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Bridging the digital divide in physical education for 2026 EdTech Trends: Faculty readiness, barriers, and training priorities

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Abstract

This study examined the digital literacy competencies, challenges, and training needs of Physical Education (PE) faculty at De La Salle–College of Saint Benilde (DLS-CSB) in the context of emerging educational technologies. A mixed-methods approach was employed, involving surveys completed by twenty-eight faculty members and thematic analysis of open-ended responses. Quantitative data revealed high self-assessed competence in foundational digital skills, such as accessing credible resources and integrating media into instruction. However, confidence declined in advanced areas like using digital tools for assessment, applying AI-enhanced platforms, and designing gamified learning experiences. Statistical analysis using the Mann-Whitney U and Kruskal-Wallis tests showed no significant differences in digital literacy perceptions across gender and age groups, indicating a uniform level of digital readiness. Qualitative findings highlighted the need for hands-on training workshops, improved infrastructure, and greater exposure to emerging technologies such as video analysis and AI tools. Challenges identified included limited device access, unstable internet connectivity, and difficulties aligning technology with PE's physically active learning model. Despite innovative uses of platforms like YouTube, Canva, and LMS tools, there was low awareness of institutional support programs such as the DOST SETUP Initiative. The study underscores the importance of equity-driven professional development and infrastructure support to enhance the effective integration of digital tools in PE instruction, aligning with future-focused education trends in 2026 and beyond.

Keywords: Digital Divide; Physical Education; Faculty Development; 2026 EdTech Trends; Educational Technology

1 Introduction

De La Salle-College of Saint Benilde, Inc. (DLS-CSB) is a non-stock, non-profit educational institution offering both secondary and tertiary education in Manila and Antipolo, Philippines. Established in 1988, Benilde is a member of De La Salle Philippines and is guided by the Lasallian tradition of transformative education. Rooted in its Catholic identity and inspired by Saint John Baptist De La Salle and Saint Benilde Romançon, the College fosters a vibrant community committed to the holistic development of individuals in service to society and the Church [8].

Benilde envisions itself as an inclusive and innovative academic community, pioneering excellence in the Creative, Digital, and Service industries in the Philippines and Southeast Asia. Anchored in its Lasallian heritage, the institution is dedicated to building a just and humane society by making education accessible to the underserved and diversely gifted. The College's learning environment is founded on the belief that each student is unique and endowed with talents and gifts that should be nurtured and appreciated. This philosophy is reflected in learner-centered teaching methodologies, such as those grounded in Howard Gardner's Theory of Multiple Intelligences, and in responsive student activities and services.

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The educational landscape has undergone a significant transformation, particularly accelerated by the pandemic, which has reshaped how Physical Education (PE) is delivered. The shift to virtual and hybrid learning environments highlighted the importance of digital literacy among PE teachers, making technology integration an essential component of effective instruction and assessment. As DLS-CSB continues to invest in digital infrastructure and align with evolving educational standards, PE teachers are challenged to adapt their pedagogical approaches and master digital competencies.

Understanding the digital literacy profiles of PE teachers is important for supporting targeted professional development, enhancing teaching quality through technology, and ensuring compliance with institutional and accreditation requirements [6]. Moreover, the digital literacy of PE teachers directly impacts student learning outcomes and future career opportunities. In a world where digital fluency is integral to education, strengthening teachers' digital competencies ensures that students receive quality physical education and are prepared for a technology-driven future. This study examined the digital literacy profile of PE teachers at Benilde, providing a data-driven foundation for future faculty development initiatives that respond to the demands of contemporary education.

2 Related Literature and Studies

Recent studies highlight the importance of digital literacy for physical education (PE) teachers in the era of educational digital transformation. Digital literacy encompasses multiple dimensions, including digital awareness, teaching skills, communication, and evaluation capabilities [21]. Research indicates that PE teachers' digital literacy levels vary, with younger teachers generally demonstrating higher proficiency [1]. However, many PE teachers still exhibit moderate to low levels of digital literacy, particularly in ICT-based instructional media usage. To address these challenges, researchers propose systematic solutions such as developing digital curriculum training systems, optimizing digital teaching environments, and strengthening faculty development [15]. Additionally, creating digital technology environments, enhancing digital application abilities, and building digital communication platforms are suggested as cultivation paths for improving PE teachers' digital literacy [21]. These efforts aim to support PE teachers in adapting to the evolving educational landscape and effectively integrating digital technologies into their teaching practices.

2.1 Importance of the Study

The study is timely and essential to address a critical gap in understanding their digital competencies in an era where technology integration is reshaping education. By assessing PE teachers' digital literacy levels—focusing on information, technology, and media literacy—this research provided valuable insights for administrators and policymakers to design targeted professional development programs. The assessments revealed potential perception gaps, enabling more effective resource allocation and training strategies. Additionally, the study identified specific challenges PE teachers face in implementing technology, conducting online/hybrid classes, and using digital tools, offering practical solutions to enhance their instructional practices.

Beyond immediate professional development, this research has broader implications for curriculum design, teacher preparation, and educational technology. It ensures that technology integration in PE aligns with realistic goals, balancing traditional physical instruction with digital innovation. The findings informed teacher preparation programs, emphasizing digital competencies for future PE educators. By providing evidence-based recommendations for enhancing faculty development initiatives, this study supports schools in creating robust systems for technology integration to ensure that physical education remains relevant in the digital age while continuing to promote physical literacy and healthy lifestyles among students.

2.2 Statement of the Problem

- How do the respondents assess their level of digital literacy in terms of:
  - Information Literacy;
  - Media Literacy;
  - Technology Literacy;
  - Attitude towards Technology
- Is there a significant difference in the distributions of responses between males and females for any question?
- Is there a significant difference in the distributions of responses across age groups?
- What are the digital tools and strategies employed by teachers in teaching Physical Education?
- What challenges and barriers related to digital literacy do Physical Education teachers face
- What are the professional development needs of PE teachers to better support their digital literacy needs?

2.3 Hypotheses

- (H_0): There is no significant difference in the distribution of responses between male and female faculty members for any of the Likert-scale questions (Q1–Q12).
- (H_1): There is a significant difference in the distribution of responses between male and female faculty members for at least one of the Likert-scale questions (Q1–Q12).
- (H_0): There is no significant difference in the distribution of responses across the four age groups (Under 30, 30–39, 40–49, and 50+) for any of the Likert-scale questions (Q1–Q12).
- (H_1): At least one age group differs significantly from the others in its distribution of responses for at least one of the Likert-scale questions (Q1–Q12).

3 Conceptual frameworks

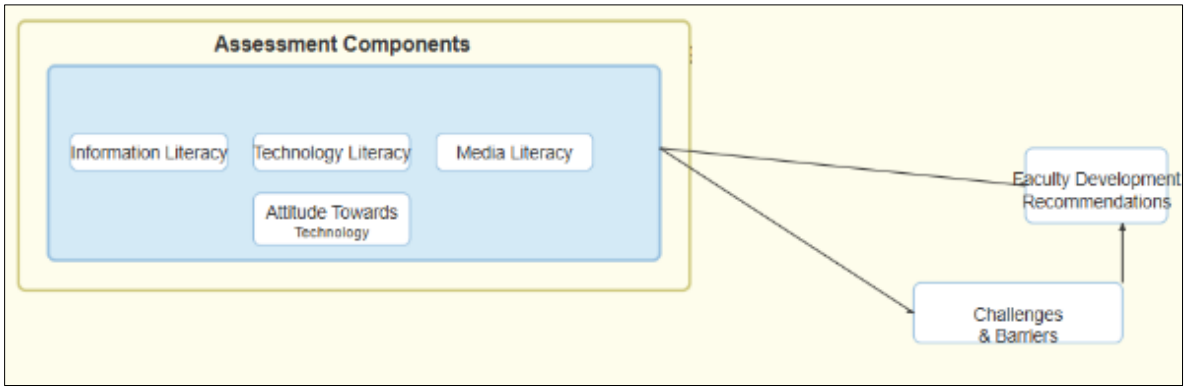

Figure 1 Conceptual Frameworks

A structured approach was used in examining the digital literacy of Physical Education (PE) teachers, focusing on interconnected components that guide the study. At its core, the framework employs a dual-assessment approach: Self-Assessment by the P.E. Administrator, PE Teachers and Staff to evaluate four critical dimensions of digital literacy—Information, Media, Technology Literacy, and attitude towards technology. The framework also integrates Professional Development as a central element, addressing four key areas: technical skills, digital pedagogy, integration strategies, and assessment methods. These areas represent the essential competencies PE teachers need to effectively integrate digital tools into their instruction. Additionally, the framework identifies challenges and barriers that may hinder their development, such as difficulties in implementing technology, conducting online classes, or using digital tools. These challenges, alongside the assessment findings, were used to form actionable recommendations to craft faculty development programs. By synthesizing insights from assessments, challenges, and professional development needs, the framework ensured that program enhancements are data-driven and tailored to address specific gaps in PE teachers' digital literacy. This holistic approach provides a comprehensive foundation for understanding, improving, and supporting digital literacy in physical education instruction.

4 Methodology

This study employed a mixed-methods approach to comprehensively assess faculty competencies and challenges in digital literacy. The target population consisted of twenty-eight (28) faculty members from the School of Multidisciplinary Discipline in Physical Education at De La Salle–College of Saint Benilde (DLS-CSB). Data collection involved both quantitative and qualitative techniques to capture a more complete picture of the faculty's digital literacy landscape. Quantitative data were collected using a structured survey composed of 12 Likert-scale items (Q1–Q12), designed to assess various dimensions of digital literacy. Descriptive statistics such as frequency, percentage, mean, and standard deviation were computed to summarize the responses. These measures provided insights into the general trends and variability in digital literacy skills across the faculty. To analyze differences between groups, the Mann-Whitney U test (also known as the Wilcoxon rank-sum test) was utilized to compare male and female faculty members. This non-parametric test was appropriate due to the ordinal nature of the Likert-scale data and the small sample size, as it does not assume normal distribution and is robust for analyzing skewed or non-normally distributed data.

Additionally, the Kruskal-Wallis H test was used to examine differences across four age groups (Under 30, 30–39, 40–49, and 50+). As a non-parametric alternative to one-way ANOVA, this test is suitable for ordinal data and

accommodates unequal group sizes without assuming normality, making it ideal for the study's demographic segmentation. Qualitative data were collected through focus group discussions and class observations. These methods allowed for the exploration of deeper insights into faculty experiences, attitudes, and contextual challenges related to digital literacy. The qualitative and quantitative data sets were analyzed independently and later triangulated to generate integrated, holistic findings that informed recommendations for faculty development initiatives.

4.1 Profile of the Respondents

The study involved a total of 28 faculty members from various departments, with the majority coming from the School of Multidisciplinary Studies–Physical Education (SMS-PE) and the PE Department. The age of the respondents ranged from 19 to 54 years old. Most respondents were in their 40s and 50s, indicating a generally mature and experienced group. The gender distribution was relatively balanced, with 15 males and 13 females participating in the study. In terms of professional experience, the years of service ranged from 0 to 27 years, with several respondents having over 15 years of teaching experience, reflecting a seasoned faculty cohort. A smaller number of respondents, particularly younger faculty members, had less than five years of service, suggesting the presence of both veteran and early-career educators within the group. This mix of experience levels provides a comprehensive perspective on digital literacy practices across different stages of teaching careers.

5 Results and Discussion

Table 1 Information Literacy Assessment

Statement	Strongly Agree (4)	Agree (3)	Disagree (2)	Strongly Disagree (1)	Mean	Std Dev
1. I access credible and relevant digital resources to enhance my teaching strategies.	24 (85.7%)	2 (7.1%)	0 (0%)	2 (7.1%)	3.71	0.80
2. I ensure the information I use in my lessons is accurate, current, and aligns with learning objectives.	24 (85.7%)	2 (7.1%)	0 (0%)	2 (7.1%)	3.71	0.80
3. I effectively organize and present information to improve student understanding and engagement.	24 (85.7%)	2 (7.1%)	0 (0%)	2 (7.1%)	3.71	0.80

Table 1 summarizes responses to three statements regarding teaching practices, specifically focusing on the use of digital resources, the accuracy and relevance of information, and the effective organization and presentation of content.

The findings reveal a high level of agreement among respondents. For all three statements, 85.7% (24 out of 28) strongly agreed, while 7.1% (2 out of 28) agreed, and none disagreed. A small proportion, 7.1% (2 out of 28), strongly disagreed with each statement. Each item achieved a mean score of 3.71 out of 4, indicating that responses were strongly skewed toward the highest level of agreement. The standard deviation of 0.80 suggests relatively low, though slightly increased, variability compared to the original dataset. This consistent distribution across all statements reflects a solid and unified perception among respondents regarding their teaching practices. Notably, **92.8%** of participants either strongly agreed or agreed that they access credible and relevant digital resources, ensure the accuracy and alignment of information with learning objectives, and organize and present information effectively. This high level of self-assessed performance indicates a strong sense of confidence and professional efficacy in these areas. Information literacy encompasses basic research skills, critical thinking, and problem-solving abilities [17].

However, the presence of a small group (7.1%) who strongly disagreed suggests a need for targeted professional support or development opportunities. While the standard deviation remains low, it is primarily influenced by the few dissenting responses. Overall, the data point to a clear positive consensus among respondents about their digital resource use, content accuracy, and instructional clarity. The consistently high means and modest variability reinforce this favorable assessment, though further inquiry into the concerns of the minority who strongly disagreed may help ensure all educators are adequately supported.

Table 2 Media Literacy Assessment

Statement	Strongly Agree (4)	Agree (3)	Disagree (2)	Strongly Disagree (1)	Mean	Std Dev
4. I analyze media content critically to ensure its appropriateness and alignment with my teaching goals.	21 (75.0%)	6 (21.4%)	0 (0%)	1 (3.6%)	3.68	0.66
5. I create media-rich content (e.g., presentations, videos) that effectively enhance student learning.	21 (75.0%)	6 (21.4%)	0 (0%)	1 (3.6%)	3.68	0.66
6. I integrate diverse forms of media to accommodate the varied learning needs of my students.	21 (75.0%)	6 (21.4%)	0 (0%)	1 (3.6%)	3.68	0.66

The survey revealed consistent patterns across three key areas: critical analysis of media content, creation of media-rich instructional materials, and integration of diverse media forms to support varied learning needs. Responses show near-identical distributions across all three statements, with 75% (21 out of 28) of respondents strongly agreeing, 21.4% (6 out of 28) agreeing, none disagreeing, and 3.6% (1 out of 28) strongly disagreeing. This distribution suggests that educators perceive themselves as consistently capable across all media-related competencies, without significant variation in perceived strength across the different domains.

Each item achieved a mean score of 3.68 out of 4, indicating a strongly positive self-assessment. The standard deviation of 0.66 points to relatively low variability in responses. However, the presence of a small minority (3.6%) who strongly disagreed slightly increases the variability and may signal isolated gaps in confidence or capability. The lack of neutral disagreement responses, coupled with a predominance of strong agreement, emphasizes a generally high level of perceived competence among respondents. The data reflected a teaching population that is confident and consistent in its use of media to support learning. Nonetheless, the existence of even a small number of educators expressing significant concern suggests an opportunity for targeted support or professional development in media integration and content creation to ensure that all teachers are equally equipped to meet their instructional goals. This confirms that Computer literacy levels among PE teachers significantly affect their use of technology in classes, with higher literacy correlating to increased technology integration [10].

Table 3 Technology Assessment

Statement	Strongly Agree (4)	Agree (3)	Disagree (2)	Strongly Disagree (1)	Mean	Std Dev
7. I effectively use digital tools (e.g., simulations, software) to facilitate student-centered learning.	18 (64.3%)	10 (35.7%)	0 (0%)	0 (0%)	3.64	0.48
8. I incorporate ICT tools (e.g., Learning Management Systems, collaborative platforms) to improve outcomes.	18 (64.3%)	9 (32.1%)	0 (0%)	1 (3.6%)	3.61	0.60
9. I demonstrate advanced skills in applying digital tools to measure and achieve learning outcomes.	15 (53.6%)	10 (35.7%)	1 (3.6%)	2 (7.1%)	3.36	0.82

Enhancing physical education teachers' digital literacy is crucial for educational development and requires systematic solutions [15]. The survey data revealed a pattern in teachers' assessment in their competencies across three digital teaching practices. For Statement 7 ("I effectively use digital tools to facilitate student-centered learning"), the results show the highest confidence levels: 64.3% (18 out of 28) strongly agreed, and 35.7% (10 out of 28) agreed. With no disagreement recorded, the mean score of 3.64 and a low standard deviation of 0.48 reflect strong consensus and minimal variability, suggesting most teachers feel confident in using digital tools to support student-centered learning.

In Statement 8 ("I incorporate ICT tools to improve outcomes"), the pattern is similar, with 64.3% strongly agreeing and 32.1% agreeing, though one respondent (3.6%) strongly disagreed. This slight divergence reduces the mean to 3.61 and raises the standard deviation to 0.60, indicating that while the overall response remains positive, there is a minor increase in response dispersion that may point to isolated challenges in ICT integration. Statement 9 ("I demonstrate advanced skills in applying digital tools to measure and achieve learning outcomes") yielded the lowest confidence scores. While 53.6% strongly agreed and 35.7% agreed, 3.6% disagreed and 7.1% strongly disagreed, producing a lower mean of 3.36 and the highest standard deviation of 0.82 among the three items. This variation suggests that while a majority still report positive perceptions, some teachers may struggle with more advanced aspects of digital pedagogy, such as outcome-based tool application or data-driven assessment.

The findings indicated strong foundational confidence in using digital tools for instruction (Statement 7), moderate variability in ICT integration (Statement 8), and emerging skill gaps in advanced applications (Statement 9). These results underscore the importance of offering differentiated professional development that not only reinforces basic competencies but also addresses more complex skill areas to support equitable digital teaching capacity across the faculty.

Table 4 Attitude towards Technology

Statement	Strongly Agree (4)	Agree (3)	Disagree (2)	Strongly Disagree (1)	Mean	Std Dev
10. I feel confident that my use of digital tools positively impacts student learning and engagement	18 (64.3%)	8 (28.6%)	0 (0%)	2 (7.1%)	3.57	0.74
11. I have access to sufficient training and resources to improve my digital literacy effectively	14 (50.0%)	10 (35.7%)	2 (7.1%)	2 (7.1%)	3.29	0.85
12. I am effective in addressing student challenges related to diverse levels of digital proficiency	11 (39.3%)	15 (53.6%)	2 (7.1%)	0 (0%)	3.32	0.60

Physical education teachers' attitudes toward technology integration are influenced by their self-efficacy and the contextual factors in their schools [19]. The analysis of educators' perceptions regarding digital tool usage, training access, and support for students with varying digital proficiencies reveals generally positive trends with slight variations in confidence and consistency. For the first statement, "I feel confident that my use of digital tools positively impacts student learning and engagement," 64.3% (18 out of 28) strongly agreed and 28.6% (8) agreed. Only 7.1% (2) strongly disagreed. The mean of 3.57 and standard deviation of 0.74 indicate strong overall confidence in the impact of tools such as LMS, YouTube, and Kahoot, with a moderate spread suggesting that while the majority are assured of their impact, a small group may experience uncertainty or obstacles.

In the second statement, "I have access to sufficient training and resources to improve my digital literacy effectively," exactly 50% (14) strongly agreed, 35.7% (10) agreed, while 7.1% each (2 respondents) disagreed and strongly disagreed. This yields a slightly lower mean of 3.29 and a higher standard deviation of 0.85, reflecting broader variability and hinting at access disparities. These figures align with broader trends where some educators cite gaps in ICT skills or infrastructure support. The third statement, "I am effective in addressing student challenges related to diverse levels of digital proficiency," received the most consistent positive responses, with 39.3% (11) strongly agreeing and 53.6% (15) agreeing. Only 7.1% (2) disagreed, and no one strongly disagreed. The mean of 3.32 and the lowest standard deviation of 0.60 among the three items suggest widespread and stable confidence in this area—likely driven by the use of adaptive tools like Canva, Google Classroom, or gamified apps that cater to different skill levels.

These findings reflected a workforce that is largely confident in its digital teaching practices, but with isolated pockets of concern—particularly around training access and the more technical aspects of integration. The high mean scores (ranging from 3.29 to 3.57) combined with moderate to low variability reinforce a generally optimistic outlook. Still, the data highlights the importance of targeted professional development and equitable resource distribution to ensure that all educators are empowered to thrive in increasingly digital, hybrid, and student-centered learning environments [3].

Table 5 Gender Differences

Question	Male Median	Female Median	U Statistic	Z Score	p-value	Significant
Q1. Access credible resources	4.00	4.00	52.5	0.835	0.404	No
Q2. Ensure accurate information	4.00	4.00	60.5	0.241	0.810	No
Q3. Organize information effectively	4.00	3.50	48.0	1.159	0.247	No
Q4. Analyze media critically	4.00	4.00	58.0	0.422	0.673	No
Q5. Create media-rich content	4.00	3.00	54.0	0.724	0.469	No
Q6. Integrate diverse media	4.00	3.00	56.5	0.531	0.596	No
Q7. Use digital tools for learning	4.00	3.00	47.0	1.233	0.218	No
Q8. Incorporate ICT tools	4.00	4.00	53.0	0.797	0.425	No
Q9. Apply digital tools for outcomes	3.50	3.00	48.0	1.159	0.247	No
Q10. Confidence in digital impact	4.00	3.00	43.5	1.496	0.135	No
Q11. Access to training/resources	3.00	3.00	64.0	0.000	1.000	No
Q12. Address student challenges	3.00	3.00	53.0	0.797	0.425	No

The Mann-Whitney U test was conducted to evaluate potential gender differences across 12 questions (Q1–Q12) addressing digital literacy, resource access, and pedagogical practices. The results revealed no statistically significant differences between male and female responses, as all *p*-values exceeded the 0.05 threshold. For instance, Q10 (Confidence in digital impact) showed the largest—albeit non-significant—effect, with a Z-score of -1.496 (*p* = 0.135). Median comparisons further supported this pattern: seven questions (Q1, Q2, Q4, Q6, Q8, Q11, Q12) had identical medians for both genders, while five questions (Q3, Q5, Q7, Q9, Q10) displayed slight, non-significant differences. For example, females reported marginally lower medians in Q5 (Create media-rich content: 3.0 vs. 4.0 for males) and Q10 (Confidence in digital impact: 3.0 vs. 4.0). However, these trends lacked statistical backing, as reflected in U statistics (ranging from 43.5 for Q10 to 64.0 for Q11) and Z-scores clustered near zero, indicating minimal divergence from the null hypothesis.

The absence of significant gender differences suggests that factors like access to resources, critical media analysis, and digital tool usage are not strongly influenced by gender in this sample. Non-significant trends, such as lower female medians in areas like organizing information (Q3) or confidence in digital impact (Q10), could still hold practical relevance. These patterns might warrant qualitative follow-up to explore contextual factors, such as confidence gaps or institutional barriers. In conclusion, the study found no evidence of gender-based disparities in the assessed domains.

Table 6 Age Group Differences

Question	Under 30	30-39	40-49	50+	H Statistic	df	p-value	Significant
Q1. Access credible resources	4.00	4.00	4.00	4.00	0.431	3	0.934	No
Q2. Ensure accurate information	4.00	4.00	4.00	4.00	0.980	3	0.806	No
Q3. Organize information effectively	4.00	4.00	4.00	4.00	0.263	3	0.967	No
Q4. Analyze media critically	4.00	4.00	4.00	4.00	0.471	3	0.925	No
Q5. Create media-rich content	3.00	3.50	3.50	3.00	0.731	3	0.866	No
Q6. Integrate diverse media	3.00	3.50	3.00	3.00	1.098	3	0.778	No
Q7. Use digital tools for learning	3.00	4.00	3.50	3.00	2.194	3	0.533	No

Q8. Incorporate ICT tools	4.00	3.50	4.00	3.00	1.541	3	0.673	No
Q9. Apply digital tools for outcomes	4.00	3.50	3.00	3.00	4.046	3	0.257	No
Q10. Confidence in digital impact	4.00	3.50	3.50	3.00	3.051	3	0.384	No
Q11. Access to training/resources	3.00	3.00	3.00	3.00	0.920	3	0.821	No
Q12. Address student challenges	4.00	3.00	3.00	3.00	1.855	3	0.603	No

The Kruskal-Wallis test was conducted to evaluate potential differences in responses across four age groups (Under 30, 30–39, 40–49, 50+) for 12 questions (Q1–Q12) related to digital literacy, resource access, and pedagogical practices. Results revealed no statistically significant age-based differences, as all *p*-values exceeded the 0.05 threshold. For example, Q9 (Apply digital tools for outcomes) showed the highest H statistic (H = 4.046, *p* = 0.257), but this still fell short of significance. Median comparisons further underscored the homogeneity: five questions (Q1–Q4, Q11) had identical medians across all age groups (e.g., 4.00 or 3.00), while others (Q5, Q7–Q10, Q12) displayed minor, non-significant variability. For instance, the 30–39 age group reported a marginally higher median in Q7 (Use digital tools for learning: 4.00 vs. 3.00–3.50 in other groups), and the Under 30 group had a higher median in Q12 (Address student challenges: 4.00 vs. 3.00 for older cohorts). However, these trends lacked statistical support, as H statistics ranged from 0.263 (Q3) to 4.046 (Q9), all below the critical χ^2 value of 7.815 for significance at $\alpha = 0.05$.

The absence of significant differences suggests that age does not strongly influence responses in areas like digital tool usage or media analysis. This homogeneity may stem from consistent institutional training, universal access to resources, or limitations in measurement sensitivity (e.g., Likert-scale granularity). Non-significant trends, such as the gradual decline in Q9 medians with age (Under 30 = 4.00 vs. 50+ = 3.00), could hint at generational nuances but require further investigation. Practically, educators and policymakers should focus on universal support strategies while remaining attentive to non-significant trends, such as tailored confidence-building initiatives for older cohorts in applying digital tools [13]. This analysis underscores the need to balance statistical outcomes with practical relevance, particularly in studies with homogeneous responses or limited power.

Table 7 Thematic Analysis on Digital Tools and Strategies Employed by Teachers

Theme	Count	Example Response
Training on Digital Tools and Platforms	4	"No specific tool used yet, but open to using fitness apps."
Interactive and Gamified Tools	3	"We can use Kahoot for formative assessments and also they can enjoy because they will feel that they are playing."
Multimedia and Visual Resources	5	"The used of YouTube as visual representation for my class and the utilization of Bigsky."
Video Analysis and Biomechanics Applications	2	"Using an application to anaylize the biomechanics of students."
Fitness Apps and Wearable Technology	3	"One successful strategy I've used is incorporating fitness tracking apps or wearable technology, like pedometers or smartphone step counters, into weekly activity challenges."
LMS and Course Management	4	"Maximizing the use of available LMS."
AI and Emerging Technologies	2	"Incorporating the new gens trends like using AI and other streaming platforms."
Hybrid/Online Learning Strategies	4	"Best example is when you use the technology during online classes and exploring related topics that are digital copies on the net."
DOST SETUP Initiative	1	"The SETUP Initiative of the DOST."

Digital technologies—particularly exergames—are becoming increasingly prominent in physical education (PE) instruction [18]. However, educators' perceived digital competence varies, with younger teachers generally reporting

greater confidence in applying technology within PE settings [16]. A thematic analysis of the responses reveals a diverse range of digital tools and strategies used by PE educators to enhance teaching effectiveness. The findings, summarized in the accompanying table, identify nine key themes, training on digital tools and platforms, interactive and gamified tools, multimedia and visual resources, video analysis and biomechanics applications, fitness apps and wearable technology, learning management systems (lms) and course management, ai and emerging technologies, hybrid/online learning strategies and awareness of the dost setup initiative

Among these, multimedia and visual resources, such as YouTube and Canva, emerged as the most frequently cited tools. Their popularity underscores their versatility and accessibility, allowing educators to visually demonstrate concepts and enhance lesson delivery. Similarly, LMS platforms like MS Teams and BigSky are widely used for managing courses—facilitating the distribution of materials, announcements, grading, and assignment submissions—especially in hybrid and online learning environments. Interactive tools such as Kahoot and Mentimeter are valued for their ability to gamify the learning experience, turning assessments into engaging, play-like activities that promote participation and motivation. Though cited less frequently, emerging technologies such as AI and video analysis applications show promise. Respondents noted AI's potential to personalize learning content or automate tasks, while apps like Kinovea could support biomechanics instruction by analyzing students' movements—a growing area of interest in PE.

The use of fitness apps and wearable devices, such as smartphone step counters, was also highlighted. One teacher described using these tools for weekly activity challenges, where students tracked their progress using Google Sheets. This approach promotes accountability and enables data-driven feedback, aligning with 2026 EdTech trends that emphasize real-time monitoring and the integration of IoT in PE. These practices could be further enhanced through AI-generated performance insights or more advanced tools like Hudl for video-based feedback. Despite growing openness to these technologies, many educators indicated a need for training, particularly in using AI, biomechanics tools, and fitness apps. This aligns with broader trends, as a significant portion of educators seek support in mastering complex technologies to keep pace with evolving instructional demands.

Notably, only one respondent referenced the DOST SETUP Initiative—the Philippines' Small Enterprise Technology Upgrading Program—indicating limited awareness or utilization within the education sector[9]. However, the initiative could be a valuable resource for funding or training to support digital integration in PE. The widespread reliance on free and accessible tools reflects ongoing cost concerns, which may limit the adoption of more sophisticated technologies without institutional support or external funding [5]. Overall, the analysis highlights both the promise and limitations of digital integration in PE. While accessible tools can foster engaging, personalized, and immersive learning experiences, effective implementation, particularly of advanced technologies—will depend on targeted training and infrastructure support. These findings align with 2026 educational trends that prioritize mobile, hybrid, and technology-enhanced learning environments.

Table 8 Thematic Analysis on Challenges Educators Face in Integrating Digital Technologies

Challenge Category	Frequency	Example Response
PE-Specific Integration Challenges	8	"Balancing screen time with physical activity and assessing performance remotely."
Limited Access to Devices/Resources	7	"Lack of TVs, projectors, and tech devices in teaching venues."
Training/ICT Competency	6	"My limited competency with ICT tools."
Internet Connectivity Issues	5	"Slow internet connection and unreliable digital connectivity."
None/N/A	2	"None" or "N/A"
Technological Difficulties	1	"Technological malfunctions during lessons."
Privacy and Data Security	1	"Concerns about privacy and data security."

Physical Education (PE) teachers face a range of challenges when integrating technology into their teaching practices. These challenges include feelings of unpreparedness, reliance on trial-and-error methods, shifting instructional priorities, and varying levels of teaching effectiveness [2]. Limited access to reliable internet connections and technological tools, along with concerns about the suitability of online platforms for PE instruction, further complicate implementation efforts [4].

A thematic analysis of 28 responses, categorized into seven major types of challenges, highlights key barriers to the effective use of digital tools such as learning management systems, fitness apps, and AI-driven platforms. The most frequently cited challenge was the difficulty of integrating technology specifically within the PE context, with responses pointing to the complexity of balancing screen time with physical activity and accurately assessing performance in remote settings. One respondent noted, "Balancing screen time with physical activity and assessing performance remotely," reflecting the unique difficulty of aligning hands-on movement with digital instruction. The next most common issue involved limited access to devices and resources [17]. Teachers described difficulties such as lacking TVs, projectors, or adequate devices in teaching venues, which constrained their ability to use platforms like YouTube or LMS tools effectively, particularly in under-resourced schools. Gaps in ICT training and digital competency also emerged as a major theme. Teachers expressed a need for further upskilling, with comments like "My limited competency with ICT tools" highlighting the importance of ongoing professional development, especially as tools like biomechanics apps and other complex digital resources become more prevalent in PE instruction.

Internet connectivity problems were another recurring barrier. Respondents shared frustrations about slow or unreliable internet, which disrupts streaming, real-time feedback, and other elements of hybrid or online learning environments. A small number of teachers reported experiencing no significant challenges, suggesting that some educators are either proficient with currently available tools or have limited exposure to more advanced technologies. Less commonly mentioned but still noteworthy were concerns about technical malfunctions and privacy or data security, such as disruptions during lessons or discomfort with storing student data online—issues likely to grow in importance with the wider adoption of AI and cloud-based platforms.

The majority of the reported challenges revolve around practical and immediate concerns: aligning digital tools with PE instruction, ensuring equitable access to resources, improving digital competencies, and securing reliable infrastructure. Meanwhile, concerns about technical reliability and data privacy, although less common, point to growing areas of concern as technology becomes more embedded in educational practice.

These findings align with 2026 EdTech trends, including increased adoption of cloud-based LMS, expanding use of IoT devices in PE, and the growing need for secure and inclusive learning environments. Addressing these challenges requires a multi-pronged strategy: providing PE-specific technology solutions, investing in infrastructure, offering comprehensive digital training, and ensuring robust technical and data protection support. Programs like the DOST SETUP Initiative offer potential avenues for funding and resource support, helping to bridge existing gaps and empower educators to deliver engaging, inclusive, and future-ready PE instruction.

Table 9 Thematic Analysis on the Teachers Training and Support Needs

Category	Count	Example Response
Workshops & Seminars	5	*"Training and seminar workshops tailored to digital tools."*
Advanced Digital Skills Training	3	*"Advance training on maximizing digital learning materials."*
Digital Literacy & General Training	3	*"Digital literacy sessions to improve foundational ICT skills."*
Infrastructure Support	3	*"Faster internet connection and reliable devices."*
PE-Specific Training & Support	2	*"Training on PE-specific apps for assessing movement skills."*
Access to Tools & Resources	2	*"Innovation and availability of needed digital tools."*
No Training Needed/N/A	2	*"N/A"*
Pedagogical Integration Training	1	*"Differentiated instruction strategies using digital tools."*
AI & Emerging Technologies	1	*"Application of AI to assess student movement skills."*
Training on Current Trends	1	*"Training in recent trends in educational technology."*

While PE teachers are generally technologically literate, they often express skeptical attitudes toward integrating technology and indicate a need for additional training [7]. Thematic analysis of the responses, as summarized in the accompanying table, identifies key training and support needs that can enhance educators' effectiveness in using digital tools. These insights highlight priority areas and existing gaps in digital competencies.

Based on 28 responses, ten categories of needs were identified. The most frequently mentioned was workshops and seminars, cited by five respondents, who emphasized the importance of hands-on, collaborative training to build confidence in using tools like LMS platforms (e.g., MS Teams, BigSky) and interactive apps (e.g., Kahoot, Canva). Other commonly cited needs included advanced digital skills training, basic digital literacy, and infrastructure support, each mentioned three times. Respondents expressed the need for specialized skills, improved foundational ICT proficiency, and reliable hardware and internet connectivity to support hybrid learning environments.

Some participants noted the need for PE-specific training and better access to digital tools, while a few reported no additional training needed. These responses point to more tailored needs within the discipline and a small subset of educators who feel adequately equipped. Less frequently cited needs included pedagogical integration of technology, awareness of AI and emerging technologies, and training on current digital trends, each mentioned only once. For example, one respondent highlighted the potential of AI for assessing student movement skills, underscoring a general lack of familiarity with these newer tools despite their growing relevance in 2026 EdTech trends.

The distribution of responses suggests a strong demand for practical training and infrastructure support, while more advanced or future-focused technologies are less commonly addressed. This highlights a gap between current capabilities and evolving educational demands. The findings support a multi-tiered professional development strategy: emphasizing immediate needs like workshops and reliable infrastructure, providing targeted support for PE-specific tools, and gradually introducing AI integration and pedagogical innovations.

The lack of reference to available resources like the DOST SETUP Initiative, which could support EdTech implementation, suggests underutilization of funding opportunities. Additionally, the frequent mention of free tools like YouTube and Canva reflects cost-related constraints that may hinder broader innovation. To address these challenges, professional development must balance foundational training with exposure to emerging technologies, enabling educators to create engaging, personalized, and inclusive learning experiences aligned with the dynamic, student-centered landscape of 2026 education.

5.1 Results

There were no significant differences in digital literacy perceptions between male and female PE faculty members, as determined by the Mann-Whitney U test across all twelve Likert-scale items.

There were no significant differences in digital literacy perceptions across age groups (Under 30, 30–39, 40–49, and 50+), as shown by the Kruskal-Wallis test, indicating a generally uniform view of digital literacy across demographics.

PE faculty members demonstrated high self-assessed competence in foundational digital skills, particularly in accessing credible digital resources, ensuring content accuracy, organizing information, integrating media into lessons, and using basic digital tools for teaching.

Lower confidence was observed in more advanced digital competencies, such as applying tools to measure student learning outcomes, using digital analytics or AI-enhanced assessment tools, and designing interactive or gamified learning experiences.

The most frequently identified training need was for workshops and hands-on sessions, especially for commonly used platforms like MS Teams, BigSky, Canva, and Kahoot.

Educators also expressed a need for advanced digital skills training, improved infrastructure (such as faster internet and access to devices), PE-specific technology tools (like movement assessment apps), and exposure to AI and other emerging EdTech trends.

Key challenges in integrating digital technology included aligning tools with physical activity-based instruction, limited access to teaching devices, gaps in ICT competency, and unstable internet connectivity that disrupts hybrid learning environments.

Secondary but notable concerns included technical malfunctions and privacy or data security issues, which may become more significant with the increased use of AI and cloud-based platforms.

The most widely used digital tools among PE faculty were multimedia platforms (e.g., YouTube, Canva), learning management systems (e.g., MS Teams, BigSky), gamified learning apps (e.g., Kahoot, Mentimeter), and fitness tracking tools and wearables.

Emerging tools, such as AI-driven apps and video analysis software (e.g., Kinovea, Hudl), were less commonly used but indicate a growing interest in personalized and performance-based technology in PE.

Some educators reported using creative digital strategies, such as Google Sheets to monitor student fitness activities, illustrating innovative approaches within available resource limits.

The DOST SETUP Initiative was mentioned only once, suggesting limited awareness or use of government-funded programs that could support EdTech adoption in physical education.

PE faculty at DLS-CSB showed readiness in basic digital literacy but face challenges in advanced tool adoption, particularly due to resource limitations, training gaps, and infrastructure issues.

Demographic characteristics such as gender and age did not significantly influence digital competence, highlighting a consistent need for professional development across the faculty.

The study highlights the importance of equitable digital readiness, recommending targeted professional development, infrastructure improvements, and greater visibility of institutional or national support initiatives to prepare PE educators for technology-integrated and student-centered learning in 2026 and beyond.

6 Conclusion

Physical Education (PE) teachers at De La Salle-College of Saint Benilde demonstrate strong self-assessed digital literacy, particularly in foundational competencies such as accessing credible digital resources, verifying content accuracy, and organizing information (mean = 3.71). Similarly, they express confidence in integrating media into instruction (mean = 3.68) and using basic technological tools (mean = 3.64). The findings indicate no statistically significant difference in the distribution of responses between male and female faculty members, nor across the four age groups (Under 30, 30–39, 40–49, and 50+) for any of the Likert-scale items (Q1–Q12). This suggests a relatively consistent perception of digital literacy across gender and age demographics within the faculty. However, the data reveals areas for growth, especially in more advanced competencies, such as utilizing digital tools to measure learning outcomes (mean = 3.36)—highlighting a clear need for targeted professional development.

Thematic analysis further supports these findings by identifying major challenges: integrating digital tools in PE-specific contexts, limited access to devices and resources, and gaps in ICT training. These issues suggest that while general digital competence is relatively high, systemic barriers—particularly in infrastructure and specialized training—limit the effective and equitable integration of technology in PE instruction.

The absence of significant gender- or age-based differences emphasizes that the need for support is widespread and not confined to any particular subgroup. This underscores the importance of implementing inclusive, faculty-wide development initiatives that address both the immediate, practical needs (e.g., hardware access, foundational ICT skills) and the longer-term demands of a technology-enhanced educational landscape, such as AI-driven tools and performance analytics. Aligning support with these dual priorities is essential to ensure all faculty members are prepared to foster engaging, inclusive, and future-ready learning environments.

6.1 Recommendations

The institution should conduct workshops and seminars focused on PE-specific digital tools, such as biomechanics apps and fitness trackers, to address integration challenges in physical education. Additionally, advanced training modules on AI, data-driven assessment, and immersive technologies like video analysis tools should be offered to bridge skill gaps among educators.

To mitigate resource shortages, investments should be made in reliable devices, high-speed internet, and PE-friendly technologies, including projectors and wearable devices. Leveraging initiatives like the DOST SETUP Program could further fund EdTech tools and infrastructure upgrades to ensure equitable access [9].

Training programs on blended learning strategies and adaptive tools, such as Kahoot and LMS platforms, should be developed to cater to students with diverse digital proficiencies. Gamified and multimedia resources, including YouTube and Canva, should be integrated into curricula to enhance student engagement and instructional clarity.

Future studies should expand to include administrator assessments, validating self-reported data, and identifying perception gaps in digital literacy. Partnerships with EdTech providers should also be fostered to pilot innovative tools tailored specifically to physical education contexts, ensuring alignment with evolving technological trends.

Compliance with ethical standards

Statement of ethical approval

Informed consent was obtained from all individual participants included in the study.

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