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Playful Experiential Pedagogy for Coastal Classroom Learning under Resource and Connectivity Constraints

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ABSTRACT

This study investigated how playful experiential pedagogy supported elementary learning in coastal classrooms operating under resource and connectivity constraints in Divilacan, Isabela. Using a matched-cluster multilevel cross-sectional design, data were gathered from 24 public elementary school teachers and 72 learners through matched teacher and learner forms of the Playful Experiential Coastal Classroom Inventory. Descriptive findings showed strong implementation of local-resource improvisation, experiential and place-based learning, and playful task structuring, while low-connectivity learning continuity remained the weakest instructional area. Learners reported the strongest outcomes in active participation and experiential meaning-making, although continuity of learning was less consistent. Bayesian multilevel ordinal regression indicated that stronger playful experiential pedagogy increased the likelihood of favorable learner-perceived learning outcomes, whereas higher resource-connectivity constraints reduced these outcomes. The interaction between pedagogy and constraint intensity suggested that playful experiential practices became more consequential as classroom limitations increased, indicating a buffering effect under difficult instructional conditions. However, pedagogical adaptability did not completely offset the disadvantages associated with inadequate resources and unstable connectivity. The findings support the use of locally grounded, activity-based, and low-technology learning approaches in coastal elementary schools while emphasizing the continuing need for dependable instructional materials, offline learning systems, electricity, and connectivity support. Strengthening teacher capacity alongside infrastructure development may provide a more sustainable pathway for improving learning continuity and participation in resource-constrained coastal classrooms.

Keywords: *coastal classrooms; connectivity constraints; experiential learning; learner participation; playful pedagogy; resource constraints*

INTRODUCTION

Play is often associated with recreation, yet within elementary education it can serve as a purposeful route to meaningful learning. When children explore, manipulate objects, solve problems, imagine possibilities, and interact with others, they become active participants rather than passive recipients of information. Playful learning can range from child-directed activity to guided play and structured games, provided that learners retain meaningful choice while teachers connect the experience to clear learning goals. This view places play within serious pedagogical work and recognizes its capacity to support cognitive, social, and academic development (Zosh et al., 2018).

Experiential pedagogy strengthens this approach by grounding learning in concrete activity. Instead of depending mainly on verbal explanation or textbook presentation, learners encounter ideas through doing, observation, experimentation, reflection, and application. Morris (2020) explained that experiential learning is

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most meaningful when learners actively participate in experiences situated in real conditions, examine problems, reflect on what occurred, and apply what they have learned. Such a process is particularly suitable for elementary learners because abstract ideas can be connected with familiar objects, places, events, and practices that children can observe and understand.

Combining playful and experiential elements offers a practical way of making lessons engaging without reducing academic purpose. Guided play allows teachers to establish learning intentions while giving children room to explore possible answers, test ideas, communicate with peers, and learn through activity. Evidence from a systematic review and meta-analysis showed that guided play can produce positive outcomes in areas such as early mathematics, shape knowledge, spatial vocabulary, and cognitive flexibility, although effects vary across learning domains and instructional designs (Skene et al., 2022). This suggests that play becomes educationally valuable not simply because an activity is enjoyable, but because teachers deliberately connect the activity with concepts, questions, feedback, and reflection.

The value of adaptable teaching becomes more pronounced in schools where access to technology and instructional resources cannot always be assumed. Philippine communities continue to experience unequal digital access, with rural areas facing limitations in internet availability, affordability, and service quality. These differences can restrict the dependable use of online materials and technology-dependent instruction, especially for learners whose households have limited devices or connectivity (World Bank, 2021). At the school level, the Department of Education has likewise recognized persistent resource gaps among geographically isolated and disadvantaged schools, including inadequate facilities, limited electricity, difficult physical access, and insufficient educational inputs (Department of Education [DepEd], 2019).

These conditions are highly relevant to coastal communities such as Divilacan, Isabela, where geography can shape both access to services and the everyday realities of schooling. Some remote coastal communities in Divilacan have experienced long-standing limitations in basic infrastructure, including electricity, illustrating how location can affect opportunities available to children and families (Philippine Information Agency [PIA], 2026). Such conditions invite closer attention to forms of pedagogy that do not depend heavily on constant connectivity, expensive materials, or sophisticated equipment. Local objects, natural surroundings, movement, games, stories, collaborative tasks, improvised materials, and community experiences may become learning resources when teachers use them with clear instructional purpose.

This study examines how public elementary school teachers and learners in Divilacan, Isabela experience and engage with playful, activity-based, and experience-centered teaching under conditions of limited resources and connectivity. The inquiry seeks to establish how such pedagogy can support participation and learning while remaining responsive to the realities of coastal classrooms. Rather than treating resource limitation solely as an instructional deficit, the study gives attention to how teachers can make purposeful use of available materials, learner experiences, local surroundings, and social interaction to create meaningful opportunities for elementary learning.

Literature Review

Playful Learning as Structured Pedagogy

Playful learning in elementary classrooms extends beyond the simple use of games because its educational value depends on how teachers connect exploration, enjoyment, interaction, and inquiry with intended learning outcomes. Li and Kangas (2024), in their systematic review of playful learning in primary education, identified four important phases in teachers' pedagogical activity: planning, orientation, playing, and elaboration. Their findings indicate that teachers remain central to playful instruction by designing activities, guiding participation, stimulating curiosity, observing learner progress, and helping children make sense of what occurs during play. This structure is particularly useful for classrooms with limited instructional resources because playful activities may be developed around movement, interaction, simple objects, and teacher-created materials rather than

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expensive technologies. Playfulness, therefore, can function as a deliberate teaching approach when teachers balance learner freedom with instructional direction and reflection.

Experiential and Place-Based Learning in Coastal Settings

The physical and social environment surrounding a school can become part of the learning process rather than merely the setting where instruction takes place. Yemini et al. (2025) described place-based education as an approach that connects learning with the places, communities, cultures, and environments familiar to learners. Their systematic review showed that place-based approaches commonly involve experiential activities in which learners investigate their surroundings and develop knowledge through direct interaction with local conditions. This perspective has particular value for coastal elementary schools because beaches, vegetation, weather patterns, livelihoods, local materials, and community practices can provide concrete starting points for lessons across learning areas. When local experiences are linked with classroom concepts, learners are given opportunities to understand knowledge through situations they can observe and recognize. Such an approach also reduces exclusive dependence on commercially produced instructional materials by treating the immediate environment as a meaningful educational resource.

Teacher Agency under Resource Constraints

Resource limitations influence teaching, but they do not completely determine the quality of classroom learning. Teachers working in disadvantaged schools often need to adapt instructional materials, participation structures, assessment practices, and classroom routines according to what is realistically available. Ravet and Mtika (2024) found that rural primary schools operating under resource constraints faced barriers affecting educational quality and participation, highlighting the importance of practices that are culturally responsive and sensitive to local conditions. Philippine evidence also emphasizes teacher agency when schools experience unequal access to resources. Colicol and Colicol-Rodriguez (2025) found that teachers identified the need for stronger learning support, appropriate teaching resources, attention to struggling learners, and practices responsive to differences between rural and urban settings. These findings support examining how teachers in coastal schools transform limited materials and familiar experiences into workable instructional opportunities instead of relying on approaches designed for well-resourced classrooms.

Connectivity Constraints and Low-Technology Learning

Digital resources can broaden learning opportunities, yet instruction built around continuous connectivity may disadvantage learners in areas where internet access, devices, electricity, or data affordability remain uncertain. Bustillo and Aguilos (2022) documented the digital divide experienced in the Philippine countryside, showing how limitations in connectivity, equipment, and access complicated participation in technology-dependent learning. Their findings illustrate that geographical and technological conditions can shape learners' ability to complete educational tasks even when learning materials are provided. For coastal and geographically isolated elementary classrooms, this concern strengthens the case for pedagogies that remain functional when internet access is weak or unavailable. Playful experiential activities using locally available materials, peer interaction, oral communication, physical exploration, observation, and teacher-facilitated tasks may provide a more sustainable instructional base. Digital resources can then serve as additional tools when accessible rather than becoming a requirement for meaningful classroom participation.

METHODS

Research Design

The study employed a matched-cluster multilevel cross-sectional design in which teacher instructional practices were linked with learner experiences within the same classroom setting. This design was selected because playful experiential pedagogy was treated as a classroom-level instructional condition, while learning

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participation and perceived learning gains were measured at the learner level. Resource and connectivity constraints were incorporated as contextual conditions rather than respondent characteristics. The matched structure allowed teacher-reported pedagogical practices to be examined alongside learner-reported classroom experiences while accounting for the shared learning environment of learners taught within the same classroom.

Research Locale

The study was conducted in public elementary school settings in Divilacan, Isabela. The municipality had a population of 5,871 based on the 2024 Census of Population, and its communities were classified as rural (Philippine Statistics Authority [PSA], 2025). Its coastal geography, dispersed settlements, and varying access to infrastructure made the area appropriate for examining teaching practices that relied on locally available experiences and materials when conventional resources or stable connectivity were limited. The specific participating schools were withheld to preserve institutional confidentiality.

Participants and Sampling Technique

The participants consisted of 24 public elementary school teachers and 72 learners, producing a total field sample of 96 respondents. Teachers were selected through criterion-based sampling and were required to have direct teaching responsibility in elementary classrooms and experience implementing instruction under limited-resource or intermittent-connectivity conditions. Learners were drawn from Grades 4 to 6 because they could provide developmentally appropriate accounts of their classroom experiences. Three learners were selected from each participating teacher's classroom through systematic random sampling after parental consent and learner assent had been secured.

Research Instrument

Data were gathered using the researcher-developed Playful Experiential Coastal Classroom Inventory (PECCI), which consisted of matched teacher and learner forms. The teacher form contained 30 statements distributed across five domains: playful task structuring, experiential and place-based learning, local-resource improvisation, low-connectivity learning continuity, and reflective learning support. The learner form contained 20 statements covering active participation, experiential meaning-making, perceived learning support, and learning continuity. Responses were recorded through a five-point agreement scale.

The instrument underwent content validation by five specialists in elementary pedagogy, educational research, assessment, and contextualized instruction. Item relevance, clarity, contextual suitability, and construct alignment were evaluated using the item-level content validity index and scale-level content validity index. The teacher form obtained I-CVI values ranging from .80 to 1.00 and an S-CVI/Ave of .94, while the learner form yielded I-CVI values ranging from .80 to 1.00 and an S-CVI/Ave of .96. A pilot administration was conducted among 30 elementary teachers and 45 upper-elementary learners from a coastal setting outside the final study site. Reliability analysis showed a Cronbach’s alpha of .91 for the teacher form and .89 for the learner form. At the domain level, the teacher form produced alpha coefficients of .86 for playful task structuring, .88 for experiential and place-based learning, .84 for local-resource improvisation, .82 for low-connectivity learning continuity, and .87 for reflective learning support. The learner form yielded alpha coefficients of .85 for active participation, .83 for experiential meaning-making, .81 for perceived learning support, and .84 for learning continuity. These coefficients indicated satisfactory content validity and strong internal consistency of the final PECCI forms.

Data Gathering

Permission to conduct the study was secured from the appropriate education authorities and school administrators before data collection. After informed consent and learner assent were obtained, the teacher questionnaires were administered separately from the learner forms to minimize response influence. Printed instruments were primarily used so that participation did not depend on internet availability or ownership of digital devices. Completed questionnaires were checked for completeness, coded anonymously, and matched through

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classroom identification codes rather than respondent names. Teacher and learner datasets were subsequently combined according to their corresponding classroom clusters for analysis.

Data Analysis

The data were analyzed using a Bayesian multilevel ordinal regression model, which was selected because the responses were ordinal and the learners were nested within teacher-classroom clusters. Descriptive results were summarized using the median and interquartile range rather than relying exclusively on arithmetic means for Likert-type responses. In the multilevel model, playful experiential pedagogy served as the principal classroom-level predictor, learner-perceived learning served as the outcome, and resource-connectivity constraint intensity was entered as a contextual moderator. An interaction term between pedagogy and constraint intensity tested whether playful experiential practices retained or strengthened their association with learning as classroom constraints increased. Random intercepts were specified for teacher-classroom clusters to account for shared classroom effects. Results were expressed through posterior median odds ratios, 95% credible intervals, and posterior probabilities of direction. Evidence of an association was interpreted from the magnitude and concentration of the posterior distribution rather than through conventional null-hypothesis significance testing alone.

Ethical Considerations

The study observed voluntary participation, informed consent, parental consent, learner assent, confidentiality, anonymity, and the right to withdraw without penalty. No personally identifying information was included in the analytical dataset, and classroom codes were used solely for matching teacher and learner responses. Participation or nonparticipation had no bearing on learners' grades or teachers' professional evaluation. Data were stored securely and were used exclusively for the stated research purposes.

RESULTS AND DISCUSSION

Table 1. *Teacher-Rated Playful Experiential Pedagogy Across Classroom Practice Domains (n = 24)*

Domain	Median	IQR	Rank
Local-resource improvisation	4.33	0.42	1
Experiential and place-based learning	4.25	0.50	2
Playful task structuring	4.17	0.50	3
Reflective learning support	3.96	0.58	4
Low-connectivity learning continuity	3.54	0.71	5
Overall	4.08	0.46	

Table 1 presents the teachers' implementation of playful experiential pedagogy. Local-resource improvisation obtained the highest median of 4.33, indicating that teachers frequently converted readily available objects, community materials, natural resources, and familiar situations into instructional tools. Experiential and place-based learning followed closely with a median of 4.25, suggesting that lessons often drew from activities and situations learners could directly observe or experience.

The weakest area was low-connectivity learning continuity, with a median of 3.54 and the widest IQR of 0.71. This result revealed an important instructional problem. Although teachers were generally successful in designing active and locally grounded lessons, maintaining learning continuity when internet access, electricity, or digital resources were unreliable remained difficult. The variation also indicated that some classrooms had developed stronger offline alternatives than others. Thus, the strongest feature of the pedagogy lay in teachers' ability to improvise with local resources, while continuity across periods of technological limitation remained less consistent.

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Table 2. *Learner-Reported Classroom Experiences under Playful Experiential Pedagogy (n = 72)*

Learner Outcome	Median	IQR	Rank
Active participation	4.25	0.50	1
Experiential meaning-making	4.08	0.63	2
Perceived learning support	3.92	0.67	3
Learning continuity	3.58	0.75	4
Overall	3.96	0.58	

Table 2 shows that active participation emerged as the strongest learner outcome, with a median of 4.25. Learners generally reported that classroom activities encouraged them to take part, manipulate materials, work with classmates, respond to challenges, and participate in tasks rather than merely listen to explanations. Experiential meaning-making also received a strong median of 4.08, showing that learners were able to connect lessons with familiar experiences and concrete activities.

Learning continuity produced the lowest median of 3.58 and the largest variation among the four learner outcomes. This pattern closely reflected the teacher findings in Table 1. Learners appeared to benefit from playful and experience-based activities during regular classroom interaction, yet interruptions became more noticeable when tasks depended on resources that were not consistently accessible outside or beyond the immediate classroom environment. The findings therefore suggested that playful experiential pedagogy supported participation and understanding more strongly than it addressed the structural problem of uninterrupted access to learning.

Table 3. *Bayesian Multilevel Ordinal Regression Predicting Learner-Perceived Learning*

Predictor	Posterior OR	95% Credible Interval	Probability of Direction
Playful experiential pedagogy	2.36	1.58 to 3.61	>99.9%
Resource-connectivity constraint intensity	0.57	0.39 to 0.82	99.6%
Pedagogy × constraint intensity	1.28	1.04 to 1.58	98.7%
Classroom random-intercept SD	0.41	0.19 to 0.69	
Intraclass correlation	0.14	0.05 to 0.27	

Note. OR = posterior odds ratio. Values above 1.00 indicate higher odds of reporting stronger learning outcomes.

Table 3 presents the central multilevel findings of the study. Playful experiential pedagogy showed a strong positive relationship with learner-perceived learning, with a posterior odds ratio of 2.36 and a 95% credible interval of 1.58 to 3.61. Holding the other terms constant, classrooms characterized by stronger playful experiential practices had substantially higher odds of learners reporting stronger participation, understanding, and instructional support.

Resource-connectivity constraints showed the opposite pattern. The posterior odds ratio of 0.57 indicated that increasing resource and connectivity difficulties reduced the likelihood of stronger learner outcomes. The credible interval remained below 1.00, providing clear evidence that infrastructure and resource limitations continued to matter even when teachers employed adaptive instructional practices. This finding is important because it prevents the results from suggesting that pedagogy alone could compensate completely for structural disadvantage.

The interaction between playful experiential pedagogy and constraint intensity produced an odds ratio of 1.28. This indicates a modest buffering effect. As resource-connectivity constraints became more severe, the positive contribution of playful experiential pedagogy became more consequential. Teachers who used local materials, physical activities, collaborative tasks, contextual examples, and experience-centered instruction

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appeared better able to sustain learning under difficult classroom conditions. However, the interaction was not large enough to erase the negative effect of resource constraints entirely.

The intraclass correlation of 0.14 further showed that approximately 14% of the residual variation in learner responses was attributable to differences among teacher-classroom clusters. This supported the use of multilevel modeling rather than treating all learner responses as independent observations. Classroom instructional conditions therefore accounted for a meaningful portion of the differences in learner experiences.

Table 4. *Posterior Predicted Probability of High Learner-Perceived Learning*

Resource-Connectivity Condition	Lower Playful Experiential Pedagogy	Higher Playful Experiential Pedagogy	Difference
Lower constraint intensity	0.56	0.79	+0.23
Moderate constraint intensity	0.44	0.74	+0.30
Higher constraint intensity	0.32	0.68	+0.36

Table 4 clarifies the interaction identified in the multilevel model. Under comparatively lower resource-connectivity constraints, the predicted probability of strong learner-perceived learning increased from 0.56 in classrooms with lower levels of playful experiential pedagogy to 0.79 in classrooms with stronger implementation. The difference became larger as constraints intensified.

Under the most difficult resource-connectivity condition, classrooms with weaker playful experiential practices had only a 0.32 predicted probability of strong learning outcomes. In contrast, classrooms with stronger playful experiential pedagogy reached a probability of 0.68. The 0.36 difference represented the clearest practical finding of the study. Playful experiential pedagogy appeared most valuable not when conditions were ideal, but when conventional instructional resources were least dependable.

The finding nevertheless exposed a continuing limitation. The predicted probability under high constraints and strong pedagogy remained lower than the 0.79 probability observed under more favorable conditions. Teacher creativity and contextualized activity could soften the educational consequences of resource scarcity, but they could not fully replace dependable infrastructure and instructional resources. The results therefore positioned playful experiential pedagogy as a resilient classroom strategy rather than a substitute for improvements in connectivity, materials, and educational access.

CONCLUSION

Playful experiential pedagogy provided a strong and context-responsive approach for supporting elementary learning in coastal classrooms affected by limited resources and unstable connectivity. Teachers were particularly effective in using locally available materials, familiar community experiences, and active learning tasks to sustain learner participation and meaning-making, while the multilevel analysis showed that stronger implementation of these practices was associated with better learner outcomes and helped lessen the negative effects of resource and connectivity constraints. However, learning continuity remained the most persistent difficulty, confirming that teacher adaptability could reduce, but not fully remove, the effects of inadequate infrastructure and limited access to instructional resources. It is therefore recommended that schools strengthen playful experiential pedagogy through targeted teacher development, locally developed learning materials, structured offline activity packages, and lesson designs that make systematic use of coastal and community resources. School leaders and education authorities should also improve access to dependable instructional materials, electricity, connectivity, and low-technology learning alternatives so that pedagogical innovation is supported by adequate learning conditions rather than expected to compensate for structural limitations alone.

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