



Exploring the Relationship between Digital Nativity and TPACK through Professional Learning Communities at the HLI in the Maldives

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Abstract

This study investigates the effect of Digital Nativity on Technological Pedagogical Content Knowledge (TPACK) with the moderation effect of Professional Learning Community (PLC) in the higher learning institutions in the Maldives. A quantitative, cross-sectional research design was employed, with data collected from 300 lecturers at Maldives National University (MNU) and the Islamic University of Maldives (IUM) using a structured questionnaire. Data has been collected through stratified convenient sampling method. PLC was measured using Professional Learning Communities Assessment-Revised (PLCA-R) while TPACK was assessed using the instrument developed by Schmidt et al. (2009). DN has been measured by using Digital Natives Assessment Scale (DNAS) developed by Teo (2013). Data were analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM), including moderation analysis.

The findings indicated that, DN and PLC has a significant direct effect on TPACK, indicating that lecturers who are more linked to digital nativity and PLC practices demonstrate higher levels of technology integration. Furthermore, PLC moderates the relationship between DN and TPACK. These findings highlight the importance of PLC practices over traditional PD practices in enhancing technology integration. The study provides valuable insights for higher education institutions and policymakers in designing PD policies and activities advocating collaboration while recognising digital native attributes of the faculty members.

INTRODUCTION

The landscape of higher education is undergoing a profound transformation driven by rapid technological advancements and shifting faculty demographics. Across Higher Learning Institutions (HLIs) in the Maldives, there is an urgent need of a transition from traditional pedagogical models toward robust technology integration in teaching and learning environments. This transition is further accelerated as the generation of "digital natives" individuals is now entering the academic workforce as university lecturers. DN are those who grew up completely immersed in digital tools. These younger educators bring an innate familiarity with technology to their institutions. However, current professional development (PD) practices at HLIs do not sufficiently focus on this digital

proficiency. Existing PD training is largely hindered by traditional structures, relying on "sit-and-get", passive lecturing formats and "one-size-fits-all" general sessions that ignore individual faculty needs, baseline tech skills, and discipline-specific contexts.

To bridge this gap and foster meaningful classroom transformation, HLIs must move toward collaborative professional learning environments. Establishing institutional structures like Professional Learning Communities (PLCs) provides a critical mechanism for lecturers to share best practices, co-design curricula, and engage in continuous peer-to-peer mentoring. Within these collaborative frameworks, there is a clear, unfulfilled need to systematically measure the role of digital nativity and evaluate how it contributes to Technological Pedagogical Content Knowledge (TPACK). TPACK highlights the essential blend of technological, pedagogical, and content expertise required for effective 21st-century teaching. While a lecturer's inherent digital nativity may provide a strong foundation in basic technology skills, it does not automatically translate into effective teaching. Therefore, assessing the underlying factors that contribute to TPACK at Maldivian HLIs is vital to understanding how intuitive technical skills can be successfully paired with sound pedagogical practices.

This study is uniquely relevant and significant in the contemporary educational climate. For researchers, this study offers empirical insights into a distinct geographic and cultural context, enriching global literature on faculty demographics and educators' knowledge frameworks. For policy makers in higher education, it provides a data-driven foundation to restructure institutional funding and institutional mandates toward sustainable, team-based academic growth. Finally, for professional development organisers, this research serves as a guide to shift from traditional, generic workshops in favour of tailored, PLC-driven technology training. By addressing these critical areas, this study outlines a strategic pathway to cultivate a highly digitally competent, pedagogically sound academic workforce capable of elevating the quality of higher education in the Maldives.

BACKGROUND

The rapid advancement of Information and Communication Technology (ICT) has fundamentally transformed higher education systems worldwide, reshaping not only how knowledge is delivered but also how teaching and learning are conceptualised (UNESCO, 2015; Bates, 2019). This transformation is particularly significant in small island developing states (SIDS) such as the Maldives, where geography, limited land connectivity, and dispersed populations create unique challenges for educational delivery (UNDP, 2020; Crossley & Sprague, 2014). In such contexts, ICT is not simply an enhancement to traditional instruction but a critical infrastructure for ensuring equitable access to higher education (Daniel, 2016). Within the Maldivian higher education sector, digital technologies have therefore become essential tools for bridging geographical separation across islands, enabling continuity of learning, and expanding access to diverse learning opportunities (NIE, 2016; Ministry of Education Maldives, 2020). In particular, technology enabled learning has become a generally accepted mean for delivery in HLI after Covid -19 besides the challenges experienced by the institutions, academic staff and students.

The Maldives has experienced rapid expansion in its higher education sector over the past two decades, with both public and private institutions contributing to increased access to tertiary education (Lodhia & Spiller, 2021). The Maldivian National Qualifications Framework (MNQF) by Maldives Qualifications Authority (MQA) spans from Level 1 to Level 10, with universities offering certificate, diploma, undergraduate, and postgraduate programmes, including doctoral-level courses. Public universities in particular play a central role in national human capital development by providing advanced academic programmes aligned with labour market needs and national development priorities. In response to the increasing demand for flexible and accessible education, institutions have progressively adopted blended learning and online learning modalities. These shifts have been further accelerated by national digital transformation agendas, including initiatives such as Maldives 2.0, which aim to strengthen ICT infrastructure and promote digital literacy across sectors, including education (Government of Maldives, 2022). The universities have been undertaking important projects in collaboration with international parties in recent years. Examples of some of the initiatives undertaken by higher learning institutions in the Maldives include the AMED Project and the EduTech Symposium conducted by the Maldives National University, the TEL Project implemented by Islamic University of Maldives, and the DIGIT-Asia Project collaboratively carried out by MNU, IUM, and Villa College (European Union, 2024; MNU, 2019; Saeed, 2025).

Despite these advancements and efforts, the effectiveness of technology integration in higher education is largely dependent on the competencies of academic staff (Ertmer & Ottenbreit-Leftwich, 2010; Koehler & Mishra, 2009). In the Maldivian context, lecturers are increasingly expected to function not only as content experts but also as facilitators of technology-enhanced learning environments. This is particularly important as the digital native generation of individuals has started to enrol to universities in recent years. This evolving role requires the integration of pedagogical knowledge, disciplinary expertise, and technological proficiency to effectively engage

learners in digital and blended learning environments (Mishra & Koehler, 2006). However, evidence suggests that many lecturers still struggle to integrate technology meaningfully into their teaching practices, highlighting a persistent gap between institutional investment in ICT infrastructure and actual pedagogical implementation (Aminath & Waseela, 2022; UNESCO, 2019; Adam 2015). According to Adam (2015), technology integration in higher learning institutions (HLIs) in the Maldives remains limited, with lecturers primarily using technology for basic instructional tasks such as presenting PowerPoint slides rather than facilitating interactive and student-centred learning experiences.

Digital natives are individuals who have grown up in technology-rich environments and are generally comfortable with digital tools, multitasking, online communication, and rapid access to information (Prensky, 2001). Digital nativity describes individuals born into an environment rich in digital technologies. It provides them an intuitive familiarity with computers, internet platforms, and multi-tasking behaviours. As the first generation of these digital natives enters higher education as lecturers, they are actively transforming university teaching by introducing interactive, student-centred, and flexible digital methods. Their natural comfort with gadgets enables them to construct collaborative online spaces using videos and educational games. However, this baseline technical familiarity does not automatically guarantee effective instruction. To truly succeed, these educators must intentionally bridge their intuitive tech literacy with proper teaching methods and curriculum goals. This can probably be done through frameworks like Technological Pedagogical Content Knowledge (TPACK) Mishra and Koehler (2006), ensuring classroom technology meaningfully drives student engagement rather than acting as a distraction.

The concept of integrating technology into teaching is commonly described through the Technological Pedagogical Content Knowledge (TPACK) framework, originally developed by Mishra and Koehler (2006) and later expanded by other scholars (Koehler & Mishra, 2009; Archambault & Crippen, 2009). The framework highlights teachers' ability to combine technology, pedagogy, and subject knowledge effectively in instructional practice. Research has consistently shown that educators with stronger TPACK are more capable of using digital technologies meaningfully in classrooms, which positively influences students' learning experiences and outcomes (Koh et al., 2013). Higher-order thinking skills, creativity, collaboration, and active engagement are often associated with technology-supported teaching environments.

Studies have also identified a connection between digital nativity and technology integration in education. Prensky (2001) described "digital natives" as individuals who have grown up surrounded by digital technologies and are therefore more comfortable using them. Such individuals tend to process information differently, prefer fast access to information, multitask effectively, and communicate through digital media. Research indicates that educators who possess characteristics of digital natives are generally more confident and competent in integrating technology into teaching and learning processes (Teo, 2013; Wang et al., 2018). As a result, digital nativity has increasingly been examined as a factor influencing lecturers' TPACK development (Imran & Mydin 2026).

Professional development and collaborative learning opportunities are also essential in strengthening lecturers' technological competencies. Scholars have emphasised the importance of Professional Learning Communities (PLCs) in fostering collaboration, reflective practice, and continuous improvement among educators (DuFour & Eaker, 1998; Vescio et al., 2008). PLCs create supportive environments where educators share experiences, discuss instructional strategies, and learn from one another. Participation in PLCs has been found to enhance educators' confidence and instructional effectiveness, especially in technology integration practices. Overall, the literature suggests that digital nativity contributes positively to lecturers' TPACK, while PLCs play a supportive role in enhancing professional growth and technology integration. These relationships highlight the importance of fostering collaborative learning environments and continuous professional development to improve lecturers' technological and pedagogical competencies.

Research Objectives

1. To examine the direct effect of DN on TPACK among the faculty members.
2. To assess the moderating effect of PLC on the relationship between DN nativity and TPACK.
3. To establish the direct effect of PLC on TPACK

Research Questions

1. Is there a significant direct effect of DN on TPACK among the faculty members.?
2. Does PLC significantly moderate the relationship between DN and TPACK?
3. Is there a significant direct effect of PLC on TPACK?

Conceptual Framework

FIGURE 1
CONCEPTUAL FRAMEWORK

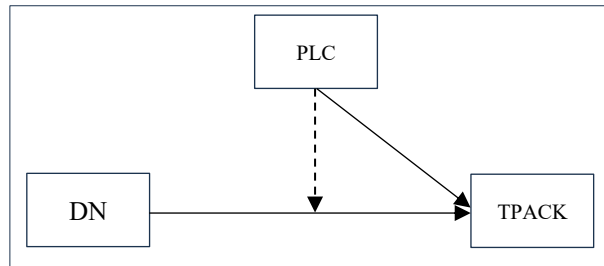


Figure 1 presents the conceptual framework of this study, illustrating the relationship between Digital Nativity (DN), Technological Pedagogical Content Knowledge (TPACK), and Professional Learning Community (PLC). In this framework, Digital Nativity (DN) functions as the independent variable, TPACK serves as the dependent variable, and PLC acts as the moderating variable. The framework proposes that educators' level of digital nativity influences their TPACK, while PLC strengthens or alters the nature of this relationship.

The direct relationship between DN and TPACK suggests that educators who possess stronger digital native characteristics are more likely to demonstrate higher levels of technological pedagogical and content knowledge. Digital natives are individuals who have grown up in technology-rich environments and are generally comfortable with digital tools, multitasking, online communication, and rapid access to information (Prensky, 2001). These characteristics may positively contribute to educators' ability to integrate technology effectively into teaching practices. TPACK, introduced by Mishra and Koehler (2006), refers to the integration of technological knowledge, pedagogical knowledge, and content knowledge required for effective technology-enhanced teaching. Therefore, the framework assumes that educators with stronger digital nativity traits are more capable of developing and applying TPACK in educational settings.

The framework further identifies PLC as a moderating variable that may influence the strength or direction of the relationship between DN and TPACK. A Professional Learning Community refers to a collaborative environment where educators engage in continuous learning, knowledge sharing, reflective dialogue, and collective problem-solving to improve teaching practices (DuFour & Eaker, 1998). The inclusion of PLC as a moderator suggests that participation in collaborative professional learning environments may enhance the positive effect of digital nativity on TPACK. Educators who actively engage in PLCs may receive greater opportunities to share technological practices, learn innovative instructional methods, and strengthen their confidence in technology integration. Consequently, even educators with varying levels of digital nativity may improve their TPACK through strong professional collaboration and support.

This conceptual framework is supported by existing literature that highlights the relationship between digital competence and technology integration in teaching. Previous studies have found that digital nativity positively predicts educators' technological readiness and technology integration practices (Teo, 2013; Wang et al., 2018). Similarly, research on PLCs has shown that collaborative professional learning contributes significantly to educators' instructional improvement and technology adoption (Vescio et al., 2008). The framework therefore combines these perspectives by proposing that PLC plays an important contextual role in strengthening educators' technology-related competencies.

The framework can also be linked to Social Cognitive Theory (Bandura, 1986), which emphasises the interaction between personal factors, behaviours, and environmental influences. In this study, digital nativity represents a personal factor reflecting educators' technological orientation and experiences, while TPACK reflects the behavioural outcome related to technology integration in teaching. PLC represents the environmental factor that supports learning and professional growth. According to Social Cognitive Theory, individuals learn and develop competencies through observation, interaction, collaboration, and social experiences. Therefore, educators who participate in supportive PLC environments are more likely to enhance their TPACK by learning from peers, observing effective practices, and building confidence in using technology for teaching and learning.

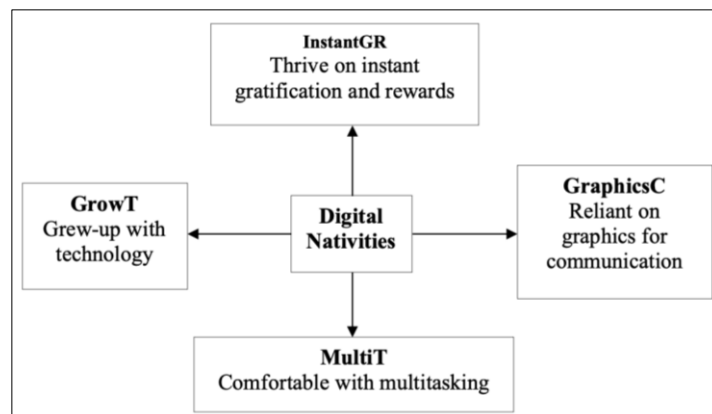
LITERATURE REVIEW

The concept of digital nativity refers to the idea that people born during or after the rapid rise of digital technologies possess an instinctive familiarity with computers and the internet (Prensky, 2001). This term was introduced by Marc Prensky in 2001 to separate "digital natives" as the generation that grew up completely surrounded by technology from "digital immigrants", who had to learn and adapt to these tools later in life (Prensky, 2001). Historically, this idea came from watching young people easily handle early internet platforms and mobile devices in the late 1990s (Gallardo-Echenique et al., 2015). Over time, researchers have broken down digital nativity into four distinct dimensions including growing up with technology, being comfortable with multitasking, relying heavily on graphics for communication, and thriving on instant rewards and feedback (Teo, 2013). Today, this topic is highly relevant as the very first generation of digital natives has completed their education and permanently joined universities as lecturers (Riegel & Mete, 2017). Recent studies show that these younger lecturers are bringing their lifelong tech experiences into higher education, changing the way university departments approach everyday teaching by introducing more interactive and flexible digital methods (Riegel & Mete, 2017).

The growing presence of digital native lecturers in higher education has a major impact on how technology is used in classrooms. University faculty who exhibits "digital native" traits regardless of their chronological age tend to perceive technology as more useful and easier to integrate into their specialised curricula (Huang et al., 2021). Educators who are naturally comfortable with digital tools are much more likely to create active, collaborative learning spaces that use videos, online games, and shared platforms to keep students engaged (Hashim et al., 2019). This natural comfort helps them move away from old, lecture-heavy styles and shift toward modern, student-centred teaching (Hashim et al., 2019). This shift connects directly to the Technological Pedagogical Content Knowledge (TPACK) framework, which outlines how educators' combine their knowledge of technology, teaching methods, and subject matter (Mishra & Koehler, 2006). Digital proficiency significantly predicts overall TPACK competency (Milutinović, 2024; Yurdakul, 2018). Notably, digital nativity has a statistically significant positive effect on a lecturer's overall TPACK proficiency (Imran & Mydin, 2026).

While being a digital native gives a lecturer a strong head starts in basic tech skills, researchers frequently note that being good with gadgets does not automatically make someone a great at technology integration (Kabakci Yurdakul, 2018). To successfully deploy the TPACK model, digital native lecturers must intentionally connect their intuitive tech skills with proper teaching methods and the actual lesson content, ensuring that classroom technology genuinely supports student learning rather than just serving as a modern distraction (Yurdakul & Ursavaş, 2024). Figure 2 below illustrates DN model by Prensky 2001.

FIGURE 2
DIGITAL NATIVITY MODEL



The Professional Learning Community (PLC) model was established as an official approach during the final years of the 1990s to transform school environments from isolated teaching habits into teamwork-focused learning settings. Shirley Hord (1997) described PLCs as a continuous framework for upgrading schools, expanding on corporate learning theories from the 1980s that focused heavily on shared guidance and shared questioning. Within tertiary education, PLCs have transformed from simple peer-assessment groups into well-organised, multi-subject networks focused on upgrading the standard of instruction (DuFour, 2004; Stoll et al., 2006; Vescio et al., 2008).

Around the same time, the Technological Pedagogical Content Knowledge (TPACK) model was put forward by Mishra and Koehler (2006) to describe the complicated relationship between subject material, teaching methods, and digital tools. It expanded upon Lee Shulman's (1986) essential 1980s concept of Pedagogical Content Knowledge (PCK) by introducing technological expertise as a vital third area. Nowadays, TPACK functions as a central model for assessing how instructors combine digital applications with teaching strategies across international university landscapes (Chai et al., 2013; Schmidt et al., 2009; Voogt et al., 2013).

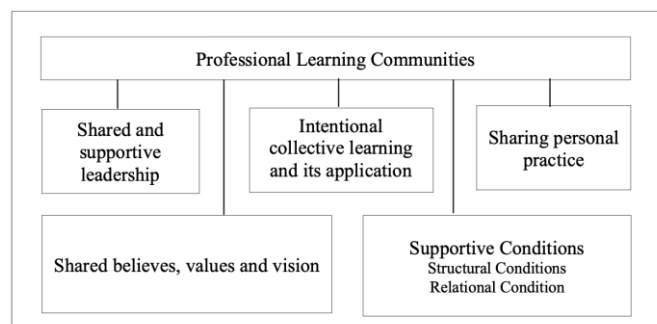
Both PLC and TPACK hold immense importance for contemporary Higher Learning Institutions (HLIs), where complicated course requirements call for constant educational creativity. Investigations exploring these specific elements have increased dramatically over the past ten years, prompted by a worldwide transition towards hybrid educational setups (Archambault & Barnett, 2010; Bond et al., 2020; Garrison & Kanuka, 2004). In university environments, PLCs offer the organisational reinforcement required to minimise academic isolation (King, 2002; Lawless & Pellegrino, 2007; Schuck et al., 2012). Concurrently, TPACK provides a quantifiable benchmark for computer literacy among university faculty members. Literature tracking studies prove that academic papers centring on higher-education PLCs and TPACK combinations have increased rapidly across primary academic libraries like Scopus and Web of Science (Scherer et al., 2019; Torrey et al., 2023; Zheng et al., 2021).

Combining PLCs and TPACK radically changes academic staff development from single, isolated training sessions into long-term, practice-centred learning. PLCs build a safe and compelling environment where university staff can openly talk about teaching difficulties and jointly plan tech-based sessions (Borko, 2004; Darling-Hammond et al., 2017; Ertmer & Ottenbreit-Leftwich, 2010). This shared atmosphere directly encourages the development of TPACK skills by letting instructors demonstrate electronic tools and gather instant input from peers (Kennedy, 2016; Prenger et al., 2017; Rienties et al., 2013). As a result, staff development plans that merge cooperative PLC formats with direct TPACK training bring about permanent advances in instructional standards and student participation (Garet et al., 2001; Hairon & Tan, 2015; Trust et al., 2016).

The TPACK model continues to serve as a foundational pillar for successful digital integration, shifting educational institutions away from using electronic devices purely as a gimmick. Instead of viewing technological expertise as an isolated capability, TPACK highlights that active learning takes place only when technology, teaching strategies, and lesson content are perfectly combined (Graham, 2011; Hew & Brush, 2007; Jonassen et al., 2008). Studies show that university lecturers with advanced TPACK skills can intentionally choose software and systems that directly match their particular lesson goals and student requirements (Harris et al., 2009; Kim et al., 2013; Kopcha et al., 2016). In the end, a solid understanding of TPACK stops superficial technology application, ensuring that computer programmes and devices actively advance student understanding and core subject mastery (Inan & Lowther, 2010; Kirkwood & Price, 2014; Tondeur et al., 2012).

Hord (1997) outlined five separate structural areas required to keep a Professional Learning Community running effectively. These consist of shared and supportive leadership, mutual values and vision, collaborative learning and its application, shared personal practice, along with encouraging structural and relational environment settings. These specific areas work in unison to steer an educational organisation away from competitive isolation and guide it towards shared responsibility. Figure 3 below illustrates PLC Framework by Hord 1997.

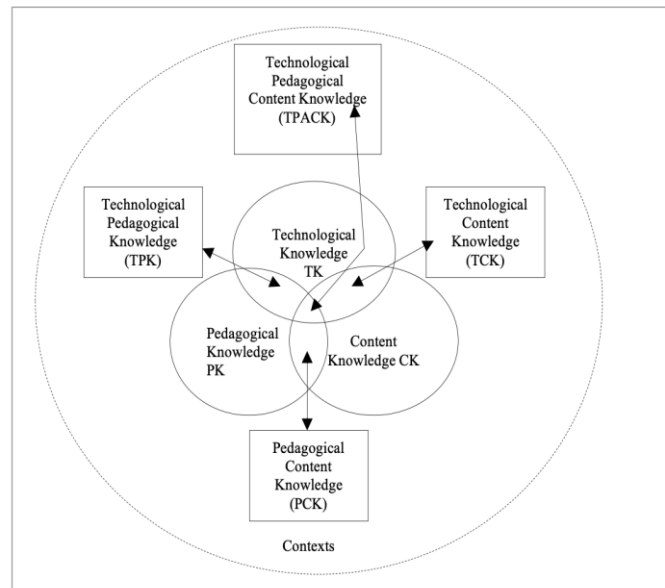
FIGURE 3
PLC MODEL HORD 1997



These structural pillars guarantee that academic staff development stays ongoing, deeply cooperative, and officially built into the organisation rather than happening by chance (Hipp & Huffman, 2010; Hord & Tobia, 2012; Kruse et al., 1995). The TPACK model is made up of seven interconnected sub-areas positioned within a larger contextual boundary. The three primary pillars are Technological Knowledge (TK), Pedagogical

Knowledge (PK), and Content Knowledge (CK), which overlap to create four distinct combined spaces: Pedagogical Content Knowledge (PCK), Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK), and the focal centre point, Technological Pedagogical Content Knowledge (TPACK).

FIGURE 4
TPACK FRAMEWORK



These overlapping segments show that high-level teaching demands an intricate, flexible grasp of how digital tools combine with specific instructional techniques and lesson material (Koehler & Mishra, 2009; Mishra & Koehler, 2006; Niess, 2005).

The workplace environment of a university directly influences how successfully its academic staff build digital skills. In Asia, an investigation at Universiti Sains Malaysia in Penang, Malaysia, discovered that organised lecturer teamwork within academic areas greatly enhanced lecturers' technological pedagogical knowledge (TPK) during digital syllabus redesigns (Thah et al., 2021). Likewise, an exploration carried out across public universities in Wuhan, China, at the Central China Normal University, showed that when academic departments operate as active PLCs, peer assistance reduces technology stress, allowing lecturers to embrace advanced digital systems much faster (Wang et al., 2023). In Africa, an investigation at the University of the Witwatersrand in Johannesburg, South Africa, pointed out that cooperative educator networks offered the essential educational support required for instructors to successfully deploy learning management platforms within resource-limited settings (Mpungose & Ngubane, 2022).

European and North American studies verify that cooperative work environments are essential for upgrading technical knowledge. In Europe, a study at the University of Helsinki in Uusimaa, Finland, showed that taking part in cross-subject university PLCs helped lecturers change from isolated topic experts into tech-proficient lecturers (Lakkala et al., 2021). Meanwhile, in North America, a study at Michigan State University in East Lansing, United States, determined that the supportive trust established within departmental PLCs gave educators the confidence to try out new interactive software in large lecture spaces (Koehler et al., 2022). Additionally, a study at the University of Toronto in Ontario, Canada, indicated that continuous peer input within academic learning groups directly improved participants' comprehensive TPACK ratings (Gagnon & Hubert, 2020).

South American and Australian investigations reinforce the worldwide truth of this organisational relationship. In South America, an investigation at the Pontificia Universidad Católica de Chile in Santiago, Chile, proved that organised, cooperative planning meetings among STEM teachers resulted in more developed and successful technology application in classrooms (Urrutia et al., 2024). In Australia, a study at the University of Melbourne in Victoria, Australia, discovered that institutional support and shared teaching habits within department groups greatly increased instructors' confidence to build digital tests (Barbour et al., 2023).

When looked at together, these global findings prove that active Professional Learning Communities (PLCs) are essential for building educators' Technological Pedagogical Content Knowledge (TPACK) across diverse

university settings, though the outcomes often vary based on institutional support (Koehler & Mishra, 2009; Mishra & Koehler, 2006; Niess, 2005). While extensive research has mapped these dynamics across Asia, Europe, and the Americas (Gagnon & Hubert, 2020; Lakkala et al., 2021; Thah et al., 2021; Wang et al., 2023), a major gap remains in the literature regarding Small Island Developing States (SIDS), particularly within higher learning institutions in the Maldives.

Current international studies heavily focus on large, well-resourced universities. It generally overlooks how territorial fragmentation, isolated island campuses, and a rapid influx of young, digital native lecturers impact collaborative lecturers' networks and technology integration (Barbour et al., 2023; Mpungose & Ngubane, 2022; Urrutia et al., 2024). This study directly addresses these critical oversights by investigating how Maldivian university lecturers combine their intuitive digital capabilities with structured PLC dimensions, providing policy makers and professional development organisers with the contextual insights needed to move past generic, ineffective training models.

METHODOLOGY

Research Design

This research employs a rigorous quantitative methodology structured around a cross-sectional framework to assess how digital nativity (DN) directly influences university lecturers' Technological Pedagogical Content Knowledge (TPACK), while simultaneously evaluating the potential moderating role of Professional Learning Communities (PLCs). Utilising an empirical quantitative framework is exceptionally well-suited for this line of inquiry, as it allows for the neutral, objective evaluation of systemic correlations and statistical interaction effects among explicitly operationalised variables (Creswell & Creswell, 2018).

The utilisation of a cross-sectional design is equally justified based on practical and methodological considerations. This design entails gathering empirical data from participants at a single, specific point in time, which makes it a reasonably efficient mechanism for assessing prevailing educational conditions and structural associations without artificially altering the natural academic environment (Creswell, 2014; Tabachnick & Fidell, 2019). Within educational research, cross-sectional strategies are widely respected for their ability to capture a reliable snapshot of institutional cultures, faculty perceptions, and teaching behaviours across a representative sample (Babbie, 2021).

Population and Sample

The target population for this research consisted of university lecturers working at the two public universities in the Maldives. These institutions are the Maldives National University (MNU) and the Islamic University of Maldives (IUM). These specific universities were selected because they function as the main public higher education providers in the country. They offer a wide range of academic courses and employ a large percentage of the total teaching workforce within the higher education sector. The study gathered a final sample of 300 lecturers. This group was made up of 154 male and 146 female participants, providing a very equal and balanced split between genders. To make sure that this sample size was methodologically sound, the necessary number of participants was determined using the standard statistical tables created by Krejcie and Morgan (1970). According to the Krejcie and Morgan (1970) calculations, a population of this size requires a minimum of 186 participants. By exceeding this minimum threshold, the study ensured the sample was large enough to meet the basic data requirements needed for quantitative analysis. Using this established approach helped reduce sampling errors and increased the trustworthiness and dependability of the final research findings.

Sampling Technique

To choose participants from the target population, this research used a stratified convenience sampling approach. The selection process started by splitting the total population into separate groups based on their specific university. These groups directly identified academic staff at the Maldives National University and the Islamic University of Maldives. Using this grouping step was crucial to ensure that both public institutions were fairly and properly represented in the final dataset. This step actively strengthened the wider relevance and generalisability of the study's conclusions across the entire Maldivian universities' academic staff. After completing this initial grouping phase, a convenience selection method was used within each separate institution. This approach allowed the researcher to recruit lecturers based on their immediate availability and their voluntary willingness to fill out the questionnaire. While relying solely on a convenience approach can sometimes limit how well the findings apply to other settings, combining it with institutional grouping acts as a strong methodological defence. This combination actively lowers sampling bias and ensures a well-balanced representation of participants across the universities.

Instrumentation

The main setup of the questionnaire focused on defining and measuring three key institutional variables including digital nativity (DN), Professional Learning Communities (PLCs), and Technological Pedagogical Content Knowledge (TPACK). To evaluate DN, the study used the Digital Natives Assessment Scale (DNAS) developed by Teo (2013). To evaluate the PLC practices, which acts as the moderating factor in this study, this study used the standardised Professional Learning Communities Assessment-Revised (PLCA-R) tool designed by Olivier (2009). At the same time, TPACK was measured using the extensive framework established by Schmidt et al. (2009). This specific tool is highly regarded because it successfully evaluates a teacher's professional expertise across individual and overlapping areas of technology, pedagogy, and lesson content. The final collection of questions was put together and built as an online Google Form as the compiled questionnaire. This digital survey was shared officially with universities via email. Next these questionnaires were shared by the institutions via staff Viber groups.

Instrument Reliability

To ensure that the questionnaire items were accurate and dependable, this study chose established measurement scales that have been successfully deployed several times in previous research in various context. To guarantee these instruments are suitable for the local university context, a group of local experts evaluated the items. They suggested small modifications, such as rewording specific phrases to better match the unique context of Maldivian higher learning institutions, following the validation practices noted by Saunders et al. (2019). After making these structural adjustments, a preliminary pilot test was run with 29 academic staff members. This initial test aimed to identify any unclear phrasing and ensure all items were straightforward to read and comprehend, matching the recommendations of Creswell (2018). The survey responses gathered from this pilot test were then statistically evaluated using Cronbach's alpha reliability coefficients across the separate DN, PLC, and TPACK dimensions. In academic research, a value of 0.70 or greater on this statistical check shows that the survey questions are highly consistent and stable in what they are tracking (Field, 2018). This specific benchmark was strictly adopted for the current research project. The final Cronbach's alpha consistency values for the DN, PLC, and TPACK questionnaires are presented below.

TABLE 1
CRONBACH ALPHA RELIABILITY SCORES FOR RELIABILITY (DIGITAL NATIVITY)

#	Hypothesis	Cronbach Alpha (Based on Original Tool)	Cronbach Alpha (Based on Modified Tool)
1	Grew up with technology (GrowT)	.89	.95
2	Comfortable with multitasking (MultiT)	.91	.94
3	Reliant on graphics for communication (GraphicsC)	.87	.92
4	Thrive on instant gratifications and rewards (InstantGR)	.87	.92

TABLE 2
CRONBACH ALPHA RELIABILITY SCORES FOR RELIABILITY (PLC)

#	Dimensions	Cronbach Alpha (Based on Original Tool)	Cronbach Alpha (Based on Modified Tool)
1	Shared and supportive leadership	.94	.88
2	Shared values and vision	.92	.85
3	Collective learning and its application	.91	.92
4	Shared personal practice	.87	.92
5	Supportive conditions: relationships	.82	.85
6	Supportive conditions: relating to structures	.88	.92

TABLE 3
CRONBACH ALPHA RELIABILITY SCORES FOR RELIABILITY (TPACK)

#	Dimensions	Cronbach Alpha (Based on Original Tool)	Cronbach Alpha (Based on Modified Tool)
1	Content Knowledge (CK)	.85	.94
2	Pedagogical Knowledge (PK)	.84	.90
3	Technological Knowledge (TK)	.82	.87
4	Pedagogical Content Knowledge (PCK)	.85	.93
5	Technological Content Knowledge (TCK)	.80	.88
6	Technological Pedagogical Knowledge (TPK)	.86	.86
7	Technological Pedagogical Content Knowledge (TPACK)	.92	.89

Data Collection Procedure

Primary data for this study were gathered using an online survey built and managed through Google Forms, which allowed for an efficient distribution process and quick response tracking. The administrative process was executed through six sequential phases to ensure ethical and methodological transparency. First, the sampling frame was strictly defined as all active academic staff members currently employed in the public universities in the Maldives. Second, formal institutional approvals and ethical clearances were officially secured from the Ministry of Higher Education (MoHE), the Maldives National University (MNU), and the Islamic University of Maldives (IUM) to allow campus-wide research access. Third, specific stratification and inclusion criteria were applied to the sampling frame, filtering eligible participants based on their higher learning institution (HLI) affiliation and their gender to ensure an even demographic balance. Fourth, the required sample size of 186 participants was calculated using standard statistical estimation frameworks to ensure the study maintained adequate statistical power. Fifth, the final distribution of questionnaires was initiated by sharing the web-based survey link through official institutional communication channels, giving staff the freedom to complete the questions at their convenience. Relying on online methods is highly beneficial in university environments because it broadens access across departments and helps achieve higher response rates (Saunders et al., 2019). Finally, data were collected from the conveniently available participants within each stratum who voluntarily chose to complete the instrument. Participation was completely voluntary, and all lecturers were given a clear explanation of the study's purpose before filling out the questionnaire (Creswell & Creswell, 2018). This step-by-step approach ensures that the web-based survey offered flexibility to respondents while producing a highly accurate, reliable dataset for final analysis (Wright, 2005).

Measurement Model

Before conducting the primary statistical analyses, the collected dataset was thoroughly screened for missing values, extreme outliers and normality to ensure its suitability for subsequent multivariate testing. Prior to evaluating the core research hypotheses, a comprehensive data verification process was executed, which included a normality assessment, Confirmatory Factor Analysis (CFA), and a model fit evaluation. Additionally, systematic checks were completed to confirm convergent validity, discriminant validity, and overall construct reliability, ensuring that all measurement scales were psychometrically stable and accurate. The statistical outcomes of these screening and validation procedures are summarised in the accompanying table.

TABLE 4
RESULTS OF DATA SCREENING

#	Test	Measurements	Results
1	Normality Test	Skewness & Kurtosis	98% items' value falls between the range of -2 and +2
2	Confirmatory Factor Analysis (CFA)	Outer Loading (Standardised)	89.5% Acceptable
3	Model Fit	Chi-square P value ChiSqr/df RMSEA AGFI PGFI SRMR	22338.79 0.00 4.60 0.11 0.31 0.32 0.07
4	Convergent Validity	Factor Loading	89.5% items acceptable
5	Discriminant Validity	Heterotrait-monotrait Ratio (HTMT)	DN 0.127 PLC 0.142 TPACK 0.287
		Fornell-Larcker	DN 0.836 > 0.698 (AVE) PLC 0.714 > 0.509 (AVE) TPACK 0.765 > 0.585 (AVE)
6	Construct Reliability and Validity	Cronbach's alpha,	0.980 (DN), 0.977 (PLC), 0.981 (TPACK)
		Composite reliability (rho_c)	0.980 (DN), 0.977 (PLC) 0.982 (TPACK)
		Average Variance Extracted (AVE)	0.698 (DN) 0.509 (PLC) 0.585 TPACK

Data Analysis

To analyse the gathered data, Partial Least Squares Structural Equation Modelling (PLS-SEM) was employed, incorporating an assessment of moderating effects. As a variance-based structural equation modelling approach, PLS-SEM is highly effective for exploratory studies, highly intricate model frameworks, and research oriented towards predictive outcomes (Hair et al., 2019; Henseler et al., 2016). This methodology facilitates the concurrent evaluation of several interconnected variables, rendering it highly suitable for exploring the direct and moderated pathways hypothesised in this investigation (Rigdon et al., 2017). Furthermore, the selection of PLS-SEM is justified by its robustness when dealing with restricted sample sizes and data that deviate from normal distributions (Hair et al., 2022). Specifically, moderation analysis was executed to determine how PLC might alter the intensity of the connection linking DN and TPACK. Statistical significance across all tests was evaluated against a threshold of $p < .05$. Notably, methodological literature strongly advocates for the application of PLS-SEM within social science frameworks that utilise latent constructs and emphasise predictive modelling (Hair et al., 2019; Sarstedt et al., 2022).

Ethical Considerations

Ethical protocols were accurately integrated into every stage of the research design, and formal ethical approval was secured from all relevant authorities, including the Ministry of Higher Education (MoHE), the Islamic University of Maldives (IUM), and the Maldives National University (MNU). The institutions were informed about the objectives and scope of the study and supporting document from MoE were conveyed through email to both universities. Individuals involved were fully briefed on the primary research objectives via an informed consent statement embedded directly into the introductory section of the online questionnaire. This digital mechanism ensured that formal consent was secured prior to gathering any data, guaranteeing that contributors fully grasped their entitlements, specifically the freedom to pull out of the study at any stage even without informing. Furthermore, absolute confidentiality and anonymity were rigorously enforced, the collection process strictly avoided any personally identifiable data, and the gathered material was used exclusively for scholarly investigations. Adhering to these ethical mandates remains paramount in pedagogical inquiries to safeguard contributors (American Educational Research Association, 2011; British Educational Research Association, 2018).

RESULTS*Direct effect of DN on TPACK*

The results of the hypothesis testing revealed that Digital Nativity (DN) had a significant positive effect on Technological Pedagogical and Content Knowledge (TPACK). The path coefficient ($\beta = 0.189$) indicates that an increase in digital nativity is associated with an increase in lecturers' TPACK levels. Furthermore, the relationship was statistically significant, as the p -value ($p = 0.005$) was below the commonly accepted threshold of 0.05. This finding suggests that lecturers who demonstrate stronger characteristics of digital nativity are more likely to possess higher levels of technology-integrated pedagogical knowledge and skills. Therefore, the hypothesis proposing a positive relationship between DN and TPACK was supported.

TABLE 5
PATH COEFFICIENTS AND HYPOTHESIS TESTING

#	Hypothesis	β (Beta)	p -value	Result
H ₁	DN → TPACK	0.189	0.005	Supported
H ₂	PLC x DN → TPACK	0.104	0.049	Supported
H ₃	PLC → TPACK	0.162	0.001	Supported

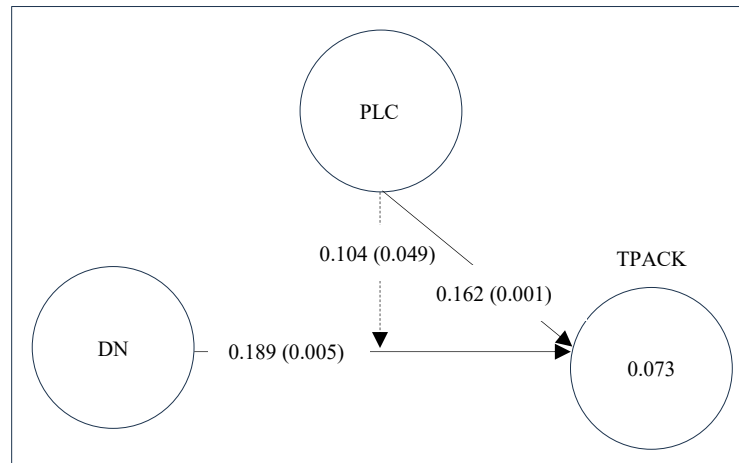
Moderating Effect of PLC

The results of the moderation analysis indicated that the interaction effect between Professional Learning Community (PLC) and Digital Nativity (DN) had a significant positive influence on Technological Pedagogical and Content Knowledge (TPACK). The path coefficient ($\beta = 0.104$) suggests that PLC positively moderates the relationship between DN and TPACK. In addition, the relationship was statistically significant, as the p -value ($p = 0.049$) was below the threshold value of 0.05. This finding implies that the positive effect of digital nativity on TPACK becomes stronger when educators actively engage in professional learning community practices. Therefore, the hypothesis proposing the moderating effect of PLC on the relationship between DN and TPACK was supported.

Direct effect of PLC on TPACK

The results demonstrated that Professional Learning Community (PLC) had a significant positive effect on Technological Pedagogical and Content Knowledge (TPACK). The path coefficient ($\beta = 0.162$) indicates that higher engagement in PLC activities is associated with higher levels of TPACK among educators. Moreover, the relationship was statistically significant, with a p-value of $p = 0.001$, which is well below the recommended significance level of 0.05. This finding suggests that participation in collaborative professional learning practices contributes positively to educators' ability to integrate technology effectively into their pedagogical and content knowledge. Therefore, the hypothesis proposing a positive relationship between PLC and TPACK was supported.

FIGURE 5
STRUCTURAL MODEL



DN, PLC, and the interaction effect (PLC x DN) is explained approximately 7.3% of the variance in TPACK ($R^2 = 0.073$). This indicates that the model had a relatively weak but meaningful explanatory power in predicting TPACK. The direct effect analysis revealed that DN had a significant positive effect on TPACK ($\beta = 0.189$, $p = 0.005$), suggesting that an increase in DN was associated with an increase in TPACK. Likewise, PLC showed a significant positive effect on TPACK ($\beta = 0.162$, $p = 0.001$). Furthermore, the interaction effect between PLC and DN was statistically significant ($\beta = 0.104$, $p = 0.049$), indicating that PLC significantly moderated the relationship between DN and TPACK. Overall, the findings demonstrate that PLC not only directly influenced TPACK but also strengthened the effect of DN on TPACK.

DISCUSSION

Direct Effect of DN on TPACK

This study examined whether there is a significant direct effect of Digital Natives (DN) on TPACK among academic staff in Maldivian higher learning institutions. The findings revealed that DN had a significant positive effect on TPACK ($\beta = 0.189$, $p = 0.005$). This indicates that academic staff with stronger digital-native characteristics were more likely to demonstrate higher levels of technological, pedagogical, and content knowledge in their teaching practices. Therefore, the study confirms that DN significantly influences TPACK among university academic staff in the Maldives.

The finding suggests that academic staff who are more familiar with digital technologies, online communication, and digital learning environments are better able to integrate technology into their teaching. This may be because digital-native characteristics encourage confidence, adaptability, and frequent engagement with technological tools. Academic staff who are comfortable with digital technologies are more likely to explore innovative teaching approaches, use online learning platforms effectively, and integrate interactive digital resources into classroom practice.

This result is consistent with the TPACK framework developed by Punya Mishra and Matthew J. Koehler, which emphasises that technological knowledge is an important component of effective teaching with technology. Their framework argues that educators require the integration of technological, pedagogical, and content knowledge to

teach effectively in digital learning environments. The current finding supports this argument by demonstrating that digital familiarity among academic staff contributes positively to TPACK development.

The result is also aligned with previous studies conducted in higher education contexts. For example, studies have shown that educators with stronger digital competencies and greater exposure to technology tend to demonstrate higher levels of confidence and effectiveness in technology integration (Shamim et al., 2024; Aziz et al., 2022). Similarly, Waseela (2022), in a study conducted in the Maldives, found that teachers' technological readiness and digital competence significantly influenced their ability to integrate technology into teaching and learning practices. Similarly, a recent study in the Maldivian higher education context concluded that digital nativity as contributing factor to TPACK (Imran & Mydin, 2026). The present study extends these findings to the higher education context by focusing specifically on university academic staff in the Maldives.

In the Maldivian context, the finding is particularly important because higher learning institutions have increasingly adopted digital and blended learning approaches in recent years. Following the COVID-19 pandemic, universities and colleges in the Maldives expanded the use of online learning systems, virtual classrooms, digital assessment platforms, and learning management systems. Academic staff were therefore required to adapt quickly to technology-enhanced teaching environments. Those with stronger digital-native characteristics may have adjusted more easily to these changes, resulting in stronger TPACK competencies.

Although the effect of DN on TPACK was statistically significant, the effect size was relatively modest ($\beta = 0.189$). This indicates that DN alone does not fully explain TPACK development among academic staff. Technology integration in teaching is a complex process that may also depend on other factors such as institutional support, professional development opportunities, access to technological infrastructure, leadership support, teaching experience, and organisational culture. Nevertheless, the finding confirms that digital-native characteristics remain an important factor influencing academic staff's ability to integrate technology effectively within higher education teaching contexts in the Maldives.

Moderating Effect of PLC on TPACK

The findings of this study revealed that Professional Learning Community (PLC) significantly moderates the relationship between Digital Nativity (DN) and Technological Pedagogical and Content Knowledge (TPACK) among academic staff. The positive interaction effect between PLC and DN ($\beta = 0.104, p = 0.049$) indicates that the influence of digital nativity on TPACK becomes stronger when academic staff actively participate in professional learning community practices. This suggests that digital familiarity alone may not be sufficient to improve academic staff members' technological pedagogical competencies unless it is supported through collaborative professional environments within higher education institutions.

The findings demonstrate that academic staff who possess higher levels of digital nativity are more likely to develop stronger TPACK when they engage in collaborative learning, knowledge sharing, peer discussions, and reflective professional practices. In the context of Maldivian higher learning institutions, this result is important because universities in the Maldives have been integrating digital technologies into teaching and learning, particularly after the rapid expansion of online and blended learning following the COVID-19 pandemic. Although many lecturers are familiar with digital tools, effective integration of technology into teaching remains a challenge within some Maldivian higher education institutions. The findings therefore suggest that PLC practices can provide the collaborative and professional support needed to strengthen lecturers' pedagogical use of technology.

The present findings are consistent with earlier studies which identified PLC as an important factor in improving professional knowledge, collaboration, teaching quality, and instructional innovation (DuFour & Eaker, 1998; Hord, 1997; Vescio et al., 2008). Previous research demonstrated that collaborative professional cultures positively influence educators' confidence, reflective practice, and willingness to adopt technology in teaching (Trust, 2017). Similarly, the current findings indicate that PLC strengthens the relationship between DN and TPACK by creating opportunities for lecturers to exchange teaching experiences, discuss technological practices, and collaboratively solve instructional challenges.

The findings are also supported by more recent studies linking PLC directly with technology integration competencies in the higher education context of Maldives. For instance, Imran and Mydin (2026) found a positive relationship between PLC and TPACK, indicating that lecturers who are more connected to PLC practices and collaborative settings demonstrate higher levels of technology integration. This finding strongly supports the present study because it confirms that PLC environments contribute significantly to strengthening lecturers' technological pedagogical competencies within higher education institutions. In the Maldivian university context,

this is particularly important because many academic staff members continue to adapt to rapidly changing digital teaching environments.

The findings further align with the TPACK framework proposed by Mishra and Koehler (2006), which emphasised that effective technology integration requires the interaction of technological, pedagogical, and content knowledge. Although digitally native lecturers may possess confidence in using digital technologies, they may still require pedagogical guidance and collaborative learning opportunities to apply technology effectively in teaching. PLC activities appear to support this process by encouraging peer learning, reflective dialogue, and shared professional growth. This may explain why the positive effect of DN on TPACK became stronger when PLC engagement increased.

In addition, the findings support studies conducted on digital nativity which suggested that individuals who grow up with digital technologies tend to be more comfortable and confident in digital environments (Prensky, 2001). However, later research challenged the assumption that digital natives automatically possess strong educational technology integration skills (Kirschner & De Bruyckere, 2017; Margaryan et al., 2011). The present study supports this argument because DN alone did not appear sufficient to ensure stronger TPACK. Instead, the relationship became stronger in environments where PLC practices were actively present. This suggests that collaborative professional learning remains necessary even for lecturers who are digitally confident (Trust, 2017).

Research conducted in the Maldivian context also showed growing attention towards TPACK development among educators. Studies on technology integration in Maldivian higher education identified that lecturers generally possess positive attitudes towards digital teaching but still experience difficulties in integrating technology effectively into pedagogy and content delivery Imran and Mydin (2026). Similar findings were reported in studies conducted in South Asian contexts where technological competence alone was insufficient without institutional and collegial support (Koh et al., 2015; Chai et al., 2013). The present findings therefore contribute to the emerging literature by showing that PLC can strengthen the practical application of digital knowledge and support lecturers in improving their TPACK competencies.

Moreover, studies related to professional learning communities in developing nations' contexts emphasised that collaboration, collegial support, and shared professional dialogue are particularly important in geographically dispersed educational systems (Stoll et al., 2006). In the Maldives, where institutions and campuses are distributed across islands, PLC practices supported through digital platforms may help academic staff overcome professional isolation and improve collaborative learning opportunities. Online PLCs may therefore provide sustainable professional development opportunities for lecturers working across different islands and campuses (Trust, 2017; Wenger, 1998).

Another important implication of the findings is that university management and policy makers in the Maldives should place greater emphasis on institutionalising PLC practices within higher education institutions. While investment in educational technologies remains important, the findings indicate that technology integration becomes more effective when lecturers are supported through collaborative professional cultures (DuFour & Eaker, 1998; Zhao, 2021). Universities may therefore benefit from establishing formal PLC structures such as peer mentoring programmes, interdisciplinary discussion groups, digital pedagogy workshops, collaborative research activities, and reflective teaching forums. These practices may strengthen lecturers' confidence and improve the quality of digital teaching across Maldivian universities.

The moderation effect identified in this study, although modest, remains statistically significant and meaningful within the higher education context. The findings indicate that PLC serves as an enabling condition that strengthens the influence of digital nativity on lecturers' TPACK development. Similar moderation and collaborative effects were identified in studies examining technology adoption and professional learning in higher education environments (Imran & Mydin, 2026; Koh et al., 2015). This provides important evidence for higher education institutions in the Maldives, where improving the quality of digital teaching and learning continues to be a national priority.

Direct Effect of PLC on TPACK

The statistical analysis reveals that Professional Learning Communities (PLCs) exert a significant positive direct effect on the Technological Pedagogical and Content Knowledge (TPACK) of academic staff ($\beta = 0.162$, $p = 0.001$). This finding indicates that higher engagement in collaborative peer activities directly enhances the capability of university lecturers to integrate digital tools into their teaching practices effectively. This outcome strongly supports the overarching TPACK framework developed by Mishra and Koehler (2006), which emphasises the non-linear, interconnected nature of technological, pedagogical, and content knowledge. Within

the context of Maldivian higher learning institutions, such as the Maldives National University (MNU) and the Islamic University of Maldives (IUM), this relationship demonstrates that collaborative professional development is a critical instrument for modernising tertiary education. Peer-led collaborative settings help faculty members demystify complex learning technologies and cultivate confidence in their instructional delivery (Imran & Mydin, 2026; Rizwan, 2019).

When comparing these outcomes with existing literature, the findings closely align with recent empirical studies conducted within the context of Maldives. For example, Imran and Mydin (2026) demonstrated that lecturers in Maldivian universities require targeted technological competencies to manage modern learning environments, noting that digital capabilities often outweigh traditional teaching experience. Furthermore, these results complement the comprehensive research by Waseela (2022), who observed that while Maldivian educators frequently report a high perception of TPACK components, their practical execution depends heavily on institutional support systems. By establishing a direct positive path from PLCs to TPACK, this study provides a concrete operational mechanism to advance faculty members beyond basic teacher-centred knowledge transmission. It encourages them to transition towards the interactive, technology-enhanced pedagogical models advocated by contemporary researchers (Mishra & Koehler, 2006; Waseela, 2022).

The unique geographic dispersion of the Maldives highlights the practical importance of these results for the higher education sector. Maldivian higher education institutions increasingly utilise blended and flexible delivery modes to bridge physical gaps between remote, isolated island communities (Imran & Mydin, 2026). As argued by Adam (2017), the cultural and institutional workplace environments within Maldivian institutions heavily dictate how teacher educators receive and adapt to new technology. While traditional professional development was often brief and disjointed, the establishment of ongoing collaborative networks allows faculty members to build a shared pedagogical habitus (Adam, 2017; Ahmed et al., 2022). Working through these structured communities enables academic staff to share experiences, troubleshoot infrastructure challenges, and alleviate the technical anxieties associated with online learning systems (Waseela, 2022).

Ultimately, these insights offer clear guidance for university administrators and policymakers working towards a comprehensive national digital transformation agenda. Historical reviews of the Maldivian higher educational sector indicate that technology integration has frequently faced practical hurdles due to fragmented training mechanisms and a lack of unified institutional policies (Azlifa & Saeed, 2021; Waseela, 2022, Imran & Mydin 2026). To address these systemic issues, institutions like MNU and IUM must deliberately integrate technology-focused discussions within their active professional learning networks. Dedicating structured time and assigning formal institutional recognition to PLC participation can empower academic staff to master digital tools cooperatively (Imran & Mydin, 2026; Rizwan, 2019). According to Mohamed et al. (2019) a collaborative culture is at most important at HLI in the Maldives to spread new knowledge and resources. This collaborative strategy ensures that the Maldivian higher education sector can move past passive administrative support towards a fully integrated digital academic environment.

Overall, this study contributes to the growing body of literature on PLC, DN, and TPACK by providing empirical evidence from the Maldivian education context, which remains limited in existing research. The findings highlight the importance of collaborative professional environments in supporting technology integration among academic staff and reinforce the need for universities in the Maldives to strengthen professional learning cultures alongside digital transformation initiatives. The study also contributes to ongoing discussions regarding sustainable digital transformation in small island higher education systems and the role of collaborative professional learning in strengthening academic staff competencies (Stoll et al., 2006; Zhao, 2021).

CONCLUSION

This study provides conclusive empirical evidence regarding the critical factors that drive Technological Pedagogical and Content Knowledge (TPACK) among academic staff in Maldivian higher learning institutions. The findings demonstrate that both Digital Nativity (DN) and Professional Learning Communities (PLCs) exert significant positive direct effects on lecturers' technological capabilities. Crucially, the integration of moderation analysis reveals that PLCs significantly strengthen the relationship between Digital Nativity and TPACK. This indicates that while inherent digital familiarity gives educators an advantage, active engagement in collaborative professional networks serves as a powerful catalyst that amplifies these digital traits into effective instructional practices.

From a practical perspective, these outcomes offer actionable insights for institutional leaders at major institutions such as the Maldives National University (MNU) and the Islamic University of Maldives (IUM). Because the

unique geography of the Maldives demands resilient blended and online learning frameworks, universities cannot rely solely on the standalone technical skills of individual staff members. Instead, administrators must actively cultivate structured peer-learning networks to support educators who may lack native digital confidence. By embedding technology-focused workshops and peer mentoring within formal institutional strategies, Maldivian universities can systematically elevate the baseline digital competencies of their entire faculty. This collective approach helps overcome the professional isolation often caused by the country's dispersed island geography.

In summary, advancing the digital transformation agenda within Maldivian higher education requires a dual strategy that balances individual digital literacy with collaborative professional structures. While digital nativity provides a strong foundation for technology adoption, it is the collaborative environment of a professional learning community that fully unlocks its pedagogical value. Future policies should focus on providing sustained institutional funding, dedicated hours, and formal recognition for PLC participation across all regional campuses. Implementing these systemic changes will help the Maldivian higher education sector transition from fragmented IT training towards a highly integrated, digitally capable academic ecosystem.

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