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FROM DRILLS TO INQUIRY: PROBLEM-BASED AND PROJECT-BASED LEARNING AS PEDAGOGICAL INNOVATIONS PREDICTING STUDENT ENGAGEMENT IN PHYSICAL EDUCATION IN BAMENDA III, CAMEROON

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Abstract

Teacher-centred, drill-based instruction still dominates Physical Education (PE) in Cameroonian secondary schools, and students' engagement in the subject is reported to be low. This study therefore examined the extent to which Problem-Based Learning (PBL) and Project-Based Learning (PjBL), conceived as pedagogical innovations, predict Lower Sixth students' engagement in PE in Bamenda III Municipality, North-West Region, Cameroon. A concurrent mixed-methods design, with a correlational quantitative strand, was adopted. Quantitative data were collected from 233 students, selected by proportionate stratified random sampling from two government, one mission and one private school, and from all nine PE teachers in these schools, while qualitative data came from interviews with four Heads of Department (HODs). Data were analysed using descriptive statistics, Pearson correlation, simple linear regression and thematic analysis. Students endorsed both PBL (M = 3.18) and PjBL (M = 3.30) on a 4-point scale. Teachers agreed that both approaches foster critical thinking and teamwork, yet they rarely designed lessons around real-life problems. PBL ($r = .47$, $R^2 = .22$, $p < .001$) and PjBL ($r = .49$, $R^2 = .24$, $p < .001$) each significantly and positively predicted engagement in separate simple regression models. HODs linked both approaches to decision-making, teamwork and sustained participation, but cited limited time, large classes, mixed abilities and scarce resources as barriers. The study concludes that PBL and PjBL are positively associated with students' engagement in PE and are viable innovations for the subject, although their spread depends on teacher training, protected instructional time and institutional support.

Keywords:

pedagogical innovation, problem-based learning, project-based learning, student engagement, physical education, Cameroon.

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Résumé

L'enseignement traditionnel, centré sur l'enseignant et fondé sur des exercices répétitifs, demeure prédominant dans l'enseignement de l'Éducation Physique et Sportive (EPS) dans les établissements secondaires camerounais, tandis que l'engagement des élèves dans cette discipline reste relativement faible. Cette étude visait donc à examiner dans quelle mesure l'apprentissage par problèmes (APP) et l'apprentissage par projets (APPr), considérés comme des innovations pédagogiques, permettent de prédire l'engagement des élèves de Lower Sixth (classe de Première du sous-système anglophone) en EPS dans la municipalité de Bamenda III, région du Nord-Ouest du Cameroun. Un devis méthodologique mixte concomitant, comportant un volet quantitatif corrélationnel, a été adopté. Les données quantitatives ont été recueillies auprès de 233 élèves, sélectionnés par échantillonnage aléatoire stratifié proportionnel dans quatre établissements secondaires, dont deux publics, un confessionnel et un privé, ainsi qu'auprès des neuf enseignants d'EPS exerçant dans ces établissements. Les données qualitatives ont été obtenues à travers des entretiens menés auprès de quatre chefs de département. Les données ont été analysées à l'aide de statistiques descriptives, du coefficient de corrélation de Pearson, de la régression linéaire simple et de l'analyse thématique. Les résultats révèlent que les élèves ont exprimé une appréciation favorable de l'apprentissage par problèmes (M = 3,18) et de l'apprentissage par projets (M = 3,30), sur une échelle à quatre points. Les enseignants reconnaissent que ces deux approches favorisent le développement de la pensée critique et du travail collaboratif, bien qu'ils intègrent rarement des situations-problèmes issues de la vie quotidienne dans la conception de leurs leçons. Les analyses statistiques montrent que l'apprentissage par problèmes ($r = 0,47$; $R^2 = 0,22$; $p < 0,001$) et l'apprentissage par projets ($r = 0,49$; $R^2 = 0,24$; $p < 0,001$) constituent chacun, dans des modèles de régression linéaire simple distincts, des prédicteurs positifs et statistiquement significatifs de l'engagement des élèves. Les chefs de département soulignent que ces approches contribuent au développement des capacités de prise de décision, de l'esprit d'équipe et de la participation soutenue des élèves. Toutefois, ils identifient plusieurs obstacles à leur mise en œuvre, notamment l'insuffisance du temps d'enseignement, les effectifs pléthoriques, l'hétérogénéité des niveaux des élèves et le manque de ressources pédagogiques. L'étude conclut que l'apprentissage par problèmes et l'apprentissage par projets sont positivement associés à l'engagement des élèves en EPS et constituent des innovations viables pour cette discipline, bien que leur diffusion dépende de la formation des enseignants, de la préservation du temps d'enseignement et du soutien institutionnel.

Mots-clés : *innovation pédagogique, apprentissage par problèmes, apprentissage par projets, engagement des élèves, éducation physique et sportive, Cameroun.*

Introduction

Physical Education (PE) is the only curriculum subject that combines the development of body and physical competence with values-based learning (UNESCO, 2015), which allows it to address the physical, cognitive, social and affective domains of learning together. Beyond fitness and motor competence, quality PE is expected to develop teamwork, leadership, perseverance and self-regulation, which are the transferable competences that contemporary curriculum reforms describe as twenty-first-century skills (Paniagua & Istance, 2018). These benefits, however, materialise only when students actually

engage with lessons. Engagement is understood here as a multidimensional construct with behavioural (participation, effort and persistence), cognitive (strategic thinking and self-regulation) and emotional (interest, enjoyment and belonging) components (Fredricks et al., 2004). Because physical activity is both the medium and the outcome of learning in PE, disengagement undermines the subject at its core.

In Cameroon, Law No. 98/004 of 14 April 1998 commits the education system to the intellectual, physical, civic and moral development of the learner (Republic of Cameroon, 1998), and PE is compulsory in secondary schools. Moreover, the secondary syllabi introduced from the 2014/2015 school year adopted a competency-based approach (CBA) that organises learning around real-life situations and casts the learner as an active participant (Alemnge, 2021). In practice, however, PE remains marginalised. Schools lack facilities and qualified staff, timetables favour subjects examined in high-stakes public examinations, and lessons are commonly reduced to demonstration, imitation and routine drills (Mbua, 2003; Tambo, 2012). Studies of CBA implementation in the neighbouring South West Region likewise report that inadequate training, large classes, scarce materials and insufficient time prevent teachers from applying the learner-centred methods that the reform requires (Diffang, 2019). Such teacher-centred practice offers students few opportunities to make decisions, solve problems or collaborate, and it consequently under-serves the very cognitive and emotional dimensions of engagement that the subject is meant to develop.

Against this background, Problem-Based Learning (PBL) and Project-Based Learning (PjBL) are two of the most widely studied innovative pedagogies that move learners from passive reception to active inquiry, collaboration and authentic work (Hmelo-Silver, 2004; Kokotsaki et al., 2016; Paniagua & Istance, 2018; Thomas, 2000). In PBL, which originated in medical education, learning begins with an ill-structured, authentic problem; learners identify what they need to know, investigate, propose and test solutions, and then reflect (Savery, 2006). In PE, the problem might be how to break a zonal defence or how to adapt a gymnastics sequence for a peer with limited flexibility. PjBL, by contrast, organises learning around an extended inquiry that ends in a tangible product or event, such as a school fitness campaign, an inter-class tournament or an instructional video (Blumenfeld et al., 1991; Thomas, 2000). In this study, pedagogical innovation refers to the deliberate introduction of teaching practices that are new to a particular setting and that change the roles of teacher and learner (Rogers, 2003). Under this definition, PBL and PjBL are not new globally, but they are innovations in Bamenda III PE classrooms, where teacher-centred instruction remains the norm. Viewing them as innovations raises two questions that a purely pedagogical framing ignores: whether they deliver a relative advantage in engagement over current practice, and what conditions help or hinder their adoption.

Literature Review

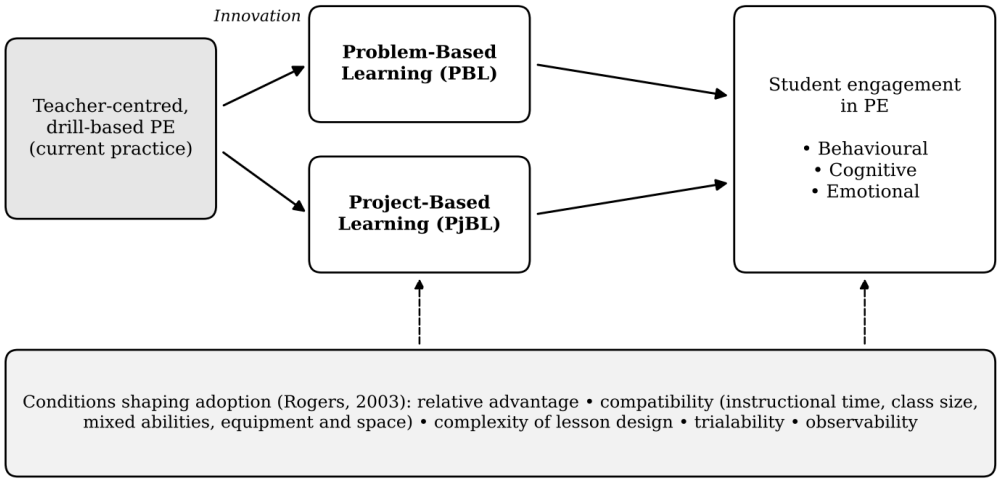
The study is anchored in two theoretical lenses. On the one hand, constructivist theory holds that learners build knowledge through active engagement with experience (Piaget, 1972) and through social interaction scaffolded within the Zone of Proximal Development (Vygotsky, 1978). The generative teacher-education perspective developed in Cameroon by Nsamenang and Tchombe (2011) extends this view by arguing that pedagogy in

African settings should be participatory, rooted in learners' contexts and oriented toward producing usable knowledge rather than reproducing content. Both perspectives predict that PBL and PjBL, which place learners at the centre of inquiry and collaboration, should raise engagement. Neither, however, explains why learner-centred methods so often fail to take hold in schools. On the other hand, diffusion of innovations theory fills this gap by proposing that adoption depends on how potential adopters perceive an innovation's relative advantage, compatibility, complexity, trialability and observability (Rogers, 2003). Applied to PE, teachers will use PBL or PjBL to the extent that they see clear engagement benefits that fit their time, class sizes and resources without excessive planning demands. Combining the two lenses thus allows the study to ask both whether the innovations are associated with engagement and what shapes their uptake.

Building on these two lenses, Figure 1 summarises the conceptual model of the study. The model begins with the current teacher-centred, drill-based practice that dominates PE lessons and shows the shift from this practice to two learner-centred innovations, PBL and PjBL, which constitute the independent variables. Each innovation is expected to predict student engagement, the dependent variable, in its behavioural, cognitive and emotional dimensions (Fredricks et al., 2004). Beneath these links, the lower band represents the contextual conditions that shape whether teachers adopt the innovations, namely their perceived relative advantage, their compatibility with available time, class sizes, ability range and resources, their complexity, and the extent to which they can be tried out and observed (Rogers, 2003). The model therefore links the two theoretical lenses to the variables tested in the study and to the empirical evidence reviewed below.

Figure 1

Conceptual Model of PBL and PjBL as Pedagogical Innovations Predicting Student Engagement in Physical Education



Source: Fokong & Nkeh (2026)

Empirically, the evidence on PBL is promising but contested. Advocates argue that authentic, ill-structured problems create a genuine need to know, distribute responsibility across the group and require metacognitive reflection (Hmelo-Silver, 2004; Savery, 2006). Meta-analytic evidence partly supports this view: Walker and Leary (2009)

found an overall positive effect of PBL, while Strobel and van Barneveld (2009) found that PBL outperformed conventional instruction on long-term retention and skill development, though not necessarily on short-term knowledge tests. Conversely, Kirschner et al. (2006) argued that minimally guided instruction overloads novices' working memory, to which Hmelo-Silver et al. (2007) replied that well-implemented PBL is heavily scaffolded rather than unguided. This debate matters for Cameroonian PE because, if teachers equate PBL with leaving students to "figure it out" in large, mixed-ability classes, the cognitive-load critique predicts frustration rather than engagement.

Similarly, the case for PjBL rests on the motivational power of sustained, purposeful work that results in a public product (Blumenfeld et al., 1991). In self-determination terms, well-designed projects support autonomy, competence and relatedness, which are the conditions under which engagement becomes internally driven (Ryan & Deci, 2000). Kokotsaki et al. (2016) linked PjBL with gains in collaboration and motivation, yet they warned that outcomes depend heavily on implementation quality, teacher support and time. Within Cameroon, studies of the CBA reveal a comparable pattern, in which teachers accept the principles of active learning but find the conditions for applying them lacking (Diffang, 2019). Furthermore, most of the evidence for learner-centred PE models such as cooperative learning, Sport Education and tactical-games teaching comes from North America, Europe and Australasia, so its transferability to classes of 60 or more students with few balls and scarce playing space cannot be assumed.

Three gaps consequently emerge from this literature. First, evidence on PBL and PjBL in sub-Saharan African PE is scarce, and the debate about guidance and implementation has not been tested in such settings. Second, most studies focus on achievement rather than on engagement as a multidimensional outcome. Third, few studies examine learner-centred approaches as innovations by asking both whether they work and whether teachers actually adopt them. The present study addresses these gaps in Bamenda III Municipality.

Statement of the Problem

Cameroon's education policy expects PE to contribute to the holistic development of learners (Republic of Cameroon, 1998), and the competency-based syllabi presuppose active, learner-centred teaching (Alemnge, 2021). In the secondary schools of Bamenda III Municipality, however, PE lessons are frequently irregular, displaced by examinable subjects or reduced to teacher-directed drills. Students in the Lower Sixth, where preparation for the General Certificate of Education Advanced Level examinations dominates, tend to treat PE as peripheral, and their participation is often passive and minimal.

Three features make this problem distinctively Cameroonian. To begin with, there is a policy–practice gap, because large classes, scarce equipment, limited teacher preparation and examination-driven timetables push teachers toward the least demanding, teacher-centred methods (Mbua, 2003; Tambo, 2012). In addition, the socio-political crisis in the North-West and South-West Regions since 2016 has disrupted schooling through closures, displacement and attacks on students, teachers and schools (Bang & Balgah, 2022; Human Rights Watch, 2021). Students in Bamenda have therefore lost instructional time and, in many cases, experienced insecurity, which makes re-engaging them with

school a pressing concern; PE could help with this, but only if it is taught in engaging ways. Finally, there is an evidence gap, since decisions about investing scarce training resources in learner-centred PE are being made without local evidence on whether such methods raise engagement in Cameroonian classrooms. Without such evidence, teacher educators, school leaders and policymakers cannot judge whether PBL and PjBL offer a real advantage over current practice or what support their adoption would require. The problem addressed by this study is thus the persistently low engagement of students in PE in Bamenda III Municipality, together with the lack of context-specific evidence on whether PBL and PjBL predict higher engagement.

Accordingly, the general objective was to examine PBL and PjBL as predictors of students' engagement in PE in selected secondary schools in Bamenda III Municipality. Specifically, the study sought, first, to determine the extent to which PBL predicts students' overall engagement in PE, measured as a composite of its behavioural, cognitive and emotional dimensions, and, second, to determine the extent to which PjBL predicts the same overall engagement. In line with these objectives, two research questions were posed: (a) To what extent does PBL predict students' engagement in PE in selected secondary schools in Bamenda III Municipality? (b) To what extent does PjBL predict students' engagement in PE in selected secondary schools in Bamenda III Municipality? These questions were, in turn, tested through the following null hypotheses:

H_{01}: PBL does not significantly predict students' engagement in PE in selected secondary schools in Bamenda III Municipality.

H_{02}: PjBL does not significantly predict students' engagement in PE in selected secondary schools in Bamenda III Municipality.

Methodology

A concurrent mixed-methods design was adopted, in which the quantitative strand followed a correlational design: student and teacher questionnaires supplied quantitative evidence on the relationships between students' reported exposure to PBL and PjBL and their engagement, while semi-structured interviews with Heads of Department (HODs) supplied qualitative insight into how the approaches operate and what constrains them. The two strands were collected at the same time, analysed separately and integrated during interpretation by setting the student and teacher results for each approach alongside the HOD themes and noting where the three sources converged or diverged.

The study was conducted in Bamenda III Municipality, Mezam Division, North-West Region of Cameroon, where the target population comprised 1,975 Lower Sixth students and 40 PE teachers in 16 secondary schools. From this population, four schools representing the main school types were selected, namely two government schools (GBHS Atiela and GBHS Bayelle), one mission school (St. Joseph College Menteh) and one private school (CAMSCI Nkwen). Together, these schools provided an accessible population of 687 Lower Sixth students and 13 PE staff, made up of nine classroom PE teachers and four HODs (one in each school). Using the sample-size determination table reproduced by Amin (2005), a sample of 248 students was drawn by proportionate stratified random sampling, with schools as strata and simple random selection within each school. Of the questionnaires administered, 233 were returned complete and usable (93.9%), and these

formed the basis of the inferential analyses. In addition, all 13 PE staff were included through total population sampling: the nine teachers completed the teacher questionnaire, and the four HODs who were not among the nine teachers, were interviewed. The students were aged approximately 18 to 20 years.

Three instruments were used to collect data. The student questionnaire measured perceived exposure to PBL (6 items) and PjBL (6 items), as well as student engagement through 18 items covering the behavioural, cognitive and emotional dimensions described by Fredricks et al. (2004), all on a 4-point scale (1 = *strongly disagree*, 4 = *strongly agree*), with a mean of 2.50 taken as the criterion for agreement. To keep the predictor and outcome measures distinct, the PBL and PjBL items referred specifically to lessons or activities organised around problems or projects, whereas the engagement items described students' participation, effort, thinking and feelings in PE lessons in general, and the three scales were presented in separate sections of the questionnaire. Nevertheless, some exposure items, such as enjoyment of and motivation from problem-solving, are conceptually close to emotional engagement, and this overlap is acknowledged as a limitation. The teacher questionnaire, by contrast, contained four items on each approach and was coded in the reverse direction (1 = *strongly agree*, 4 = *strongly disagree*), so lower teacher means indicate stronger agreement. Finally, a semi-structured interview guide for HODs explored how PBL and PjBL were used, their perceived effects on students and the challenges of implementation.

To ensure face and content validity, the instruments were reviewed by an expert in the Department of Physical Education and Animation in the Faculty of Education and an experienced secondary-school PE teacher, who judged the items for clarity, relevance and appropriateness. Thereafter, the instruments were piloted with 15 students and 4 teachers from three non-sampled schools (GBTHS Bamenda, FONAB Nkwen and All Saints College Bayelle). Cronbach's alpha coefficients were .79 for the PBL scale, .81 for the PjBL scale and .80 for the engagement scale, and .81 and .80 for the student and teacher questionnaires as a whole, all exceeding the .70 threshold commonly accepted for internal consistency (Amin, 2005).

Quantitative data were analysed with means and standard deviations, Pearson product-moment correlation and simple linear regression, with significance set at $\alpha = .05$. Because each hypothesis concerned a single predictor, separate simple regressions were estimated for PBL and PjBL. Before estimation, the assumptions of linearity, normality of residuals, homoscedasticity and independence of errors were checked using scatterplots of each predictor against engagement, histograms and normal P-P plots of standardised residuals, plots of standardised residuals against predicted values and the Durbin-Watson statistic, and cases with standardised residuals beyond ±3 were screened as potential outliers. Because students were nested within four schools, those in the same school probably shared similar instructional experiences; with only four schools, multilevel modelling was not feasible, so standard errors may be slightly underestimated and the significance tests should be read with this in mind. Meanwhile, interview data were transcribed verbatim and subjected to thematic content analysis, following the phases described by Braun and Clarke (2006): the transcripts were read repeatedly for familiarisation, initial codes were generated inductively, related codes were grouped into candidate themes, and the themes were reviewed against the transcripts, defined and

compared across the four HODs before illustrative statements were selected for Table 4 and 8. With regard to ethics, authorisation was obtained from school authorities and informed consent from all participants; participation was voluntary, participants could withdraw at any time, responses were treated confidentially, and interviewees are identified only by school.

Results

This section presents the findings according to the two research questions. For each question, students' descriptive results are reported first, followed by the teachers' responses, the regression test of the corresponding hypothesis and the HODs' qualitative perspectives. The section closes with the implementation challenges that HODs reported for both approaches. Student means are interpreted against the criterion mean of 2.50, whereas lower teacher means indicate stronger agreement because the teacher questionnaire was reverse-coded.

Problem-Based Learning and Students' Engagement in Physical Education

Students' perceptions of PBL are presented first in Table 1, followed by the teachers' responses in Table 2.

Table 1

Students' Perceptions of Problem-Based Learning in Physical Education (N = 233)

Item	Statement	*M*	*SD*
1	My PE teacher presents problems for students to solve during lessons	2.95	0.86
2	Solving problems during PE lessons makes learning more engaging	3.45	0.74
3	I enjoy PE activities that involve finding solutions to challenges	3.25	0.72
4	Problem-solving activities help me think critically in PE	2.89	0.86
5	Working on PE problems keeps me involved in the lesson	3.24	0.71
6	I feel motivated when I successfully solve PE-related problems	3.31	0.84
	Grand mean	3.18	0.79

Note. Scale: 1 = *strongly disagree*, 4 = *strongly agree*; criterion mean = 2.50. Source: Field data (2026).

Students endorsed PBL (grand *M* = 3.18), and every item exceeded the criterion mean. The pattern across items is, however, informative. The highest ratings concerned the experience of problem-solving, namely that it makes learning more engaging (*M* = 3.45) and motivating (*M* = 3.31), whereas the lowest concerned how often teachers actually present problems (*M* = 2.95) and whether problem-solving develops critical thinking (*M* = 2.89). In other words, students value the approach more than they encounter it, and its cognitive pay-off is the least secure benefit.

Table 2

Teachers' Responses on Problem-Based Learning (n = 9)

Item	Statement	*M*	*SD*
1	I design PE lessons around real-life problems for students to solve	2.89	0.33
2	PBL encourages students to think critically during PE activities	1.11	0.33
3	Students are more motivated when they investigate practical problems	1.56	0.53
4	PBL makes my PE lessons more interactive	1.78	0.44
	Grand mean	1.84	0.41

Note. Scale: 1 = *strongly agree*, 4 = *strongly disagree*; lower means indicate stronger agreement. Source: Field data (2026).

All nine teachers agreed that PBL promotes critical thinking (*M* = 1.11) and makes lessons more interactive (*M* = 1.78). In sharp contrast, the practice item, designing lessons around real-life problems, had a mean of 2.89, which falls on the disagree side of the scale. Teachers thus endorse PBL's benefits but rarely build lessons around it, which is a classic adoption gap in which an innovation is valued in principle but not yet enacted; this gap also mirrors the students' lower rating of how often problems are presented (Table 1, Item 1). Hypothesis One was then tested by simple linear regression, as shown in Table 3.

Table 3

Simple Linear Regression of Student Engagement on Problem-Based Learning (N = 233)

Predictor	*r*	R^2	Adj. R^2	*B*	*SE B*	β	*t*(231)	*P*
Problem-based learning	.470	.220	.217	0.389	0.048	.470	8.10	< .001

Note. $F(1, 231) = 65.61$, $p < .001$; 95% CI for *B* [0.294, 0.484]. *B* = unstandardised coefficient; β = standardised coefficient (equal to *r* in simple regression). H_{01} rejected. Source: Field data (2026).

PBL correlated moderately and positively with student engagement ($r = .47$) and explained 22.0% of its variance, $F(1, 231) = 65.61$, $p < .001$, such that each one-point increase in perceived PBL exposure was associated with a 0.39-point increase in engagement. H_{01} was therefore rejected, meaning that PBL is a significant positive predictor of students' engagement in PE. The HODs' perspectives in Table 4 help to explain this association.

Table 4

Heads of Department's Perspectives on Problem-Based Learning

Respondent	Illustrative statement	Theme
GBHS Atiela	"When students are asked to identify the correct pass or solution during games, they become more involved in the lesson."	Active participation
CAMSCI	"Students are required to adjust techniques and think critically to solve movement-related challenges."	Critical thinking
GBHS Bayelle	"Learners develop strategies during activities, making lessons more interactive and engaging."	Strategy development
St. Joseph Menteh	"Problem-solving activities in gymnastics improve students' cognitive abilities and understanding."	Cognitive engagement

Note. Respondents are the HODs of the schools named. Source: Field interviews (2026).

In all four schools, HODs described students as more involved when they had to make decisions, for example by choosing a pass, adjusting a technique or devising a strategy. This suggests that PBL's value in PE lies in turning students from executors of drills into decision-makers. Notably, the statements refer to tactical and movement problems embedded in normal lessons rather than to extended inquiry cycles, which is consistent with the teachers' low rating of whole-lesson problem design.

Project-Based Learning and Students' Engagement in Physical Education

Students' and teachers' responses on PjBL are presented in Tables 5 and 6, respectively.

Table 5

Students' Perceptions of Project-Based Learning in Physical Education (N = 233)

Item	Statement	*M*	*SD*
1	My PE teacher assigns projects related to physical activities and sports	3.12	0.81
2	Working on projects makes Physical Education more interesting	3.41	0.76
3	Project activities help me collaborate with classmates	3.38	0.72
4	I become more responsible when completing PE projects	3.29	0.79
5	Projects help me connect classroom learning with real-life experiences	3.34	0.70
6	I actively participate when involved in PE projects	3.26	0.71
	Grand mean	3.30	0.75

Note. Scale: 1 = *strongly disagree*, 4 = *strongly agree*; criterion mean = 2.50. Source: Field data (2026).

Students rated PjBL favourably (grand *M* = 3.30), most strongly for making PE more interesting (*M* = 3.41), supporting collaboration (*M* = 3.38) and linking learning to real life (*M* = 3.34). As with PBL, the lowest rating concerned how often teachers assign projects (*M* = 3.12), although this item still exceeded the criterion.

Table 6

Teachers' Responses on Project-Based Learning (n = 9)

Item	Statement	*M*	*SD*
1	I regularly assign project activities during PE lessons	1.67	0.50
2	Projects improve students' teamwork and collaboration	1.22	0.44
3	Students demonstrate greater responsibility during project activities	1.44	0.53
4	Project-based learning promotes sustained student participation	1.56	0.53
	Grand mean	1.47	0.50

Note. Scale: 1 = *strongly agree*, 4 = *strongly disagree*; lower means indicate stronger agreement. Source: Field data (2026).

Teachers agreed strongly that projects improve teamwork (*M* = 1.22), responsibility (*M* = 1.44) and sustained participation (*M* = 1.56). Unlike with PBL, they also reported regularly assigning projects (*M* = 1.67). The endorsement–practice gap is therefore narrower for PjBL than for PBL, possibly because projects such as organising a tournament or a fitness event fit more easily with existing school sporting traditions. Hypothesis Two was tested next, as shown in Table 7.

Table 7

Simple Linear Regression of Student Engagement on Project-Based Learning (N = 233)

Predictor	*r*	R^2	Adj. R^2	*B*	*SE B*	β	*t*(231)	*P*
Project-based learning	.485	.236	.233	0.426	0.050	.485	8.44	< .001

Note. $F(1, 231) = 71.23$, $p < .001$; 95% CI for *B* [0.327, 0.526]. *B* = unstandardised coefficient; β = standardised coefficient (equal to *r* in simple regression). H_{02} rejected. Source: Field data (2026).

PjBL correlated moderately and positively with student engagement (*r* = .49) and explained 23.6% of its variance, $F(1, 231) = 71.23$, $p < .001$, so that each one-point increase in perceived PjBL exposure was associated with a 0.43-point increase in engagement. H_{02} was therefore rejected, indicating that PjBL is a significant positive predictor of students' engagement in PE. Table 8 presents the HODs' accounts.

Table 8

Heads of Department's Perspectives on Project-Based Learning

Respondent	Illustrative statement	Theme
GBHS Atiela	"Students become more committed when they work together to organise sporting activities."	Teamwork and commitment
CAMSCI	"Projects encourage learners to share responsibilities and support one another."	Shared responsibility
GBHS Bayelle	"Students remain engaged for longer periods when completing practical projects."	Sustained engagement
St. Joseph Menteh	"Project activities help learners connect theory with practice in Physical Education."	Experiential learning

Note. Respondents are the HODs of the schools named. Source: Field interviews (2026).

The HODs linked PjBL mainly to the social and temporal aspects of engagement, namely commitment to a shared goal, mutual support and remaining engaged over a longer period. Moreover, the theme of connecting theory with practice suggests that projects give PE content a meaning that extends beyond the lesson itself.

Implementation Challenges

Across the interviews, HODs identified four barriers common to both innovations: limited instructional time on PE timetables; large classes that make group facilitation and monitoring difficult; wide variation in students' physical and cognitive abilities; and shortages of equipment, space and materials.

Discussion

This section interprets the findings in light of the theoretical framework and compares them with prior studies, beginning with each innovation in turn before turning to the barriers to adoption, the relative standing of the two innovations and the limitations of the study.

The finding that PBL significantly predicts engagement is consistent with constructivist expectations (Piaget, 1972; Vygotsky, 1978) and with the generative view that learners engage when they help to construct knowledge (Nsamenang & Tchombe, 2011). It likewise agrees with meta-analytic evidence that PBL produces positive outcomes, especially for skills and long-term learning (Strobel & van Barneveld, 2009; Walker & Leary, 2009). Furthermore, the HOD data suggest a possible mechanism, since HODs associated greater involvement with tactical and technical decisions, which is the "need to know" that Hmelo-Silver (2004) and Savery (2006) place at the heart of PBL. Two qualifications, nevertheless, are needed. First, the association is moderate, as PBL accounted for about one-fifth of the variance in engagement, leaving most of it to other factors such as students' prior attitudes, teacher enthusiasm and facilities. Second, the weakest student rating concerned the critical-thinking benefit, and teachers seldom design whole lessons around problems. This pattern fits the guidance debate (Hmelo-Silver et al., 2007; Kirschner et al., 2006): students appear to experience the behavioural and emotional aspects of PBL more readily than its cognitive benefits, which probably depend on structured scaffolding, such as well-designed problems, prompts and

debriefing, that teachers have not yet been trained to provide. PBL in Bamenda III thus appears to be at the early-adoption stage (Rogers, 2003), used in brief, embedded episodes rather than as a planned instructional model.

The PjBL results are consistent with the arguments of Thomas (2000) and Blumenfeld et al. (1991) that sustained, authentic and collaborative work supports engagement, and with Kokotsaki et al.'s (2016) account of PjBL's benefits for collaboration and responsibility. Similarly, the HODs' emphasis on commitment, mutual support and sustained participation corresponds closely to the relatedness and autonomy needs described by self-determination theory (Ryan & Deci, 2000), which suggests that PjBL may be associated with engagement partly because it meets psychological needs that drill-based PE leaves unmet. The finding has added significance in a region affected by prolonged conflict, where the crisis has disrupted schooling and displaced families (Bang & Balgah, 2022; Human Rights Watch, 2021), so rebuilding students' sense of belonging and purpose at school is itself an educational priority.

Taken together, the three data sources largely converge but also differ in instructive ways. For PBL, students valued problem-solving more than they encountered it (Table 1), teachers endorsed its benefits but seldom designed lessons around problems (Table 2), and HODs described brief tactical and movement problems embedded in ordinary lessons (Table 4), so all three sources point to an approach that is valued but only partly enacted. The sources diverge, however, on its cognitive benefit: teachers and HODs emphasised critical thinking (Table 2, item 2; Table 4), whereas students gave the critical thinking item their lowest rating *(M= 2.89)*. For PjBL, the sources converge more closely, since students rated projects favourable, teachers reported assigning them regularly and HODs described sustained, shared work, although students' lowest rating still concerned how often projects are assigned *(M=3.12)*.

The four barriers reported by HODs, namely limited time, large classes, mixed abilities and scarce resources, can be interpreted through diffusion theory as problems of compatibility and complexity, because the innovations are valued but the existing conditions of schooling make them costly to adopt (Rogers, 2003). These barriers closely resemble those reported by teachers implementing the CBA in the South West Region, namely inadequate training, overcrowded classes, scarce materials and insufficient time (Diffang, 2019), which suggests that they are systemic rather than specific to PE. Each barrier also points to a practical response. Limited time can be eased by protecting PE periods and allowing block periods for project work; large classes by structured group roles, peer leaders and station formats that allow one teacher to monitor several groups; mixed abilities by differentiated roles and tiered problem; and scarce resources by low-cost or improvised equipment, pooling of materials across schools and problems designed around the space available. Because these responses demand planning skills for which most teachers have not been trained, they need to be supported through in-service training, mentoring and peer observation, which would also increase the trialability and observability of the innovations (Rogers, 2003).

Comparing the two innovations, PjBL's coefficients were slightly larger than PBL's (r = .485 vs. .470; B = 0.426 vs. 0.389). This difference should not, however, be overstated, because the 95% confidence intervals for the two B values overlap substantially, the difference was not tested statistically, and the two predictors were analysed in separate

models, so their shared variance was not controlled. The defensible conclusion is therefore that the two innovations are associated with engagement to a similar degree. Where they differ is in adoption, since teachers reported using projects more readily than designing problem-centred lessons. From an innovation perspective, PjBL may currently be the more compatible option because it builds on familiar school sporting events, whereas PBL is the more complex option because it requires a redesign of lesson structure.

Limitations of the Study

Several limitations should be borne in mind when interpreting these findings. First, the design is correlational and cross-sectional, so the research results show statistical prediction and association rather than causal effects; students who are already more engaged may, for example, perceive or report more exposure to PBL and PjBL. Second, all quantitative data were self-reported, which exposes them to social desirability and common-method bias, and some exposure items, such as enjoyment of and motivation from problem-solving, are conceptually close to emotional engagement, which may have inflated the observed association. Third, the sample was drawn from only four schools and nine teachers in one municipality, which limits generalisation. Finally, each predictor was examined in a separate simple regression, so the unique contribution of each approach, controlling for the other, remains unknown. The future research recommended in the conclusion is intended to address these limitations.

Conclusion

This study examined PBL and PjBL as pedagogical innovations predicting students' engagement in PE in Bamenda III Municipality. Both approaches significantly and positively predicted engagement, each explaining just over one-fifth of its variance, with associations of similar size. Students and teachers endorsed both approaches, and HODs linked them to decision-making, critical thinking, teamwork, responsibility and sustained participation. However, the two innovations differ less in their association with engagement than in their adoption, because projects are already part of practice, whereas problem-centred lesson design is valued but rarely enacted, and both are constrained by time, class size, ability range and resources.

These findings carry implications for theory, practice and policy. Theoretically, they suggest that constructivist explanations of why learner-centred pedagogies engage students need to be complemented by diffusion theory, which explains why such pedagogies are or are not adopted. Practically, they indicate that engagement in PE tends to be higher where students report being given problems to solve and projects to own, although the cognitive benefits of PBL are likely to depend on deliberate scaffolding. At the policy level, the endorsement–practice gap shows that awareness alone is insufficient, and that PBL and PjBL can be presented as concrete ways of implementing the competency-based syllabi (Alemnge, 2021) and of delivering the quality, learner-centred PE that international guidelines call for (UNESCO, 2015), rather than as additional demands on teachers.

In light of these findings, PE teachers should move from occasional, embedded problem-solving to planned PBL units with explicit scaffolds such as guiding questions, prompts and structured debriefs, and they should continue to extend PjBL by giving students defined roles in organising tournaments, fitness campaigns and health events. Mixed-ability grouping with differentiated roles could, in addition, turn varying abilities from a barrier into a resource. To support this, teacher-training institutions and the Ministry of Secondary Education should provide practical pre-service and in-service training in designing PBL and PjBL for PE, preferably through demonstration lessons and mentoring rather than lectures. School administrators, for their part, should protect PE time, allow block periods for project work, pool equipment across schools and organise peer observation, which would increase the observability and trialability of the innovations. Curriculum planners should likewise include learner-centred practice in inspection and appraisal criteria and, in crisis-affected regions, integrate collaborative PE projects into wider efforts to re-engage students and support their psychosocial recovery. Lastly, researchers should test these relationships with quasi-experimental designs, multiple regression models that include both predictors, classroom observation and larger samples across regions. Although the present correlational evidence cannot show that these innovations cause higher engagement, moving PE in Cameroon from drills to inquiry ultimately depends on building the teacher capacity and school conditions that allow them to spread.

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Declaration of Conflict of Interest

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