this task. The dialogic method of *sastrartha* (structured debate), for example, is not merely historical but a model for democratic conversation. To see IKS in this light is to rediscover education as a shared search for truth, where heritage is not a limit but a springboard.

The problem, therefore, is not whether IKS should be taught, but *how*. Do we reduce it to content, or can we recover it as a living method of plural reasoning? The significance of this question is profound because classrooms today are not just sites of knowledge transfer, they are laboratories of democracy. In times of

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social polarization, to learn how to reason together is as urgent as learning mathematics or science. This paper argues that IKS, if approached as dialogic practice, can nurture this democratic imagination.

Literature Review

Scholars have long noted that the democratic classroom must move beyond rote learning toward participatory reasoning. John Dewey described education as ‘the fundamental method of social progress,’ arguing that learning occurs best through active engagement rather than passive memorization (Dewey, 1916). Similarly, Paulo Freire emphasized that education is never neutral; it either reinforces systems of domination or becomes a practice of freedom that empowers learners to think critically about their social realities (Freire, 1970).

Within the Indian intellectual tradition, there is also a long legacy of dialogic reasoning. The Upanishads are structured as conversations between teacher and student, using questioning as a method for discovering philosophical truth (Radhakrishnan, 1953). Buddhist councils institutionalized deliberation as a collective method of preserving and interpreting teachings (Gombrich, 1988). The Nyāya school formalized logical debate through well-defined rules of inference, while *sastrartha* in medieval India became a public forum where scholars tested knowledge through structured argumentation (Ganeri, 2001).

Modern scholarship on Indian Knowledge Systems (IKS) often emphasizes heritage value, highlighting historical contributions to mathematics, medicine, or linguistics (Rao, 2019). While valuable, this approach risks treating IKS as static or fossilized. Less attention has been given to how IKS methods such as debate, dialectics, and dialogic reasoning can inform contemporary pedagogy. Some educators have experimented with classroom practices inspired by these traditions, including philosophy courses structured around dialogue resembling *sastrartha*. However, systematic empirical studies remain limited, suggesting the need for deeper philosophical inquiry into IKS as pedagogy rather than merely content.

This debate is not without critics. Some scholars caution that incorporating IKS into modern classrooms may risk cultural essentialism or exclusion of non-Indian perspectives (Nussbaum, 2010). Others express concern about ideological misuse. These critiques highlight the importance of integrating IKS with humility, inclusivity, and openness to plural viewpoints. At the same time, the dialogic core of IKS aligns strongly with democratic pedagogy, which values discussion, participation, and critical reasoning (Biesta, 2006).

Research Foundation (Research Questions, Objectives & Guiding Propositions)

The central research question is: *How can IKS be employed as a living method for plural reasoning, scaffolding democratic pedagogy and public reasoning in contemporary classrooms?*

This question unfolds into three inquiries. First, what can we learn from *sastrartha* about structuring classroom deliberation? Second, how do IKS-infused lesson plans foster critical thinking, inclusivity, and shared reasoning? Third, what ethical implications arise when we bring IKS into public education, where plurality of faiths and worldviews must coexist?

The guiding proposition is that IKS is not merely cultural content but a living method of democratic inquiry. To treat IKS this way is to recognize its dialogic and deliberative modes as resources for building inclusive, participatory classrooms.

Research Framework

This study is grounded in an interpretivist paradigm. It seeks not universal laws but meaning- how IKS practices can be interpreted for modern pedagogy. It is also critical, questioning the dominance of Western pedagogical models and arguing for epistemic plurality. Finally, it is constructivist, seeing learners not as empty vessels but as active co-creators of knowledge.

The ontological assumption here is that knowledge is relational and dialogic. Epistemologically, learning is engagement, not absorption. Methodologically, this paper combines philosophical text analysis, design critique of lesson plans, and conceptual mapping of IKS practices.

The theoretical framework blends Dewey's democratic pedagogy, Freire's critical pedagogy, and Indian dialogic traditions. The conceptual framework is simple: IKS methods feed into lesson plans, which scaffold classroom deliberation, which in turn fosters democratic engagement and ethical reasoning.

Research Methodology

This study is qualitative, philosophical, and interpretive. It does not seek large-scale data but focuses on depth of meaning. The research design has three strands. First, philosophical analysis of classical texts and IKS methods like *sastrartha*. Second, critique of 2–3 lesson plans that consciously integrate IKS. Third, comparative analysis with Western pedagogies of dialogue and democracy.

The methods include textual analysis of classical debates, thematic analysis of pedagogical practices, and critical reflection. Ethical considerations are vital. Any invocation of IKS must avoid misrepresentation or appropriation. It must respect plurality and ensure inclusivity in classrooms.

Exposition (Analysis and Discussion)

The heart of this inquiry lies in understanding Indian Knowledge Systems (IKS) not merely as preserved traditions but as living methods of reasoning and inquiry (Rao, 2018). A classroom infused with IKS can be imagined as a dialogical space where knowledge is constructed collaboratively rather than transmitted hierarchically (Freire, 1970). In such a setting, a teacher may initiate learning through *sastrartha*, a classical Indian method of structured debate characterized by open-ended questioning and critical deliberation (Matilal, 1998). Students actively participate by presenting claims, citing textual and experiential evidence, and responding to counter-arguments, while the teacher facilitates rather than dictates conclusions (Dewey, 1916). The outcome is not consensus imposed by authority but a collective journey of reasoning where the process itself becomes the site of learning.

This pedagogical approach resonates strongly with democratic education. Democracy extends beyond electoral practices to include habits of public reasoning, respectful disagreement, and listening across differences (Gutmann, 1999). Through dialogical practices such as *sastrartha*, IKS provides a framework

for cultivating these democratic dispositions within classrooms (Sen, 2005). When students engage in structured debates, they are not only acquiring subject knowledge but also developing the skills necessary for participatory citizenship.

For example, in a lesson on environmental ethics, instead of presenting climate change as a fact to be memorized, a teacher might introduce hymns from the *Atharva Veda* that describe Earth as a nurturing mother deserving reverence and care (Bloomfield, 1897). Students can then deliberate on the ethical implications of this worldview, debating whether humans are stewards of nature or exploiters of its resources. When these discussions are enriched with contemporary scientific evidence and moral reasoning, students learn not only about environmental issues but also how to engage ethically and collectively with global challenges (UNESCO, 2017).

Consider a second lesson where the teacher introduces the Nyaya categories of knowledge-perception(*pratyakṣa*), inference(*anumāna*), comparison (*upamāna*), and testimony(*śabda*) as tools for structured reasoning rather than relics of ancient philosophy (Ganeri, 2001; Matilal, 1998). Students may be asked to analyze a contemporary media claim such as a viral news story, advertisement, or political speech. By examining how knowledge claims are justified and identifying logical fallacies, students apply Nyaya logic to distinguish valid reasoning from manipulation (Chakrabarti, 2010). In an age marked by widespread misinformation, such critical training supports democratic citizenship by enabling individuals to reason independently and resist deceptive narratives (Sen, 2005).

A third example can be drawn from Buddhist deliberative traditions. Historical Buddhist councils brought monks together to resolve doctrinal disputes through collective deliberation and consensus rather than coercion (Gombrich, 1988). When classrooms simulate such councils to deliberate on contemporary ethical dilemmas such as artificial intelligence governance or the expansion of animal rights- students learn patience, attentive listening, and shared decision-making (Keown, 2005). The emphasis shifts from winning an argument to achieving collective ethical clarity, reinforcing the idea that reasoning is both intellectual and moral.

Together, these examples illustrate the transformative potential of Indian Knowledge Systems (IKS)-infused pedagogy. Rather than reducing IKS to static heritage content names, dates, or doctrines this approach presents it as a living method of inquiry and engagement (Raina, 2016). Practices such as *sastrartha*, Nyāya inference, and Buddhist deliberation rehearse democratic habits by encouraging respectful disagreement, careful listening, and responsible argumentation.

Despite its promise, integrating IKS into contemporary education faces real challenges. Teachers may lack adequate training in these traditions, and institutions may fear that IKS integration risks cultural essentialism or political misuse (Nussbaum, 2010). The philosophical task, therefore, is to frame IKS inclusively as plural, dialogic, and critical rather than as dogmatic or nationalist. The goal is pedagogical renewal, not uncritical glorification of the past.

A comparison with dominant Western pedagogical models further clarifies this contribution. While many Western classrooms emphasize adversarial debate, where one side prevails over another, *sastrartha* is cooperative and truth-oriented (Matilal, 1998). The aim is illumination rather than persuasion. As *Amartya Sen* has argued, India's long argumentative tradition nurtures public reasoning and democratic dialogue (Sen, 2005). Far from being parochial, these traditions address universal educational and democratic needs.

In fact, we may argue that the greatest gift of Indian Knowledge Systems (IKS) to pedagogy is not its content but its method. It teaches that truth is not given but sought through collective reasoning, emphasizing inquiry over memorization (Ganeri, 2011). It shows that dialogue is not a technique but a way of life, central to philosophical and educational practice (Radhakrishnan, 1951). It reminds us that knowledge is not only to be possessed but also to be shared, tested, and co-created through discussion and debate (Sen, 2005). In this sense, to integrate IKS into classrooms is to honor democracy itself, for democracy, too, is never finished it is always in dialogue (Dewey, 1916).

To strengthen the argument, it is important to place IKS not in isolation but in dialogue with other philosophical traditions of pedagogy. John Dewey, for instance, described education as a ‘mode of associated living,’ where learning emerges through social interaction and shared inquiry (Dewey, 1916). For Dewey, classrooms are miniature democracies where students learn to deliberate, cooperate, and reason together. Similarly, Paulo Freire, in *Pedagogy of the Oppressed*, emphasized dialogue as the heart of education (Freire, 1970). He warned against the ‘banking model’ of teaching, in which students are treated as passive recipients of information, and instead proposed a dialogical model where teachers and students co-create knowledge.

If we compare these insights with *sastrartha*, we find striking resonances. Like Dewey, *sastrartha* treats reasoning as a communal act governed by shared norms (Matilal, 1998). Like Freire, it rejects passivity, insisting that learners actively question, argue, and respond. Yet IKS also offers something distinct. Dewey’s pragmatism and Freire’s liberation pedagogy were shaped by modern historical conditions such as industrial democracy and colonial oppression. *Sastrartha*, by contrast, evolved over centuries in monasteries, royal courts, and public assemblies, where the goal was not only social reform but the careful clarification of philosophical truth (Ganeri, 2011). Its rigor, codified through formal rules of debate, ensured disciplined reasoning rather than unstructured discussion.

This comparison reveals a powerful synthesis. From Dewey and Freire, we learn that pedagogy must be democratic, liberating, and socially engaged. From IKS, we inherit dialogic methods that emphasize logical discipline and ethical responsibility in argumentation. Together, these traditions offer a model of democratic pedagogy that balances freedom of thought with intellectual rigor an especially important goal for contemporary classrooms (Sen, 2005).

However, a potential critique remains. Is it realistic to transplant *sastrartha* a practice rooted in Sanskrit scholarship into modern, culturally diverse classrooms? This concern is valid. Yet the solution lies in adaptation rather than literal replication. The aim is not to reproduce ancient debates word for word, but to cultivate their underlying principles: structured dialogue, mutual respect, and reasoned disagreement. Just as Freire’s ideas have been adapted globally beyond their Brazilian origins, IKS methods too can be reinterpreted for modern education without losing their philosophical core (Freire, 1970; Ganeri, 2011).

Another challenge lies in inclusivity. Can Indian Knowledge Systems (IKS), often associated with Brahmanical traditions, truly serve plural classrooms that include Dalit, tribal, or minority perspectives? Scholars argue that this concern arises from a narrow reading of IKS rather than from its historical reality (Guha, 2007; Sen, 2005). Indian traditions of reasoning were never monolithic. The deliberative practices of Buddhist councils, the Jain principle of *anekantavada* (many-sidedness), and the dialogic traditions of the Bhakti movement all demonstrate plural reasoning within the Indian intellectual landscape (Bronkhorst, 2011; Cort, 2001). If IKS

is to support democratic pedagogy, it must therefore be interpreted through a pluralist lens that emphasizes diversity rather than hierarchy (Nussbaum, 2010).

At stake is a broader philosophical claim: knowledge is not owned by a single culture. Traditions of reasoning can travel, interact, and enrich one another through dialogue (Sen, 2009). Bringing IKS into conversation with thinkers such as John Dewey, Paulo Freire, and Amartya Sen exemplifies democratic reasoning in practice, where learning emerges through interaction rather than authority (Dewey, 1916; Freire, 1970).

Consider an environmental ethics lesson. While the exclusive use of Vedic hymns may appear exclusionary, combining them with Buddhist compassion, Jain non-violence, and modern scientific perspectives on climate change transforms the lesson into a pluralist exercise (IPCC, 2023). Students learn that ethical reasoning develops through the interaction of multiple viewpoints, illustrating public reasoning in action (Sen, 2009).

However, the ethical risks of politicization remain real. When IKS is framed as cultural pride rather than a dialogic method, it risks becoming dogmatic (Kumar, 2005). Democratic pedagogy must therefore emphasize openness and inquiry. Teachers should use tradition as a scaffold for questioning, not as an unquestionable authority (Dewey, 1938). In doing so, IKS contributes to the universal human project of collective reasoning.

As Martha Nussbaum reminds us, ‘education for democracy requires the cultivation of the narrative imagination’ (Nussbaum, 2010, p. 95). Through practices such as *sastrartha* (structured debate), students learn to inhabit different perspectives, test arguments, and arrive at shared understanding. This dialogic practice reflects the very foundation of democratic life.

Conclusion

This study set out to challenge the prevailing tendency to frame Indian Knowledge Systems as static cultural inheritance and argued instead for their recovery as living practices of public reasoning. By foregrounding dialogic traditions such as *sastrartha*, Nyaya debate, and Buddhist deliberation, the paper has shown that IKS contains pedagogical resources that align deeply with the aims of democratic education. When approached as method rather than mere content, IKS enables classrooms to function as spaces of shared inquiry, where knowledge is tested through dialogue, disagreement is disciplined by reason, and plurality is treated as a strength rather than a threat.

The analysis demonstrates that IKS-infused pedagogy does more than diversify curricular references. It reshapes the very structure of learning. Students trained in structured debate, ethical deliberation, and multi-perspectival reasoning acquire not only intellectual skills but democratic dispositions: listening across difference, arguing without domination, and seeking understanding rather than victory. In this sense, IKS contributes directly to the cultivation of public reason, a foundational requirement for democratic life in plural societies.

At the same time, the paper has acknowledged the ethical risks involved cultural essentialism, exclusion, and politicization. These dangers underscore a crucial condition for integration: IKS must be interpreted expansively and critically, in dialogue with other traditions of thought, rather than elevated as unquestionable authority. The pedagogical value of IKS lies precisely in its openness to contestation and its historical commitment to disciplined disagreement.

The broader implication is that democratic pedagogy need not be confined to a single intellectual lineage. By placing IKS in conversation with modern theories of democratic and critical education, this study affirms epistemic plurality as an educational virtue. Democracy, after all, is sustained not by uniformity of belief but by shared practices of reasoning.

Future work must therefore move beyond philosophical advocacy toward institutional practice: developing curricula that foreground dialogic methods, preparing teachers to facilitate structured deliberation, and conducting empirical studies on classroom outcomes. If education is understood as the ongoing formation of democratic habits, then reclaiming IKS as a living method of reasoning is not an act of nostalgia, but a forward-looking investment in democratic futures.

References

- Biesta, G. (2006). *Beyond learning: Democratic education for a human future*. Paradigm Publishers.
- Bloomfield, M. (1897). *Hymns of the Atharva-Veda*. Oxford University Press. <https://archive.org/details/hymns-of-atharvave00bloo>
- Bronkhorst, J. (2011). *Buddhism in the shadow of Brahmanism*. Brill.
- Chakrabarti, A. (2010). *Classical Indian philosophy of mind: The Nyāya dualist tradition*. State University of New York Press.
- Cort, J. E. (2001). *Jains in the world: Religious values and ideology in India*. Oxford University Press.
- Dewey, J. (1916). *Democracy and education: An introduction to the philosophy of education*. Macmillan. <https://archive.org/details/democracyeducati00deweuoft>
- Dewey, J. (1938). *Experience and education*. Kappa Delta Pi. <https://archive.org/details/experienceeducat00dewe>
- Freire, P. (1970). *Pedagogy of the oppressed*. Continuum. <https://archive.org/details/pedagogyofoppre00frei>
- Ganeri, J. (2001). *Indian logic: A reader*. Curzon Press. <https://archive.org/details/indianlogicreader>
- Ganeri, J. (2011). *The lost age of reason: Philosophy in early modern India 1450–1700*. Oxford University Press.
- Gombrich, R. (1988). *Theravāda Buddhism: A social history from ancient Benares to modern Colombo*. Routledge. <https://archive.org/details/theravadabuddhis00gomb>
- Guha, R. (2007). *India after Gandhi*. HarperCollins.
- Gutmann, A. (1999). *Democratic education*. Princeton University Press.
- IPCC. (2023). *Climate change 2023: Synthesis report*. <https://www.ipcc.ch/report/ar6/syr/>
- Keown, D. (2005). *Buddhist ethics: A very short introduction*. Oxford University Press.
- Kumar, K. (2005). *Political agenda of education*. Sage Publications.
- Matilal, B. K. (1998). *The character of logic in India*. State University of New York Press. <https://archive.org/details/characteroflogic0000mati>
- Nussbaum, M. C. (2010). *Not for profit: Why democracy needs the humanities*. Princeton University Press.
- Radhakrishnan, S. (1951). *Indian philosophy* (Vol. 1). George Allen & Unwin. <https://archive.org/details/indianphilosophy01radh>
- Raina, D. (2016). *Needham, Joseph*. Oxford University Press. <https://doi.org/10.1093/obo/9780195399318-0197>
- Rao, K. R. (2019). *Indian knowledge systems: Past, present and future*. DK Printworld.
- Rao, S. (2018). *Indian knowledge systems: Concepts and applications*. PHI Learning.
- Sen, A. (2005). *The argumentative Indian: Writings on Indian history, culture and identity*. Farrar, Straus and Giroux. <https://archive.org/details/argumentativeind00sena>
- Sen, A. (2009). *The idea of justice*. Harvard University Press.
- UNESCO. (2017). *Education for sustainable development goals: Learning objectives*. <https://unesdoc.unesco.org/ark:/48223/pf0000247444>

Integrating Reader Response Theory to Enhance Pre-Calculus Conceptual Understanding

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Abstract

This action research examined the effects of incorporating Reader Response Theory (RRT) into mathematics instruction to improve conceptual understanding among 84 Grade 11 STEM students at Talisay Senior High School. Addressing issues of rote memorization and superficial learning in mathematics, the intervention utilized narrative-based activities, such as problem-solving stories and mathematical journaling, to foster personal connections with the material. Quantitative data from pre- and post-tests indicated a significant enhancement in conceptual understanding. Qualitative findings from focus group discussions and analysis of student journals corroborated these results, revealing deeper engagement with the content and greater relatability of abstract concepts through the narrative approach. Students also found journaling effective for reflecting on their understanding and misconceptions. The study concludes that integrating RRT effectively promotes deeper engagement and improved conceptual understanding in Pre-Calculus education.

Keywords: Conceptual understanding, Focus Group Discussions, Mathematical Journaling, Narrative-Based Problem Solving, Reader Response Theory

Context and Rationale

Pre-Calculus teaching often falls within a positivist approach, treating mathematical concepts as objective truths that students are required to learn through memorization and repetitive practice. This emphasis results in “procedural knowledge without insight,” where learners can handle equations or plot functions but do not understand the deeper connections involved, such as how a function’s algebraic expression relates to its graphical representation (Adamon & Tan, 2018). This lack of conceptual understanding-the ability to link ideas and adapt them as needed-has been recognized as a significant barrier to success in higher-level mathematics, since students typically do not have the cognitive frameworks necessary to transition from specific procedures to more abstract reasoning (Khoule et al., 2017).

In the Philippines, mathematics education encounters significant challenges: students often find it difficult to progress beyond mere rote memorization of formulas and procedures, resulting in a limited comprehension of fundamental concepts (Capulong et al., 2020). This issue is particularly evident at the high school level, where abstract topics in algebra, geometry, and calculus necessitate a more profound conceptual understanding. Traditional instructional methods, which frequently emphasize lecture-based teaching and procedural drills, do not effectively foster the cognitive and emotional engagement essential for genuine learning. Consequently, these approaches can create a daunting educational atmosphere, where students perceive the subject matter as disconnected and inaccessible, viewing it as a series of impersonal rules (Tan, 2019).

The absence of conceptual understanding hinders students’ ability to apply mathematical knowledge to real-world situations and stifles the development of critical thinking skills (Orbillosa & Cruz, 2021). Integrating

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Reader Response Theory (RRT) is an effective method for bridging this conceptual gap by using a constructivist approach that allows for personal interpretation and meaning-making of the “text.” This approach aligns with one of the fundamental tenets of the theory: meaning is derived not from the text itself but through the dynamic interaction between the reader (the student) and the text (the mathematical material) (Spirovska, 2019). By redirecting the educational emphasis from simply seeking the “correct” procedure to exploring how students personally interpret a problem, RRT promotes a deeper understanding of concepts. When students express their initial uncertainties, relate new theorems to what they already know, or contemplate graphical representations in a “math journal,” they are engaging in a process of meaning-making that is crucial for comprehending abstract concepts (Bautista et al., 2022). Additionally, RRT acknowledges students’ unique viewpoints-encompassing their prior experiences, intuitions, and initial confusions-fostering a supportive learning atmosphere. This methodology is essential for alleviating mathematics anxiety and discouraging passive learning, both of which are often linked to inadequate conceptual outcomes, by validating the challenges students face and encouraging them to reflect on and articulate their thought processes (Khoule et al., 2017; Setyaningrum et al., 2025). Ultimately, RRT offers a framework for students to meaningfully connect mathematical concepts, which is critical for building the foundational understanding necessary for success in Pre-Calculus and beyond (Siregar & Siagian, 2019).

Innovations, Interventions, and Strategy

This action research utilized innovations and strategies based on Reader Response Theory to improve conceptual understanding in mathematics.

Narrative-Based Problem Solving

- a. This strategy entails transforming conventional math word problems into relatable narratives that align with students’ experiences or interests. The aim is to shift from a mere “find the numbers and solve” methodology to one that promotes comprehension of the problem’s meaning. This approach is supported by Bressi’s (2018) assertion that narratives link abstract concepts to real-life contexts.

- b. *Example: The Solar Concentrator*

Students read a short story about an inventor trying to harness solar energy using a parabolic mirror.

Narrative Element	Mathematical Task
The Setup: The mirror is 80 cm wide and 10 cm deep. The inventor needs maximum heat.	Find the Focus: Determine the coordinates of the focus (0, p) and write the standard equation of the parabola, $x^2 = 4py$
RRT Response: Students write a quick note on what the “focus” means in the story (the goal, the highest power) versus in the equation the coordinate (0, p).	Justification: Explain why finding the focus mathematically guarantees the highest concentration of light.

Mathematical Journal

- a. This strategy allows students to express their thoughts and feelings about math, fostering metacognition beyond mere problem-solving. Supported by Diaz & Reyes (2020), it deepens emotional engagement with the material.

Example: Defining the Directrix

Students reflect on the abstract definition of the parabola.

Journal Prompt “The Line of Opposition”: The Directrix is defined as the fixed line equidistant from every point on the parabola as the Focus is. Write a journal entry titled “My Life as a Directrix.”	Required Reflection Articulate Meaning: Explain the Directrix’s purpose using a metaphor (e.g., an “anchor,” a “measuring stick,” or a “line of absolute equality”). Why is its existence necessary for the curve to form?
RRT Goal: The reflection moves beyond the equation ($y^2 = -4p$) to explore the role and relationship of the concept, enabling a deeper, personal interpretation of the mathematical “text.”	

1. **Dialogue and Collaborative Interpretation** Classroom activities fostered collaboration and varied interpretations of math concepts. Instead of adhering to a single method, students shared and justified their problem-solving strategies, enhancing their learning ownership and reflecting Rosenblatt’s (1978) transactional model of reading, which highlights the shared creation of meaning.

Example: Vertex and Standard Form

Groups analyze two mathematically equivalent ways to represent the same parabola.

Scenario Two Equations: Group A has $(x-3)^2 = 8(y-1)$ and group B has . They represent a water fountain	Discussion Task Collaborative Interpretation: Discuss which form (Standard/Vertex vs General Quadratic) is the “easiest to read” for finding vertex and the focus. Negotiate the census.
RRT Goal: The dialogue requires students to justify their preference, demonstrating that while the mathematical truth is fixed, the interpretation and usability (the “reading” experience) of the algebraic form can vary based on the task and the reader.	Consensus Report: The group writes a sentence on how the different forms serve different “reading purposes.”

Action Research Questions

This research sought to address these questions:

1. How did the integration of Reader Response Theory affect the Grade 11 STEM students’ conceptual understanding of key Pre-Calculus topics?

2. What were the students' views and experiences related to the use of narrative-driven activities and mathematical journaling in their mathematics education?
3. How did the application of Reader Response Theory affect the students' involvement and attitudes towards mathematics?

Action Research Methods

a. Participants and/ or other Sources of Data and Information

The study involved 84 Grade 11 STEM students from Talisay Senior High School. Participants were chosen from two intact classes to ensure that the intervention could be effectively implemented within a standard classroom environment.

b. Data Gathering Method

1. **Pre-Test:** All 84 participants took a pre-test to evaluate their initial understanding of the chosen pre-calculus topics.
2. **Interventions:** Over an eight-week period, RRT-based interventions, which included narrative-based problem-solving and mathematical journaling, were conducted during regular class sessions.
3. **Data Collection:** Throughout the intervention, student journals were consistently gathered and analyzed.
4. **Post-Test:** A post-test, which was identical to the pre-test, was administered to assess the students' conceptual understanding following the intervention.
5. **Focus Group Discussion (FGD):** After the post-test, two distinct FGDs were held with a purposely selected group of 10 students each to collect detailed qualitative insights about their experiences.

c. Data Analysis Plan

Quantitative Data: The pre-test and post-test scores underwent analysis using descriptive statistics (mean and standard deviation) alongside inferential statistics (paired-sample t-test) to evaluate whether a statistically significant difference in conceptual understanding existed before and after the intervention.

Qualitative Data: An analysis of the data obtained from focus group discussions and student journals was conducted through thematic analysis. The researcher discerned prevalent themes, patterns, and categories that pertain to students' perceptions, experiences, and attitudes. Direct quotations from participants were incorporated to substantiate the identified themes.

Discussion of Results

Table 1 Pre-Test and Post-Test Results		
Pre-Calculus Topic	Pre-Test (Mean)	Post-Test (Mean)
Circle	3.5	4.8
Parabola	2.8	4.5
Ellipse	3.1	4.6
Hyperbola	2.5	4.1
Series	3.0	4.7
Sigma Notation	2.9	4.4
Mathematical Induction	3.2	4.8
Binomial Theorem	3.4	4.9
AVERAGE	3.05	4.65

The quantitative analysis of the pre-test and post-test scores showed a statistically significant enhancement in the overall conceptual understanding of 84 STEM 11 students after implementing narrative-based problem solving. The research undertaken by Chen et al. (2023) identified a significant relationship between mathematics reading proficiency and value-added performance in mathematics. It was observed that students who exhibited stronger mathematics reading abilities attained greater value-added outcomes, indicating that effective reading skills are essential for sustained progress and comprehensive success in the field of mathematics.

The analysis indicates a statistically significant difference between pre-test and post-test scores after implementing the interventions, with a p-value of 0.000, which is lower than the significance threshold of 0.05. Korkheili et al. (2024) have demonstrated in their research that integrating reading strategies with working memory instruction improved fundamental math skills and enhanced students' problem-solving abilities. This improvement is linked to students' increased capacity to understand and process mathematical texts, including problems and notations.

Table 2		Test of Significant Difference between Pre-Test and Post-Test Results							
Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	PRE-TEST and POST-TEST	-1.550	0.131	0.046	-1.659	-1.441	-33.484	7	0.000

This research supports the connection between reading-centered teaching approaches and success in mathematics. Although not explicitly rooted in Reader Response Theory (RRT), the incorporation of reading strategies into math instruction reflects RRT's focus on the active role of the reader in making meaning from texts, which is essential for deeper understanding in problem-solving situations.

Moreover, a study by Baful & Derequito (2022) in a literary context found that the Reader Response Strategy contributed to advancements in three of four key competencies: defining, classifying, and drawing conclusions. RRT also successfully engaged both cognitive and emotional aspects of learners, resulting in heightened interest.

A solid grasp of mathematical concepts fundamentally depends on the ability to define concepts, classify examples, and make reasoned conclusions. Since this study indicates that RRT boosts these vital skills, it provides compelling evidence that utilizing RRT's methodology-such as active interpretation, personal connection, and evidence-based responses-in mathematics will similarly enhance the cognitive processes necessary for a profound understanding of concepts.

The ability to read mathematics-encompassing the interpretation of problems, diagrams, and mathematical symbols-is an active process similar to the transactional reading described by RRT. This study confirms that a high level of engagement with mathematical texts, as promoted by RRT, has a positive effect on achievement, which is an important result of a thorough conceptual understanding.

Qualitative Findings

The qualitative data from the focus group discussions and student journals corroborated the quantitative findings.

1. **Theme1: Personal Connection and Relatability:** Students indicated that the narrative-based approach rendered mathematics more tangible. One student noted in their journal, "The budget story helped me understand how linear equations apply in real life, rather than as merely 'x' and 'y'." Another participant stated, "Previously, math seemed like just numbers; now, it resembles a comprehensible story."
2. **Theme2: Deeper Understanding and Reflection:** The mathematical journaling process promoted enhanced cognitive engagement. Students expressed their confusion, paraphrased concepts, and incorporated diagrams in their journals to reinforce understanding. A frequent observation was that "writing it out clarified my errors." This reflective practice enabled deeper comprehension beyond surface-level knowledge.

3. **Theme3: Reduced Anxiety and Increased Engagement:**

Participants reported diminished anxiety regarding mathematics. The RRT approach, which fostered personal interpretation and collaborative discussion, contributed to a more supportive learning atmosphere. One student remarked, "I used to hesitate to ask questions, but sharing our 'stories' made it safe to be incorrect." This shift in mindset resulted in higher levels of participation and engagement in class.

Discussion

The notable quantitative enhancement in conceptual understanding substantiates the effectiveness of integrating RRT strategies as a pedagogical approach in Pre-Calculus instruction. The results corroborate the idea that positioning students as active “readers” who engage with the mathematical “text” enables instruction to transcend the confines of the conventional procedural-based model (Andamon & Tan, 2018). The qualitative data offered essential insights into the nature of this learning process. The requirement for students to articulate and justify their interpretations in journals and discussions compelled them to partake in higher-order thinking and the pursuit of meaning, which are foundational to achieving true conceptual mastery (Bautista et al., 2022). In particular, the observed decrease in anxiety and the rise in student engagement, consistent with prior research (Khoule et al., 2017), indicate that RRT effectively mitigated the emotional obstacles typically associated with the complexities of Pre-Calculus content. This transactionally oriented instructional model has demonstrated itself to be a practical and influential method for fostering critical thinking and establishing a solid conceptual foundation for advanced studies in STEM fields.

Conclusion

The findings indicate that employing Reader Response Theory significantly enhances conceptual understanding of mathematics among Grade 11 STEM students. This study demonstrates that perceiving mathematics as a narrative to be actively interpreted, rather than a collection of rigid rules, leads to notable improvements in both test scores and learning experiences. The approach fosters personal connections with the content, promotes deeper reflection, and positively influences students’ attitudes toward mathematics. This research presents a valuable alternative to conventional procedural instruction and underscores the importance of emotional and cognitive engagement in STEM education.

Recommendations

Based on the findings of this action research, the following recommendations are proposed:

The findings of this action research suggest that the school administration should officially adopt the RRT-integrated method for all foundational mathematics courses, such as Pre-Calculus and Basic Calculus, in the Senior High School STEM Track. It is recommended that training sessions and workshops be organized for all mathematics teachers to focus on the practical application of RRT strategies, which should include guidance on how to effectively assess and provide constructive feedback on Transactional Math Journals. Additionally, instructional materials should be updated to feature RRT-aligned tasks, incorporating specific sections for “Conceptual Interpretation” or “Meaning-Making Reflection” within existing modules. Future action research could investigate the long-term effects of RRT on students’ performance in subsequent courses like Basic Calculus, as well as its effectiveness across various learning styles.

References

- Andamon, M., & Tan, D. (2018). Conceptual understanding: A step to enhancing mathematics achievement. *International Electronic Journal of Mathematics Education*, 13(3), 415-424.
- Baful, R. C., & Derequito, F. O. (2022). Using reader response strategy and affective learning domain in teaching literature to enhance critical thinking. *International Journal of Educational Management and Development Studies*, 3(4), 553-569.
- Bautista, R. A., Barlis, E. G., & Pascua, S. L. (2022). Using Reader Response Strategy and Affective Learning Domain in Teaching. Literature to Enhance Critical Thinking. *International Journal of Education, Culture and Society*, 7(2), 99-108.
- Bressi, R. (2018). The narrative arc of problem-solving: A new approach to teaching mathematics. *Journal of Mathematical Education*, 15(2), 45-60.
- Capulong, M., Dizon, T., & Javier, K. (2020). Conceptual understanding and problem-solving skills of senior high school students in mathematics. *Philippine Journal of Education*, 25(3), 112-128.
- Chen, T. H., Chuang, H. H., & Chen, J. M. (2023). A study on differential effects of mathematics reading ability on students' value-added mathematics achievements. *Educ. Sci.*, 13(9), 754. [DOI: 10.3390/educsci13090754]
- Diaz, L., & Reyes, F. (2020). Journaling as a tool for metacognition in mathematics. *International Journal of STEM Education*, 7(1), 1-12.
- Khoule, G. P., Govender, N., & Ndlovu, M. C. (2017). The effect of teaching conceptual knowledge on students' achievement, anxiety about, and attitude toward mathematics. *Eurasia Journal of Mathematics, Science and Technology Education*, 13(9), 6061-6076.
- Kordkheili, A. S., Alizadeh, S., & Ghorbanpour, M. (2024). Teaching mathematics based on integrating reading strategies and working memory in elementary school. *Athens Journal of Education*, 11(1), 9-22. [DOI: 10.30958/aje.11-1-1]
- Orillosa, J., & Cruz, R. (2021). Rethinking mathematics pedagogy in the K-12 curriculum. *Journal of Philippine Education*, 40(1), 5-20.
- Rosenblatt, L. M. (1978). The reader, the text, the poem: *The transactional theory of the literary work*. Southern Illinois University Press.
- Setyaningrum, W., Sutarto, H., & Pratikno. (2025). A Study of Students' Mathematical Concept Understanding Ability: Learning Anxiety and Independence in Learning Mathematics. *International Journal of Mathematics. International Journal of Multidisciplinary Research (IJFMR)*, 7(1), 143-155.
- Siregar, Y., & Siagian, P. (2019). The ability to connect mathematical concepts meaningfully as essential for students in every level of education. *Journal of Education and Learning (EduLearn)*, 13(4), 546-553.
- Spirovska, E. (2019). Reader-Response Theory and Approach: Application, Values and Significance for Students in Literature Courses. *SEEU Review*, 14(1), 188-203.
- Tan, M. (2019). Student attitudes towards mathematics and their impact on learning outcomes. *Journal of Asian Education*, 12(2), 78-94.

Institutional Differences in Role Conflict Dimensions among Special Education Teachers: A Comparative Analysis

Dr. Anita Kumari

Abstract

The present research paper aims to examine the comparison of Role conflict between special educators teaching in public and private schools. The cross-sectional method has been applied in the study, and the research design adopted is descriptive in nature. Purposive sampling has been applied for selecting 200 teachers from government and private schools. Standardized tools for the assessment of Teacher's role conflict have been applied in the study. The collected data has been analyzed by applying SPSS, Mean, Standard deviation, t-test, and P-value, for testing the hypothesis in data analysis. The findings indicate that there is no significant difference in the role conflict faced by government and private special educators in schools, and all types of teachers are facing the same level of role conflict in varied ways. However, a significant difference was observed between work conflict and family conflict in both types of school education teachers. The suggestions emanating from this research comprises of school administration and education authorities should organize stress management workshops, and conferences, and recruit psychologists/counsellors for consultancy so that the teachers can cope with their role conflict.

Keywords: Role Conflict, Special Educator, Inclusive Education, Public School, Private School.

Introduction

Role conflict arises when an individual is asked to meet unrealistic targets which are not compatible with their workplace and household responsibilities. It happens when employees try to perform duties as per the multiple roles they have to perform. Moreover, these employees are asked to perform duties of different nature. The problem of role conflict can occur over a longer period, and it can also have a inter-linkage with situations (Creary & Gordon, 2016).

The role conflict experienced by teachers in schools is a complex and multifaceted issue. It takes place due to the various societal expectations and demands placed on educators and within the educational system ("Interpersonal relationship," 2022). Role conflict is a situation where a person has to deal with incompatible or contradictory expectations or demands from different roles that they hold. There are various types of roles such as societal expectations and demands placed on educators' conflict, such as intra-role, inter-role, person-role, and role overload. Intra-role conflict occurs when there are conflicting expectations within the same role ("Role conflict," 2023). Human motivation for achieving success and the stress that emanates from two powerful, unrealistic expectations that compete with each other leads to conflict. Based on case studies and surveys, role conflict has been linked to effects on interpersonal relationships and individual personality traits. When the "facet of a person's personality conflicts with other facets of that same person's personality," personality role conflicts gives rise to individual personality characteristic conflicts.

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Interpersonal relationships “having a relationship between two or more individuals that range from fleeting to enduring, which leads to role conflict,” (Kozlowski & Ilgen, 2006).

Role conflict occurs when there are unrealistic demands placed upon an employee concerning their job or position. The employees experienced role conflict when they find themselves pulled in multiple directions, as they try to respond to the multiple roles. It is either for a short duration, or a longer duration, and it can also be connected to different situations. Therefore, it can be inferred that role conflict takes place when there are contradictory pressures on an employee relating to their different roles.

Private Schools/Institutions

The state contributes little or no financial assistance to the private organizations that are in charge of private schools. These schools have their administration, rules, and requirements that must be met. These educational institutions impose fees on students as per the policies of their private organizations and management committees. They charge relatively higher fees from the parents of their pupils (Sengupta et. al., 2019).

Public Schools

These schools are also known as public schools. These schools charge lesser school fees as all financial grants come from the government, in comparison to the private schools. In consultation with the education ministry, the government prepares the curriculum standards and policies to be implemented in these schools.

Special Education Teachers

These teachers teach on the areas of; intellectual disabilities, deaf-blindness, language disorders, hearing impairment, autism disability, multiple disabilities, orthopaedic, etc. Also, these teachers work with students of all age groups, who have a variety of psychological or physical issues, as well as learning or intellectual challenges is concerned. In addition to attending their pupil’s specific requirements, they must oversee and encourage their development. Their educational qualification includes a Diploma in Special Education (DISE), B.Ed., M.Ed., in special education. These teachers are teaching in special schools and inclusive schools in the government and private sector (RCI Academic Reports, 2016).

Family Conflict: The term “family conflict” describes the strain, argument, or discord that develops among family members. Arguments, miscommunications, or even physical altercations may occur during this dispute, which can be brought on by a variety of things including disparities in personalities, values, views, or lifestyles (“Sociological Perspective,”2016).

Special School: A special school is an educational establishment created especially to offer resources, support, and instructions that are suited to the requirements of children with special education challenges. In order to address different physical, behavioural, intellectual, emotional issues, these schools provide customised teaching techniques, specialised programs, trained staff, and modified facilities, etc. The main objective is to establish an atmosphere that allows every student to grow and learn as much as possible.

Contribution of Special Education Teachers in Inclusive Classroom

The classroom ambience of school's teaching pedagogy should be systematically designed to provide every student with best learning opportunities in order to attain inclusion. In this regard, both types of teachers should work as a team, be receptive to philosophy of inclusiveness. They should be supported by the administration, and the teachers should be sensitive about meeting the wants of the children with disabilities.

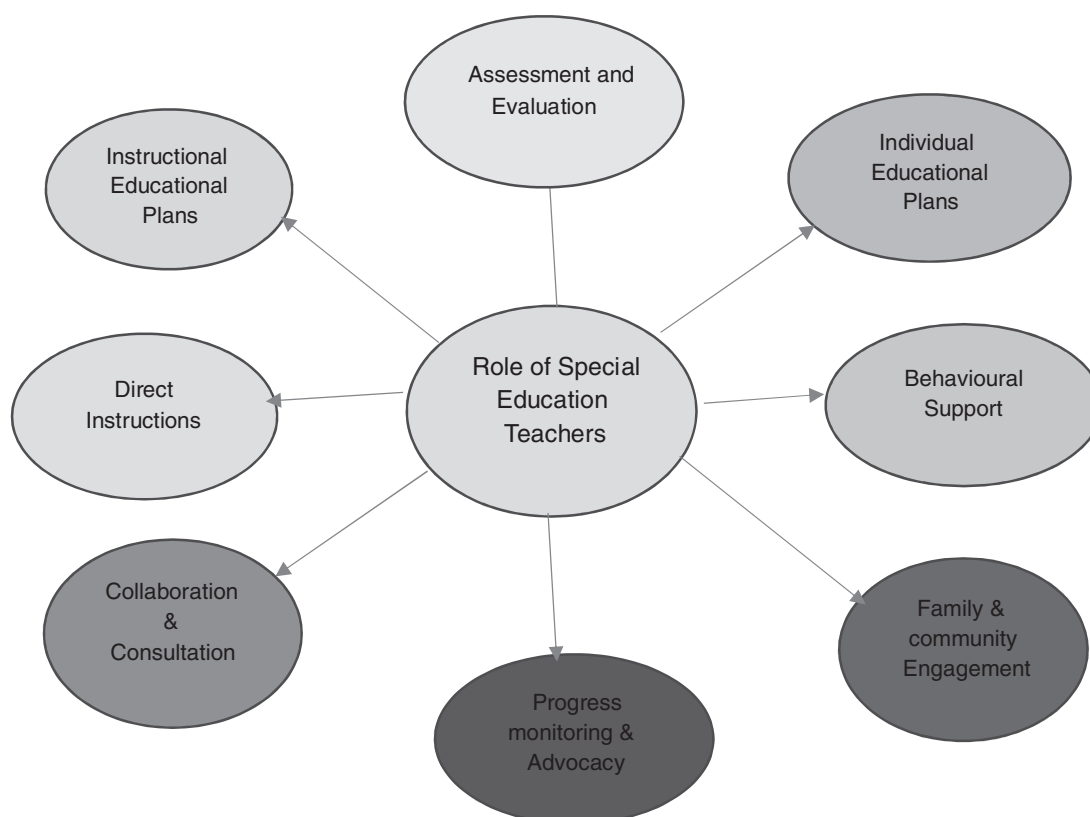


Figure 1.1 Role of Special Education Teacher

Challenges faced by Special Educator Teachers in the Classroom Setting:

These types of teachers contributed tremendously by providing support and ensuring the academic achievement of students with diverse learning requirements, disabilities, and exceptionalities. However, these educators are often confronted by numerous barriers that can impede their effectiveness and the progress of their students (Weiss et. al., 2014, Peter and Nderitu, 2014, Feldman and Denti, 2017). The major obstacles faced by these teachers is how to address the diversity of student needs within their classrooms (Peter and Nderitu, 2014, Feldman and Denti, 2017). Students with special needs can have a wide range of learning styles, cognitive abilities, physical limitations, and social-emotional challenges, which can make it challenging for teachers to design and implement their directions that effectively meets the particular needs of each student (Peter and Nderitu, 2014, Weiss et al., 2014).

Rationale and Significance of the Study:

Due to the complexity and demands of their jobs, special education teachers' issues have drawn more attention. Role conflict has become one of these issues, especially when it comes to the aspects of work and family conflict. Teachers who must manage the demanding demands of their job with their domestic duties frequently experience role conflict, which is when the expectations of one position get in the way of meeting the obligations of another.

They have less access to facilities, such as fewer resource rooms and, a well-equipped laboratory, other facilities, etc. With fewer training centers, fewer job opportunities, and no permanent vacancies in schools, they faced subtle discrimination at the hands of their colleagues.

The purpose of this study is to compare the role conflict experiences of special education teachers in public and private schools, with an emphasis on the ways in which work-family conflict appears in each context. It is essential to comprehend these distinctions in order to create focused support networks, enhance the wellbeing of educators, and eventually improve the academic performance of students with special needs.

Review of Literature:

The review of literature conducted for the research paper is discussed as follows:

Kaur and Kaistha (2020) conducted a study intended to assess job participation and role conflict among elementary school teachers of Punjab. The study comprised of 72 elementary school instructors. Primary data was gathered by applying job participation and role conflict scales. According to the study's findings, instructors' job participation does not change based on gender roles, role conflict among teachers varies significantly. A favourable association was observed between occupational participation and role conflict.

Kumar and Manjunath (2022) determined how role conflict in multiple dimensions influenced the professional growth of teacher educators. The researcher randomly selected 360 teacher educators from various teacher training institutes affiliated with Bangalore and Mysore University. They were administered role conflict and professional development scales. Data was processed using correlation and regression. Pearson's product and moment correlation coefficients revealed total role conflict scores were strongly and negatively connected to all aspects of professional growth, including overall professional development scores. Family-related conflict, self-conflict, work-related conflict, professional growth-related conflict, health-related conflict, and social-related conflict variables all significantly predicted the professional development of teacher educators (63.9%).

Mantry & Pradhan (2023) studies the level of role conflict among government higher secondary school teachers in Jammu municipality based on their gender, academic stream, and teaching experience. The descriptive survey method was used in the current investigation. The data were gathered from 200 teachers using the convenience sample method. The responses were gathered using a standardised measure called the 'Teacher's Role Conflict Scale, '. The main findings demonstrate that there is a difference in the role conflict of senior secondary school teachers with respect to their teaching.

Singh (2024) explored the effects of role conflict, professional dedication, and job satisfaction on teacher educators. The purpose of this study was to determine the effect of role conflict on professional dedication

and job satisfaction. This study included 100 teacher educators who had taught in B.Ed. course in colleges located in Kanpur. Descriptive research design was used. The data gathering instrument was a questionnaire. The finding was that role conflict was significantly associated with job happiness, neither role conflict nor job satisfaction were significantly associated with professional dedication. Job satisfaction served as an indirect mediator between role conflict and professional engagement.

Research Objectives:

The primary objectives of this study are outlined as follows:

1. To compare the level of role conflict between male and female special education teachers in schools.
2. To examine the differences in role conflict among special education teachers working in public and private schools.
3. To compare the extent of family conflict experienced by special education teachers employed in government and private schools.
4. To analyze the differences in work-related conflict among special educators working in public and private schools.

Hypotheses of the Study

1. (**H₀₁**): There is no significant difference in the level of role conflict between male and female special education teachers.
2. (**H₀₂**): There is no significant difference in the level of role conflict between public and private school special education teachers.
3. (**H₀₃**): There is no significant difference in the level of family conflict between government and private school special education teachers.
4. (**H₀₄**): There is no significant difference in the level of work-related conflict between public and private school special educators.

Research Methodology

Data Collection: Before collecting data, the researcher took permission from the District Education Officer of Chandigarh (U.T.) to collect data from teachers of different Government Schools and Private schools of Chandigarh (U.T.), and some NGOs. The primary data for the study was collected by the investigator herself. Also, permission was sought from various school's Principals and Directors, and thereafter, then the investigator approached the teachers.

The research design for the study was descriptive. Data was collected from 30 schools located in Chandigarh UT. A sample of 200 teachers from public and private schools of Chandigarh were chosen for the study. Purposive sampling was used to gather the data. Data was gathered by the researcher from teachers at private special education schools and institutions as well as from government special education facilities.

The study is based on quantitative data and applied descriptive methods. Role conflict level was measured by arithmetic mean, standard deviation, and inferential statistics (T-test), and testing for hypothesis (P-test). Subsequently, the data collected was analyzed and processed through the Statistical Package for Social Science (SPSS). The research investigator used the teachers' role conflict scale, which comprised of various dimensions. Role conflict, gender, work conflict, and teaching experience are measured using the arithmetic mean, standard deviation, inferential statistics (T-test), and hypothesis testing (P-test). The data collection was analyzed and processed through the Statistical Package for Social Science (SPSS). The primary data had been collected from special schools such as Prayas Rehabilitation Center for Special Children, Government Rehabilitation Institute for Intellectual Disabilities (GRIID), Vatika High School for Deaf & Dumb, IIAHP (Autism Treatment Centre), Sorem School (Society for Rehabilitation Mentally Challenged), and some government schools. The researcher gathered information from 100 special education teachers spread all over schools, located in Chandigarh. The private schools included Ankur School, D.A.V Model School, Shivalik Public School, The Tribune School, Doon International School, D.A.V Public School, Ishwar Singh Dev Samaj Senior Secondary School, Sri Guru Harkrishna Model, and Saint Xavier's School, Moti Ram Arya School, etc.

Variables: The researcher has used two types of variables. The school teachers were independent variables, and role conflict dimensions, like family conflict, work conflict, are dependent variables.

Tools: Madhu Gupta and Indu Nain constructed, standardized, and validated teacher's role conflict scale. It consisted of 28 items related to dimensions such as Family Conflict, Work Conflict, Professional Growth Conflict, Self-conflict, Health Conflict, and Social Conflict, etc. A five-point scale is used with responses such as Always, Frequently, Rarely, Never, and Not Applicable, with corresponding scores of 4,3,2,1,0, respectively.

Reliability of the Scale: The scale's reliability was computed using the test-retest method with N=100 and a gap of 4 weeks. The test-retest reliability for various dimensions varies from .64 to .77.

Validity of the Scale: The unanimity of 20 judges about the items was taken as an indicator of the face validity of the scale. For content validity, the dimensions were administered to twenty experts to assess the relevance of the items to the category to which they belonged. Items having 80% of agreement were selected. The inter-dimensional coefficients of the scale are significantly high. The correlation coefficients between the dimensions of TRCS ranged from .523 to .797.

Limitations of the Study

Despite the significance of the findings, the study is subject to the following limitations:

- **Sample Size:** The study included a sample of 200 special education teachers.
- **Time Constraints:** The data was obtained within six months, which may have contributed to the limited options for longitudinal analysis.
- **Participants:** The study only included special education teachers as participants. As a result, the findings may not apply to general education teachers.

- Education Levels Covered: The study focused on instructors teaching at the preparatory to middle school levels.
- Sampling Method: The participants were chosen through a purposive sampling technique.

Interpretations of Results

Table 1 Comparison of Role Conflict between Male and Female Special Education Teachers in Schools							
Role Conflict	Gender	N	M	SD	t-value	p- value	Remarks
	Male teachers	62	12.4084	7.19615	-.615	.539	Not significant
	Female teachers	138	12.7174	7.08446	-.611	.542	

As per the above Table No. 1, female special education teachers are more than male teachers. The statistical analysis depicts the differences between the male and female special education teachers in schools. The obtained value of the mean of the male special educator teachers is 12.4084, and the female special educators' mean value is 12.7174; it is a statistically minor difference, which suggests that both male and female special educators experienced nearly the same average level of role conflict. In practical terms, gender does not appear to significantly influence the perceived role conflict among special education teachers in the sample under study. Both groups faced similar pressures, expectations, and possible role-related stressors in their work environments. The standard deviation is 7.19615 of male teachers and the female special educators' standard deviation value is 7.08446. It implies that both groups revealed a moderate and nearly equal range of role conflict. Therefore, the p-value is .539. The null hypothesis is rejected as the p-value of .539 is higher than the significance level of 0.05. This implies that there is no significant difference observed between male and female teachers in special schools. Both types of teachers faced the same levels of role conflict.

Table 2 Comparison of Role Conflict between Public Special Education and Private Special Education Teachers					
	M	SD	t-value	p-value	Remarks
Public Special Educators (100)	56.0000	14.43481	1.458	.146	Not Significant
Private Special Educators (100)	53.0500	14.18306			

Table No. 2 depicts that in group statistics analysis, the role conflict between the Public Special Educator Teachers and Private Special Educator Teachers in school has been analysed. The obtained value of the mean of public special Educators is 56.0000 and the private special educators' mean value is 53.0500, which indicates that the public-sector special educators are experiencing slightly higher pressures or conflicting demands in their roles. The standard deviation of public special educators' value is 14.43481, or the private special educators' value is 14.18306. It was observed that the degree to which individual teachers' experiences deviate from their group's average is effectively the same, indicating comparable diversity of experience

within each sector. Therefore, the null hypothesis is accepted as the p-value of .146 is greater than the significance level of 0.05. It implies that there is no significant difference in role conflict between the public and private special education teachers in schools. Both school teachers are experiencing the same intensity of role conflict.

Table 3 N, Mean, Standard Deviation, and p-value of Work Conflict between Public and Private School Special Educators Teachers						
Work Conflict	School Type	N	M	SD	t-value	Sign (2-tailed)
	Public Educators	100	7.2600	2.08796	-4.237	.000
	Private Educators	100	9.2000	2.47436		

It is evident from the Table No. 3 that the work conflict of public teachers mean value is 7.2600 and the work conflict of private school teachers mean value is 9.2000. It revealed that private educators experienced a higher level of work conflict on an average compared to public educators. Work conflict can include disagreements with colleagues, lack of support, or difficulty balancing responsibilities. The standard deviation of work conflict in public teachers is 2.08796 and in private teachers is 2.47436. It indicates greater diversity in work conflict levels among private school teachers. This indicates that some private school teachers face a lot of friction, while others don't. The value of "t" scores of the two groups between both school teachers is -4.237, therefore, the p-value of both schools' teachers is .000, which is lower than 0.05. Therefore, it shows that there is a significant difference between the work conflict of teachers in public and private schools. Hence, the mean value of private school teachers is higher than government school teachers. This means that private teachers performed more duties than public school teachers.

Table 4 Table indicating the N, Mean, Standard Deviation, and p-value of Family Conflict between Government teachers and Private teachers						
Family Conflict	School Type	N	M	SD	t-value	Sign (2-tailed)
	Government	100	15.4200	74.781	12.800	.000
	Private	100	10.8600	35.051		

It is evident from the above table 4 that the family conflict of government teachers is 15.4200 and the family conflict of private school teachers is 10.8600. It was observed that public school teachers reported higher family conflict than private school teachers. The standard deviation of family conflict in government teachers was 74.781 and in private teachers it was 35.051. The value of "t" scores of the two groups between both school teachers is 12.800, which is higher than the table value at 0.05 level (1.96). Therefore, the p-value of both schools' teachers is .000 which is lower than 0.05. It implies that there is a significant difference between the family conflict of teachers in government and private schools. The results revealed that government teachers faced more family conflict than private teachers because government school teachers have to perform many duties like election duties, census duties, miscellaneous, etc.

The Main Findings of the Study:

1. It means that there is no significant difference in role conflict between male teachers and female teachers in public special teachers and private special education teachers in schools.
2. It means that there is no significant difference in role conflict between public special education and private special education teachers.
3. It means there is a significant difference in family conflict between public special education teachers and private special education teachers.
4. It means there is a significant difference in work conflict between public special education teachers and private special education teachers.

Suggestions: The suggestions of the study are as follows:

1. Clarity of Role in Professional Development

Regular workshops and training should be conducted by school administrators, both in public and private institutions, to help special education teachers fully comprehend their duties and responsibilities. This can improve job satisfaction and lessen role conflict.

2. Regularly Evaluate the Well-Being of Teachers

Regular evaluations should be used by schools to track special education teachers' stress levels, role clarity, and job satisfaction. The results should then be used to guide administrative choice.

3. Acknowledge and Honour Good Instructors

Programs for recognition can raise spirits in both industries. It is important to recognise and recognise special education instructors who successfully carry out their responsibilities and support inclusive education.

4. Promote Public School Support System

Owing to bureaucratic restrictions and larger student- teacher ratios, role and job conflict may be more noticeable in public schools. Therefore, upgrading support systems (e.g., hiring assistants, cutting paperwork) could reduce stress and enhance the learning environment.

Conclusion

The findings of the study, that there is no significant difference between special education teachers in private and government schools. And no significant difference was observed between male and female teachers. Both teachers faced the same level of role conflict in the schools. Moreover, both school teachers were facing work conflict and family conflict of teachers. Teachers have to perform various roles at home, workplace, and in society, etc. As a consequence of role conflict, teachers are not able to concentrate on their career, academic growth, and students' overall development, etc. Government authorities should take some initiatives to lessen their role conflict such as creating opportunities for teachers to discuss their roles, responsibilities, and concerns, etc. (Saif, 2013).

To ensure that the roles and responsibilities of teachers are well-defined and communicated in a proper way. Moreover, it will provide ongoing professional development opportunities for teachers to enhance their

skills adapt to evolving educational practices, and promote collaboration among teachers, allowing them to work together on curriculum development, instructional strategies, and classroom management, etc. School heads should organize time-to-time workshops, capacity-building programs, meditation, and yoga classes, and impart skill-enhancement classes to improve further their teaching skills. In a nutshell, teachers can play their roles more enthusiastically.

References & Online Sources

- Amalu, M. N., Ajake, U. E. & Ihejiamaizu, C. C. (2012). Stress from Role Conflict: Consequences for professional effectiveness of secondary school teachers in cross river state, *Global Journal of Education Research*, Vol 11(1), 37-47.
- Canu, Zainab (2023). The relationship between family-work conflict and work-family conflict among special education teachers. *Journal Multidiscipline Madani*, 3(4), 811-816. <https://doi.org/10.55927/mudima.v3i4.2648>
- Das, P and Bera, S. (2020). Role Conflict among secondary school teachers in relation to school organization climate. *International Journal of Research (IJR)* Volume 7, Issue 22, ISSN:2348-6848
- Edgerton, Susan Ketchin (2008). Teachers in Role conflict: The Hidden Dilemma *Phi Delta Kappan*, 90(4), 310-311. doi:10.1177/003172170809000417.
- Gal, E., Schreur, N. and Yeger, E. B. (2010). Inclusion of Children with Disabilities: Teachers' attitudes and requirements for environmental accommodations, *International Journal of Special Education*, 25(2), 89-99.
- Grace, G. R., (2012). *Role Conflict and the Teachers*, London: Routledge Library.
- Gupta, M., & Kumari, S. (2018). Job satisfaction as the key determinant of role conflict among teachers: An empirical study. *International Journal for Social Studies* 4(3), 25-34.
- Gupta, M. and Nain, I. (2016). *Role Conflict among Teachers: A Comparative Study on the basis of type of institution, academic stream and locus of control*, Ph.D. dissertation, Maharishi Dayanand University, Rohtak
- Interpersonal relationships. (2022, July 27). Intech Open - Open Science Open Minds | Intech.Open. [https://www.intechopen.com/books/7827\(n.d.\).eGyanKosh](https://www.intechopen.com/books/7827(n.d.).eGyanKosh). <https://egyankosh.ac.in/bitstream/123456789/46596/1/Unit-13.pdf>
- Kaur, M. (2014). Work motivation among teachers in relation to role conflict. The *International Journal of Humanities & Social Studies*, 2(5), 309-317. 1(2), 22-28.
- Luhaorg, H., and Zivian, M. T. (1995). Gender role conflict: The interaction of gender, gender role, and occupation. *Sex Roles*, 33(9-10), 607-620. <https://doi.org/10.1007/bf01547720>
- Mantry, & Pradhan. (2023). Attitude of elementary school teacher towards inclusive education: A study on Jammu and Kashmir, India. *World Journal of Advanced Research and Reviews*, 19(2), 451460. <https://doi.org/10.30574/wjarr.2023.19.2.1562>
- Panday, (2020) Role Ambiguity, Role conflict experienced by teachers of Private sector in Higher education institutions, *International Journal of Management*, Volume 11, Issue 10, October 2020, pp. 906-913.
- Pervez, Z., Noshaba, A., Arshad, T. and Noureen, G., (2022). Relationship of Teachers' Job Performance with Role Conflict, Role Ambiguity and Burnout in Public Schools of Lahore. Lahore College for Women University, *International Journal of Computational Intelligence in Control*.
- Saif, Naveed, (2013), The impact of participation & role conflict on job satisfaction. An analysis of Gomal University Lectures (government and Contract), *European Journal of Business and Management*, www.iiste.org ISSN 2222-1905 (Hard copy) ISSN 2222-2839 (Online) Volume 5, No. 8.
- Sandoval-Reyes, J., Acosta-Prado, J. C., and Sanchis-Pedregosa, C. (2019). Relationship amongst technology use, work overload, and psychological detachment from work. *International Journal of Environmental Research and Public Health*, 16(23), 4602. <https://doi.org/10.3390/ijerph16234602>
- Singh. (2024). Effect of role conflict on teacher trainers job satisfaction and professional commitment. *International Journal for Multidisciplinary Research*, 6(1). <https://doi.org/10.36948/ijfmr.2024.v06i01.13701>

INNOVATIVE SCHOOL EXPERIMENTS

Active Learning & Student Engagement Strategies in ELT

Shivani Gupta

Abstract

Student disengagement is a challenge many educators struggle with across the classrooms. Most English Language Teachers (ELT) are wary of lack of student attention, as well as poor reading comprehension skills. Students more often than not remain distracted when prose is handled in the class through conventional pedagogical methods.

My article is on Student Engagement strategies in teaching English prose. Through my article, I aspire to bring some strategies to EL Teachers that can enhance comprehension skills among students. I have discussed five strategies that can be employed in classrooms in the article. These strategies are most appropriate for the students of grades 6-12 with English as Foreign Language (EFL).

The article explains how to use each of the strategies as well as outlines the thinking skills involved in solving each of the engagement sheets.

I have also enclosed a sample sheet for each of the five strategies that I have suggested.

Keywords: English Language Teaching (ELT), Student Engagement, English as Foreign Language (EFL), Facilitation, Bloom's Cognitive Levels, Freytag's Pyramid, Socratic Method

Introduction

Most teachers, whether consciously or subconsciously, still practice the belief that they are the 'sage on the stage'. Despite their best intentions, they 'teach'. They, in their belief that if they do not 'teach' the students will not 'learn', as yet cannot wrap their head around 'facilitation'. Thus, we have students sitting passively in classrooms. Add to this AV and AI, and student-thinking is a big causality in our classroom practices.

Facilitation, as opposed to 'teaching', requires the teacher to let the students actively engage with the content. It is student-centered in the true sense of the word. The teacher assumes a supportive role in the students' journey of learning. In facilitation the students construct their own knowledge. There are four critical attributes for effective facilitation: genuine mutual respect; a partnership in learning; a dynamic, goal-orientated process; and critical reflection. Facilitation emphasises mutual respect, partnership in learning, and reflective practice (Burrows, 1997).

Active learning happens when students actively engage with the syllabus/ text/ content. In short, they THINK. In active learning methodology, teachers help the students in learning. Actually, active learning methodology focuses on helping in learning and facilitating in learning. Active learning positions the teacher as a facilitator rather than a transmitter of knowledge (Jagtap, 2016).

Bloom's taxonomy foregrounds cognitive processes involved in learning (Bloom et al., 1956; Krathwohl, 2002). When Benjamin Bloom talked of the Cognitive levels in his Taxonomy of Educational Objectives (Taxonomy of Educational Objectives: The Classification of Educational Goals 1956), all he was talking

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about was thinking processes. The six thinking levels are: Knowing, Understanding, Applying, Analysing, Evaluating, and Creating. The revised taxonomy highlights higher-order thinking skills such as analysis, evaluation, and creation (Anderson & Krathwohl, 2001). Ironically, when a teacher ‘teaches’, she negates the very requirement for active learning, i.e. facilitating student thinking. The students may somewhat remember and understand, to some extent may also apply, but for sure there is no analysis, evaluation, or creation happening in the classroom. Even if these last three thinking processes happen, they are mostly teacher- led.

The 21st century learner, being taught through the 20th century pedagogy, does not see any merit in classroom transactions. In any case, it’s also a reductionist effort by the teacher-- the learning is reduced to rote. Moreover, the student neither gains competency nor the capacity to prepare for the future that advances in AI promises to unfold. The future no longer needs individuals who are mere perpetrators of the present order, the executors, it needs thinkers and innovators. Unless teachers encourage thinking in our classrooms, rather than passive reception of content, we cannot have thinking individuals.

I am outlining five active learning strategies that can be used in the classroom to ensure ‘facilitation’ and ‘active learning’ in the teaching of literature. These strategies have been found to enhance comprehension and ensure student engagement. These strategies are most appropriate for the students of Grades 6-12 who study English as Foreign Language (EFL).

We can use some of these as pre- reading, some as mid- reading, and others as post- reading strategies.

1. Anticipation Guide*

The Anticipation Guide is an effective pre-reading or pre-teaching strategy used to activate prior knowledge and arouse curiosity. It is appropriate for students of grades 3 to 12. It helps students engage with a topic before they even begin reading and helps them make connections between what they know and what they’re about to learn. Moreover, it also serves as a tool to evaluate learning post the lesson. For teachers, Anticipation Guide serves as a tool to check the whether learning outcomes have been achieved.

An anticipation guide consists of a list of statements related to key ideas, themes, or misconceptions about a text or topic. Students respond to each statement (Agree/Disagree or True/False) **before** the lesson — and once again **after** learning — to see how their understanding has changed. Usually, the students are required to mark whether they *agree or disagree or true or false* on each statement.

These statements are thought provoking and conceptual, instead of merely based on recall. Thus, the Anticipation Guide does not contain any statement that is merely based on recall or rote.

Using an Anticipation Guide in the Classroom:

Prepare the Anticipation Guide on the lesson/ text/ story to be started in the class. It must contain 10-15 statements on vocabulary/ idioms/ literary devices and so on that will appear in the text, about what they think when they hear the title, or the predictions they make about the text through their prior knowledge.

* a sample Anticipation Guide is enclosed.

The teacher must administer the Anticipation Guide before starting the lesson. She mustn't give any introduction of the lesson or talk anything about the lesson except the information that they are about to start with this text/ lesson. The Anticipation Guide may be printed out for each individual student to attempt, or may be displayed on the smart-board for the students to see and simply write down their answers with the statement numbers in their notebook.

Thinking Skills Involved:

Remembering, Understanding, Applying, Analysing, Evaluating

2. Text- Word Puzzle*

Text-Word Puzzle is a meaningful mid- and post-reading engagement strategy that ensures comprehension and clarity on the text. It is a crossword designed on the text/ story/ prose to be handled in the class. The students fill in the grid of empty squares with words, using given clues that are based on the text that's being read/ handled in the class. Text-Word Puzzle is most appropriate for students of grades 5-12.

The purpose of using Text-Word Puzzle is to encourage vocabulary building, strengthen memory and logical thinking, and to revise lessons creatively. If used as mid- reading sheet, it also helps in enhancing comprehension.

The teacher can use an AI tool to draft the clues for the crossword. And then she may place the words corresponding to these clues in the crossword grid. (The AI tools are still not able to generate a satisfactory crossword grid to my understanding.)

Using the Text-Word Puzzle in the Classroom:

Prepare the Text-Word crossword puzzle on the lesson/ text that you have to start in the class. Provide the 10-15 clues, *Across* and *Down*. So, students have to locate 10-15 words or phrases appearing in the lesson/ text. Try and make these clues cryptic but true to the text and vocabulary. Prepare the crossword grid with clear numbering as per the clues.

It is advised to print the Text-Word Puzzle for each student in the class for better engagement. Else, it may be displayed on the smart-board as the students do a self-reading of the text and attempt the crossword alongside.

The teacher must act as a facilitator as the students read the text. The text must not be read orally. She must move around in the class and support students as they try to comprehend the text for themselves. Text-Word Puzzle also acts as a tool for 'differentiated instruction'—each student reads and comprehends the text and then attempts the text-Word Puzzle at their own pace, the teacher supports students as per their requirements.

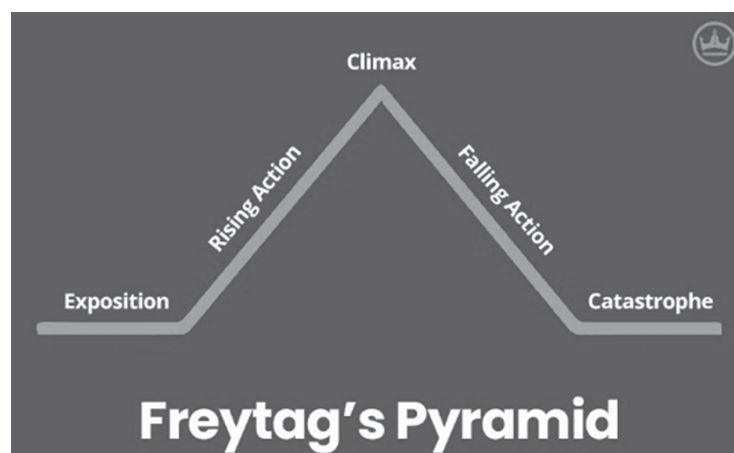
Thinking Skills Involved:

Understanding, Applying, Analysing, Evaluating. The Text- Word Puzzle also requires the students to apply their Inference and interpretation skills as well.

* a sample Text-Word Puzzle is enclosed.

3. Freytag's Pyramid (Freytag's Technique of the Drama, 1863) Sheet*

Story structure can be effectively analysed using Freytag's Pyramid (Cigerci & Yıldırım, 2024), a model that explains the structure of a narrative or dramatic plot. Developed by Gustav Freytag, a nineteenth-century German novelist and playwright, the model illustrates how narratives typically progress through rising and falling tension. An understanding of Freytag's Pyramid enables readers to identify and analyse the key structural elements of a story, thereby enhancing comprehension of narrative development and plot progression (Hamilton, J. 2023).



Jason Hamilton, Kindlepreneur, Nov. 2023

The five main stages of Freytag's Pyramid are: Exposition, Rising Action, Climax, Falling Action, Resolution or Catastrophe.

According to modern-day construction of Freytag's Pyramid, the seven elements in a story are-- Exposition, Inciting Incident, Rising Action, Climax, Falling Action, Resolution or Catastrophe, Denouement (Freytag, G.1894).

Most stories follow Freytag's structure to a good extent. Thus, the engagement strategy Freytag's Pyramid sheet serves to involve students as well as to help them understand the story structure better. The students reading short stories as part of their literature syllabus often fail to grasp the nuances of the story. Freytag's Pyramid Sheet can be effectively used for students of grades 6-12.

Freytag's Pyramid Sheet can be used for most stories that students read. It is a mid- and post reading strategy. The Sheet can also be used by the teacher to discuss the elements of the story post reading.

Using the Freytag's Pyramid Sheet in the classroom:

The Freytag's Pyramid sheet is in fact a story agnostic tool. The template once prepared can be used for any and every story that the students read.

* a sample Freytag's Pyramid Sheet is enclosed.

It consists of blank boxes for the elements of the story, arranged as the Freytag's Pyramid. The students are required to fill these blanks as they progress with reading of the story. The sheet can either be printed for each student or can be displayed on the smart board and the students attempt the blanks in their notebooks.

Once again, the teacher must act as a facilitator rather than giving answers to the students. This tool is a discussion starter and the teacher must encourage students to think actively about the elements of the story. This tool also helps the students to analyse the story and to understand the progression of the story better.

Thinking skills involved:

Understanding, Inferring, Analysing.

4. Socratic Sheet*

The Socratic Method is a way of teaching and learning through questioning — named after the Greek philosopher Socrates. Instead of giving direct answers, the teacher (or questioner) asks a series of thought-provoking questions that help students to: think deeply, examine their own ideas, and arrive at conclusions through reasoning.

The main characteristic of the Socratic method is that it is not “teaching” in the conventional sense of the word. Teacher is an observer, a helper, guide but not the purveyor of knowledge. Lectures with “undeniable” facts and truths and rote memorization or, in other words, “guiding the students” are replaced with shared dialogues between students and teachers where both are responsible for pushing the dialogue forward through questioning. The Socratic method promotes reasoning through dialogic questioning (Delić & Bećirović, 2016).

The engagement strategy Socratic Sheet employs questions for guided reading and comprehension. It can be used for students of grades 6-12.

This is a mid- reading strategy that builds long- term understanding of the text and at the same time helps students polish their skills of answering the questions based on the text. Socratic Sheet can be used for stories, travelogues, articles, extracts, and many other genres of prose.

Using the Socratic Sheet in the classroom:

The teacher prepares the Socratic Sheet before starting any prose in the class. She prepares 10-12 question covering all the six Cognitive levels on the text to be read by the students. The questions must be organised progressively as per the prose, meaning that the question for which the information to answer comes earlier in the text, must be placed first.

The Socratic sheet can either be in the form of a worksheet, or a slip containing all the questions, printed for each student individually. It can also be in the form of questions displayed on the smart board. Alternately, the teacher can also write the questions on the blackboard before starting the text reading.

* a sample Socratic Sheet is enclosed.

The students read the questions twice even before they begin reading the prose. Then they start reading the prose and try to answer the questions as they progress with their reading.

Socratic Sheet is not a test. Hence, the teacher must support students, only those who want her support, to frame their answers. The teacher must observe her students and take rounds of her class as the students read the text.

Thinking skills involved:

Understanding, Inferring, Applying, Interpreting, Analysing, Evaluating, Creating.

5. See-Think-Wonder Sheet*

The See-Think-Wonder Sheet is an effective pre- and mid- reading tool to ignite creative and predictive thinking among the students. It can be used to make the students think on the topic and make predictions on what they are going to read, or it can be used to make students wonder mid- lesson about what is to follow.

See-Think-Wonder Sheet is an effective engagement tool to make students draw out the connections and think creatively. The sheet is also an effective device to spark discussion in the class mid- reading.

Using the See-Think-Wonder Sheet in the classroom:

In case the teacher wants to use the See-Think-Wonder Sheet as a pre-reading tool, she needs to focus on the Title/ topic and choose images to be included in the sheet that focus the attention of the students towards the theme of the lesson/ text/ story.

If she wants to use it as a mid- reading strategy, the teacher must decide at what point in the lesson she wants to use the See-Think-Wonder sheet and prepare it in advance. She must choose appropriate images as per the story gone by and where the story will progress as the students read further.

The See-Think-Wonder Sheet need not be printed out individually for each student; it can be displayed on the smart- board for all students to see and think. In case there is no smart- board in the class then she can print a few copies to be passed down the class for the students to see in turns.

After the students have seen the sheet for a minute, the teacher asks them to think and wonder upon the images that they have seen and draw connections between them. The most important thing is the discussion that follows after the students have seen and mulled over the images in the sheet. The teacher must accept all opinions from her students without checking the students or leading them in her desired direction. The focus must remain more on the process than the product; thereby meaning that the teacher must focus more on the insight that the student brings to the discussion, rather than whether it is right or wrong.

Thinking Skills Involved:

Knowing and Remembering, Understanding, Applying, Analysing, Evaluating, Creating. It helps students develop the skills of Inference and Interpretation as well.

* a sample See-Think- Wonder Sheet is enclosed.

Conclusion

The antidote to student disengagement lies not in teaching more, but in **teaching differently**. Research consistently demonstrates that learners are inherently curious and learn most effectively when they are given opportunities to **explore, question, and construct meaning**, rather than receive information in a finished form. Engagement deepens when learning experiences are inquiry-driven and allow students to arrive at understanding through reflection and discovery. As constructivist research has long established, knowledge that is actively constructed is retained more meaningfully than knowledge that is passively received.

Empirical evidence strongly supports this shift. A landmark meta-analysis of 225 studies across disciplines found that students exposed to **active learning approaches significantly outperformed those in traditional lecture-based classrooms**, achieving higher examination scores and showing markedly lower failure rates (Freeman et al., 2014). Specifically, failure rates dropped from approximately **34% in lecture-driven classrooms to about 22% in active learning environments**, underscoring the impact of facilitation-based pedagogy on learner success. Active learning has also been shown to improve higher-order thinking skills such as analysis, evaluation, and creation—skills that are central to language learning and literary comprehension.

For EFL classrooms in particular, where comprehension, interpretation, and language use are critical, facilitative and exploratory learning experiences are not optional but essential. If educators genuinely seek sustained engagement and deeper learning, they must move beyond content delivery and design learning environments that encourage students to **think, question, analyse, evaluate, and create**. By positioning students as active participants in their own learning journeys, teachers not only enhance engagement but also prepare learners with the cognitive agility required for an increasingly complex and AI-driven world.

Please access the 5 handouts/ engagement sheets here:

<https://drive.google.com/drive/folders/18zbCwy621qDT3ANCmNWEc2ZnmWkN7iNW?usp=sharing>

References

- Anderson, L. W., & Krathwohl, D. R. (Eds.). (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives*. Longman.
- Bloom, B. S., Engelhart, M. D., Furst, E. J., Hill, W. H., & Krathwohl, D. R. (1956). *Taxonomy of educational objectives: The classification of educational goals. Handbook I: Cognitive domain*. Longmans, Green.
- Burrows, D. E. (1997). Facilitation: A concept analysis. *Journal of Advanced Nursing*, 25(2), 396–404. <https://doi.org/10.1046/j.1365-2648.1997.1997025396.x>
- Cığerci, F. M., & Yıldırım, M. (2024). From Freytag's pyramid story structure to digital storytelling: Adventures of pre-service teachers as story writers and digital storytellers. *Education and Information Technologies*, 29, 5697–5720. <https://doi.org/10.1007/s10639-023-12042-7>
- Delić, H., & Bećirović, S. (2016). Socratic method as an approach to teaching. *European Researcher. Series A*, 111(10), 511–517. <https://www.researchgate.net/publication/309634848>
- Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., & Wenderoth, M. P. (2014). Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the National Academy of Sciences*, 111(23), 8410–8415. <https://doi.org/10.1073/pnas.1319030111>
- Freytag, G. (1894). *Technique of the drama* (E. J. MacEwan, Trans.). Scott, Foresman and Company.
- Hunt, A., & Beglar, D. (2005). A framework for developing EFL reading vocabulary. *Reading in a Foreign Language*, 17(1), 23–59. <https://eric.ed.gov/?id=EJ689121>

- Irfan, S. (n.d.). *Difference between ESL and EFL: A comparative guide*. OI Digital Institute. <https://oidigitalinstitute.com/news/difference-between-esl-and-efl/>
- Jagtap, P. (2016). *Teacher's role as facilitator in learning*. Tilak College of Education. <https://d1wqtxts1xzle7.cloudfront.net/49615969>
- Kindlepreneur. (2025). *What are the seven elements of Freytag's pyramid?* <https://kindlepreneur.com/freytags-pyramid/>
- Krathwohl, D. R. (2002). A revision of Bloom's taxonomy: An overview. *Theory into Practice*, 41(4), 212–218. https://doi.org/10.1207/s15430421tip4104_2

Effects of Blended Learning Instructional Approach on Secondary School Students' Academic Achievement

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Abstract

The landscape of education has undergone significant transformations in recent years, largely driven by advancements in technology. Online and blended learning environments have emerged as innovative solutions, reshaping traditional educational paradigms. The study investigated the effect of blended learning instructional approach on secondary school students' achievement with three research hypotheses. The study employed pre-test, post-test, control group quasi experimental design.

The study population was 5,880 senior secondary school year two (SS2) computer studies students in Owan-West education zone, Edo State. The study involved a sample of 112 SS 2 students. The data collection instrument was Computer Studies Achievement Test (CSAT) validated by experts. Reliability of the instrument was determined by applying Kuder-Richardson Formula 20 that provided internal consistency value of 0.79. The obtained data were analyzed using ANCOVA. The study findings indicated among others that the mean academic scores of the students who had been taught computer studies with blended learning instructional approach and those taught with conventional instructional approach differed significantly in favour of blended learning. It was suggested that state ministry of education should organize workshops to computer studies teachers on how they can use blended learning instructional approach to teach.

Keywords: Achievement, Computer, Blended-Instruction, Achievement.

Introduction

The shift from traditional classroom learning to digital platforms has accelerated in the past decade. Factors such as technological advancements, the COVID-19 pandemic, and the growing demand for flexible learning options have spurred the development of online and blended learning environments. Online learning refers to the delivery of education via the internet, while blended learning combines online learning with face-to-face classroom interactions.

Nigeria is also in the quest to diversify and grow economically and one of the main aspects of the diversification strategy is to develop a workforce that is technologically literate. The country has been keen on enhancing its human resource and technological infrastructure with special concentration on enhancing computer literacy and vocational skills. The significance of this initiative is supported by the fact that computers have become ubiquitous in nearly all areas of modern life, including business and science, as well as socialization. In this realization, the Edo State Ministry of Education has adopted a major policy of providing secondary schools with computers and other technology to facilitate learning. This initiative was also supported by an in-service

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teacher training program in 2015 that was designed to improve the technological literacy and pedagogical competence of teachers. The final objective was to ensure that teachers mastered the use of computer applications and then impart the same to their learners, especially in the classes that taught computer studies (Edo State Ministry of Education, 2015).

Computer studies is a subject at the secondary school level meant to equip students with the basic skills required to effectively use computers. The longevity of computer science and its pedagogy as an area of study is a credit to the sheer significance of computers in modern society. The skills that modern job seekers need to acquire are becoming more and more computer savvy (Toshalis and Nakkula, 2012), which is why the citizens have to acquire these skills in order to be able to keep up with the pace of scientific and technological advances. The introduction of computer studies as a part of the high school curriculum is thus not an option, but a necessity to equip students with the future.

Studies have identified the following as the causes of the poor performance of students; ineffective teaching, ineffective learning conditions, and absence of functioning computer laboratories (Olunloye, 2010). Moreover, there is an overall mistrust or distrust of the subject in some students. This is especially acute in heterogeneous classes, where students of different abilities are taught in the same classroom, and it is hard to guarantee that all students will obtain good grades. This scenario necessitates that computer studies teachers should step up the pace of research on more innovative and effective teaching and learning methods.

The classical pedagogical method can also be described as being teacher-centered and didactic. In this model, the teacher is the main source of knowledge and the students are passive participants whose main task is to take notes and perform tasks given to them. Although this traditional approach has its merits, including its efficiency in presenting information to a large audience of students and its capability to address a wide variety of topics, it has been subject to widespread criticism in many academic fields. The main criticism is that it does not help the students to own their learning. This is in sharp contrast to current methods, which focus on student agency and active engagement. The traditional approach, by definition, will lead to a reliance on the teacher and might not prepare students with critical thinking and problem-solving abilities that are required in a complicated and technology-driven world. The listless outputs in computer studies are a good sign that a change in these archaic habits is badly overdue.

Blended learning is one of the most promising research and innovation domains in instructional practice. This learning model combines both digital and internet based learning resources with the traditional face-to-face classroom learning (Graham and Dvisuban, 2008). Other names used in academic literature include hybrid learning, technology-mediated instruction, web-enhanced training and mixed-mode instruction. One of the main characteristics of blended learning is that, although it still necessitates the physical presence of both the instructor and the learner, it also includes an element of student control in terms of when, where, and how their learning takes place. Students still go to a physical institution, where they are taught by a teacher, but the delivery of the curriculum is supplemented with interactive and computer-mediated activities.

The article describes a particular blended learning framework that has a three-step approach. The classroom teacher presents a specific concept in the first step and right away asks students to go online and search more information, watch educational videos, or read online tutorials. This preliminary stage is useful in strengthening the main idea using various media. Secondly, students are guided by the teacher to particular

databases and websites to find more materials on their course. This is a step towards active exploration rather than passive consumption by students. The third step involves the teacher engaging the students physically and online, probing them to get a better idea of what they are learning. This is an interactive stage that enables individualized feedback and elucidation. Once this cycle of questions and clarification has been completed, the teacher then describes the next lesson topic in the same way, forming a cyclical process of blended instruction.

The advocates of blended learning claim that it is better than regular online classes, and its advantages are proven in a range of disciplines, such as English language (Halverson, Graham, Spring, and Drysdale, 2012) and mathematics (Ojaleye and Awofala, 2018). With online education coupled with personal communication, students can learn at their own pace and teachers can give special attention to students who need special attention. This is a flexible model which enables teachers to customize their curriculum so that every learner can achieve his or her potential. Asynchronous internet communication technology integrated into the educational programs has been demonstrated to enhance independent and collaborative learning experiences at the same time (Caraivan, 2011; Delialioglu and Yildirim, 2008; Gambari, Shittu, Ogunlade, and Osunlade, 2018). The effect of this integration on student performance and student engagement is positive as it can encourage students to do their own research without being clearly guided by the teacher. Finally, blended learning arouses interest and curiosity in the learning process and, therefore, results in better student performance due to active learning, irrespective of gender.

The connection between gender and academic performance is a complicated and well-studied issue. Gender as a social construct that defines masculinity and femininity is believed to affect learning and achievement. Although not all studies have indicated a significant relationship between gender and achievement (Abiam and Odok, 2006), some have indicated small but significant differences. An example is given by the analysis of the 2008 WAEC results, which showed that 7.32 percent of male students and 6.42 percent of female students received credit passes (Uwaidiae, 2008). This result indicates a slight but present difference in performance.

Subsequent research has yielded opposing findings especially when technology-enhanced learning is concerned. According to Anusiuba (2018), there was a considerable disparity in the academic performance of male and female students who were taught computer studies using animated media. Conversely, Nweke (2018) did not find any meaningful difference in the mean score of achievement between male and female students who received the same animated media. Such a discrepancy shows that the problem is rather complex and requires more sophisticated studies.

The results are also not very clear regarding blended learning per se. In a research by Ojaleye and Awofala (2018), the authors established that the mean score of learning mathematics through blended learning and problem-solving methods showed a significant difference in the mean achievement of male and female learners. On the other hand, Adepeko (2018) did not report a significant difference in the mean achievement scores of male and female students taught geometry using blended learning. These conflicting findings highlight the importance of carrying out more comprehensive research on the nature of pedagogical practices that can guarantee equitable and fair outcomes among all students regardless of their gender. The idea is to create a model of education that does not only enhance the general performance, but also reduces any achievement gap that may exist.

Purpose of Study

The study investigated the effect of blended learning instructional approach (BLIA) on secondary school students' academic achievement. The study seeks to examine:

1. The difference in achievement between students taught with BLIA and those taught with a conventional method.
2. The difference in achievement between male and female students taught with BLIA.
3. The interaction effect of teaching methods and gender on students' achievement.

Research Hypotheses

The following null hypotheses were tested at 0.05 level of significance

1. The mean achievement scores of the students taught computer studies by the use of BLIA and those taught by the use of conventional method are not significantly different.
2. The mean achievement scores of male and female students taught computer studies with the help of BLIA do not differ significantly.

Methodology

Research design

The study employed pre-test, post-test, control group quasi experimental design.

Participants and Sampling

The study employed a sample of 112 SS 2 students selected through purposive sampling and randomly assigned to the treatment and control groups.

Instrument

The data collection instrument was Computer Studies Achievement Test (CSAT) validated by experts. Reliability of the instrument was determined by applying Kuder-Richardson Formula 20 that provided internal consistency value of 0.79. The stratified random sampling method provided the research project with an equal opportunity to select all the secondary school students.

Data collection

ANCOVA was used to analyse data collected.

Result and Discussion

Hypothesis 1: The mean achievement scores of the students taught computer studies by the use of BLIA and those taught by the use of conventional method are not significantly different.

Table 1	ANCOVA Test of Significant Difference between Mean Achievement Scores of Students Taught Using BLIA And Conventional Method					
Source of Variation	SS	DF	MS	F	P-VALUE	DECISION
Corrected Model	22037.656a	2	11018.828	434.172	.000	
Intercept	81152.021	1	81152.021	3197.609	.000	
Pretest	19.466	1	19.466	.767	.383	
Method	21722.198	1	21722.198	855.913	.000	
Error	2766.308	109	25.379			
Total	497744.000	112				
Corrected Total	24803.964	111				

Table 1 indicates that the computed F-value is 855.913, with a numerator of 1 degree of freedom and a denominator of 111 degrees of freedom, yielding a p-value of 0.000, which is not less than or equal to 0.05. The null hypothesis was consequently rejected. A notable disparity exists in the average performance of students instructed by BLIA compared to those educated via traditional methods. This supports the BLIA group.

Hypothesis 2: The mean achievement scores of male and female students taught computer studies with the help of BLIA do not differ significantly.

Table 2 indicates that the computed F value is 9.447, with 1 degree of freedom in the numerator and 58 degrees of freedom in the denominator, and the p-value is 0.003, which is below 0.05. The null hypothesis is hence rejected. Consequently, a notable disparity exists in the average performance of male and female students instructed in BLIA, favouring males.

Table 2	ANCOVA Test of Significant Difference Between the Mean Achievement Scores of Male and Female Students Taught Computer Studies Using BLIA					
Source of Variation	SS	DF	MS	F	P-VALUE	DECISION
Corrected Model	321.614a	2	160.807	5.572	.006	
Intercept	57420.840	1	57420.840	1989.774	.000	Significant
Pretest	20.180	1	20.180	.699	.407	
Method	272.631	1	272.631	9.447	.003	
Error	1616.047	56	28.858			
Total	363394.000	59				
Corrected Total	1937.661	58				

Discussion of Findings

The study's results demonstrate a substantial difference in the average achievement scores of students instructed through a mixed learning approach compared to those taught via a traditional learning method, with the blended learning strategy being favoured. The study's results align with Iga (2018), who asserts that the average score of the experimental group instructed via blended learning surpasses that of the control group. The research findings correspond with those of Kayii and Dambo (2018), who contend that the experimental group employing the blended learning approach outperformed the control group utilising the lecture method. Zhang and Zhu (2018) validate the study's findings, revealing that students engaged in blended learning outperformed their counterparts who participated in traditional face-to-face English as a second language instruction.

The research findings indicated a considerable disparity in the average performance of male and female students instructed via a blended learning strategy. The teaching style and gender exhibited no significant associations with student achievement. The disparity in performance between male and female students in blended learning can be ascribed to differences in engagement with online learning resources and their preferences for various media formats, which may affect their understanding in distinct ways. The study's findings do not corroborate those of Gambariet et al. (2018), who determined that there is no significant difference in the performance of male and female undergraduates in blended learning environments. The study results contradict those of Omenka and Kurume (2013), who observed no significant disparity in the mathematical performance of male and female students when utilising an ethnomathematics approach. The study results contradict Adepeko's (2018) findings, which assert that gender does not influence the academic performance of pupils subjected to comparable exercise settings. The study's findings align with those of Ojaleye and Awofala (2018), which demonstrated that the primary effect of gender on students' algebra achievement is statistically significant, whereas the interaction effect between treatment and gender on algebra achievement is not statistically significant.

Conclusion

The researchers concluded that the blended learning instructional model is effective in improving performance of students in computer courses. Integrated learning enhances student performance.

Recommendations

It is proposed to recommend the following in line with the study findings:

- State ministry of education: should conduct workshops and seminars to secondary school teachers on how to use BLIA to teach computer studies principles.
- School administrators should offer computer, internet and power generation facilities so that teachers can use blended learning strategies to enhance student learning.

References

- Abiam, P.O. & Odok, J.K. (2006). *Factors in students' achievement in different in different branches of secondary school mathematics. Journal Of Education and Technology*, 2(1), 161-168.
- Adepeko, O.O. (2018). Relative effectiveness of blended learning instructional approach on academic achievement of physics students in secondary schools in Edo State, Nigeria. *International Journal Of Advanced Academic Research*, 4(8), 8-17.
- Amelink, C.T. (2009). *Literature overview: gender differences in mathematics performance*. Retrieved From [Http/ Wwww.waeonline.org.ng](http://www.waeonline.org.ng) On 20/05/2015.
- Anusiuba, I.O., Osuafor, A.M. & Nweke, N.M. (2019). Effects of animated media instructional strategies on achievement and retention of secondary school students in computer studies. *International Journal Of Scientific & Engineering Research*, 10(6), 1-5.
- Caraivan, L. (2011). Blended learning: From concept to implementation. *Euromentor Journal*, 2(4), 1-18.
- Delialioglu, O. & Yildirim, Z. (2008). Design and development of a technology enhanced hybrid instruction based on molta model: its effectiveness in comparison to traditional instruction. *Computers & Education*, 51(1), 474–483.
- Gambari, A.I., Shittu, A.T., Ogunlade, O.O. & Osunlade, O.R. (2018). Effectiveness of blended learning and e-learning modes of instruction on the performance of undergraduates In Kwara State, Nigeria. *Malaysian Online Journal Of Educational Science*, 5(1), 25-36.
- Graham, C.R. & Dziuban, C.D. (2008). Core research and issues related to blended learning environments. In J.M. Spector, M.D. Merrill, J.J.G. Van Merriënboer, & M.P. Driscoll Eds., *Handbook Of Research On Educational Communications And Technology* (3rd Ed.). Mahwah, NJ: Lawrence Earlbaum Associates.
- Nweke, N.M., Okeke, S.O.C., Anusiuba, I.O. & Egbo, F.N. (2018). effects of computer assisted instruction (CAI) on achievement and retention of students with hearing impairment in computer studies. *IOSR Journal Of Research & Method In Education*, 9(5), 24-37.
- Ojaleye, O. & Awofala, A.O.A. (2018). Blended learning and problem-based learning instructional strategies as determinants of senior secondary school students' achievement in algebra. *International Journal Of Research In Education And Science (IJRES)*, 4(2), 486-501.
- Olunloye, O. (2010). *Mass failure in mathematics: a national disaster*. tribune of 07/02/2010 Retrieved From [Http/ Wwww.Tribune.Com.Nig](http://www.Tribune.Com.Nig) On 08/05/2015.
- Omenka, J.E. & Kurumeh, M.S. (2013). Gender and location as correlates of achievement in number and numeration using ethno mathematics approach in the junior secondary schools in Benue state. *Greener Journal of Educational Research*, 3(4), 184-190.
- Toshalis, E. & Nakkula, M. J. (2012). Motivation, engagement, and student voice. *Education Digest*, 78(1), 29-35.
- Uwaidiae, I. (2010). *WAEC Releases May/June WASSCE Results*. This Day Newspaper of 20/08/2010. Retrieved From Allafrica.Com.Nigeria,Nig On 6/05/2015
- Vanderlinden, K. (2014). Blended learning as transformational institutional learning. *New Directions for Higher Education*, 165, 75-85.
- Zhang, W. & Zhu, C. (2018). Impact of blended learning on university students' achievement of English as a second language. *International Journal on E Learning*, 17(2), 251-273.

Cyber Safety and Security Among School Students and Mathematical Implications

Ms. Ruchika Mittal and Ms. Preeti Anand

Abstract

The integration of digital technologies into education has exposed school-aged children to a wide spectrum of online risks, including cyberbullying, privacy breaches, misinformation, identity theft, and online grooming. This study synthesizes recent research to assess cyber-safety awareness among school students, identify key predictors of online vulnerability, and evaluate the roles of schools, parents, and teachers in shaping responsible digital behaviour. Evidence indicates that students—particularly early adolescents (ages 12–15)—often demonstrate limited understanding of safe online practices.

Beyond behavioural guidelines, the mathematical foundations underlying cybersecurity systems remain largely invisible to young learners. This paper examines how core mathematical concepts—including number theory, combinatorics, statistics, graph theory, and algorithmic analysis—support technologies that protect students' digital information. Linking these principles to students' everyday online experiences, the study highlights how mathematics enhances both security and analytical thinking, fostering ethical digital citizenship.

Keywords: Cyberbullying, Cyber Safety, Cryptography, Number Theory, Probability, Combinatorics

Introduction

The rapid expansion of digitization, online learning platforms, and social networking has fundamentally reshaped the educational experiences of school-aged students. While digital technologies offer unprecedented opportunities for learning, creativity, and global communication, they also expose children to risks such as cyberbullying, harassment, online grooming, misinformation, addictive behaviours, and digital fraud.

Traditional educational approaches emphasize safe user behaviour and responsible digital practices. However, the protection of students' data and online identities also relies on powerful mathematical structures embedded within cybersecurity technologies. Concepts familiar from school mathematics—such as prime numbers, probability, graph theory, and matrices—underpin encryption, authentication, network security, and threat detection systems.

This paper reviews contemporary research on cyber-safety awareness among school students, examines the roles of parents, teachers, and schools, and explores the mathematical foundations of cybersecurity. The discussion concludes with recommendations for enhancing cyber-safety education and fostering safer digital learning environments.

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Literature Review

Student Awareness and Digital Practices

Recent studies indicate that school students have limited awareness of cyber-safety principles. A 2025 NCERT survey reported that adolescents (ages 12–15) exhibit the lowest preparedness in password hygiene, privacy settings, and responsible information sharing. Structured, age-appropriate digital-safety modules and comprehensive teacher training are needed to address these gaps.

Major Online Risks for Students

Common risks include cyberbullying, phishing, identity theft, online fraud, exposure to inappropriate content, and unsolicited contact from strangers. Effective mitigation requires safe device configuration, strong identity-management practices, media-literacy instruction, and well-defined school policies.

Online Grooming and Early Childhood Vulnerability

Cyber risks are not limited to adolescents. A 2023 study of primary-school children found frequent instances of cyberbullying and online grooming. Predictors of vulnerability include excessive screen time, inadequate parental monitoring, and peer behaviours that normalize risky online interactions, highlighting the need for early cyber-safety education.

Role of School, Family, and Social Context

School climate, family communication patterns, and peer networks strongly influence students' online experiences. A holistic approach—including parent engagement initiatives, school-based detection mechanisms, and support systems—is essential for fostering digital safety.

Gaps in Existing Research

- Limited availability of high-quality cyber-safety programs for younger students.
- Insufficient teacher training in digital-safety pedagogy.
- Weak coordination between schools and families.
- Inadequate early-intervention frameworks and reporting mechanisms for cyber incidents.

Methodology

This study employs a qualitative, integrative review methodology. Peer-reviewed publications from 2022–2025 were systematically selected and analyzed to identify recurring themes, challenges, and effective strategies related to student cyber-safety. Keywords included cyber safety, cyberbullying, digital literacy, online grooming, and student online behaviour. Selected studies were synthesized to construct a conceptual framework outlining determinants of cyber safety and informing school-based initiatives.

Findings

Low Levels of Cyber-Safety Awareness

Students demonstrated limited understanding of fundamental practices, including secure passwords, phishing recognition, verifying online information, and reporting harmful behaviour.

High Prevalence of Cyberbullying and Online Grooming

Cyberbullying is widespread across age groups, especially on social media, messaging apps, and online games. Children under 12 are particularly susceptible to online grooming.

Key Predictors of Online Vulnerability

- Excessive screen time Limited parental supervision Peer influence
- Low digital literacy
- Socio-economic and environmental conditions

These factors often interact, creating complex patterns of vulnerability.

Inadequate School Preparedness

Many schools lack structured cyber-safety curricula, reporting mechanisms, and trained staff, reducing their ability to address digital risks proactively.

Need for Multi-Stakeholder Collaboration

Effective cyber protection requires coordinated efforts among students, teachers, parents, school administrators, counsellors, and policymakers.

Mathematics in Cyber Safety and Security

Cyber protection relies on underlying mathematical structures, which form the backbone of encryption, authentication, network security, and AI-based monitoring.

Cryptography: Mathematical Foundations

Number Theory and Prime Numbers: RSA and Elliptic Curve Cryptography (ECC) use large primes and modular arithmetic to secure student data, online exams, school emails, and LMS platforms.

Hash Functions: Convert passwords into scrambled codes. The avalanche effect ensures even minor changes in input produce entirely different outputs, protecting stored passwords.

Quantum-Resistant Cryptography: Post-quantum methods—lattice-based, multivariate, and code-based systems—protect student data against future quantum attacks.

Password Strength and Combinatorics

Counting Possible Passwords: For a 10-character password using 70 symbols, possible combinations = 7010.

Probability of Attacks: Longer, unpredictable passwords reduce the likelihood of successful attacks. Teaching these concepts strengthens students' password practices.

Graph Theory and Network Protection

School networks can be modeled as graphs (nodes = devices). Graph-theoretical methods optimize data routing, detect intrusions, prevent malware spread, and control information flow.

Geometry and Wireless Coverage: Router placement uses geometric principles (radius, distance, spatial optimization) to ensure strong and secure connectivity.

Statistics and Machine Learning

- **Statistics:** Logistic regression, Bayesian inference, and Hidden Markov Models detect abnormal online behaviour.
- **Linear Algebra:** Vectors, matrices, and gradients underpin AI tools for identifying cyberbullying, phishing, and suspicious content.

Logical Thinking and Safe Digital Behaviour

Mathematical reasoning enhances students' ability to recognize phishing, fake profiles, misleading content, and cyberbullying, integrating analytical skills with ethical digital practices.

Global Perspectives

- **High-income countries:** Advanced encryption, AI-driven monitoring, multi-factor authentication.
- **Middle-income countries:** Password safety, secure platforms, improved school networks.
- **Low-income countries:** Scalable mathematics-based solutions for shared devices and low-cost infrastructure.

Mathematics forms the universal foundation of cyber-protection systems worldwide.

Recommendations

1. Introduce cyber-safety curricula from primary to higher secondary levels.
2. Conduct regular digital-literacy workshops for students and teachers.
3. Establish school-level cyber-safety committees.
4. Promote parent-school collaboration via seminars, newsletters, and digital guidelines.
5. Implement reporting mechanisms for cyberbullying or abuse.
6. Encourage responsible social media use.
7. Monitor and regulate screen time.
8. Integrate cyber ethics and digital citizenship into existing subjects.

9. Include mathematical concepts (combinatorics, probability, modular arithmetic) in cyber-safety lessons.
10. Use hands-on activities: cipher games, password-strength challenges, network simulations.
11. Develop grade-wise modules from basic patterns to number theory and cryptography.
12. Promote collaboration between mathematics and computer science teachers.
13. Emphasize safe digital habits: strong passwords, two-factor authentication, critical evaluation of online content.

Conclusion

Cyber safety is an essential component of modern education. Lack of awareness, limited parental supervision, and inadequate school preparedness contribute significantly to online risks. Integrating cyber-safety education with curriculum, teacher training, family collaboration, and early intervention fosters safer digital environments.

Cyber safety extends beyond rules and filters—it rests on a robust mathematical foundation. Number theory secures data, combinatorics strengthens passwords, statistics detects harmful content, and graph theory protects networks. Teaching these connections cultivates a generation that is both digitally safe and mathematically literate.

References

- Azhmukhamedov, I. (2019). *Training of cryptography as a way of developing system thinking*. Proceedings of the International Conference on Pedagogical Innovations.
- Bergner, N. (2012). *Cryptography for middle school students: A two-day course*. Proceedings of the Conference on Education and New Learning Technologies.
- Boneh, D. (n.d.). *Twenty years of attacks on the RSA cryptosystem*. RSA Laboratories.
- Bogotyrev, A. (2024). *Number theory and its applications in cybersecurity: A review*. Journal of Applied Mathematics and Information Security.
- CYBER.ORG. (n.d.). *K–12 cybersecurity learning standards*. CYBER.ORG.
- Marshall, N., et al. (2024). *Exploring the evidence for email phishing training: A scoping review*. Journal of Cyber Education and Human Behavior, 12(3), 45–62.
- Modern cryptography education of middle school students. (2023). *International Journal of Computer Science Education*, 18(2), 112–128.
- National Initiative for Cybersecurity Education (NICE). (n.d.). *NICE Framework: Cybersecurity workforce and education guidelines*. NIST.
- Rivest, R. L., Shamir, A., & Adleman, L. (1978). *A method for obtaining digital signatures and public-key cryptosystems*. Communications of the ACM, 21(2), 120–126.
- Shannon, C. E. (1948). *A mathematical theory of communication*. Bell System Technical Journal, 27(3 & 4), 379–423, 623–656.
- Teaching public-key cryptography in school. (2025). *International Journal of Mathematics and Technology Integration*, 9(1), 55–70.
- Various Authors. (2021–2022). *Cryptography as an educational tool in counting techniques for high school*. Journal of STEM & Mathematics Education, 6(4), 88–101.

Mathematical Language Skills as Correlates of Students' Academic Achievement and Attitude Toward Mathematics in Senior Secondary Schools in Taraba State, Nigeria

Relevance and Implications for the Ethiopian Landscape

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Abstract

The study investigated mathematical language skills as correlates to students' academic achievement and attitude toward mathematics in senior secondary schools in Taraba State, Nigeria. Two research objectives, two research questions and two null hypotheses were formulated to guide the study. The study adopted correlational survey research design. The population of the study was 2220 students consisting of 1008 male and 1012 female of Jalingo education zone. A sample size of 339 students from nine schools was selected for the study. The study employed purposive sampling techniques to select nine schools out of 52 public secondary schools within Jalingo education zone. The study also employed simple random sampling techniques to select 339 SSIII students from the nine schools in Taraba state. The instruments used for data collection were the Students Mathematical Language Skills Test (SMLST), Attitude Toward Mathematics Inventory (ATMI) and a Mathematics Achievement Proforma (MAP). Cronbach Alpha statistics was used to obtain the reliability of 0.74 through pilot testing for SMLST. Similarly, Kendall'tau correlation coefficient of concordance was used to obtain the reliability of 0.88 through pilot testing for ATMI. Mean and standard deviation were used to answer research questions while, Pearson product moment correlation was used to test hypotheses at 0.05 level of significance. The results of the study indicated that mathematical language skill was moderate with a grand mean of 23.03, so also the students' academic achievement and attitude toward mathematics results with a grand mean of 48.04 and 3.19 respectively. Also, mathematical language skills significantly correlated academic achievement in mathematics with the r -value of 0.335. The result also shows that students mathematical language skills significantly correlated with attitude toward mathematics with the r -value 0.208, $P = 0.00$ all through. Based on the findings, it was concluded that mathematical language skills significantly correlate students' academic achievement and attitude toward mathematics in senior secondary school III in Jalingo education zone. The study recommended among others that since mathematical language significantly correlate academic achievement, the teachers of mathematics should be suitably trained in the art of using mathematical language for teaching students and hence affects their academics positively. Also, teachers should be trained on how to properly use mathematical language while teaching the students there by making them to develop positive attitude toward the subject.

Keywords: Mathematical Language, Academic Achievement, Attitude Toward Mathematics

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Introduction

Mathematics being the pivot of science is an essential component of every human culture, as every civilized society makes use of mathematics. Momozoko, Audu and Niyi (2022) opined that mathematics evolved in response to the needs of pre-history societies and that as people lived together, their interaction created problems that needed practical solutions. Activities such as trading, building of houses, working on farms, all of which had their attendant problems that found solutions in mathematics. Mathematics is a branch of science, which deals with numbers and their operations. It involves calculations, computations and solving of numerical problems. Jayanthi (2019) refers to mathematics as the Queen of sciences and very essential to the growth of many other disciplines. Mathematics plays a significant role in the national development of every nation of the world. From ancient civilization (Egyptian, Greek & Roman), mathematics has been found to be the foundation for the educational thoughts and general development. Mathematics has an enormous impact on science and society, and it is shaping our world in many ways. Sunita (2019) posited that where there is no mathematics, there is no science, where there is no science there is no technology and that the absence of technology implies absence of development. Mathematics reveals hidden patterns that help us to understand the world around us. Mathematics is a diverse discipline that deals with data, measurements and observations from science, with inference, deduction, and proof; and with mathematical models of natural phenomena, of human behavior, and of social systems. Mathematics makes its contribution to the advancement of science and technology by solving real-world problems such as designing new medical treatments, improving transportation system and developing more energy sources. Mathematics is one of the important sciences that cannot be dispensed with, and the individual's needs for mathematics is not less than the need of society.

However, academic achievement of secondary school students in mathematics has been consistently poor despite the importance of Mathematics in human and societal development. The students' poor academic achievement in Mathematics is not just a concern for particular countries but has become a global concern over the years (Slakaloba, 2024). According to WAEC Chief Examiners' Report (2020), only 39.8% of the students who sat for examination passed Mathematics with credit grade and above. Njoroge (2014) also decries the poor achievement in Mathematics despite the fact that it is one of the key subjects expected to turn Nigeria into an industrialized country. Achievement in Mathematics has been generally poor due to various factors (Ramari, 2014). The situation in Taraba State is worrisome, despite the prerequisite for a credit in mathematics for university admission, secondary schools in the state exhibit alarming low proficiency in the subject, as evidence by their performance in external examinations such as those conducted by WAEC from 2016- 2021.

Several reasons have been given to account for these variations in achievement in Mathematics. Some authors like Dugger (2014) attribute it to unfair distribution of qualified teachers in the country; while Slakaloba (2024) states that the root cause of poor achievement in Mathematics, is that Mathematics teachers are poorly prepared. Ma and Kishor (2017) have attributed the poor achievement of students in Mathematics to the fact that the subject is difficult. Poor mathematical language skills by students (Barwell, 2015). Some other researches such as Ma and Kishor (2017) have attributed students' attitude towards Mathematics as a major factor that might influence the achievement of the students.

Mathematical language skills being the foundation for students' academic achievement in mathematics is a universal language that ensures mutual communication between individuals through concepts, terms and grammars (Barwell, 2015). The language of mathematics is an important individual skill to allow understanding mathematical structures. The use of mathematical language involves the interpretation of mathematical concept by students to reflect their explanation on the ways they attain correct and incorrect answers when solving problem in mathematics (Hornburg, Schmitt & Purpura, 2018). Achieving an effective teaching of mathematics is only possible by using the language of the field of mathematics that ensures the accurate transmission of mathematics. The effective and accurate use of language is also highly important for individuals to explain what they understand and perceive, to develop the mutual communication between the student and teacher and to comprehend mathematical expressions. Students can only establish an effective communication when they are able to speak in mathematics language. As most of the terms and concepts of mathematics are inexistent or rarely seen in everyday life, students are often unfamiliar to mathematics concept and even teachers struggle to conceptualize their own thinking of mathematics concepts (Mahere & Powell, 2013). If the teacher fails to use correct concepts and terms when teaching to students the content of a lesson, students may perceive it in a different way or even attribute an incorrect meaning. Hence the students attribute the same meaning to meaning to different mathematical expressions explained by the teacher. Misusing the language of the mathematical field will entail a poor communication between the student and the teacher, leading students, in the longer term, to conceptual errors for not being able to properly structure concepts in their minds. This is why mathematics lessons require that language should be used in accordance with mathematical knowledge. Studies revealed that there are at least three main sources of students' challenges using mathematical concepts which include mathematical language, image and notation, (Alkhateeb, 2019).

In addition, attitude is a central part of human identity, everyday people love, hate, like, dislike, favour, oppose, agree, disagree, argue, persuade etc. All these are evaluative responses to an object. Hence attitudes can be defined as "a summary evaluation of an object of thought" (Florin, 2020). They are inclinations and predispositions that guide an individual's behaviour (Riboroso, 2019)). The attitude of students towards mathematics has been the subject of a great deal of attention from educators (Goldin, Hamula & Zan, 2016). A student with positive attitude towards mathematics tends to enjoy the subject, understand its values and have confidence in it. Many students look at mathematics as a difficult and abstract subject which they can never comprehend no matter the effort they put in to learn. Some perceived mathematics as an exhausted and effortful subject that triggers fear and anxiety state (Arenillo & Cruzado, 2014). Naturally, the student's response can be on a continuum of positive to negative or good to bad. Attitudes towards learning are important factors on the learner's level of goal setting, problem solving abilities, their beliefs towards learning, their inner and external motivations in the process of learning and all the academic achievement they attain. It is essential to mention that attitude is considered a psychological construct. This means you can see the consequences of the attitude but not the attitude itself. In other words, the behavior is observed to determine the attitude. For example, a child who refuses to follow orders provides evidence that they have a bad attitude. Arenillo and Cruzado (2014) itemized different aspects of students' attitudes in mathematics as follows: Perception of difficulty, mathematical language skill, teaching methods, relevance to daily life, belief in ability and peer influence. It is important to balance assessment practices and provide opportunities for intrinsic motivation, curiosity, and deep understanding of mathematical concepts ensuring that students

have good attitude to mathematical language skills. To promote a positive attitude towards mathematics, it is crucial to address the use of language of mathematics in teaching and learning. Therefore, the study determined mathematical language skill as correlate to students' academic achievement and attitude toward mathematics in senior secondary schools in Taraba State, Nigeria.

Statement of Problem

In an ideal situation, mathematics should be a subject accessible to all students, regardless of their background or career aspirations. It should serve as a foundation for developing critical thinking and problem-solving skills that are valuable in various professions. However, there is a trend of poor achievement in mathematics, which perpetuates the misconception that mathematics is only for a selected few (Siringi, 2010). In Jalingo education zone of Taraba State, Nigeria, the situation is particularly dire. Despite the prerequisite for a credit pass in mathematics for university admission, secondary school students in the state exhibit alarmingly low proficiency in the subject, as evidenced by their performance in external examinations such as those conducted by WAEC from 2016 to 2021. The result shows that 46.95% of secondary school students passed mathematics in WAEC in Taraba State in the year 2016, 41.70% in 2017, 38.41% in 2018, 49.65% in 2019, 34.25% in 2020 and 41.36% in 2021. Several interrelated factors contribute to this predicament, including the quality of learners, pedagogical methods that fail to resonate with students' experiences, teacher-centered instructional approaches, poor mathematical language skills and a dearth of innovative teaching practices. Similarly, poor attitude of students towards mathematics is another worrisome menace that often builds barriers between mathematics and the students. The factors responsible for the poor attitude towards mathematics according to Tsabalala (2013) includes poor teaching method, poor mathematical language skills, inadequate qualified teachers, teachers' relationship with students and inadequate teaching materials. To address the challenges of poor academic achievements and negative attitude towards mathematics among students in Jalingo education zone, the study investigated mathematical language skills as correlates of students' academic achievement and attitude toward mathematics in senior secondary schools in Jalingo education zone in Taraba State, Nigeria.

Purpose of the study

The purpose of the study was to investigate mathematical language skills as correlates of students' academic achievement and attitude toward mathematics in senior secondary schools in Jalingo education zone in Taraba State. Specifically, the study is designed to achieve the following objectives:

1. To determine the correlation between skills in mathematical language and students' academic achievement in Jalingo Education zone
2. To determine the correlation between skills in mathematical language and students' attitude toward mathematics in Jalingo Education zone

Research Questions

The study is guided by the following research questions

1. What is the mean academic achievement score of students in mathematics language skills in Jalingo Education Zone?
2. What is the mean attitude rating of students in mathematical language in Jalingo education zone?

Hypotheses

The following null hypotheses were formulated to guide the study.

1. H_{01} : There is no significant correlation between skills in mathematical language skills and students' academic achievement in Mathematics in Jalingo Education Zone
2. H_{02} : There is no significant correlation between mathematical language skills and students' attitude toward mathematics in Jalingo Education

Methodology

The study adopted a correlational survey research design. The population of the study was 2220, comprising of 1008 male and 1012 female SSIII students offering mathematics in Jalingo education zone in Taraba State. A sample size of 339 students from nine schools selected for the study using purposive and simple random sampling techniques. The study employed purposive sampling techniques to select nine schools out of the fifty-two public secondary schools within Jalingo education zone on the basis that the school is having WAEC center and either B.Sc (Ed) or B. Tech (Ed) mathematics with teaching experience not less than five years. The study also employed simple random sampling techniques to select 339 SSIII students from the nine schools. Three instruments were used for the purpose of data collection. They are Students Mathematical Language Skill Test (SMLST), Attitude Towards Mathematics Inventory (ATMI) and a Mathematics Achievement Proforma (MAP). The Students Mathematical Language Skills Test was adapted from (Rodriguez, 2018), the Attitude Towards Mathematics Inventory was adapted from (Taban, 2020) while the Mathematics Achievement Proforma was prepared by the researcher and used for collecting achievement scores of students in first, second and third terms. Students Mathematical Language Skills Test (SMLST) was adapted from Rodriguez (2018) as it was slightly modified to meet the present research purposes. The instrument contains 25 items each in the form of fill in the blank spaces for both mathematical languages. A scoring key of two marks per each item was prepared for the purpose of scoring the right answer for each item. The Attitude Towards Mathematics Inventory (ATMI) was adapted from Taban (2020) and was slightly modify to meet the research purposes. The ATMI comprised of two sections- Section A and B. Section A contains information about the subject, name of school and local government area while, section B has two sections for convenience considering the limit; covering student's attitude towards mathematics. The student's attitude was rated using a four points Like-type rating point wherein one was the lowest and four was the highest. The four Like-type rating point response options are Strongly Agreed (SA) = 4 Points, agreed (A) = 3 points, Strongly Disagreed (SD) = 2 points and Disagreed (DA) = 1 point. The Mathematics Achievement Proforma was prepared by the researcher and used to take students' scores in terminal examination of the

mathematics students. It was used to collect already existing scores from the students via their mathematics teachers' record books for the immediate past academic session (SSII). Each MAP gave the scores of first term, second term and third terms. These scores were converted to standard scores (Z-scores) and used as mathematics achievement for this study.

The instruments were given to four experts for validation. Two experts from the department of Physical Science Education, Modibbo Adama University, Yola. One from mathematical science department, Modibbo Adama University, Yola. And one expert from the department of Educational Foundation, Taraba State University, Jalingo. Content validation was done on the skills test, while construct validation was done on Attitude. Corrections were made on the instruments after the validation and subsequently taken for pilot testing. The instruments were subjected to a trial test by administering it to 30 SS3 students of Government Day Senior Secondary School, Mutum- Biyu, Gossol L.G.A of Taraba State. Cronbach alpha statistic at 0.05% level of confidence for instruments that are questionnaire was used to test the reliability of Attitude Toward Mathematics Inventory (ATMI) and the result obtain was 0.74. Similarly, Kendall' tau correlation coefficient of concordance was used to test the reliability of Students Mathematical Language Skills Test (SMLST) and the result obtained was 0.88. The instruments were administered on the SS3 mathematics students by the researcher with the help of three research assistants and the various schools' mathematics teachers. The researcher also identified and visited the selected schools. After each school's identification and visitation, the instruments for data collection were given to the various assisting mathematics teachers. The purpose and procedure for students' participation was explained to the various mathematics teachers. Collation of all instruments from the various local governments within the zone was done with the help of the mathematics teachers. The data collected were analyzed using mean and standard deviation to answer research questions, while Pearson Product Moment Correlation statistic was used in testing the hypotheses at 0.05 level of significant.

Results

Research Question 1

What is the mean academic achievement score of students in mathematics language skills in Jalingo Education Zone?

Table 1 shows the mean and standard deviation of students' academic achievement in mathematics among 339 students in the Jalingo education zone. The mean academic achievement score is 23.03, with a standard deviation of 7.52. This indicates that students' mathematical language skills are below average. The standard deviation indicates the spreading of their score in mathematical language skills test. This implies that most students do not understand and cannot translate the language use in expressing mathematical terms and concepts.

Table 1 The Mean Academic Achievement Score of Students in Mathematical Language Skills		
Variables n= 339	Mean	S. D
Mathematics Language Skills	23.03	7.52

Table 2 Mean Attitude Rating of students in Mathematical Language Skills in Jalingo Education Zone.				
S/N	Item (n = 339)	Mean	S. D	Remark
	I believe that using clear mathematical language is important for effective communication.	3.41	0.70	ML
	Understanding mathematical language makes concepts in mathematics simpler.	3.09	0.82	ML
	Mathematics is unique because of its special language.	2.98	0.77	ML
	I feel confident when mathematical concepts are explained using appropriate mathematical language.	3.17	0.85	ML
	I believe that a good grasp of mathematical language is crucial for success in mathematics.	3.04	0.86	ML
	I am happier in the mathematics class than any other class because of its language.	2.97	0.85	ML
	Mathematical language is the foundation for understanding mathematics.	3.15	0.85	ML
	I feel excited when exploring the meaning of mathematical language.	2.96	0.85	ML
	I believe understanding mathematical language helps me with problem solving in all areas of mathematics.	3.14	0.74	ML
	I believe I am good at translating mathematics word problems.	3.06	0.82	ML
	Mathematics is one of my most favorite subject because its language is simple.	2.99	0.78	ML
	I would prefer to do an assignment in mathematics than to write in an essay because mathematical language does not scare me.	3.01	0.84	ML
	understanding mathematical language could help me have a good mathematics background.	3.15	0.84	ML
	Mathematical language is necessary in the understanding of mathematics.	3.17	0.78	ML
	I get a great deal of satisfaction out of solving mathematics problems because the language is simple to understand.	2.97	0.84	ML
	Grand Mean	3.08	0.76	ML

Research question 2

What is the mean attitude rating of students in Mathematical Language skills in Jalingo Education Zone.

The results presented in the table 2 highlights the attitude of students in the Jalingo Education zone towards the use of mathematical language. The overall grand mean score is 3.08, indicating that students generally have moderate attitude towards mathematical language, as reflected in the majority of the item mean scores

which fall below the midpoint of 3.5 on a 5-point scale. The standard deviation (S.D.) of 0.76 suggests moderate variability in students' responses across different items. Most students agree that using clear mathematical language is important for effective communication (Mean = 3.41, S.D. = 0.70), reflecting the recognition of mathematical language's role in enhancing understanding. However, there are a few areas where students seem less enthusiastic. For instance, the mean score of 2.96 for the item "I feel excited when exploring the meaning of mathematical language." and the item "I get a great deal of satisfaction out of solving mathematics problems because the language is simple to understand." (Mean = 2.97, S.D. = 0.84) suggests that while students recognize the importance of mathematical language, they may not necessarily enjoy or find ease in working with them.

Hypotheses

H_{01} . There is no significant correlation between mathematical language skills and students' academic achievement in Mathematics in Jalingo education zone

The null hypothesis (H_{01}) stated that there is no significant correlation between skills in mathematical language and students' academic achievement in Mathematics in the Jalingo Education Zone. To test this hypothesis, a Pearson Product-Moment Correlation Coefficient (PPMC) analysis was conducted with a sample size of 339 students as presented in Table 3.

The mean score for Mathematics Language Skills was 23.03 with a standard deviation (S.D.) of 7.52, indicating a moderate level of variability in language skills among the students. The mean score for Students' Academic Achievement in Mathematics was 48.04 with a standard deviation of 11.96, which also shows a moderate level of variability in academic achievement.

The correlation coefficient (r-value) between the two variables was found to be 0.335, which suggests a positive correlation between mathematical language skills and academic achievement in Mathematics. This means that as students' skills in mathematical language improve, their academic performance in Mathematics tends to increase as well.

The p-value associated with this correlation is .000, which is less than the conventional alpha level of 0.05. This indicates that the correlation is statistically significant, and we can reject the null hypothesis (H_{01}). Therefore, the results support the alternative hypothesis that there is a significant correlation between skills in mathematical language and students' academic achievement in Mathematics in the Jalingo Education Zone.

Table 3 Result of PPMC of Correlation between Mathematical Language Skills and Students' Academic Achievement in Mathematics					
Variables n= 339	Mean	S. D	r – value	p-value	Decision
Mathematics Language Skills	23.03	7.52	0.335	.000	H_{01} rejected
Students' academic achievement in Mathematics	48.04	11.96			

Table 4 Result of PPMC of Correlation between Skills in Mathematical Language and Student's Attitudes towards Mathematics in Jalingo Education Zone					
Variables n= 339	Mean	S. D	r – value	p-value	Decision
Mathematics Language Skills	23.03	7.52	0.208	.000	H₀₂ rejected
Students' Attitude toward mathematics	3.19	.56			

In summary, the analysis suggests that there is a meaningful relationship between the ability to understand and use mathematical language and the level of success students achieve in their Mathematics studies.

H₀₂. There is no significant correlation between skills in mathematical language and students' attitude toward Mathematics in Jalingo Education Zone

The results from the Pearson Product-Moment Correlation Coefficient (PPMC) analysis presented in Table 4 indicate a study conducted to explore the relationship between students' skills in mathematical language and their attitudes toward mathematics in the Jalingo Education Zone. The sample size for the study was 339 students.

For the variable 'Mathematics Language Skills', the mean score was 23.03 with a standard deviation (S.D.) of 7.52, indicating a moderate level of variability in language skills among the students. The 'Students' Attitude toward Mathematics' had a mean score of 3.19 with a lower standard deviation of 0.56, suggesting that students' attitudes were more consistent across the sample.

The correlation coefficient (r-value) between these two variables was found to be 0.208, which is a positive but weak correlation. However, the p-value associated with this correlation was .000, which is less than the conventional alpha level of 0.05 used for statistical significance tests. This means that the null hypothesis (H₀), which stated that there is no significant correlation between the two variables, was rejected.

In summary, the analysis suggests that there is a statistically significant but weak positive correlation between students' skills in mathematical language and their attitudes toward mathematics. This implies that as students' mathematical language skills improve, there might be a slight increase in their positive attitude towards mathematics, but the effect is not strong.

Discussion of Findings

The findings of the study on mathematical language skills as correlate of students' academic achievement and attitudes toward mathematics in senior secondary schools in Taraba State, Nigeria. The findings revealed a moderate positive correlation between skills in mathematical language and students' academic achievement in mathematics in Jalingo education zone. This suggests that students who are adept understanding and using mathematical language tend to achieve higher in mathematics. The understanding facilitates clear communication and interpretation of mathematical ideas, which is crucial for academic success in the subject. This finding aligns with previous studies by Wanjiru (2015) and Myanmar (2020), which similarly identified a positive relationship between mathematical language comprehension and academic success in mathematics. Conversely, Abdulkareem (2022) reported no significant correlation between mathematical

language skills and students' performance, attributing this discrepancy to variations in mathematical abilities among students.

Additionally, this study found a moderate positive relationship between mathematical language skills and students' attitudes toward mathematics. This finding is in agreement with Faustin (2016) who noted that students display a moderate level of positive attitude toward mathematics. However, this result contrasts with Abdulkareem (2022), who observed significant differences in students' attitudes towards mathematics, attributing these differences to disparities in mathematical ability. The result also agrees with Mzomwe, Calkin, and Respickius (2019) who found that there is weak positive correlation between students' attitudes and performance.

Conclusion

Top of FormBottom of FormBased on the findings of this study, it can be concluded that mathematical language skills significantly correlate students' academic achievement and attitude toward mathematics in senior secondary schools in jalingo education zone. A good mastery of mathematical language skills will go a long way in improving senior secondary school students' achievement in mathematics.

References

- Abdulkareem, M. (2022). Effect of mathematical ability on students attitude towards physics among senior secondary schools in Katsina metropolis, Nigeria. *Asian and Applied Research Journal*, 4(1), 230-235.
- Alkhateeb, H. M. (2019). Gender differences in mathematics achievement among high school students in the united arab emirate. *International Journal of Science Education*, 101(1), 5-9.
- Arenillo, A. & Cruzado, C. (2014). College student's difficulties with basic mathematics. *Lamure International Journal of Multidisciplinary Research*, 8(1), 1-13.
- Barwell, R. (2015). Formal and informal mathematical discourses: Bakhtin and Vygotsky, dialogue and dialectic. *Educational Studies in Mathematics*, 9(2), 331-345.
- Dugger, C. (2014). In Africa, Free Schools Feed a Different Hunger. Retrieved from <http://www.Kenyaeducation.und.org/articles-newsletters/in-africa-free-schools-feed-a-different-hunger.html>.
- Faustin, H. (2016). An exploratory survey of students' attitudes towards mathematics at INES-ruhengeri in rwanda. *INES Scientific Journal*, 5(11), 230-245.
- Florin, G. (2020). Attitude as an expressible info-operational reaction to a perceived /purposed object/ objective, Bae-celona (Spain). *International Journal of Neuropsychology and Behavior Sciences*, 1(1), 25-27.
- Goldin, G. A, Hamula, M. S. S. & ZAN, Q. (2016). Attitude beliefs and motivation in mathematics education. An overview of the field and future directions, *International of Education and Information Studies*, 11(9), 104-119.
- Hornburg, B. C., Schmitt, S. A., & Purpura, D. J. (2018). Relations between preschoolers 'mathematical language understanding and specific numeracy skills. *Journal of Experimental Child Psychology*, 17(6), 84-100.
- Jayanthi, J. (2019). Mathematics in society development ,Vidhya sagar Women college department of commerce, Tamil Nadu. *Iconic Research and Engagement Journal*, 3(3), 2456-8880.
- Ma X, & Kishor, N. (2017). Assessing the relationship between Attitude towards mathematics and achievement in mathematics: A meta- analysis. *Journal of Research in Mathematics Education* 28(1), 27-47.
- Mahere, C. A & Powell, A. B. (2013). Research on informal mathematics learning. Investigations in mathematics learning. *International Journal of Science Education*, 5(7), 36-44.
- Momozoku, U. S, Audu, O. A & Niyi, O. O. (2022). Students perception of the influence of social media on academic performance in mathematics in federal college of education Kontagora-Niger State. *Abacus (Mathematics education series)*, 47(2), 15-27.

- Myanma, J. (2020). The influence of mathematical Terminology on student's achievement at the high school level. *Journal of Mathematics Science and Technology Education*, 18(9), 155-176.
- Mzomwe, Y. M. Calkin, S. M. & Respikius, O. (2019). Investigating students attitudes towards learning mathematics. *International Electronic Journal of Mathematics Education*. 5(6), 78-97.
- Njoroge K. N. (2014). Maths Still Hard Nut to Crack in the East African Standard.
- Ramari K. (2014). *Fifty Thousand Score Varsity Entry Marks*. In East Africa Standard March 2nd, 2004. 17
- Riboroso, R. (2019). The mathematics language and symbols. *Journal of Education Research*, 7(11), 50-67.
- Rodriguez, M. (2018). *Mathematics in the modern world*, Nieme publishing house Co. LTD, *Online Journal of Technology Education*, 14(29), 19-39.
- Siringi, S. (2010). *Girls still losing out in education*. In the Daily Nation, Nairobi, March 3rd, 2010.
- Slakaloba, E. (2024). Factors contributing to poor performance of learners in mathematics, Chirundu District of Lusaka, Zambia. *International Journal of Research Achieve*, 11(9), 93-109
- Sunita, Y. (2020). Role of mathematics in development of society, willinton university. *International Journal of Research and Analytical Reviews*, 6(4), 2349-5138.
- Taban, J. (2020). Mathematical language and symbols. *International Journal of Advanced Research*, 12(8), 112-123.
- Tsahbalala, T. (2013). Causes of poor performance of ordinary level pupils in mathematics in rual secondary schools in Nkayi district. *Journal of Education Research*, 18(32), 56-68.
- Wanjiru, B. (2015). *Effects of mathematical vocabulary instruction on student's achievement in mathematics in secondary schools*. A research thesis of doctorate degree, education of Kenya.

Beyond Academics: Co-Curricular Activities’ as a Catalyst for Developing 21st Century Social Emotional Learning Skills among Learners in School Education

Ms. Neha Madan

Abstract

An overview of picture of education globe clearly indicates gradual expansion from academic excellence to encompass holistic development of student along with Social emotional learning skills (SEL) such as self awareness, emotional regulation, social skills etc. the need for development of these skills among school learners as the most important component of 21st century skills arises from demand of cultivation of learner who can sustain in multifaceted challenges. Moreover statistics indicates increased number of students facing behavioral problem as a result of which they are taking intolerable steps with themselves and playing with life of fellow mates. Researchers have indicated that by incorporating Co curricular activities miracles can be achieved in development of SEL Skills among school learners’ as they in the form of as sports, performing arts, debates, and community service, schools can create enriched environments that nurture emotional intelligence, collaboration, and resilience as a catalyst. With this view point action research was conducted by Teacher trainees of B.Ed. college affiliated to GGSIPU, Delhi in government and privates schools of East Delhi to analyze role of CCA activities to act as a catalyst for development of SEL skills among school learners’. Research tools such as observation schedule and FGD were used as a part of research. On the analysis of data it was revealed that by conduction of CCA activities in various forms we can developed SEL skills among students in school education which in turn enhanced their competencies for becoming self sustained individuals in their life.

Keywords: CCA, SEL Skills, Competencies.

Introduction

The fact cannot be denied that 21st century will pose many new challenges to the younger generation especially school age children In the face of these challenges, the latest WHO 2015 report on **mental health** states that the incidence of mental health problems with the younger generation is increasing rapidly. There are many factors behind this trend but the increasing pressure to “achieve competency” in academics to secure a stable job is definitely high on this list of such causes. Even in our country India reported in 2018 that about 75,000 students committed suicide in India between 2007 and 2016. In pursuance of such era researches are increasing day by day in the field of different interventions which are taking place at school level education which can play role in development of Social and Emotional Skills (SEL) among 21st century learners’.

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Understanding 21st Century Learning

A significant shift in the education field, is represented by 21st century learning representing evolving requirements of today's global and digital world which focused on students with critical skills that go beyond traditional reading, writing, and arithmetic, to include broader competencies such as problem-solving, digital literacy, and emotional intelligence which not only requires incorporation of the latest technologies but also emphasizes the importance of learning how to learn, ensuring students are equipped to adapt to an ever-changing global environment. And to in cultivate 21st century skills development of Social Emotional Learning Skills is utmost important.

The key 21st Century Learning skills are divided into 2 categories basically **Learning Skill is (The Four Cs)** i.e Critical Thinking, Creativity, Collaboration and Communication **and Literacy Skills (IMT Skills)** i.e. Information Literacy, Media Literacy and Technology Literacy.

And for effective inculcation of 21st century skills among learners' educators require to adapt and incorporate innovative teaching methods. As the educational landscape shifts, incorporating a blend of technology, project-based learning, and a focus on **social-emotional aspects** can significantly enhance student learning outcomes.

Social-Emotional Learning Skills

Social and emotional learning (SEL) as an integral part of education and human development. The process through which all learners' acquire and apply the knowledge, skills, and attitudes to develop healthy personality traits. SEL advances educational equity and excellence through authentic school-family-community partnerships to establish learning environments and experiences that feature trusting and collaborative relationships, rigorous and meaningful curriculum and instruction, and ongoing evaluation. From the researches it is known fact that an education that promotes SEL has a positive impact on a wide range of outcomes, including academic performance, healthy relationships, mental wellness, and more. From the so many framework, **CASEL SEL framework** is the most significant at the center are the **five core social and emotional competencies**—broad, interrelated areas that support learning and development.



Figure 1: The CASEL SEL Model. Source: <https://www.etr.org/get-real/for-facilitators/sel-skills/>

Co-Curricular Activities as a Catalyst in the Development of Social Emotional Skills

Co-curricular activities which were earlier known as extracurricular are part of is education curriculum itself though through them, the students will be educated in the form of spiritual, leadership, teamwork as well as self-confidence. Participation in these activities will provide the essential skills which fostered a healthy lifestyle. According to *Wee Eng Hoe, 1994*, Co curricular activities can strengthen the interaction between the students and at the same time promoting integration between the races as well as nurturing decencies, independencies, hard work, disciplined and obedient to the law which develops the students into becoming a useful citizen Therefore, co-curricular activities are capable to improve social Emotional skill among students which will also help them in the future career prospects. It has been found that by providing opportunity to students in various forms of activities at school level lifelong development of personality is assured as School students are the root for the future generations. As being reflected from NEP 2020 curriculum learner need to develop skills not only in one aspect for sustaining self in this challenging world as stated by Howard Gardner in his theory of Multiple Intelligence much earlier.

It was also agreed by **Azmi and Hamsiah (2000)** which stated that the actual function of the co-curriculum is to enhance and strengthen interaction and communication among students. The learning environment provided by these activities outside of the classroom play an important role in influencing a person's behavior and also one of the important elements in the formation of students **social skills**, is one aspect of emotional intelligence which will define the excellence of students in any situation. Intellectual intelligence alone is not enough for a person to be excellent. Co-curricular activities can act as a catalyst to build social skills in everyday life by interacting individually or collectively as these serves as a key benchmark in fulfilling the national education policy which is unity among students of various races.

Hence, we can conclude that Co-curricular activities play essential role within arrive at presuming golden opportunities for students to be born necessary life skills, support academic growth, encourage personal growth, get ready for future careers, assemble group and increase all inclusive happiness (Marris, 2018).

Thus in the present action research titled **Beyond Academics: Co curricular Activities' as a Catalyst for developing 21st Century Social Emotional Learning Skills among learners in School Education** has been undertaken .

Literature Review

- **Rani, M. & Keshwal, H.S. (2016). Effect of Co-curricular Activities on Development of Social Skills of Children with Intellectual Disability. Journal of Disability Management and Rehabilitation,2 (1):18-21.** Conducted study on the title *Effect of Co-curricular Activities on Development of Social Skills of Children with Intellectual Disability* to find out the effect of co-curricular activities on development of social skills of children with intellectual disability. Sample. The subjects N=8, (Six boys and two girls, IQ ranging from 35-49) were selected from Govt. Rehabilitation Institute for Intellectual Disabilities (GRIID), Chandigarh based on set inclusion and exclusion criteria. Design: Using purposive sampling and utilizing single group, pre and post tests experimental method. Tool: The pre and post tests were conducted by making use of Social Skill Assessment Tool developed by the researcher. Results: The intervention

programme was conducted for 20 sessions to perform three co-curricular activities i.e. dance for 10 sessions, play (throwing the ball into the bucket) for 5 sessions and thumb painting for another 5 sessions. Based on the result of post test performance, the collected data was analyzed quantitatively by using t-test. In the analysis, it was found that the mean scores of pre-test and post-test were 27.12 and 50.75 respectively and the calculated t value was 10.88 whereas the table value of t was 3.49, which was less than the calculated value. Hence, null hypotheses was rejected at $p < 0.01$ level of significance. The statistical analysis shows that there is highly significant effect of co-curricular activities on development of social skills of children with intellectual disability.

- **Bansal K, Pal B, Kumar H. (2022):** Study the Role of Curricular and Co-curricular Activities in the Development of Academic and Social Skills of Elementary School Students. The main aim of the present study was identify the role of curricular and co-curricular activities in the development of academic and social skills of elementary school students. A descriptive Survey method was used in the study because the researcher's aim was to find out the role of a particular scenario. A number of 60 students studying in elementary classes of government and private schools. Investigators developed a five-point Likert scale to measure respondents' academic and social skills and was administered on the selected sample. The scale consisted of 20 items on five-point rating scale. Eleven items were on academic skills, whereas 9 statements were on social skills. The further scale had 18 positive statements and 2 negative statements. This study offered insight that how curricular and co-curricular activities have a remarkable contribution in the development of academic and social skills which is beneficial for elementary school students to gain success in life. After calculating the data, the results revealed that the majority of the students agreed that there is a role of curricular and co-curricular activities in the development of academic and social skills. More importantly, after applying the t-test it revealed that there is no significant difference among the skills development of both genders, students studying in private and government school and students belonging to nuclear or joint families.
- **Balls (2008):** Destine contribution of good schools is excellent teaching and learning, which help children to develop confidence. Learn about teamwork, leadership. Responsibility and successful relationships. As a vital community resource, schools could offer wider opportunity for children their families to take part in sports and cultural activities. Good schools have an understanding of the child. They are places that could identify and address emerging problems before they become serious.

Objectives of the Study

- To examine the present status of co-curricular activities and their contribution to development of various SEL competencies such as self-awareness, self-regulation, social awareness, relationship skills, and responsible decision-making among school students.
- To conduct different types of co-curricular activities for fostering Social-Emotional Learning (SEL) skills among school students.
- To investigate the role of CCA as catalyst in development of Social Emotional learning skills after conduction of such activities in schools.
- To suggest policy recommendations for integrating SEL-focused co-curricular activities within the school curriculum in alignment with the National Education Policy (NEP) 2020.

Significance of the Study

The study on “**Beyond Academics: Co-curricular Activities as a Catalyst for Developing 21st-Century Social-Emotional Learning (SEL) Skills among Learners in School Education**”, is of great significance as on the review of researches and content analysis on importance of CCA for holistic development of learners’ which accompanied inculcation of social emotional skills among learners’ clearly indicated the same. As school experiences and activities conducted are one of the most important resources in building up entire personality of learners’. The present study emphasizes how **co-curricular activities** serve as an essential platform for fostering **social-emotional learning (SEL) skills** such as self-awareness, empathy, emotional regulation, and teamwork, which are crucial for holistic development by examining present status and execution of few CCA in school aspects. Thus, findings of the study would further provide handsome of potential strategies for enhancement of horizon of CCA activities for development of SEL Skills as per need of 21st century skills in the perspective of NEP 2020.

Operational Definition

Co-Curricular Activities; Activities which are conducted in school apart from academics such as debate competitions, arts and culture, sports and physical education activities. Leadership, communication activities, literary, technology etc.

Social Emotional Learning Activities refers to self-awareness, empathy, emotional regulation, teamwork and communication skills

21st-Century skills: The Four Cs) i.e., Critical Thinking, Creativity, Collaboration and Communication **and Literacy Skills (IMT Skills) i.e.** Information Literacy, Media Literacy and Technology Literacy.

Methodology

- **Sample for the Study:** The sample for the study comprised of 10 Secondary and senior secondary level private schools of East Delhi including Students of VI-VIII Classes.
- **Sampling Technique:** For the present study Purposive sampling technique was used for selection of schools and classes VI-VIII only taken.

Tools Used

- **Observation schedule- (1):** To know about the different activities are being planned and conducted in schools related to CCA within classroom and outside at school level holistic development of students. **(2):** for observation of student’s behavior in classes with each other to understand their social emotional response.
- **Action plan: Phase I – Conduction of Peer Interaction and Social Skills Rating Scale (PISSRS)** designed by S.G. Priti in 2016, which is a standardized tool used to assess **children’s social skills and peer interactions**, particularly in educational and developmental research contexts was used to examine the present status of co-curricular activities and their contribution to development of various SEL competencies such as self-awareness, self-regulation, social awareness, relationship skills, and responsible decision-making among school students.

- **Action plan: Phase II-** conduction of different types of co-curricular activities for fostering Social-Emotional Learning (SEL) skills and to investigate the role of CCA as catalyst in development of Social Emotional learning skills after conduction of such activities in schools.

Interpretation and Analysis

- **Section I Observation schedule: On the observation different activities which were being planned and conducted in schools related to CCA within classroom and outside at school level holistic development of students,** it was found that in almost all 10 sampled schools selected for study, Co –curricular activities were conducted in form of morning assembly session sensitizing learners' about significant relevance of that day like Earth Day on April 22, World Literacy Day 8th September every year etc and celebration of National day used to take in all schools. In very few schools house system was followed as a pattern of conducting CCA activities especially in private schools system was there as compared to govt schools. While participating in Inter-house Competitions more Social emotional learning skills were being developed like group work, team spirit, leadership quality, co-operation and coordination etc. and students get recognition by name of their houses which were mainly on the names of Indian Rivers, Mountains, positive affirmation etc. In majority of the schools activities were conducted within class such as poster competitions, creative writing, drawing competitions etc. only 4 school out of 10 used to celebrate activities at large scale in which maximum stakeholders like parents, school alumni, members of community also involved.

It was observed by teacher trainees that time when students used to involve in CCA tasks they used to remain stress free, cooperative, and more attentive apart from academic classes. They used to get break from monotonous routine of study periods only. They tend to become more independent and developed leadership quality. It has been analyzed that schools in which teachers tend to enthusiastic for CCA activities had been more successful and encouraging for learners'.

Section II- Analysis and Interpretation of Action plan: Phase I –During research study action plan was formulated and conducted in two phases as in first phase to investigate the role of CCA as catalyst in development of Social Emotional learning skills after conduction of such activities in schools. Conduction of CCA activities by teacher trainees to further boost up social emotional skills of learners and secondly Conduction of Peer Interaction and Social Skills Rating Scale (PISSRS) designed by S.G. Priti was done.

Conduction of CCA Activities

Teacher trainees in sampled school from one of the B.Ed. college affiliated to GGSIPU Delhi during internship phase conducting CCA activities within classroom teaching process and outside at school level. Activities such as celebration of sports day, republic day etc were conducted at school level and within classroom as per pedagogy subject such as quiz, poster making etc were conducted. It was observed by trainees that by conduction of such activities even isolated child of their class become part of the group, students who were otherwise not interested in class become more active and participating.

- **Conduction of Peer Interaction and Social Skills Rating Scale (PISSRS) designed by S.G. Priti**

The items of scale were conducted with students of different section of class VI-VIII in selected schools. The scale assesses students' social skills and peer interaction abilities in educational settings and covered items in 6 major domains such as:

- Communication Skills
- Cooperation and Collaboration
- Empathy and Emotional Regulation
- Conflict Resolution
- Social Confidence and Assertiveness
- Friendship and Peer Relations

Each domain includes items were self assessed by the students by rating different items of each domain by **Likert-type scale** (e.g., 1 = Never, 2 = Sometimes, 3 = Often, 4 = Always) total scores were obtained by summing up scores from all items. **Higher scores** → Indicate stronger social skills and positive peer interaction and **Lower scores** → Suggest areas of difficulty in peer relationships or social skills.

Table 1 Analysis of various components of Peer Interaction and Social Skills Rating Scale (PISSRS)		
S.No.	Statement Strongly Agree	(Responses) %
1	I have high level of Communication skills such as Verbal and non-verbal interaction, listening, and expressing opinions	98.8
2	I have high level of Cooperation skills such as Teamwork, sharing, and helping behaviors has been enhanced.	97.6
3.	I have high ability of Empathy and emotional regulation: Sensitivity to others' feelings and managing one's own emotions.	98.5
4	I have high Conflict resolution skills: Handling, disagreements constructively.	88.1
5	I have Assertiveness and confidence : Ability to express oneself confidently without aggression.	96.7

From the analysis and interpretation of responses made by sampled students it was revealed that conduction of CCA activities in different mode enhanced social emotional skills such as teamwork, empathy, solving conflicts, communication skills, self confidence has been increased by participation in different modes either individual or group activities.

Recommendations for integrating SEL-focused co-curricular activities within the school curriculum in alignment with the National Education Policy (NEP) 2020.

On the basis of researched data analyzed researcher would like to recommend few strategies for further **integrating SEL-focused co-curricular activities in school education such as:**

- Making SEL practices by a consistent part of the school culture from beginning of day from morning assembly time itself
- Encouraging students to maintain daily journals to reflect on their emotions, achievements, and challenges.
- Using interactive and play-based learning to enhance SEL skills such as **Team-building Games**, Role-Playing Games and board game etc.
- SEL Integration in Subject Lessons such as using Use narratives, poems, and role-plays to discuss **empathy, resilience, and ethical decision-making**. In literature subject, including collaborative problem-solving and experiments to promote teamwork and adaptability in mathematics and science.

Conclusion

The present study indicated that co-curricular activities serve as a vital extension of classroom learning, playing a pivotal role in fostering Social Emotional Learning (SEL) competencies among school learners. Findings indicate that structured, inclusive, and intentional co-curricular programs offer meaningful contexts in which learners can practice and internalize SEL in real-world scenarios. Activities like team sports, drama, debate, community service, and student leadership not only complement academic knowledge but actively cultivate interpersonal and intrapersonal skills crucial for holistic development.

Furthermore, beyond academics the integration of SEL through co-curricular avenues bridges the gap between cognitive and emotional growth, thereby enhancing holistic development of learner.

References

- Azmi, M. N. L., & Hamsiah, A. (2000). *Co-curricular activities and their contribution to student interaction and communication*. Kuala Lumpur: Ministry of Education Malaysia.
- Ball, S.J. (2008) *The Education Debate*. The Policy Press, Bristol.
- Cited: Bansal K, Pal B, Kumar H. A Study of the Role of Curricular and Co-curricular Activities in the Development of Academic and Social Skills of Elementary School Students. JTER [Internet]. 31Jan.2023 [cited 12Mar.2025];17(02):13-6. Available from: <https://jter.in/index.php/JTER/article/view/207>
- Wee, E. H. (1994). *Co-curricular activities in school education*. Kuala Lumpur: Dewan Bahasa dan Pustaka.
- World Health Organization. (2015). *Mental health atlas 2014*. World Health Organization. <https://www.who.int/publications/i/item/9789241565011>
- https://www.business-standard.com/article/current-affairs/75-000-students-committed-suicides-in-india-between-2007-and-2016-study-118031100877_1.html
- <http://www.nln.org/docs/default-source/default-document-library/human-flourishing-final.pdf?sfvrsn=0>
- <https://mgiep.unesco.org/article/21st-century-skills-the-need-for-social-and-emotional-learning>
- <https://casel.org/fundamentals-of-sel/>
- <https://strobeleducation.com/blog/21st-century-learning-perspectives/>

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