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SCHOOLS' PHYSICAL ENVIRONMENT AND COMPETENCE OF SENIOR HIGH SCHOOL TEACHERS TOWARDS STUDENTS' LEARNING OUTCOMES IN PUBLIC SCHOOLS IN NORTH COTABATO, PHILIPPINES

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ABSTRACT

This study investigated the relationship between schools' physical environment and Senior High School (SHS) teacher competence in relation to student learning outcomes in public schools across North Cotabato, Philippines, during Academic Year 2023–2024. Using a descriptive-correlational design, 150 teachers were randomly selected from six SHS institutions. The physical environment was assessed in five dimensions: learning facilities, laboratories, sports facilities, health and care services, and equipment. Teacher competence was measured in terms of knowledge and skills, while student outcomes were determined through General Point Average (GPA). Results showed the physical environment was generally adequate, with laboratories and equipment rated Highly Adequate. Teachers demonstrated high competence, and students achieved a GPA of 89.66. Correlation analysis revealed significant positive relationships between all physical environment dimensions and teacher competence. Regression identified health and care services and equipment as predictors of knowledge competence, while learning facilities, sports, and health services predicted skills competence. No significant relationship was found with GPA.

KEYWORDS: *physical learning environment, teacher competence, learning outcomes, General Point Average, Senior High School, K–12 Philippines, school facilities, educational administration.*

1. INTRODUCTION

Education is universally recognized as a cornerstone of national development, equipping learners with the knowledge, skills, and values necessary for productive citizenship. The physical environment of schools—classrooms, laboratories, sports facilities, health services, and instructional equipment—provides the essential context for teaching and learning. Numerous studies affirm that adequate infrastructure enhances instructional delivery and student engagement, while deficiencies in facilities constrain both teacher performance and learner achievement (Bada, 2015; Cellini, Ferreira, & Rothstein, 2020). In the Philippine setting, the implementation of the K–12 reform in 2016 intensified the demand for specialized Senior High School (SHS) facilities, particularly for STEM, TVL, Sports, and Arts tracks (Asian Development Bank, 2019).

Despite the growing body of international literature linking school infrastructure to educational quality (Sirinides et al., 2017; Kellaghan et al., 2019; Baafi, 2020), empirical studies that simultaneously examine the physical environment, teacher competence, and student learning outcomes in the Philippine SHS context remain limited. Existing research often isolates either the condition of facilities or teacher competence, without integrating these dimensions to assess their combined influence on student achievement. This gap is particularly relevant in public schools in North Cotabato, where resource constraints and diverse community contexts pose challenges to sustaining quality education.

To address this gap, the present study investigates the relationship between schools' physical environment and Senior High School teacher competence, and their influence on student learning outcomes in public schools across North Cotabato during Academic Year 2023–2024. Specifically, the study evaluates the adequacy of learning facilities, laboratories, sports facilities, health and care services, and equipment; assesses teacher competence in terms of knowledge and skills; and examines student achievement through General Point Average (GPA). By employing a descriptive-correlational design, this research aims to provide empirical evidence on how school infrastructure and teacher competence interact, thereby informing educational administrators and policymakers in strengthening SHS implementation under the K–12 reform.

1.1 Research Questions

This study addressed the following research questions:

1. What is the condition of the schools' physical environment in terms of learning facilities, laboratories, sports facilities, health and care services, and equipment?

2. What is the level of teachers' competence in terms of knowledge and skills?
3. What is the level of students' learning outcomes in terms of General Point Average (GPA)?
4. Is there a significant relationship between the schools' physical environment and the competence of Senior High School teachers?
5. Is there a significant influence of the schools' physical environment on Senior High School teachers' competence?
6. Is there a significant relationship between the schools' physical environment and teachers' competence on students' learning outcomes (GPA)?
7. Is there a significant influence of teachers' competence on students' learning outcomes (GPA)?

2. METHODOLOGY

2.1 Research Design

This study employed a descriptive-correlational research design to examine the condition of the schools' physical environment, the level of teachers' competence, and students' learning outcomes, and to determine the relationships and predictive influences among these variables. This design is appropriate for research that seeks to describe the status of identified variables and to establish the nature and direction of associations between them without experimental manipulation (Creswell & Plano Clark, 2011).

2.2 Respondents and Sampling

The respondents were 150 Senior High School teachers from six public SHS schools in North Cotabato — Aleosan National High School, Pikit National High School, Kidapawan National High School, Magpet National High School, Kabacan National High School, and Matalam National High School — representing the 1st, 2nd, and 3rd Congressional Districts and Kidapawan City. Simple random sampling through lottery was applied to select 25 respondents per school from the total population of 205 SHS teachers. The sample size was validated using Slovin's formula at a 5% margin of error, yielding n = 150.

2.3 Research Instrument

A self-made survey questionnaire was developed, content-validated through expert review, and pilot-tested to establish reliability. Internal consistency was confirmed using Cronbach's alpha prior to full deployment. The instrument consisted of two main parts: Part I gathered data on the schools' physical environment using a five-point Likert adequacy scale (1 = Least Adequate to 5 = Highly Adequate), and Part II assessed teacher competence in knowledge

and skills using a five-point Likert competence scale (1 = Very Slightly Competent to 5 = Highly Competent). Students' GPA data were obtained through official school records.

2.4 Statistical Analysis

Weighted means and descriptive statistics were used to describe the condition of the physical environment, teacher competence levels, and student GPA. Pearson product-moment correlation (Pearson r) examined the significance of relationships between the schools' physical environment dimensions and teacher competence dimensions. Multiple linear regression analysis determined the predictive influence of physical environment dimensions on teacher competence. Spearman's rank-order correlation (ρ) tested relationships between physical environment and teacher competence variables with students' GPA. Statistical significance was set at $\alpha = .05$ throughout.

3. RESULTS AND DISCUSSION

3.1 Condition of the Schools' Physical Environment

Learning Facilities

Learning facilities were rated Adequate overall (M = 3.99). The highest-rated indicator was the adequacy of classrooms with proper ventilation and lighting (M = 4.20), confirming that basic classroom conditions are prioritized. The availability of 21st-century classrooms received the lowest rating (M = 3.83), indicating a gap in modern learning infrastructure. These findings are consistent with Houghton (2018), who demonstrated that well-maintained classrooms with appropriate physical conditions are essential for promoting student engagement and learning outcomes. The National Education Association (2020) further emphasizes that schools should ensure multiple identified alternative learning spaces to strengthen emergency preparedness.

Table 1: ***Condition of the Schools' Physical Environment in Terms of Learning Facilities.***

Indicators	Mean	Description
Enough classrooms with proper ventilation and lighting conducive for learning	4.20	Adequate
At least one identified alternative learning space in case of emergencies	3.84	Adequate
At least one 21st-century classroom	3.83	Adequate
Functional library accessible to at least 10% of the student population	4.09	Adequate
Weighted Mean	**3.99**	**Adequate**

Note. Scale: 1 = Least Adequate; 2 = Less Adequate; 3 = Moderately Adequate; 4 = Adequate; 5 = Highly Adequate.

Laboratory Facilities

Laboratory facilities were rated Highly Adequate (M = 4.27). ICT laboratories received the highest rating (M = 4.49), while speech laboratories received the lowest (M = 3.72). The strong provision of ICT and science laboratories supports Adeyemo's (2012) finding that ICT laboratory availability significantly improves students' performance in technology-related subjects, and Okebukola's (2000) emphasis on the critical role of science laboratories in developing practical skills. The adequate rating of speech laboratories points to an area warranting increased investment, particularly for tracks emphasizing communication competencies.

Table 2 ***Condition of the Schools' Physical Environment in Terms of Laboratory Facilities.***

Indicators	Mean	Description
At least one science laboratory	4.44	Highly Adequate
At least one Information and Communication Technology (ICT) laboratory	4.49	Highly Adequate
At least one speech laboratory	3.72	Adequate
Home Economics laboratory	4.42	Highly Adequate
Weighted Mean	**4.27**	**Highly Adequate**

Note. Scale: 1 = Least Adequate; 5 = Highly Adequate.

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Sports Facilities

Sports facilities were rated Adequate (M = 3.99). Basketball courts received the highest rating (M = 4.36, Highly Adequate), while athletics running tracks received the lowest (M = 3.68). The finding that basketball courts are the most adequately provisioned sports facility reflects the cultural centrality of basketball in Philippine school communities. These findings align with Kavussanu and Frawley (2013), who emphasized the importance of diverse and well-maintained sports facilities in promoting student physical activity, well-being, and holistic development.

Table 3 ***Condition of the Schools' Physical Environment in Terms of Sports Facilities.***

Indicators	Mean	Description
At least one basketball court	4.36	Highly Adequate
Athletics running tracks	3.68	Adequate
At least one volleyball court	3.99	Adequate
Sepak takraw court and other recreational facilities	3.92	Adequate
Weighted Mean	**3.99**	**Adequate**

Note. Scale: 1 = Least Adequate; 5 = Highly Adequate.

Health and Care Services

Health and care services were rated Adequate (M = 4.17). The school canteen (M = 4.38) and guidance and clinical services (M = 4.33) were rated Highly Adequate, while functional comfort rooms received the lowest rating (M = 3.89). These findings support Krewski et al.'s (2010) evidence that schools with better-equipped health and care facilities report higher student attendance rates and improved academic performance. The relatively lower rating for comfort rooms signals the need for targeted maintenance and sanitation improvements.

Table 4 ***Condition of the Schools' Physical Environment in Terms of Health and Care Services.***

Indicators	Mean	Description
Enough functional comfort rooms	3.89	Adequate
Canteen catering to the nutritional needs of learners	4.38	Highly Adequate
Potable drinking water/drinking station	4.08	Adequate
Guidance and clinical services	4.33	Highly Adequate
Weighted Mean	**4.17**	**Adequate**

Note. Scale: 1 = Least Adequate; 5 = Highly Adequate.

Equipment

Equipment was rated Highly Adequate overall (M = 4.25). Functional water dispensers (M = 4.40), laboratory apparatus (M = 4.37), and functional printers (M = 4.36) received the highest ratings. Audio-visual aids were the only indicator rated below Highly Adequate (M = 3.96, Adequate), pointing to a specific modernization gap in multimedia instructional resources. These findings align with Siraj-Blatchford et al.'s (2002) conclusion that well-equipped schools provide a richer and more comprehensive learning environment that positively supports both teaching and student development.

Table 5 ***Condition of the Schools' Physical Environment in Terms of Equipment.***

Indicators	Mean	Description
Educational software (e.g., Microsoft Office)	4.25	Highly Adequate
Books (e.g., textbooks and references)	4.15	Adequate
Manipulatives (e.g., microscopes)	4.17	Adequate
Audio-visual aids (traditional and digital)	3.96	Adequate
Bulletin board displaying learning materials	4.21	Highly Adequate
Recreation and sports equipment	4.29	Highly Adequate
Armchairs (40–45 units per classroom)	4.22	Highly Adequate
At least one functional water dispenser	4.40	Highly Adequate
At least 10–20 computer units in ICT laboratory	4.35	Highly Adequate
At least one functional printer per department/grade level	4.36	Highly Adequate
Necessary laboratory apparatus and supplies	4.37	Highly Adequate
Weighted Mean	**4.25**	**Highly Adequate**

Note. Scale: 1 = Least Adequate; 5 = Highly Adequate.

3.2 Level of Teachers' Competence

Knowledge

Teachers demonstrated High Competence in knowledge (M = 4.43, Highly Competent). The highest-rated indicator was giving value and respect to other opinions, ideas, and beliefs (M = 4.56), followed by respecting cultural differences and working effectively with diverse groups (M = 4.54). The lowest-rated item was selecting materials that reflect diverse learner backgrounds and needs (M = 4.34), which, while still Highly Competent, signals a relative area for professional development. These findings align with Lee and Bouffard (2015), who emphasized that teacher knowledge competence must extend beyond content mastery to include culturally responsive pedagogy and resourceful instructional design.

Table 6 ***Level of Teachers' Competence in Terms of Knowledge.***

Indicators	Mean	Description
Brainstorm and seek opportunities for learners to improve their ideas and reactions	4.44	Highly Competent
Manipulate models and simulations for learners to experiment and create new ideas	4.36	Highly Competent
Make graphic organizers to illustrate difficult topics	4.38	Highly Competent

Indicators	Mean	Description
Ensure comprehensive inquiry approaches including wonder and reflection are used	4.38	Highly Competent
Find and utilize databases, documentary films, and websites as information sources	4.42	Highly Competent
Give value and respect to other opinions, ideas, and beliefs	4.56	Highly Competent
Respect cultural differences and work effectively with diverse groups	4.54	Highly Competent
Manage and document conflicts that arise in the classroom	4.41	Highly Competent
Design learning activities reflecting different student backgrounds and needs	4.43	Highly Competent
Select materials reflecting diverse learner backgrounds and needs	4.34	Highly Competent
Weighted Mean	**4.43**	**Highly Competent**

Note. Scale: 1 = Very Slightly Competent; 2 = Slightly Competent; 3 = Moderately Competent; 4 = Competent; 5 = Highly Competent.

Skills

Teachers similarly demonstrated High Competence in skills (M = 4.52, Highly Competent), with the overall mean slightly higher than knowledge, indicating strong classroom practice. The highest-rated skill was providing initial and final overviews of the session and/or subject (M = 4.58), reflecting strong structural clarity in instruction. Allowing students to organize and distribute assignments received the lowest skills rating (M = 4.39), suggesting a relative opportunity to develop more student-directed learning approaches. These results align with Hattie and Timperley's (2007) emphasis that effective communication of learning objectives and logical content sequencing are among the highest-leverage teaching competencies.

Table 7 ***Level of Teachers' Competence in Terms of Skills.***

Indicators	Mean	Description
Present subject matter content tailored to students' knowledge	4.51	Highly Competent
Allow students to organize and distribute part of assignments	4.39	Highly Competent
Provide clear information on objectives, bibliography, and assessment methods	4.48	Highly Competent

Indicators	Mean	Description
Inform students of the competencies they will be expected to acquire	4.56	Highly Competent
Provide scientific information for deeper subject matter understanding	4.54	Highly Competent
Present content following a clear and logical framework	4.55	Highly Competent
Highlight the important aspects of the lesson	4.53	Highly Competent
Relate teachings to the professional environment	4.54	Highly Competent
Provide initial and final overviews of the session and/or subject	4.58	Highly Competent
Foster research and a critical spirit in students	4.49	Highly Competent
Weighted Mean	**4.52**	**Highly Competent**

Note. Scale: 1 = Very Slightly Competent; 5 = Highly Competent.

3.3 Students' Learning Outcomes (GPA)

The mean GPA of students across respondents' schools was 89.66, interpreted as Outstanding based on the study's GPA classification scale (90–100 = Excellent; 80–89 = Outstanding; 70–79 = Average; 60–69 = Needs Improvement). This strong academic performance reflects favorably on both the physical learning environment and the instructional capacity of teachers. However, caution is warranted in directly attributing GPA outcomes solely to these factors, as subsequent correlation and regression analyses revealed that neither physical environment dimensions nor teacher competence dimensions were significantly predictive of student GPA.

3.4 Relationship Between Physical Environment and Teacher Competence

Pearson r correlation analyses revealed significant positive relationships between all five physical environment dimensions and teacher competence in both knowledge and skills (Table 8). Equipment demonstrated the strongest correlations with both knowledge ($r = .47$, $p < .001$) and skills ($r = .45$, $p < .001$), followed by health and care services ($r = .42$, $p < .001$ for both). Learning facilities and laboratories also showed significant positive correlations with both competence dimensions. Sports facilities showed the weakest but still significant correlations. These findings confirm that schools with better-equipped, well-maintained

physical environments are associated with more competent teaching personnel, consistent with Doerfert's (2019) argument that access to high-quality environments enables and sustains higher instructional performance.

Table 8 ***Pearson r Correlation: Schools' Physical Environment and Teachers' Competence.***

Physical Environment	Knowledge r	p	Skills r	p	Sig.
Learning Facilities	.36**	.00	.41**	.00	**
Laboratory Facilities	.39**	.00	.38**	.00	**
Sports Facilities	.21**	.01	.17*	.03	*
Health and Care Services	.42**	.00	.42**	.00	**
Equipment	.47**	.00	.45**	.00	**

Note. ** Highly significant at the .01 level (2-tailed). * Significant at the .05 level (2-tailed). N = 150.

3.5 Influence of Physical Environment on Teacher Competence

Influence on Knowledge Competence

Multiple regression analysis for knowledge competence was statistically significant overall ($F = 11.94$, $p < .001$; $R^2 = .27$), indicating that the physical environment dimensions collectively explained 27% of the variance in teachers' knowledge competence. Among the individual predictors, health and care services ($B = .15$, $\beta =$ not reported, $p = .04$) and equipment ($B = .24$, $p = .02$) were the only significant predictors. Learning facilities, laboratory facilities, and sports facilities were not individually significant predictors of knowledge competence (all $p > .05$).

Table 9 ***Multiple Regression: Physical Environment Predicting Teachers' Knowledge Competence.***

Predictor	B	SE	β	t	p	Sig.
(Constant)	2.44	.27	—	9.21	<.001	—
Learning Facilities	0.08	.06	.10	1.33	.190	ns
Laboratory Facilities	0.09	.07	.11	1.27	.200	ns
Sports Facilities	−0.08	.05	−.10	−1.69	.090	ns
Health & Care Services	0.15	.07	.19	2.07	.040	*
Equipment	0.24	.10	.23	2.42	.020	*

Predictor	B	SE	β	t	p	Sig.
*R² = .27 | F = 11.94** | p = <.001*						

Note. R² = .27; F(5, 144) = 11.94, p < .001. * p < .05. ns = not significant.

Influence on Skills Competence

Multiple regression analysis for skills competence was also statistically significant (F = 13.27, p < .001; R² = .29), with the physical environment dimensions collectively explaining 29% of the variance in teachers' skills competence. Learning facilities (B = .16, p = .01) and health and care services (B = .17, p = .01) were significant positive predictors of skills competence. Sports facilities showed a significant negative influence (B = −.12, p = .01), potentially indicating that inadequate sports facilities redirect teacher attention or resources away from instructional skill development. Laboratory facilities and equipment were not individually significant predictors of skills competence (both p > .05).

Table 10 ***Multiple Regression: Physical Environment Predicting Teachers' Skills Competence.***

Predictor	B	SE	β	t	p	Sig.
(Constant)	2.59	.26	—	10.05	<.001	—
Learning Facilities	0.16	.06	.20	2.78	.010	**
Laboratory Facilities	0.10	.07	.12	1.53	.130	ns
Sports Facilities	−0.12	.05	−.14	−2.63	.010	**
Health & Care Services	0.17	.07	.21	2.48	.010	**
Equipment	0.15	.09	.14	1.53	.130	ns
*R² = .29 | F = 13.27** | p = <.001*						

Note. R² = .29; F(5, 144) = 13.27, p < .001. ** p < .01. ns = not significant.

3.6 Relationship and Influence of Physical Environment and Teacher Competence on Students' GPA

Spearman's rho analyses revealed no statistically significant relationships between any of the five physical environment dimensions and students' GPA, nor between either teacher competence dimension (knowledge or skills) and students' GPA. Physical environment Spearman ρ values ranged from −.07 to .11 (all p > .05). Teacher competence correlations with GPA were similarly non-significant (ρ = −.02 for knowledge, p = .79; ρ = .07 for skills,

p = .39). Regression models for GPA were non-significant in both cases (physical environment: $R^2 = .02$, $F = 0.82$, $p = .54$; teacher competence: $R^2 = .01$, $F = 1.09$, $p = .34$).

Table 11 ***Spearman's rho Correlation: Physical Environment and Teacher Competence with Students' GPA.***

Variable	GPA ρ (Physical Env.)	p	GPA ρ (Competence)	p	Sig.
Learning Facilities	.01	.90	—	—	ns
Laboratory Facilities	−.07	.36	—	—	ns
Sports Facilities	.11	.15	—	—	ns
Health and Care Services	−.02	.81	—	—	ns
Equipment	−.05	.49	—	—	ns
Knowledge Competence	—	—	−.02	.79	ns
Skills Competence	—	—	.07	.39	ns

Note. ns = not significant ($p > .05$). N = 150. GPA ρ (Physical Env.) = correlation of each physical environment dimension with GPA; GPA ρ (Competence) = correlation of each teacher competence dimension with GPA.

These findings suggest that while the schools' physical environment and teachers' competence are significantly interrelated, they do not individually or collectively serve as direct predictors of student GPA outcomes. This result is consistent with Hattie's (2009) synthesis, which positions student achievement as a product of multiple interacting influences — including learner characteristics, family engagement, instructional quality, socioeconomic context, and prior academic preparation — that extend well beyond the physical and competence dimensions captured in this study. The outstanding GPA (M = 89.66) achieved by students despite the gaps in infrastructure noted in some dimensions also suggests that teachers are effectively compensating for physical environment limitations through their instructional competence and professional commitment.

4. CONCLUSIONS

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

The schools' physical environment in public Senior High Schools in North Cotabato is generally adequate to highly adequate across all five assessed dimensions. Laboratory facilities and equipment achieve the highest ratings (Highly Adequate), while learning

facilities and sports facilities are rated Adequate, with 21st-century classrooms and speech laboratories consistently identified as areas requiring improvement.

Senior High School teachers demonstrate high to highly competent levels in both knowledge (M = 4.43) and skills (M = 4.52) competence, reflecting strong instructional preparation and professional capability. Students achieve outstanding academic performance (M GPA = 89.66), indicative of an effective teaching and learning process within the study context.

Significant positive relationships exist between all five physical environment dimensions and teacher competence in both knowledge and skills, confirming that better-equipped and well-maintained schools are associated with more competent teachers. Health and care services and equipment are the most influential predictors of knowledge competence, while learning facilities, health and care services, and sports facilities significantly predict skills competence.

Neither the schools' physical environment nor teachers' competence demonstrates a significant direct relationship with or predictive influence on students' GPA. This finding confirms that student learning outcomes are determined by a complex set of interacting factors beyond the physical and competence dimensions examined in this study, consistent with the multi-causal nature of academic achievement established in the broader literature.

5. RECOMMENDATIONS

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

1. School administrators and DepEd Division Offices should prioritize the upgrading and modernization of 21st-century classrooms, speech laboratories, and audio-visual resources, as these consistently received the lowest adequacy ratings across the physical environment assessment. Addressing these specific infrastructure gaps will better align schools' physical environments with the instructional demands of the SHS curriculum, particularly for STEM, ABM, HUMSS, and TVL tracks.
2. Division Superintendents and DepEd Regional Office XII should ensure that health and care services and equipment are adequately provisioned across all SHS schools, as these two dimensions demonstrated the strongest predictive relationships with teacher competence. Adequate sanitation facilities, clinical services, and complete instructional equipment directly support teachers' professional effectiveness and contribute to a safe, productive learning environment.

3. Teachers should develop and consistently apply instructional strategies that are not exclusively reliant on the adequacy of the physical environment, particularly those addressing diverse learner needs, readiness levels, and learning styles. Differentiated instruction, collaborative learning approaches, and technology-integrated pedagogy can maximize student outcomes even under resource-constrained conditions.
4. Future researchers are encouraged to investigate the additional variables that mediate or moderate the relationship between physical environment, teacher competence, and student GPA in the Philippine SHS context — including student motivation and self-efficacy, family engagement and socioeconomic status, instructional quality and alignment with competency standards, and school governance effectiveness — to develop a more comprehensive explanatory model of SHS student achievement.

DECLARATIONS

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Conflict of Interest

The authors declare no conflict of interest.

Ethical Considerations

All respondents participated voluntarily with informed consent. Data confidentiality and anonymity were maintained throughout data collection, analysis, and reporting in compliance with the Cotabato Foundation College of Science and Technology's research ethics protocols.

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