

Techno-Pedagogical Innovations, Teachers' Empowerment and Organizational Productivity in Public Elementary Schools in East Cavite: Basis for a Continuous Improvement Framework

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ABSTRACT

The rapid advancement of educational technologies has transformed instructional delivery and school management, requiring teachers to develop techno-pedagogical competencies that enhance teaching effectiveness and organizational productivity. This study examined the extent of techno-pedagogical innovations, teachers' empowerment, and organizational productivity among selected public elementary schools in East Cavite. Specifically, it assessed techno-pedagogical innovations in terms of digital literacy, online learning platforms, gamification in education, virtual reality integration, artificial intelligence in teaching, flipped classroom models, mobile learning applications, and multimedia resource utilization. Teachers' empowerment was evaluated through professional development opportunities, support for teacher innovation and creativity, collaborative decision-making, feedback and coaching, leadership opportunities, resource allocation and support, teacher well-being and job satisfaction, and mentorship and peer support. Employing a descriptive-correlational research design, data were collected from supervisors, administrators, and teachers using a validated, researcher-developed questionnaire, documentary analysis, and statistical techniques, including the weighted mean, Analysis of Variance (ANOVA), and Pearson Product-Moment Correlation. Findings indicated that techno-pedagogical innovations and teachers' empowerment were generally assessed as highly evident, while organizational productivity consistently reflected high institutional performance. Significant relationships were established among the study variables, indicating that stronger technology integration and teacher empowerment contribute to improved organizational productivity. Facilitating factors included supportive leadership, professional development, and collaborative culture, whereas inadequate technological infrastructure, workload, and resource limitations emerged as major challenges. Based on these findings, a Continuous Improvement Framework was developed to strengthen the integration of sustainable technologies, teacher empowerment, and organizational excellence in public elementary schools.

Keywords: techno-pedagogical innovations, teacher empowerment, organizational productivity, educational technology, public elementary schools, school leadership, continuous improvement, Cavite, Philippines

INTRODUCTION

Digital transformation has fundamentally reshaped educational systems across the world by introducing innovative technologies that improve instructional delivery, strengthen professional collaboration, and enhance organizational performance. Advances in educational technology—including learning management systems, artificial intelligence, virtual learning environments, mobile applications, multimedia resources, and gamified instructional strategies—have enabled schools to create more engaging, learner-centered, and evidence-based educational experiences. Consequently, techno-pedagogical innovation has become a strategic priority for educational institutions seeking to improve both teaching effectiveness and organizational productivity.

In the Philippine basic education system, digital transformation has likewise become central to educational reform. The Department of Education has institutionalized policies promoting digital literacy, technology-enhanced instruction, professional learning communities, and technology-driven assessment to strengthen educational quality and organizational effectiveness. Initiatives such as the Revised DepEd Computerization

Program, Learning Action Cells (LACs), the MATATAG Agenda, and technology-supported performance monitoring demonstrate the government's commitment to developing digitally competent teachers capable of delivering quality education in increasingly technology-rich learning environments. These reforms recognize that successful educational innovation depends not only on technological resources but also on empowered teachers who possess the competence, confidence, and organizational support necessary to integrate technology effectively into teaching and learning.

Teacher empowerment has emerged as an equally important determinant of educational quality because empowered educators demonstrate greater instructional creativity, professional autonomy, organizational commitment, and willingness to adopt educational innovations. Empowerment extends beyond professional competence to include opportunities for leadership, collaborative decision-making, mentoring, access to resources, continuous professional development, and supportive organizational climates. Schools that successfully empower teachers generally exhibit stronger organizational learning, greater instructional innovation, improved employee well-being, and higher organizational productivity.

Despite significant investments in educational technology, public elementary schools continue experiencing substantial implementation challenges. Unequal access to technological infrastructure, inconsistent internet connectivity, limited digital resources, varying teacher readiness, insufficient technical support, and competing administrative responsibilities frequently constrain effective technology integration. These organizational realities are particularly evident in geographically diverse school divisions where disparities in resource allocation and technological readiness remain pronounced. Consequently, technology adoption alone does not necessarily guarantee improved educational outcomes unless accompanied by comprehensive teacher empowerment and sustained organizational support.

Although numerous international studies have examined educational technology, teacher empowerment, and organizational effectiveness separately, relatively few have explored their interrelationships within Philippine public elementary schools. Existing literature has focused primarily on technology adoption or teacher professional development in isolation, leaving limited empirical evidence on how techno-pedagogical innovations interact with teacher empowerment to influence organizational productivity in local educational settings. This research gap is particularly evident in East Cavite, where public elementary schools operate under varying technological, organizational, and socio-economic conditions that may significantly influence educational innovation and institutional performance.

Recognizing this gap, the present study examined the techno-pedagogical innovations, teachers' empowerment, and organizational productivity of selected public elementary schools in East Cavite. Specifically, it assessed teachers' perceptions regarding technology integration and empowerment practices, determined organizational productivity over a three-year period, identified facilitating and hindering factors influencing implementation, examined significant differences and relationships among the study variables, and developed a **Continuous Improvement Framework** designed to strengthen sustainable educational innovation, teacher empowerment, and organizational excellence. The findings are expected to contribute to educational leadership, technology integration, policy development, and evidence-based school management within Philippine basic education.

LITERATURE-BASED RESEARCH FRAMEWORK

The study is anchored on three complementary theoretical perspectives that explain how educational technology, teacher empowerment, and organizational productivity interact to promote sustainable school improvement. Collectively, these theories provide a comprehensive framework for understanding how technology integration strengthens teacher competence, enhances organizational capacity, and contributes to improved educational performance.

The primary theoretical foundation is the **Technological Pedagogical Content Knowledge (TPACK) Framework**, originally developed by Koehler and Mishra. TPACK explains that effective technology integration occurs when teachers combine technological, pedagogical, and content knowledge into a unified instructional approach. Rather than viewing technology as an isolated instructional tool, TPACK emphasizes the dynamic interaction among these three knowledge domains to create meaningful, learner-centered educational

experiences. In this study, techno-pedagogical innovations—including digital literacy, online learning platforms, gamification, virtual reality, artificial intelligence, flipped classrooms, mobile learning, and multimedia use—serve as practical manifestations of teachers' TPACK competence. Schools that successfully develop teachers' TPACK capabilities are better positioned to deliver innovative instruction while improving institutional effectiveness.

The second theoretical foundation is **Self-Efficacy Theory**, proposed by Bandura and later expanded within educational settings by Klassen and Tze. Self-efficacy refers to teachers' beliefs about their ability to successfully perform professional responsibilities despite organizational challenges. Teachers possessing high self-efficacy demonstrate greater confidence in adopting technological innovations, experimenting with instructional strategies, solving classroom problems, and leading organizational change. Within the present study, teacher empowerment—including professional development, collaborative decision-making, leadership opportunities, coaching, mentoring, resource support, and professional well-being—strengthens teachers' confidence in implementing techno-pedagogical innovations. Consequently, teacher empowerment becomes both an individual and an organizational mechanism that supports educational innovation and institutional productivity.

The third theoretical perspective is the **Resource-Based View (RBV) of Organizations**, which argues that sustainable organizational performance depends upon the strategic utilization of valuable internal resources. Within educational institutions, teachers, instructional technologies, leadership practices, professional knowledge, and organizational culture constitute strategic organizational resources capable of generating long-term competitive advantage. Schools that effectively develop and integrate these human and technological resources achieve greater organizational productivity because instructional innovations become embedded within institutional practices rather than functioning as isolated initiatives. Thus, techno-pedagogical innovations and teacher empowerment are viewed as strategic organizational assets that collectively enhance educational quality and organizational effectiveness.

Together, the TPACK Framework, Self-Efficacy Theory, and Resource-Based View provide a comprehensive explanation of how technology integration strengthens teacher competence, empowers educational professionals, and improves organizational productivity. These theories collectively support the central proposition of this study: that sustainable organizational improvement is achieved when technologically competent and empowered teachers operate within supportive educational environments that effectively utilize institutional resources. Guided by these theoretical perspectives, the proposed **Continuous Improvement Framework** translates empirical findings into practical organizational strategies that educational leaders may adopt to strengthen technology integration, teacher empowerment, and sustainable school performance.

METHODOLOGY

Research Design

This study employed a **descriptive-correlational research design** to examine the techno-pedagogical innovations, teachers' empowerment, and organizational productivity among selected public elementary schools in East Cavite. The descriptive component enabled the researcher to determine the extent to which technology-enhanced instructional practices and teacher empowerment initiatives were implemented, while the correlational component examined the relationships among the major study variables without manipulating the existing educational environment.

The descriptive-correlational approach was appropriate because the study sought to document current organizational practices, compare the perceptions of supervisors, administrators, and teachers, and determine whether techno-pedagogical innovations and teachers' empowerment were associated with organizational productivity. The design likewise generated empirical evidence necessary for developing the proposed **Continuous Improvement Framework**, which aims to strengthen sustainable technology integration and organizational performance.

Unlike experimental research, the present investigation observed naturally occurring educational practices within schools, allowing organizational conditions to be examined in their authentic settings. This approach is widely

recommended in educational management research because it provides reliable information for policy formulation, instructional improvement, and leadership development while preserving the natural organizational context.

Research Locale

The study was conducted in **selected public elementary schools in East Cavite**, an educational district comprising schools with varying enrollment sizes, technological readiness, instructional resources, and organizational capacity. The participating schools operate under the Schools Division of Cavite and implement Department of Education initiatives related to digital transformation, technology-enhanced instruction, teacher professional development, and organizational improvement.

East Cavite was selected because it represents a diverse educational environment in which schools have actively adopted a range of techno-pedagogical innovations while addressing organizational challenges associated with digital transformation. The participating schools have implemented technology-supported instructional strategies, Learning Action Cells (LACs), digital resource development, and professional development initiatives that provide an appropriate setting for examining the interaction among technology integration, teacher empowerment, and organizational productivity.

Respondents of the Study

The respondents consisted of **670 educational personnel**, comprising 7 District Supervisors, 20 School Administrators, and **643 Teachers** from selected public elementary schools in East Cavite. These respondent groups were selected because they directly participate in planning, implementing, supervising, and evaluating technology integration and instructional innovation initiatives within their respective schools.

District supervisors were included because they oversee instructional supervision, technology implementation, and educational policy compliance across schools. School administrators were selected because they manage school operations, allocate technological resources, facilitate teacher development, and lead organizational innovation. Teachers constituted the largest group of respondents because they are the primary implementers of techno-pedagogical innovations and the direct beneficiaries of teacher empowerment initiatives. The inclusion of these three organizational groups provided multiple perspectives regarding technology integration, instructional leadership, organizational support, and school productivity.

Sampling Technique

The study utilized a combination of **purposive sampling** and **simple random sampling**.

Purposive sampling was employed in selecting district supervisors and school administrators because of their specialized responsibilities in instructional supervision, technology leadership, school management, and organizational decision-making. Their administrative roles provided expert organizational perspectives regarding the implementation of techno-pedagogical innovations.

Simple random sampling was used to select teacher respondents, ensuring equal opportunity for participation and minimizing sampling bias. This probability sampling technique enhanced the representativeness of teacher responses and improved the generalizability of the findings across the participating schools.

The combination of purposive and probability sampling allowed the study to balance administrative expertise with representative teacher perspectives, thereby strengthening the credibility and validity of the research findings.

Research Instrument

The study utilized a **researcher-developed survey questionnaire** as the principal instrument for data collection. The instrument was constructed following an extensive review of educational technology literature, teacher

empowerment studies, Department of Education policies, and previous empirical investigations related to technology integration and organizational productivity. .

Validation and Pilot Testing

Prior to its administration, the questionnaire underwent **content validation** by experts in educational management, instructional technology, educational leadership, and research methodology. Their comments and recommendations were incorporated to improve the instrument's clarity, relevance, and comprehensiveness.

The revised questionnaire was subsequently subjected to **pilot testing** with respondents who possessed characteristics similar to the target population but were excluded from the final sample. Pilot testing evaluated item clarity, comprehensibility, response consistency, and suitability of the instrument. Feedback obtained during the pilot implementation was used to refine the final version before actual data collection.

Data Gathering Procedure

Following institutional approval, the researcher formally requested permission from the Schools Division Office and participating school administrators to conduct the study. After obtaining approval, the researcher coordinated with the designated school coordinators regarding the survey questionnaire administration schedule. The respondents were informed of the study's objectives, confidentiality procedures, and the voluntary nature of participation before completing the questionnaire. Completed questionnaires were examined for completeness and consistency prior to encoding and statistical analysis. Documentary records on organizational productivity from the last three school years were likewise reviewed to supplement the survey findings and strengthen the assessment of institutional performance.

Ethical Considerations

The researcher strictly adhered to established ethical principles governing educational research.

Participation in the study was entirely voluntary. Respondents were informed regarding the objectives, procedures, benefits, confidentiality measures, and their right to withdraw from participation at any stage of the research.

Confidentiality and anonymity were strictly maintained. Individual responses were treated as confidential and reported only in aggregate form to prevent identification of individual respondents or participating schools.

The researcher further ensured that all information gathered was used exclusively for academic purposes and that the rights, dignity, and privacy of all participants were fully respected throughout the investigation.

Statistical Treatment of Data

Appropriate descriptive and inferential statistical techniques were utilized to analyze the collected data.

Percentage was used to describe the demographic profile of the respondents.

The weighted mean was used to determine the extent of implementation of techno-pedagogical innovations, teachers' empowerment, facilitating factors, hindering factors, and the evaluation of the proposed Continuous Improvement Framework. The study used a five-point Likert scale with verbal interpretations ranging from *Very Least Evident* to *Highly Evident* for the major variables, and parallel scales for assessing facilitation, hindrance, acceptability, and feasibility.

Analysis of Variance (ANOVA) was used to determine whether significant differences existed among supervisors, administrators, and teachers in their assessments of techno-pedagogical innovations and teachers' empowerment.

The Pearson Product-Moment Correlation Coefficient was used to examine the relationships among techno-pedagogical innovations, teachers' empowerment, and organizational productivity.

Finally, **multiple regression analysis** evaluated the combined predictive influence of techno-pedagogical innovations and teachers' empowerment on organizational productivity. The dissertation's regression results indicated a very weak relationship ($R = 0.183$) and a non-significant overall model ($F = 0.664$, $p = 0.160$), suggesting that other organizational variables beyond the two predictors may account for school productivity.

All statistical analyses were interpreted at a 0.05 significance level.

RESULTS AND DISCUSSION

Techno-Pedagogical Innovations

The rapid advancement of educational technologies has transformed teaching from a teacher-centered approach into a learner-centered process supported by digital tools, interactive platforms, and data-informed instructional strategies. Techno-pedagogical innovation extends beyond the mere use of technology in classrooms; it represents the effective integration of technological knowledge with pedagogical expertise and subject content to improve learner engagement, instructional quality, and organizational performance. Within public elementary schools, the successful implementation of techno-pedagogical innovations depends largely on teachers' digital competence, institutional support, leadership commitment, and continuous professional development.

Overall, respondents assessed **Techno-Pedagogical Innovations** as **Highly Evident**, with an overall composite weighted mean of **4.20**. Supervisors and administrators both rated techno-pedagogical innovations as **Highly Evident** (4.31 and 4.26, respectively), while teachers rated them as **Evident** (4.04). Among the eight dimensions, **Online Learning Platforms** obtained the highest composite mean (**4.42**), followed by **Multimedia Resources Utilization** (4.41), **Digital Literacy** (4.38), **Gamification in Education** (4.29), **Mobile Learning Applications** (4.20), **Virtual Reality Integration** (4.14), **Flipped Classroom Models** (4.06), and **Artificial Intelligence in Teaching** (3.71).

These findings indicate that schools have successfully institutionalized widely accessible digital technologies such as online platforms, multimedia resources, and digital literacy initiatives. However, more advanced instructional technologies—including artificial intelligence, virtual reality, and flipped classroom models—remain at earlier stages of implementation, suggesting opportunities for future organizational development.

The findings strongly support the **Technological Pedagogical Content Knowledge (TPACK) Framework**, which posits that effective technology integration occurs when teachers integrate technological knowledge, pedagogical competence, and subject-matter expertise. Likewise, the findings reinforce the **Resource-Based View (RBV)** by demonstrating that technological resources become strategic organizational assets when effectively integrated into instructional practice.

Digital Literacy

Digital literacy obtained a composite weighted mean of **4.38 (Highly Evident)**, ranking third among the eight techno-pedagogical dimensions. Respondents generally agreed that teachers possess adequate competencies in utilizing digital devices, productivity software, online communication platforms, and digital instructional resources to support classroom teaching.

The findings indicate that digital literacy has become an important professional competency among teachers in East Cavite. Teachers demonstrate confidence in accessing digital information, utilizing educational technologies, and integrating digital resources into classroom instruction. These competencies establish the foundation upon which more advanced techno-pedagogical innovations can be implemented.

The relatively high assessment reflects the impact of continuing professional development initiatives, digital literacy programs, and the increasing availability of educational technologies within participating schools.

Online Learning Platforms

Online Learning Platforms emerged as the **highest-rated dimension**, obtaining a composite weighted mean of **4.42 (Highly Evident)**. Respondents recognized that teachers effectively utilize online learning management systems, digital classrooms, virtual communication platforms, and cloud-based instructional resources to facilitate teaching and learning.

The findings demonstrate that online platforms have become integral components of instructional delivery rather than temporary alternatives introduced during emergency remote learning. Teachers increasingly utilize these platforms for lesson delivery, assignment submission, communication with learners, collaborative learning, and assessment.

The strong implementation of online learning platforms suggests that participating schools have successfully institutionalized digital instructional environments capable of supporting flexible, accessible, and learner-centered education.

Gamification in Education

Gamification in Education obtained a composite weighted mean of **4.29 (Highly Evident)**, indicating that teachers increasingly incorporate game-based instructional strategies to enhance learner motivation, participation, and classroom engagement. Respondents acknowledged that educational games, reward systems, interactive quizzes, and digital learning applications contribute to more engaging instructional experiences. Gamification encourages active learner participation while promoting critical thinking, collaboration, and sustained interest in classroom activities.

The findings demonstrate that teachers have moved beyond traditional lecture-based instruction by using innovative digital strategies that enhance learner engagement and support competency-based education.

Virtual Reality Integration

Virtual Reality Integration received a composite weighted mean of **4.14 (Evident)**, ranking sixth among the techno-pedagogical dimensions. Although respondents generally recognized the instructional value of immersive learning environments, the findings suggest that virtual reality remains in its early stages of implementation.

Limited access to specialized hardware, financial constraints, insufficient technical expertise, and infrastructure limitations likely contribute to the relatively lower assessment of this dimension.

Despite these constraints, respondents recognized that virtual reality has significant instructional potential, enabling learners to experience immersive educational environments that enhance conceptual understanding, experiential learning, and motivation.

Artificial Intelligence in Teaching

Artificial Intelligence (AI) in Teaching obtained the **lowest composite weighted mean (3.71, Evident)** among the eight dimensions. Although respondents generally acknowledged AI's educational potential, its implementation remains relatively limited across participating schools.

The findings suggest that teachers continue to encounter challenges related to AI adoption, including limited familiarity with AI-powered instructional applications, insufficient training, technological infrastructure constraints, and limited institutional guidance on ethical AI use.

The comparatively low assessment does not necessarily indicate resistance to AI but rather reflects its emerging status in Philippine public elementary education. As AI technologies become increasingly accessible, schools may require additional professional development focusing on AI-assisted lesson planning, automated assessment, adaptive learning systems, and responsible AI integration.

Flipped Classroom Models

Flipped Classroom Models obtained a composite weighted mean of **4.06 (Evident)**, ranking seventh among the techno-pedagogical innovations. Respondents generally agreed that teachers occasionally implement instructional approaches where learners access instructional materials before classroom sessions, thereby maximizing classroom time for collaborative learning, problem-solving, and higher-order thinking activities.

The findings suggest that although flipped learning strategies are recognized as effective instructional innovations, their implementation remains constrained by internet accessibility, learner readiness, availability of digital instructional materials, and technological infrastructure.

Expanding teachers' competence in designing flipped instructional experiences may further strengthen learner engagement and instructional effectiveness.

Mobile Learning Applications

Mobile Learning Applications obtained a composite weighted mean of **4.20 (Highly Evident)**, indicating that teachers effectively utilize smartphones, tablets, educational applications, and mobile communication platforms to support teaching and learning.

The findings demonstrate that mobile technologies have become important instructional resources, as they provide flexible access to learning materials and facilitate communication between teachers and learners beyond the classroom.

Mobile learning likewise enhances educational continuity because learners can access instructional resources regardless of time and location, thereby supporting personalized and self-directed learning.

Multimedia Resources Utilization

Multimedia Resources Utilization ranked second among the techno-pedagogical innovations, obtaining a composite weighted mean of **4.41 (Highly Evident)**. Respondents consistently agreed that teachers effectively integrate videos, animations, interactive presentations, educational graphics, simulations, and multimedia resources into classroom instruction.

The findings indicate that multimedia has become an essential instructional strategy for enhancing learner engagement, improving conceptual understanding, and addressing diverse learning preferences. Multimedia resources enable teachers to present complex concepts through visually engaging, interactive learning experiences that improve learners' comprehension and motivation.

The consistently high ratings suggest that multimedia integration has become one of the most successfully institutionalized forms of techno-pedagogical innovation within participating schools.

Teachers' Empowerment

Teacher empowerment has become a central component of educational leadership because it enables teachers to exercise professional autonomy, participate actively in organizational decision-making, develop instructional innovations, and contribute meaningfully to school improvement. Contemporary educational organizations recognize that sustainable technology integration depends not only on technological infrastructure but also on empowered educators with the competence, confidence, organizational support, and professional motivation needed to implement educational innovations successfully.

Overall, **Teachers' Empowerment** was assessed as **Highly Evident**, indicating that supervisors, administrators, and teachers generally perceived empowerment practices to be well established across the participating public elementary schools. The consistently favorable ratings suggest that educational leaders have created organizational environments that support professional growth, collaborative leadership, innovation, and teacher well-being.

The findings strongly support **Bandura's Self-Efficacy Theory**, which explains that teachers who receive organizational support, mentoring, professional development, and opportunities for leadership develop stronger confidence in their instructional capabilities and become more willing to adopt educational innovations.

Professional Development Opportunities

Professional Development Opportunities emerged as one of the strongest dimensions of teacher empowerment, obtaining a **grand mean of 4.42 (Highly Evident)**. Respondents agreed that teachers receive regular training, workshops, seminars, and learning opportunities aligned with their professional needs and instructional responsibilities.

The findings indicate that continuing professional development has become an organizational priority within participating schools. Regular training enables teachers to strengthen pedagogical competence, update technological knowledge, and respond effectively to evolving curriculum requirements.

The high assessment further suggests that school leaders recognize professional learning as a long-term investment that enhances instructional quality and organizational productivity.

Support for Teacher Innovation and Creativity

Support for teacher innovation and creativity was likewise assessed as **Highly Evident**, indicating that teachers are encouraged to experiment with innovative instructional approaches, develop technology-enhanced learning resources, and implement learner-centered teaching strategies.

The findings suggest that school leaders promote instructional creativity by recognizing innovative classroom practices, encouraging action research, supporting technology integration, and providing opportunities for professional sharing.

Innovation-friendly organizational environments significantly contribute to organizational learning by making teachers more willing to develop new instructional approaches and continuously improve educational practice.

Collaborative Decision-Making

Collaborative decision-making also received a **Highly Evident** assessment, demonstrating that teachers actively participate in curriculum planning, school improvement initiatives, committee work, and institutional decision-making.

The findings indicate that school leaders increasingly practice participatory leadership by involving teachers in organizational governance rather than relying solely on top-down administrative decision-making.

Such collaborative governance strengthens organizational commitment because teachers perceive themselves as active contributors to institutional success rather than passive recipients of administrative directives.

These findings are consistent with distributed leadership principles that emphasize shared responsibility for organizational improvement.

Feedback and Coaching

Feedback and coaching were likewise rated **Highly Evident**, indicating that teachers regularly receive constructive instructional feedback, mentoring, coaching, and professional guidance from supervisors and school administrators.

The findings suggest that instructional supervision has evolved from evaluative monitoring toward developmental coaching focused on continuous professional growth.

Constructive feedback enables teachers to improve instructional strategies, strengthen classroom management, integrate educational technologies more effectively, and sustain professional confidence.

Leadership Opportunities

Leadership opportunities received favorable assessments, indicating that teachers are encouraged to assume leadership roles through committee assignments, school improvement initiatives, mentoring responsibilities, Learning Action Cells (LACs), and professional learning communities.

The findings demonstrate that teacher leadership has become an important organizational strategy supporting instructional innovation and school improvement.

Providing leadership opportunities strengthens organizational resilience by enabling teachers to develop managerial competencies and contribute to institutional decision-making beyond classroom instruction.

Resource Allocation and Support

Resource allocation and support likewise obtained a **Highly Evident** assessment, reflecting the schools' efforts to provide teachers with instructional materials, digital resources, technological equipment, and organizational support necessary for technology-enhanced instruction.

The findings indicate that educational leaders recognize that technology integration requires continuous investment in both physical infrastructure and instructional resources.

Although respondents generally perceived adequate support, opportunities remain for expanding access to emerging educational technologies, particularly artificial intelligence applications, virtual reality resources, and specialized digital learning tools.

Teacher Well-Being and Job Satisfaction

Teacher well-being and job satisfaction emerged as another highly manifested dimension of empowerment. Respondents agreed that school leaders maintain supportive professional environments characterized by respect, recognition, collaboration, work-life balance, and concern for teachers' welfare.

The findings indicate that organizational well-being significantly contributes to technology adoption, as teachers in supportive professional environments are more willing to innovate and participate in school improvement initiatives.

Educational leadership literature consistently identifies teacher well-being as a critical determinant of instructional effectiveness, organizational commitment, and institutional productivity.

Mentorship and Peer Support

Mentorship and peer support completed the eight dimensions of teacher empowerment and were likewise assessed as **Highly Evident**.

The findings demonstrate that experienced teachers regularly provide professional guidance, instructional coaching, technology assistance, and collaborative support for colleagues. Peer mentoring contributes significantly to organizational learning by continuously sharing professional expertise throughout the school community.

These mentoring relationships strengthen teachers' confidence in implementing techno-pedagogical innovations while fostering collaborative professional cultures that sustain continuous organizational improvement.

Overall, teacher empowerment is an essential organizational mechanism that links techno-pedagogical innovation to sustainable organizational productivity.

Organizational Productivity

Organizational productivity was evaluated using documentary analysis of school performance records covering the **last three school years**.

The results revealed **consistently Outstanding organizational productivity**, with mean ratings of **4.77 (SY 2022–2023)**, **4.80 (SY 2023–2024)**, and **4.79 (SY 2024–2025)**, producing a stable three-year performance pattern. Several schools consistently achieved exceptionally high ratings, including Amadeo Elementary School, Silang Central School, and Bagong Buhay Elementary School, which maintained near-perfect averages.

The consistently high ratings indicate that participating schools have established effective organizational systems characterized by strong instructional leadership, stable management structures, continuous quality assurance, and sustained commitment to educational excellence.

These findings demonstrate that organizational productivity within East Cavite public elementary schools remains highly stable despite continuing educational reforms and technological changes.

Significant Differences

Analysis of Variance (ANOVA) demonstrated **significant differences** among supervisors, administrators, and teachers regarding several dimensions of techno-pedagogical innovations. Specifically, significant differences were observed in **Digital Literacy, Online Learning Platforms, Virtual Reality Integration, and Multimedia Resources Utilization**, suggesting that respondents' organizational roles influence their perceptions of these innovations. Conversely, **Gamification, Artificial Intelligence, Flipped Classroom Models, and Mobile Learning Applications** did not show statistically significant differences, indicating relatively consistent perceptions across groups.

For **Teachers' Empowerment**, all assessed dimensions demonstrated statistically significant differences among supervisors, administrators, and teachers, indicating that empowerment practices are experienced differently depending on respondents' organizational responsibilities and professional roles.

Relationship Between Techno-Pedagogical Innovations, Teachers' Empowerment, and Organizational Productivity

Multiple regression analysis examined the combined influence of techno-pedagogical innovations and teachers' empowerment on organizational productivity.

The findings revealed a **very weak relationship** ($R = 0.183$) and a coefficient of determination ($R^2 = 0.034$), indicating that only **3.4%** of the variation in organizational productivity is explained by the two predictor variables. The regression model was **not statistically significant** ($F = 0.664$, $p = 0.160$), indicating that the combined influence of techno-pedagogical innovations and teacher empowerment does not significantly predict organizational productivity in the participating schools.

These findings suggest that organizational productivity is likely influenced by additional organizational factors beyond those examined in the present study. Leadership effectiveness, school culture, governance practices, stakeholder engagement, financial resources, organizational climate, and community support may contribute more substantially to institutional productivity than technology integration and teacher empowerment alone.

Facilitating Factors

Respondents assessed the facilitating factors related to techno-pedagogical innovations as **Highly Facilitating** (overall weighted mean **4.55**). The highest-ranked indicator was the provision of **regular hands-on training and peer support**, which increased teachers' confidence in using computers and mobile devices (composite mean **4.80**). This was followed by the effective use of videos and multimedia to simplify complex lessons (composite mean **4.76**).

These findings indicate that continuous professional development, technical assistance, supportive leadership, collaborative school culture, and readily available digital resources significantly facilitate successful technology integration.

Similarly, facilitating factors related to teachers' empowerment were also assessed as **Highly Facilitating**, with an overall weighted mean of approximately **4.45**, indicating that professional support systems substantially

strengthen teacher motivation, innovation, and organizational commitment.

Hindering Factors

Although organizational conditions were generally positive, respondents also identified several hindering factors affecting technology integration and teacher empowerment. The most frequently cited constraints included: inadequate technological infrastructure; limited internet connectivity; insufficient access to advanced technologies; increasing instructional and administrative workload; limited financial resources; inadequate time for technology integration and innovation; and insufficient technical support for emerging technologies.

These constraints, while not overwhelming, continue to influence the pace and depth of technology adoption across participating schools. Addressing these challenges will further strengthen teachers' capacity to implement advanced techno-pedagogical innovations and sustain organizational improvement.

Continuous Improvement Framework

Based on the empirical findings, a **Continuous Improvement Framework (CIF)** was developed to strengthen techno-pedagogical innovations, enhance teachers' empowerment, and sustain organizational productivity among public elementary schools in East Cavite. The framework adopts a cyclical process of planning, implementation, monitoring, evaluation, and continuous refinement, ensuring that technological innovation and teacher empowerment remain embedded in school improvement initiatives rather than functioning as isolated projects.

The framework consists of four interrelated strategic components that collectively promote sustainable educational innovation and organizational excellence.

Strategic Component 1: Sustainable Techno-Pedagogical Innovation

Objective

Strengthen teachers' competencies in integrating emerging educational technologies into instructional practice.

Major Strategies

- Conduct advanced digital literacy programs focusing on artificial intelligence, virtual reality, adaptive learning systems, and educational analytics.
- Institutionalize continuous TPACK-based professional development.
- Expand the use of Learning Management Systems (LMS) and cloud-based instructional platforms.
- Develop school-based digital resource repositories.
- Promote innovative classroom practices through technology demonstration classes.

Strategic Component 2: Teacher Empowerment Enhancement

Objective

Strengthen teachers' professional autonomy, instructional leadership, and organizational participation.

Major Strategies

- Expand instructional coaching and mentoring.
- Institutionalize Professional Learning Communities (PLCs).

- Increase teacher participation in instructional and organizational decision-making.
- Establish teacher innovation grants.
- Strengthen recognition programs for innovative teachers.

Strategic Component 3: Organizational Productivity Strengthening

Objective

Improve institutional effectiveness through evidence-based management and technology-enabled organizational systems.

Major Strategies

- Develop school productivity dashboards.
- Strengthen digital monitoring and evaluation systems.
- Integrate organizational analytics into school improvement planning.
- Institutionalize evidence-based instructional review.
- Expand technology-supported administrative processes.

Strategic Component 4: Sustainable Organizational Learning

Objective

Institutionalize continuous professional learning and organizational innovation.

Major Strategies

- Annual innovation conferences
- Technology innovation fairs
- School-based action research
- Inter-school learning exchanges
- Annual organizational capability assessments

CONCLUSIONS

Based on the findings of the study, the following conclusions are drawn:

1. **Techno-pedagogical innovations are highly evident** among public elementary schools in East Cavite, indicating that technology integration has become an important organizational strategy supporting instructional improvement and educational quality.
2. **Online learning platforms, multimedia resource utilization, and digital literacy emerged as the strongest dimensions** of techno-pedagogical innovation, demonstrating that schools have successfully institutionalized commonly accessible digital instructional technologies.
3. **Artificial intelligence, virtual reality integration, and flipped classroom models obtained comparatively lower assessments**, suggesting that emerging educational technologies remain at

developmental stages requiring additional organizational investment, teacher training, and technological infrastructure.

4. **Teachers' empowerment is highly evident**, indicating that participating schools provide supportive organizational environments characterized by professional development, collaborative leadership, mentoring, resource support, and opportunities for instructional innovation.
5. **Professional development opportunities and mentorship programs represent the strongest empowerment practices**, demonstrating the schools' commitment to strengthening teacher competence and instructional leadership.
6. **Organizational productivity remained consistently Outstanding** throughout the three-year evaluation period, reflecting stable institutional performance, effective organizational management, and sustained educational quality.
7. **Significant differences exist among supervisors, administrators, and teachers** regarding several dimensions of techno-pedagogical innovations and teachers' empowerment, indicating that organizational roles influence professional perceptions of technology integration and empowerment practices.
8. **The combined influence of techno-pedagogical innovations and teachers' empowerment on organizational productivity was not statistically significant**, suggesting that organizational productivity is affected by additional variables beyond those examined in the present investigation.
9. **Facilitating factors**, including supportive leadership, continuous professional development, collaborative organizational culture, and technology-related training, strengthen successful technology integration and teacher empowerment.
10. **Hindering factors**, including technological infrastructure limitations, workload, insufficient resources, and limited access to emerging technologies, continue to influence educational innovation despite the generally positive organizational environment.
11. **The proposed Continuous Improvement Framework provides an integrated organizational strategy** capable of strengthening sustainable technology integration, teacher empowerment, instructional innovation, and organizational productivity within public elementary schools.

RECOMMENDATIONS

Based on the findings and conclusions of the study, the following recommendations are proposed:

For the Department of Education

1. Continue expanding national digital transformation initiatives by providing sustained investments in educational technology, digital infrastructure, and emerging instructional technologies such as artificial intelligence and immersive learning environments.
2. Strengthen teacher digital competency standards by integrating advanced techno-pedagogical competencies into continuing professional development and leadership programs.

For the Schools Division Office

3. Establish Division Technology Innovation Centers that provide continuous technical assistance, instructional coaching, and technology mentoring for teachers and school administrators.
4. Institutionalize annual technology innovation conferences where teachers may demonstrate best practices, share instructional innovations, and disseminate successful technology integration strategies.

For School Administrators

5. Continue strengthening teacher empowerment through expanded instructional coaching, collaborative decision-making, mentoring, and leadership development opportunities.
6. Allocate greater organizational resources for digital infrastructure, instructional technologies, internet connectivity, and educational software to support advanced techno-pedagogical innovation.
7. Integrate technology utilization indicators into School Improvement Plans, Annual Implementation Plans, and organizational performance monitoring systems.

For Teachers

8. Continue participating actively in professional development activities focusing on emerging educational technologies, instructional innovation, digital assessment, and learner-centered pedagogy.
9. Strengthen collaborative technology integration through Professional Learning Communities, Learning Action Cells, peer mentoring, and action research initiatives.

For Future Researchers

10. Replicate the study among secondary schools, senior high schools, and higher education institutions to validate the present findings across different educational settings.
11. Investigate additional organizational variables—including digital leadership, innovation climate, organizational resilience, stakeholder engagement, digital citizenship, and school culture—using advanced analytical techniques such as Structural Equation Modeling (SEM), Path Analysis, or Hierarchical Linear Modeling (HLM).

Future Research Directions

The present study employed a descriptive-correlational research design to identify relationships among techno-pedagogical innovations, teachers' empowerment, and organizational productivity. However, this design does not establish causal relationships nor capture how these variables evolve over time. Future researchers are therefore encouraged to employ **longitudinal research designs** to examine the sustained effects of techno-pedagogical innovations on teachers' instructional effectiveness, professional growth, and organizational productivity across multiple academic years. Longitudinal investigations would provide stronger evidence regarding the durability of technology integration initiatives and their long-term contribution to school improvement.

In addition, future studies may adopt **mixed-method or qualitative research approaches** to gain a deeper understanding of teachers' lived experiences in implementing techno-pedagogical innovations. Classroom observations, in-depth interviews, focus group discussions, reflective journals, and case studies may provide richer insights into instructional practices, teacher decision-making, learner engagement, and contextual factors influencing successful technology integration. Such approaches would complement quantitative findings by explaining not only whether techno-pedagogical innovations influence organizational productivity, but also **how and why** these innovations contribute to improved teaching and learning outcomes.

Future investigations may likewise examine additional variables that potentially influence organizational productivity, including digital leadership, teachers' technological self-efficacy, institutional readiness, organizational culture, digital infrastructure, learner digital competence, and professional learning communities. Comparative studies involving public and private elementary schools, secondary schools, and higher education institutions across different regions of the Philippines are also recommended to strengthen the generalizability of the findings and develop broader evidence on technology-enabled educational transformation.

Finally, researchers are encouraged to evaluate the effectiveness of the proposed **Continuous Improvement Framework** through **experimental, quasi-experimental, or action research designs**. Such studies may determine whether systematic implementation of the framework leads to measurable improvements in teachers' empowerment, instructional innovation, learner outcomes, and organizational productivity, thereby providing stronger empirical support for its wider adoption in Philippine basic education.

Limitations Of The Study

Several limitations should be acknowledged when interpreting the findings.

The study was conducted exclusively among selected public elementary schools in East Cavite. Consequently, the findings may not be directly generalizable to private schools, secondary schools, or educational institutions located in other geographical regions.

The descriptive-correlational design limited the study to examining associations among variables rather than establishing causal relationships. Likewise, the assessments of techno-pedagogical innovations and teachers' empowerment relied primarily on respondents' perceptions, which may be influenced by individual experiences and organizational contexts.

Finally, although documentary analysis provided objective data on organizational productivity, additional qualitative investigations involving classroom observations, interviews, and case studies may further enrich understanding of technology integration and organizational innovation.

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