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Degrees apart: A literature review on the challenges and support needs of non-education science instructors in higher education

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Abstract

The growing presence of non-education science instructors in higher education underscores a complex challenge: subject-matter expertise often comes without formal training in pedagogy. This literature review investigates the instructional barriers and professional support needs of these instructors, who are frequently tasked with teaching roles despite limited background in educational theory and practice. Drawing from a range of scholarly sources, the review identifies recurring issues such as classroom management difficulties, lack of instructional design skills, limited assessment literacy, and challenges with technology integration. It also examines structural impediments, including inadequate institutional support and restricted access to professional development opportunities. Despite these challenges, promising strategies—such as peer mentoring, targeted training programs, and reflective teaching practices—have emerged to help bridge the pedagogical divide. The review advocates for the implementation of comprehensive and context-sensitive faculty development frameworks to enhance instructional capacity among non-education science instructors and ultimately improve student learning outcomes in higher education.

Keywords: Non-Education Instructors; Science Education; Pedagogical Challenges; Higher Education; Faculty Development

1. Introduction

The increasing diversity of faculty backgrounds in higher education has drawn significant attention to the unique instructional realities faced by non-education science instructors—those who possess advanced degrees in specialized scientific fields but lack formal training in pedagogy. Recent research underscores that effective teaching extends beyond content expertise, emphasizing the critical role of Pedagogical Content Knowledge (PCK)—a fusion of deep subject matter understanding and pedagogical skills that allows educators to present material in ways that engage diverse learners [1]. Effective teaching requires utilizing diverse strategies like inquiry- and project-based learning [2], incorporating technology and collaboration [3], and engaging in continuous professional development to meet evolving student needs [3]. In the Philippine context, while hiring practices tend to favor subject matter expertise, teachers often struggle to apply research-based teaching principles, revealing gaps in pedagogical competence [4].

As a result, non-education science instructors encounter a distinct set of challenges when transitioning into teaching roles within colleges and universities, including difficulties in lesson planning [5], implementing student-centered teaching strategies [6,7], and designing formative assessments [8,5]—skills that are typically developed through formal teacher education programs. The literature highlights that gap in pedagogical training—particularly in science education, where complex content requires skilled instructional approaches—can result in ineffective teaching, underscoring the need for integrated training that builds both content and pedagogical competence [9,10].

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Moreover, as higher education increasingly adopts learner-centered approaches and technology-enhanced instruction, the gap between content knowledge and pedagogical capability becomes more evident, emphasizing the need for educators to integrate subject expertise with effective, tech-supported teaching strategies [11]. The need to examine the experiences, limitations, and support structures of non-education science instructors is underscored by research showing that their struggles with technology integration [12], classroom management [13], and student assessment stem not from a lack of scientific knowledge but from limited exposure to foundational teaching principles and professional training [14,15].

This literature review aims to synthesize existing research that highlights the challenges and developmental needs of non-education science instructors, as well as potential interventions to enhance their effectiveness as educators. Organized thematically, the review begins by outlining the pedagogical challenges commonly faced by this demographic. It then examines current faculty development practices and their inclusivity in addressing these concerns. The role of technology in teaching, particularly how it is utilized or underutilized by non-education instructors, is also analyzed. Furthermore, institutional and systemic influences—such as hiring practices, professional expectations, and evaluation systems—are discussed to provide a comprehensive understanding of the support mechanisms available to these instructors.

The review explores cultural and international dynamics that shape the experiences of non-education science instructors across different educational contexts, drawing on comparative perspectives where applicable. By focusing specifically on non-education science instructors in higher education, this review seeks to offer a targeted understanding of their lived experiences, challenges, and support needs. Ultimately, it aims to inform institutional policy, faculty development programming, and future research efforts that can bridge the gap between scientific expertise and effective teaching practices in higher education.

2. Materials and Method

This literature review employed a narrative review approach, aimed at synthesizing current knowledge on the pedagogical challenges and support needs of non-education science instructors in higher education. Narrative reviews emphasize qualitative synthesis and interpretation over statistical generalization, offering valuable context and thematic insights into complex academic issues [16,17]. This review followed the structured approach proposed by Levy and Ellis [18], which includes literature search and screening, data extraction, and synthesis.

Relevant studies published between 2019 and 2024 were identified through academic databases such as Google Scholar, ERIC, SAGE Journals, Taylor & Francis Online, and ScienceDirect. In addition, the AI-powered platform SciSpace was used to enhance the efficiency of the review process. SciSpace's advanced search features, supported by large language models and vector-based queries, enabled quicker identification and analysis of relevant literature [19,20]. The tool's multilingual support, annotation, and summarization functions were also instrumental in facilitating thematic synthesis and collaboration. However, technical limitations, such as occasional issues with reference export compatibility, were noted [21].

From the selected literature, six key themes emerged: (1) Pedagogical Challenges of Non-Education Instructors, (2) Faculty Development and Professional Growth, (3) Technology Integration in Science Education, (4) Impact of Institutional Support and Systemic Factors, (5) Cultural Differences and Institutional Dynamics, and (6) Non-Education Instructors in the Philippines. These themes guided the analysis and presentation of findings in this review.

3. Discussion

This narrative literature review presents a thematic synthesis of studies examining the challenges and support needs of non-education science instructors in higher education. Through a structured review process, six major themes emerged, each highlighting critical dimensions that shape the instructional experiences of these instructors. These themes reflect recurring patterns across global and local contexts, particularly within the Philippine higher education landscape. The discussion below explores each theme in depth, drawing on recent research to highlight the pedagogical, institutional, technological, and cultural factors influencing teaching effectiveness. Emphasis is placed on understanding the nuances of these challenges and identifying support strategies that can enhance instructional quality, professional growth, and student outcomes.

3.1. Pedagogical Challenges of Non-Education Instructors

Teaching in Higher Education does not require instructors to have an education degree as outlined in CMO No. 40, s. 2008 [22]. Consequently, these non-education instructors have not been given training in teaching that is required to deliver academic norms. Somosot and Relox [23] highlight that college instructors are either new to the field of teaching or lack training in teaching entirely. Thus, non-education instructors in higher education face numerous pedagogical challenges, primarily stemming from their lack of formal training and the demands of diverse student needs, institutional pressures, and professional growth. It is important to note that, while these instructors have content knowledge, they seem to have insufficient pedagogical understanding [24].

Institutional demands further complicate teaching for non-education instructors. Neoliberal frameworks emphasizing standardization and efficiency often stifle innovative practices, shifting focus from meaningful learning to assessment conformity [25]. This is particularly challenging in science education, where fostering curiosity and critical thinking is essential. Without institutional support, instructors often struggle to align their teaching with these systemic pressures.

Many instructors turn to self-directed learning to fill gaps in their pedagogical knowledge. Shavelson [26] highlights how tools like YouTube and guidebooks help build content and pedagogical content knowledge (PCK). However, the heavy reliance on traditional lecture methods and limited active learning integration may hinder student engagement. Collaborative support from peers and teacher educators can bridge these gaps, offering mentorship and resources to address practical teaching challenges [26].

Classroom management and lesson delivery are additional challenges. This involves adapting to students' expectations, accommodating the diverse needs of learners, and transitioning from their prior professional roles. To address these challenges effectively, they often implement interactive activities and establish clear guidelines [27]. The study of Trudel et al. [28] also found that preventative measures, such as clear expectations and positive routines, are crucial for reducing disruptions. Furthermore, professional development programs focusing on classroom strategies and pedagogical growth have shown promise, but these must be tailored to the unique needs of non-education instructors [29].

Thus, non-education instructors face a range of pedagogical challenges, from addressing diverse student needs to overcoming gaps in their training and navigating institutional pressures. While self-learning, collaboration, and structured professional development offer solutions, tailored support remains essential to enable these instructors to deliver high-quality science education effectively.

3.2. Faculty Development and Professional Growth of Non-Education Teachers

Faculty development and professional growth initiatives are crucial for enhancing the teaching competencies of non-education instructors in higher education, particularly in science education. Professional development programs have demonstrated significant effectiveness in improving instructional quality, promoting innovative teaching methods, and integrating technology into pedagogical practices. Structured in-service training programs, for instance, have been associated with a 61% improvement in instructional quality and a 71% enhancement in student performance, largely due to their focus on hands-on workshops and peer collaboration [30]. These initiatives create a supportive learning environment that fosters teacher confidence and facilitates the adoption of effective teaching strategies.

Faculty development programs (FDPs) play a pivotal role in equipping instructors with modern pedagogical approaches and the skills necessary for technology integration [31]. Their structured design, which often includes pre- and post-assessments, enables measurable improvements in teaching efficacy and attitudes toward innovative practices [31]. Additionally, non-face-to-face professional development programs targeting facilitation competencies have shown substantial success in enhancing teaching efficacy and flexibility [32]. Such programs cater to diverse learning needs, allowing instructors to participate in professional growth opportunities that align with their schedules and preferences [32].

The impact of these training programs extends beyond instructional quality to fostering greater self-efficacy and confidence among non-education instructors [33]. Participation in structured training programs has been linked to increased confidence and reduced teaching anxiety, particularly for instructors new to teaching [33]. Professional training programs have been proven to enhance teachers' motivation and self-confidence, fostering improved teaching strategies and better learning outcomes for students [34]. While, peer collaboration and hands-on workshops are integral components of in-service training, contributing to enhanced motivation and professional satisfaction among participants [30].

Despite these successes, significant gaps remain in current faculty development efforts. Many professional development initiatives lack a structured framework explicitly linked to student learning outcomes, reducing their overall effectiveness [35]. Programs often fail to conduct comprehensive needs assessments, resulting in a disconnect between the training offered and the specific pedagogical requirements of higher education science faculty [36]. Furthermore, feedback mechanisms in educational contexts have been found to elevate the quality of education by improving the processes of selecting and training educators. This strategy not only strengthens immediate learning outcomes but also fosters the sustained involvement of subject matter experts in advancing education [37].

Addressing these gaps is critical to achieving transformative change in faculty development. While existing programs have demonstrated the potential for incremental improvements, a more robust approach that incorporates structured frameworks, targeted needs assessments, and effective feedback mechanisms are necessary to fully realize their impact. By prioritizing these aspects, higher education institutions can better support the professional growth of non-education instructors, ultimately enhancing teaching quality and student learning outcomes.

3.3. Technology Integration in Science Education

Integrating educational technology into teaching practices presents significant challenges for non-education instructors, particularly in science instruction, due to technological, organizational, and attitudinal barriers [38, 39]. Infrastructure issues such as unreliable internet access and outdated hardware are common obstacles that limit the effective use of technology in classrooms [38, 39]. Additionally, the scarcity of educational resources and tools further discourages instructors from adopting technology [39]. The cost of digital technologies and resources can be prohibitive, limiting access for some students and educators [40] which underscores the need for enhanced access to reliable technology and resources to support both instructors and students in educational settings.

A lack of training is another critical barrier, as many non-education instructors are not adequately equipped with the skills and knowledge needed to effectively utilize educational technology [41, 42]. This gap often leads to frustration and resistance to technology integration [41, 42]. Continuous professional development programs that offer practical, hands-on training and ongoing institutional support are essential for building instructors' confidence and competency in using technology effectively [41, 43]. Furthermore, structured frameworks such as TPACK help educators connect technological tools with pedagogical and content knowledge, fostering more effective integration into their teaching practices [44].

Attitudinal barriers also play a significant role in hindering technology adoption. Resistance to change, often stemming from technophobia or negative past experiences, can prevent instructors from embracing new tools and methods [39, 42]). Addressing these attitudes through supportive measures such as peer tutoring and collaborative learning environments can help instructors overcome their reluctance. Peer-support mechanisms, including discussion boards and electronic journals, provide platforms for instructors to share experiences and solutions, fostering a sense of community and shared learning [45].

Despite these challenges, the integration of technology in science instruction offers transformative benefits. Tools such as Learning Management Systems (LMS), virtual laboratories, and interactive simulations have been shown to enhance student engagement and learning outcomes. For instance, virtual labs and simulations facilitate active learning environments, enabling students to interact with complex scientific concepts in an engaging and practical manner [46]. Additionally, personalized instruction through LMS allows educators to cater to diverse student learning needs and paces, resulting in improved educational outcomes [47]. A meta-analysis further highlights the positive impact of digital tools on student performance, demonstrating a significant effect size ($g = 0.65$) in secondary education settings [48].

However, challenges such as the digital divide, privacy concerns, and the need for teacher training persist and must be addressed to maximize the potential of technology in science education [49]. By addressing these challenges comprehensively, educators can leverage technology to transform traditional teaching methods into more effective and engaging learning experiences, ultimately enhancing both teaching practices and student outcomes.

3.4. Impact of Institutional Support and Systemic Factors on Teaching Effectiveness

Institutional factors, including workload and resource availability, play a significant role in shaping the teaching practices of non-education instructors, particularly in higher education. Heavy workloads and limited resources can negatively impact teaching quality, reducing the time instructors have for preparation and engaging with students [50]. This means that the heavier the workload, the less likely instructors are to deliver quality instruction. The job demands-resources theory further explains this phenomenon, suggesting that excessive demands coupled with insufficient resources can lead to stress and ultimately reduce teaching quality [51].

Resource availability is another critical determinant of teaching effectiveness. Institutions that provide robust support systems, including mental health resources and professional development opportunities, can significantly enhance faculty well-being and instructional practices [51].

Systemic challenges further compound the difficulties faced by non-education instructors. Limited access to professional development opportunities remains a pervasive issue. Acharya and Subedi [52] noted that science educators often lack ongoing training necessary to sustain effective teaching strategies. Systemic inequities also exacerbate these challenges, particularly in STEM fields, where resource distribution disparities disproportionately affect underrepresented groups, leading to lower student performance and retention [53].

Despite these challenges, some institutions are beginning to recognize the importance of equitable resource allocation and structured professional development programs, signaling a potential shift toward more supportive environments for educators. This shift has the potential to improve teaching practices and foster better student outcomes, particularly in disciplines like STEM, where systemic challenges are most pronounced. Addressing these institutional and systemic factors through targeted interventions and strategic support mechanisms can significantly enhance the teaching effectiveness of non-education instructors, ultimately benefiting both educators and learners.

3.5. Cultural Differences and Institutional Dynamics

Foreign studies reveal that non-education instructors face systemic challenges in delivering academic norms, with cultural differences and institutional dynamics playing a significant role. Payne et al. [54] note that language barriers and unfamiliar teaching contexts often hinder these instructors' effectiveness, particularly in international settings where cultural expectations vary widely. These challenges necessitate significant adaptation on the part of instructors, who must modify their teaching strategies to align with institutional norms while addressing cultural nuances.

Institutional support is critical in mitigating these challenges. Smith and Wyness [55] highlight that professional development programs, including peer review systems and collaborative teaching communities, enhance instructors' motivation and ability to adapt to academic standards. Moreover, the availability of teaching resources, such as technology and instructional materials, significantly impacts teaching quality, as underscored by Kim et al. [56]. However, disparities in access to these resources often exacerbate the difficulties faced by instructors, particularly in resource-constrained settings.

Tailored professional development programs have been effective in various contexts. Payne et al. [54] report on initiatives at Texas A&M University designed to improve instructors' language proficiency and pedagogical skills, yielding positive outcomes. Similarly, Vovk et al. [57] describe structured mentorship and financial incentives in certain countries, which foster continuous growth among instructors. Labzina [58] highlights the value of collaborative learning environments, such as communities of practice and reading groups, in providing platforms for instructors to refine their teaching methodologies through shared experiences. Despite these successes, systemic issues like limited funding and uneven participation remain persistent barriers to program effectiveness.

Technology integration has emerged as a vital strategy for improving instructional quality and managing workload. Khanna et al. [59] emphasize the benefits of technology-enabled tools, such as interactive software, which offer personalized instruction and immediate feedback, significantly enhancing teaching efficacy. Similarly, Mauliska and Karlssön [60] note that innovative technology-driven methods can increase student engagement, bridging gaps where traditional teaching methods fall short. However, as Ansari et al. [61] caution, integrating technology effectively requires comprehensive teacher training and improved infrastructure. Castro [62] suggests that professional development programs focused on technology can streamline lesson planning and resource allocation, easing instructors' workload. Yet, the need for ongoing technical support remains a critical challenge.

Aligning non-education instructors with academic norms in diverse cultural and institutional contexts requires a multifaceted approach. Tilovatova [63] stresses the importance of fostering cultural competence, which involves understanding and respecting diverse cultural backgrounds and perspectives. This can be achieved by incorporating these perspectives into the curriculum, bridging gaps between instructors and students. Institutional strategies, such as those proposed by Webb et al. [64], advocate for glocalization of curriculum practices—ensuring alignment with both global standards and local needs.

Inclusive teaching practices also contribute significantly to this alignment. Inclusive teaching practices bring significant benefits, but they also come with challenges that require attention. Educators may encounter implicit biases and structural obstacles that complicate the adoption of inclusive approaches [65]. Moreover, there is a pressing need for

more extensive training and professional development to prepare teachers with the competencies necessary for successful inclusive education [66].

3.6. Non-Education Instructors in The Philippines

The challenges faced by non-education instructors in the Philippine educational system have been well-documented in recent studies, emphasizing the impact of inadequate training and systemic support on teaching effectiveness. For instance, Damalerio et al. [67] and Bucao et al. [68] highlight that non-education instructors often lack the necessary pedagogical training, resulting in difficulties in curriculum delivery and classroom management. Additionally, job mismatch—where instructors are assigned teaching responsibilities outside their academic expertise—further exacerbates feelings of inadequacy and stress, as noted by Bucao et al. [68]. Moreover, Genosas et al. [69] point out that balancing teaching duties with the pursuit of further education presents significant challenges in time management, often leading to burnout. These findings underscore the multifaceted difficulties these instructors face in aligning with academic norms.

Institutional support plays a pivotal role in mitigating these challenges and enhancing the effectiveness of non-education instructors. Esmane and Quezon [70] emphasize the value of professional development opportunities, such as training programs and mentorship, which equip instructors with the skills needed to adapt to their teaching roles. Similarly, financial aid and emotional support from institutions have been shown to empower instructors, improving both their confidence and job performance [69]. However, the literature also indicates systemic limitations, such as inadequate resources and teacher shortages, which may hinder the effectiveness of these supportive measures. For example, Cauilan [71] note that state universities often face budget constraints, limiting the scope and accessibility of faculty development programs. These systemic issues suggest that while institutional efforts are vital, comprehensive reforms in the educational framework are necessary to address foundational challenges.

In response to these challenges, non-education instructors employ various coping mechanisms to navigate academic demands effectively. Magno [72] and Fronda [73] observe that flexibility and adaptability are critical traits, as instructors adopt innovative teaching methods to enhance curriculum delivery and student engagement, particularly during the pandemic. Help-seeking behavior is another significant strategy, with instructors leveraging peer support and institutional resources to manage stress and workloads, fostering a collaborative academic environment [69, 74]. Furthermore, strategic rest and well-being practices, such as maintaining work-life balance, are crucial for sustaining long-term professional engagement [75, 69]. While these strategies have proven effective, disparities in access to resources and support systems remain a concern, leading to varied coping experiences among instructors. This highlights the importance of tailored interventions to address the unique needs of non-education instructors in the Philippine educational context.

4. Conclusion

The review of related literature and studies highlights the multifaceted challenges and coping mechanisms of non-education instructors as they navigate the demands of academic norms. These instructors, often coming from diverse professional backgrounds, face significant hurdles, such as limited pedagogical training, resource inadequacies, and mismatched roles. The findings emphasize that these issues can hinder their teaching effectiveness and overall adaptation to academic standards. Despite these obstacles, institutional support through professional development programs, mentoring, and technological integration has shown promise in equipping instructors with the tools needed to meet their instructional responsibilities effectively.

Moreover, the review underscores the role of individual resilience and adaptability in overcoming professional challenges. Non-education instructors demonstrate innovative approaches in their teaching practices, leveraging technology and collaborative networks to enhance their delivery. While institutional initiatives provide structural support, the instructors' ability to balance personal and professional demands significantly contributes to their success in fulfilling academic expectations. These insights point to the need for more comprehensive, inclusive strategies that address both systemic and individual factors, fostering a supportive environment for non-education instructors to thrive in their roles.

Compliance with ethical standards

Disclosure of conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

References

[1] McGaw MAD. Professional Content Knowledge. In: IGI Global; 2023. p. 121–135. https://doi.org/10.4018/978-1-6684-7583-6.ch005

[2] Al Hussaini M, Kousar S, Kousar N, Batool U, Munawar NA. Exploring Effective Strategies for Student Engagement and Learning Outcomes in Elementary Education. Int J Learn Reformation Elem Educ. 2024;3(02):90–101. https://doi.org/10.56741/ijlree.v3i02.573

[3] Balida DAR, Banas LB. Teaching pedagogies in the new normal. Russ Law J. 2023;11(3). https://doi.org/10.52783/rlj.v11i3.2054

[4] Manigbas JI, Ollet A-L, Noble MPL, Angeles JR, Cayetano NM, Fucioc MP. Teachers' Competency in Content Knowledge and Pedagogy in Buhi South District, Philippines. 2024. https://doi.org/10.56442/ieti.v2i1.365

[5] Sengul O. A Process of Pedagogical Change in College Science Education: Instructor Perspectives. J Coll Sci Teach. 2022. https://doi.org/10.1080/0047231x.2022.12290693

[6] Winter D, Lemons PP, Bookman J, Hoese W. Novice Instructors and Student-Centered Instruction: Identifying and Addressing Obstacles to Learning in the College Science. J Scholarsh Teach Learn. 2012;2(1):14–42. https://www.maa.org/sites/default/files/pdf/upload_library/57/1590-6369-1-PB.pdf

[7] Nageotte N, Buck GA. Transitioning to Teaching Science in Higher Education: Exploring Informal Dialogical Approaches to Teaching in a Formal Educational Setting. Stud Teach Educ. 2020;16(1):105–122. https://doi.org/10.1080/17425964.2019.1690443

[8] Luo X. On the Teaching of Pedagogy in Colleges and Universities. J Hunan Univ Arts Sci. 2005.

[9] Ramolula K, Nkoane M. Pedagogical training of lecturers for higher education. Int J Res Bus Soc Sci. 2024;13(6):330–338. https://doi.org/10.20525/ijrbs.v13i6.3425

[10] Juanda A, Wahyudin D, Ansori YZ. Strategies To Improve Teachers' Pedagogical Skills in Science Learning. 2024. https://doi.org/10.46799/ajesh.v3i4.291

[11] Zou R, Jiang L, Cao Y, Muthukrishnan P, Fauzi MA, Zhang H. Mapping Fifteen Years of Technological Pedagogical and Content Knowledge (TPACK) Model Applications in Higher Education. 2024. https://doi.org/10.21203/rs.3.rs-5400076/v1

[12] Dinçer S. Bridging the gap in technology integration in education: An examination of science teachers' competencies and needs. J Turk Sci Educ. 2024;21(4):620–634. https://doi.org/10.36681/tused.2024.033

[13] Pantaleon A, Alpizar Rodríguez ME, Villanueva Z, Visaya A. Classroom Management Experiences Through the Lens of Non-Education Graduate Mathematics Instructors. J Interdiscip Perspect. 2025;3(2). https://doi.org/10.69569/jip.2024.0685

[14] Alpuerto R Jr. Science teachers' experiences on ICT integration: challenges, coping mechanisms, and opportunities. Sapienza. 2022;3(2):136–145. https://doi.org/10.51798/sijis.v3i2.254

[15] Intasingh S. Non-science teacher's teaching science: Problems, adaptation, and anxiety. 2019;2081:030014. https://doi.org/10.1063/1.5094012

[16] Baumeister RF, Leary MR. Writing narrative literature reviews. Rev Gen Psychol. 1997;1(3):311–320.

[17] Green BN, Johnson CD, Adams A. Writing narrative literature reviews for peer-reviewed journals: secrets of the trade. J Chiropr Med. 2006;5(3):101–117.

[18] Levy Y, Ellis TJ. A systems approach to conduct an effective literature review in support of information systems research. Informing Sci. 2006;9:181–211.

[19] Jain S, Kumar A, Roy T, Shinde KN, Vignesh G, Tondulkar R. SciSpace Literature Review: Harnessing AI for Effortless Scientific Discovery. In: Springer Science+Business Media; 2024. p. 256–260. https://doi.org/10.1007/978-3-031-56069-9_28

[20] Nailis M. Enhancing Literature Review through AI-based Research Tools: A Comparative Study of SciSpace and Semantic Scholar. TIJER Int Res J. 2024;11(7):a779–a785.

[21] Dewi SP, Irawati I. Pemanfaatan Teknologi Scispace untuk Meningkatkan Layanan Literature Review di Perpustakaan. Baca: Jurnal Dokumentasi Dan Informasi. 2024. https://doi.org/10.55981/baca.2024.5013

[22] Commission on Higher Education. Manual of regulations for private higher education (MORPHE): CHED Memorandum Order (CMO) No. 40, series of 2008. Commission on Higher Education; 2008.

[23] Somosot I, Relox C. Student to teacher: Experiences of non-education graduates teaching in higher education institutions. Asian J Univ Educ. 2023;19(4):759–767. https://doi.org/10.24191/ajue.v19i4.24837

[24] Manuel L, Garcia M, Sangalang J. Managing the teaching competence of part-time instructors at Ilocos Sur Polytechnic State College, Philippines. Paedagogia: Jurnal Pendidikan. 2023;12(1):1–20. https://doi.org/10.24239/pdg.Vol12.Iss1.369

[25] Harland T. University challenge: Critical issues for teaching and learning. 1st ed. Routledge; 2020. https://doi.org/10.4324/9781003008859

[26] Shavelson RJ. Research on teaching and the education of teachers: Brokering the gap. Beitr Lehrinnen Lehrerbild. 2020;38(1):37–53. https://doi.org/10.25656/01:21773

[27] Babasoro C, Cabrillas A. Classroom management experiences of non-education graduate teachers. CGCI Int J Admin Manag Educ Technol. 2024;1:17–27. https://doi.org/10.70059/40ng8k70

[28] Trudel SM, Winter EL, Bray MA. Prevention strategies for classroom management. In: Emmer ET, Stough LM, eds. Handbook of classroom management. 3rd ed. Routledge; 2022. p. 23–52.

[29] Montague ML, Kwok A. Teacher training and classroom management. In: Emmer ET, Stough LM, eds. Handbook of classroom management. 3rd ed. Routledge; 2022. p. 22–23.

[30] Uzorka A, Kalabuki K, Odebiyi AO. The effectiveness of in-service teacher training programs in enhancing teaching quality and student achievement. Found Educ Stud. 2024;2(3). https://doi.org/10.59400/fes.v2i3.1465

[31] Kulal A, Nanjundaswamy A, Dinesh S, Suraj N, Mallika N. Advancing teacher competencies: Assessing the influence of faculty development programs (FDP) on embracing modern innovations in teaching. J Appl Res High Educ. 2024. https://doi.org/10.1108/jarhe-01-2024-0004

[32] Choi K, Lyu JH. The effect of the non-face-to-face program of lifelong education instructors to strengthen facilitation competency on the facilitation competency and teaching efficacy. Keolcheo Keonbeojeonseu. 2022. https://doi.org/10.22143/hss21.13.1.92

[33] [33] Uygur M, Yanpar Yelken T. Trainer training program developed for instructors about student-centered teaching-learning processes and its effects: A study of a curriculum development in higher education. Int J Curric Instr. 2021;13(3):2981–3000.

[34] Hyseni Duraku Z, Blakaj V, Shllaku Likaj E, Boci L, Shtylla H. Professional training improves early education teachers' knowledge, skills, motivation, and self-efficacy. Front Educ. 2022;7:980254. https://doi.org/10.3389/feduc.2022.980254

[35] Cormas PC, Gould G, Nicholson L, Fredrick KC, Doan SY, Cormas P. A professional development framework for higher education science faculty that improves student learning. BioScience. 2021. https://doi.org/10.1093/BIOSCI/BIAB050

[36] Gaikwad S, Wadegaonkar DA. Exploring gaps between the need and reach for training programmes in higher education through teacher reflections. Ymer. 2022. https://doi.org/10.37896/ymer21.01/60

[37] Marikar F, Zayan A. Improving professional development based on evaluation of nursing education programs through feedback. J Contin Educ Nurs. 2024;55(3):110–112. https://doi.org/10.3928/00220124-20240221-04

[38] Msomi AM. Lecturers' experiences in the integration of technology in teaching and learning in the context of an ICT-challenged environment: The case of a South African university of technology. In: Advancing Education in Technology-Challenged Contexts. 2024. https://doi.org/10.1007/978-3-031-56953-1_2

[39] Nyakito C, Amimo C, Allida V. Challenges of integrating information and communication technology in teaching among national teachers' colleges in Uganda. East Afr J Educ Soc Sci. 2021;2. https://doi.org/10.46606/eajess2021v02i03.0114

[40] Zhang H. The use of Open Educational Resources (OER) in digital pedagogy. 2023. p. 69–81. https://doi.org/10.1007/978-981-99-0444-0_6

[41] Ranbir. Educational technology integration: Challenges and opportunities. Innov Res Thoughts. 2024;10(2):75–79. https://doi.org/10.36676/irt.v10.i2.1406

[42] Chellammal T, Sathya Bama K, Krishnamoorthy R. Challenges faced by educators in adopting online technology. World Rev Entrep Manag Sustain Dev. 2022:1–10. https://doi.org/10.1504/WREMSD.2023.127244

[43] Theodorio AO. Examining the support required by educators for successful technology integration in teacher professional development programs. Cogent Educ. 2024. https://doi.org/10.1080/2331186X.2023.2298607

[44] Yarnall L, Fusco J. A framework for supporting in-service teachers to use domain-specific technologies for instruction. In: Advances in Educational Technologies and Instructional Design. 2017. p. 239–259. https://doi.org/10.4018/978-1-5225-0164-0.CH014

[45] Dewey DP, Cannon AE. Supporting technology instruction through peer tutoring, discussion boards, and electronic journals. IALLT J Lang Learn Technol. 2006. https://doi.org/10.17161/iallt.v38i2.8461

[46] Schweiker SS, Levonis SM. Enhancing chemistry education through technology-enhanced learning: Impact on student outcomes. 2023. https://doi.org/10.14742/apubs.2023.463

[47] Adesina AE. Enhancing science education with learning management systems for effective learning outcomes. Qeios. 2023. https://doi.org/10.32388/vurdu1

[48] Hillmayr D, Ziernwald L, Reinhold F, Hofer SI, Reiss K. The potential of digital tools to enhance mathematics and science learning in secondary schools: A context-specific meta-analysis. Comput Educ. 2020. https://doi.org/10.1016/j.compedu.2020.103897

[49] Hutasuhut F, Harahap HD. The influence of technology in the world of education. Deleted J. 2024. https://doi.org/10.54209/edumaniora.v3i01.39

[50] Ujir H, Salleh S, Marzuki A, Hashim H, Alias AA. Teaching workload in 21st century higher education learning setting. Int J Eval Res Educ. 2020;9:221. https://doi.org/10.11591/ijere.v9i1.20419

[51] Kovács K, Dobay B, Halasi S, Pinczés T, Tódor I. Demands, resources, and institutional factors in the work of academic staff in Central and Eastern Europe: Results of a qualitative research among university teachers in five countries. Front Educ. 2024. https://doi.org/10.3389/feduc.2023.1326515

[52] Acharya P, Subedi RR. Exploring experiences of science education teachers on professional development. Open Access Sci J. 2023;2(1). https://doi.org/10.3126/oas.v2i1.65600

[53] Denaro K, Dennin K, Dennin MD, Sato BK. Identifying systemic inequity in higher education and opportunities for improvement. PLoS One. 2022. https://doi.org/10.1371/journal.pone.0264059

[54] Payne G, Cooper B, Hu X, Figueiredo B, Félix G. A flexible professional development program for international instructors and its suitability for a Brazilian context. 2018. p. 63–90.

[55] Smith B, Wyness L. What makes professional teacher development in universities effective? Lessons from an international systematized review. J In-serv Educ. 2024. https://doi.org/10.1080/19415257.2024.2386666

[56] Kim DH, Lee JH, Park J, Shin JS. Process-oriented evaluation of an international faculty development program for Asian developing countries: A qualitative study. BMC Med Educ. 2017. https://doi.org/10.1186/s12909-017-1101-2

[57] Vovk M, Hodatska O, Venhryniuk O, Bronitska M. Professional development of teachers in formal and non-formal education: Ukrainian and foreign contexts. Comp Prof Pedagog. 2021. https://doi.org/10.31891/2308-4081/2021-11(2)-3

[58] Labzina PG. Methodological support for professional development of university instructors. Vestn Samarsk Gosudarstvenn Tehničesk Univ. 2023;2(16). https://doi.org/10.17673/vsgtu-pps.2023.2.16

[59] Khanna L, Yadav A, Reddy BNK, Kalele G, Zaveri B, Goyal S, Ambulkar A. Investigating the evolution of technological integration on teaching effectiveness and staff development. Evol Stud Imagin Cult. 2024. https://doi.org/10.70082/esiculture.vi.1183

[60] Mauliska N, Karlsson M. Challenges and opportunities in the use of technology for teaching English as a foreign language. Interlingual. 2024;2(1):1780. https://doi.org/10.55210/interling.v2i1.1780

[61] Ansari M, Waris S, Zara C. Barriers to educational technology adoption: Navigating challenges in integration. Qual J Soc Sci. 2024;4. https://doi.org/10.55737/qjss.123732538

[62] Castro W. Challenges of professional development for technology integration in higher education. 2021;12(2):82–99. https://doi.org/10.18861/CIED.2021.12.2.3090

[63] Tilovatova X. Strategies for effective intercultural communication in teaching. Eur Int J Multidiscip Res Manag Stud. 2024;4:39–41. https://doi.org/10.55640/eijmrms-04-08-05

[64] Webb A, Hubball H, McKenzie M. Strategic approaches to glocalising curriculum: Responding to faculty development needs and circumstances in diverse university contexts. High Educ Res Dev. 2021;13:1209–1225.

[65] Abdalla H, Moussa A. Culturally responsive teaching: Navigating models and implementing effective strategies. Acta Pedagog Asiana. 2024;3:91–100. https://doi.org/10.53623/apga.v3i2.432

[66] Wu M, DeWitt D, Nazry N, Alias N, Jiao Y. Factors influencing the teaching practices of in-service teachers in inclusive education: A systematic review. J Quran Sunnah Educ Spec Needs. 2024;8:76–90. https://doi.org/10.33102/jqss.vol8no1.204

[67] Damalerio FJ, Wagas MMC, De Mesa FM, Maloon FK, Monterola HLS. Beyond the classroom: A qualitative study of the lived experiences of special needs education teachers in the Philippines. Deleted J. 2024. https://doi.org/10.56183/plepist.v2i2.649

[68] Bucao NK, Robledo E, Galaura LL. Flying without wings: Stories of non-physical education graduates teaching physical education. Eur J Phys Educ Sport. 2024. https://doi.org/10.46827/ejpe.v11i2.5415

[69] Genosas BP, Abadiez AJM, Lemana HE, Apolinario RC. Paving the path to permanence: Filipino HEI instructors' experience of balancing work and studies in pursuit of permanent teaching positions. Am J Hum Psychol. 2024;2(1):3363. https://doi.org/10.54536/ajhp.v2i1.3363

[70] Esmane A, Quezon M. Work challenges, opportunities, and job performance of non-teaching personnel in a private higher education institution. J Institutional Prog. 2024. https://doi.org/10.69569/jip.2024.0489

[71] Cauilan LP. Faculty development program policies in state universities and colleges: The case of Cagayan State University. Int J Sci Basic Appl Res. 2019;47(1):130–140. https://www.gssrr.org/index.php/JournalOfBasicAndApplied/article/view/9134

[72] Magno GC. Challenges and coping mechanisms in supervision of the instructional leaders in the new normal. Int Multidiscip Res J. 2023. https://doi.org/10.54476/ioer-imrj/280386

[73] Fronda JR. Coping mechanism of teachers in the new normal. GEO Acad J. 2024. https://doi.org/10.56738/issn29603986.geo2024.5.76

[74] Prose IG, Yepes FAR, Sy AB, Lunzaga MT, Udtuhan GB, Tupaz ML, Tolibas VA, Agda ML. Stress-coping strategies of higher education academic and non-academic staff in Eastern Visayas. J Educ Hum Resour Dev. 2013;4. https://doi.org/10.61569/yd915n19

[75] Aina JD, Agayon AKR, Pentang JT. Teachers in the new normal: Challenges and coping mechanisms in secondary schools. J Humanit Educ Dev. 2022;4(1):8. https://doi.org/10.22161/jhed.4.1.8