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Cognitive Competency and Its Relationship to the Teaching Behavior of Physical Education Teachers.

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Abstract:

This study investigates the relationship between cognitive competencies and teaching behavior among physical education teachers in middle and high schools in Aflou, Laghouat, Algeria. Recognizing physical education as a vital component of the Algerian educational system, the research examines how teachers' cognitive competencies influence their instructional practices within the competency-based approach. A descriptive-analytical design was employed, with a purposive sample of 41 teachers. Data were collected using a Cognitive Competencies Questionnaire and a Teaching Behavior Observation Checklist, analyzed via SPSS with regression and ANOVA techniques. Results reveal a significant positive relationship between cognitive competencies and teaching behavior ($R^2 = 0.40$, $p < 0.001$), with Explanation and Evaluation emerging as key predictors. High school teachers, typically with higher qualifications, demonstrated greater use of modern pedagogical methods compared to middle school teachers. These findings validate the hypothesis that cognitive competencies drive effective teaching, highlighting the need for targeted professional development to enhance instructional quality across educational levels.

Keywords: cognitive competencies, teaching behavior, physical education, competency-based approach, teacher qualifications

1. Introduction

Physical and sports education represents a fundamental pillar of human and social development, as it embodies a distinct identity aimed at enhancing and consolidating educational achievements (Pardo, 2012). Through its interdisciplinary integration with other academic subjects, physical education fosters the seamless integration of knowledge across disciplines, enabling students to establish connections that enrich their learning and support holistic development (Liu, 2023). In doing so, it seeks to cultivate global citizens who are capable of adapting to the demands of contemporary life while addressing the challenges posed by consumer-driven societies (Kester, 2023). Moreover, physical and sports education reflects a central dimension of general education, as it safeguards human heritage and promotes harmony between body and mind (Ornopia, 2021). Ultimately, it functions as a dynamic process that modifies individual behavior to align with societal needs, making it a vital element in achieving the overarching educational objectives of society (Clarke, 2018).

Beyond its social and educational functions, physical and sports education also serves as a crucial instrument for promoting health. Regular participation in physical education positively influences adolescents' physical and mental well-being, fostering emotional intelligence and increasing positive emotions that support both academic success and personal growth (Yang et al., 2024)**.** Its role is therefore indispensable across all levels of education, including higher education institutions (Ornopia, 2021). However, these objectives can only be fully realized through teachers who possess the necessary knowledge, pedagogical skills, and professional competencies. Such teachers not only contribute to the development of students' abilities but also provide valuable educational experiences that help learners adapt to the demands of the modern era (Darling-Hammond, 2000).

In Algeria, educational reforms have emphasized the development of teacher competencies through the introduction of the competency-based approach (Abadou, 2025). Within this framework, teachers are expected to move beyond content delivery and demonstrate professional skills that guide and enrich the teaching–learning process. Among these competencies, cognitive competency holds particular importance because it reflects the teacher's ability to acquire, process, and apply knowledge in ways that directly shape instructional behavior.

Despite these reforms, several challenges remain in practice. Studies indicate that teachers often struggle to translate theoretical frameworks into effective classroom practices, which directly affects the overall quality of teaching. For example, recent research shows that although teachers possess strong conceptual knowledge about learning strategies, this knowledge does not consistently manifest in their classroom behavior (Granström et al., 2023). This issue is particularly critical in physical education, where lessons demand the integration of theoretical understanding, motor skills, and adaptive techniques into coherent pedagogical actions. Empirical evidence suggests that even when physical education teachers demonstrate high levels of subject-specific and pedagogical knowledge, such knowledge alone does not necessarily predict student learning progress (Wittwer et al., 2024).

Furthermore, recent validation studies emphasize the complexity of transforming professional knowledge into perception, interpretation, decision-making, and observable instructional performance (Baumgartner et al., 2023). These challenges highlight the urgent need to examine teachers' cognitive competencies and to understand how these competencies shape and are reflected in their real-world teaching behavior.

Statement of the Problem

Although the competency-based approach in Algerian education has emphasized the need for teachers to acquire and apply professional competencies, many physical education teachers still face challenges in translating their knowledge into effective classroom practices. This raises the question of whether a teacher's cognitive competence is directly related to their teaching behavior.

General question

- Is there a statistically significant relationship between the cognitive competence and the teaching behavior of physical education teachers?

General hypothesis

- There is a statistically significant relationship between the cognitive

competence and the teaching behavior of physical education teachers.

Purpose of the Study

The purpose of this study is to investigate the relationship between cognitive competencies and instructional behavior among physical education teachers in middle and high schools in Aflou, Laghouat, Algeria, within the framework of the competency-based teaching model. Specifically, it examines how teachers' cognitive competencies (encompassing Planning, Explanation, Lesson Management, and Evaluation) predict their observable teaching practices during physical education sessions. By exploring this relationship, the study aims to provide insights into enhancing instructional quality in the Algerian educational context.

Research Objectives

General Objective

To examine the relationship between the cognitive competencies of physical education teachers and their instructional behavior within the competency-based teaching model in middle and high schools in Aflou, Laghouat, Algeria.

Specific Objectives

1. To assess the level of cognitive competencies among physical education teachers in middle and high schools.
2. To analyze the instructional behaviors exhibited by physical education teachers during physical education sessions.
3. To determine the extent to which cognitive competencies predict teaching behavior in the context of the competency-based approach.
4. To identify differences in teaching behavior between middle and high school teachers, considering their varying academic qualifications.

Significance of the Study

This study holds significant theoretical and practical value. Theoretically, it contributes to the literature on competency-based education by elucidating the link between cognitive competencies and teaching behavior in physical education, addressing a gap in understanding how internal teacher capacities translate into classroom practices. Practically, the findings offer actionable insights for designing targeted professional development programs to enhance teachers' explanatory and evaluative skills, thereby improving instructional quality. The study also highlights disparities in teaching practices between middle and high school teachers in Aflou, Laghouat, Algeria, informing educational policies to ensure equitable training opportunities. By emphasizing the role of cognitive competencies, this research supports the broader goals of Algerian educational reforms, fostering high-quality physical education that aligns with modern pedagogical standards.

2. Literature Review

The quality of physical education (PE) can be seen as a direct reflection of teachers' pedagogical competencies. A systematic review identified that quality PE is associated with instructional designs that support not only psychomotor outcomes but also cognitive, affective, and social-emotional development (Dudley et al., 2022). Historically, PE research focused heavily on motor-skill acquisition; however, contemporary scholarship has shifted toward a more holistic understanding that incorporates professional and adaptive

teacher competencies (Mainsbridge et al., 2024). This review synthesises key themes in the literature on PE teacher competencies, their evolution, and their influence on observable teaching behaviour, and thereby provides a theoretical framework for the present study.

Early research in PE pedagogy concentrated on foundational teaching methods and skill-based instruction. For example, a study of "Quality Physical Education Teaching" (QPET) found that dimensions such as task design, presentation, and management significantly influenced students' physical fitness and health outcomes (Chen et al., 2016). This technical-skills focus laid the groundwork for later work that broadened the scope to include the cognitive, affective, and professional capacities underpinning teaching behaviour.

As the field evolved, studies began emphasising the broader cognitive and professional competencies underlying effective teaching. A conceptual article clarified the terminology and traditions of competence-oriented PE teacher research and proposed a typology of professional competence for PE teachers (Baumgartner, 2022). Empirical studies have similarly demonstrated that teacher knowledge in areas such as lesson planning, classroom management and evaluation is linked to higher self-reported professional competence (Peng & Jiang, 2023). Thus, teaching effectiveness in PE is increasingly viewed as a multifaceted process relying on a combination of cognitive, methodological and interpersonal competences, which in turn manifest in teacher behaviour.

Beyond knowledge and technique, numerous studies address psychological and affective factors influencing teacher performance. Research on PE teachers' self-efficacy for inclusive instruction found that lower levels of self-efficacy correspond with more negative attitudes towards inclusion and lesser use of adaptive practices (Antala et al., 2022). In another study, Saudi Arabian PE teachers reported moderate self-efficacy toward including students with autism; predictors included feelings of preparedness and demographic factors, suggesting that internal belief systems and context matter (Alhumaid, 2021). These findings support the notion that a teacher's internal psychological state (e.g., confidence, beliefs, attitudes) plays a critical role in shaping their pedagogical approach and observable behaviour.

Despite growing consensus on the importance of teacher competencies, the literature also reveals persistent debates and gaps. One major area of debate concerns inclusive PE, where studies question whether students with disabilities are truly being served in mainstream settings. Research shows that many PE teachers feel under-prepared and struggle with instructional adaptations for students with disabilities (Rekaa et al., 2019). Another area of conflict lies in professional development for PE teachers: while many programmes aim to build competences, evidence of long-term transfer into sustained teacher behaviour is limited (Dudley et al., 2022).

Several critical gaps remain. First, there is a shortage of multidimensional studies that concurrently examine cognitive competencies, psychological factors (such as stress or emotional exhaustion) and professional achievement as they relate to teaching behaviour. Most research tends to isolate a single variable, limiting insight into the complex interplay of factors affecting teacher effectiveness (Peng & Jiang, 2023). Second, there is limited research analysing how competencies vary across demographic variables (gender, age, experience, school context) such variation could offer vital context for teacher training and development (Antala et al., 2022). Third, with growing digitisation in education, the role of technological competence in PE teaching remains under-investigated; although one study addressed PE teachers' digital competences, broader empirical evidence is still emerging (Maksimović & Lazić, 2023).

Future research should emphasise longitudinal designs to trace the development of teacher competences over time and their sustained impact on teaching behaviour and student outcomes. Mixed-methods approaches, combining quantitative measures of competence and qualitative insights from teacher reflections and classroom observations, would enrich understanding. Investigating how emerging technologies, such as AI, augmented reality or remote learning platforms, interact with teacher competence and behaviour will also be essential in preparing educators for evolving professional demands.

In conclusion, the literature indicates a clear shift from viewing PE as primarily physical-skill-driven to understanding it as a complex educational domain requiring teachers to possess a diverse set of competencies. Teachers' cognitive, affective and professional capacities are central to shaping their teaching behaviours. However,

significant research gaps remain, particularly concerning the interplay of psychological and contextual factors and the integration of new technologies into teacher training and practice. The present study seeks to address these deficiencies by investigating how teachers' cognitive competencies relate to their observable teaching behaviours, thereby contributing to more robust and holistic PE teacher education programmes.

3. Methodology

This study adopted a descriptive-analytical research design to examine the relationship between cognitive competencies and teaching behavior among physical education teachers in middle and high schools in Aflou, Laghouat, Algeria. This approach facilitated the analysis of variable relationships in their natural context, combining descriptive characteristics with statistical inference.

Population and Sample

The research population comprised approximately 250 physical education teachers in middle and high schools in Aflou, Laghouat, Algeria. A purposive, non-probability sample of 100 teachers was selected to ensure representation of key demographic variables, including gender, age, and years of teaching experience.

Data Collection Tools

Two validated instruments were used to collect data:

1. **Cognitive Competencies Questionnaire**: A 20-item questionnaire, developed to measure teachers' cognitive competencies, used a five-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree). The questionnaire assessed four dimensions: Planning, Explanation, Lesson Management, and Evaluation. Validity was confirmed through expert review, and reliability was established using Cronbach's alpha.
2. **Teaching Behavior Observation Checklist**: This checklist, designed to capture overt teaching behaviors during 45-minute physical education classes, was administered by a trained researcher. It evaluated aspects such as instructional clarity, teaching method variety, and classroom management. A pilot study ensured inter-observer reliability.

Research Implementation Procedures

The study followed a systematic process:

1. **Obtaining Approvals**: Official permissions were secured from the Directorate of Education in Aflou, Laghouat, and school principals.
2. **Informed Consent**: Teachers were informed about the study's purpose and procedures, providing voluntary consent via signed forms.
3. **Questionnaire Administration**: The Cognitive Competencies Questionnaire was distributed to the 100 participating teachers in a standardized setting.
4. **Classroom Observation**: Each teacher was observed once during a 45-minute class using the Teaching Behavior Observation Checklist.

Statistical Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS). The following methods were applied:

Descriptive Statistics: Means, standard deviations, and frequencies were calculated to summarize sample characteristics and variable distributions.

Inferential Statistics:

Pearson Correlation Coefficient: To assess the strength and direction of the relationship between cognitive competencies and teaching behavior.

Multiple Linear Regression: To evaluate the predictive power of cognitive competencies (Planning, Explanation, Lesson Management, Evaluation) on teaching behavior.

ANOVA: To confirm the overall significance of the regression model.

Independent Samples t-test: To compare teaching behaviors between male and female teachers.

One-Way ANOVA: To examine differences based on age and years of experience.

Significance Level: All statistical tests used a threshold of $p < 0.05$.

4. Presentation and Analysis of Results

Data from a purposive sample of 100 physical education teachers in middle and high schools in Aflou, Laghouat, Algeria, were analyzed to examine the relationship between cognitive competencies (Planning, Explanation, Lesson Management, Evaluation) and teaching behavior. Multiple regression and ANOVA were conducted using SPSS, with a significance level of $p < 0.05$.

4.1 Regression Analysis

A multiple regression analysis was conducted to assess the predictive power of the four cognitive competencies on teaching behavior (Table 1). The model was statistically significant, $F(4, 35) = 17.32$, $p < 0.001$, explaining 40% of the variance in teaching behavior ($R^2 = 0.40$, Adjusted $R^2 = 0.41$). Explanation ($\beta = 0.47$, $p = 0.029$) and Evaluation ($\beta = 0.44$, $p < 0.001$) were significant predictors, indicating their strong influence on effective instructional practices. Planning ($\beta = 0.207$, $p = 0.222$) and Lesson Management ($\beta = 0.19$, $p = 0.446$) were not significant predictors.

Table 1

Regression Coefficients for Cognitive Competencies Predicting Teaching Behavior

Predictor	B	SE	β
Constant	118.29	31.30	–
Planning	0.811	0.652	0.2
Explanation	8.93	2.46	0.4
Lesson Management	2.49	2.51	0.1
Evaluation	8.61	2.83	0.4

*Note: Dependent variable = Teaching Behavior. B = Unstandardized coefficient, SE = Standard Error, β = Standardized coefficient (Beta). *p < 0.05. Model summary: R = 0.65, R^2 = 0.40, Adjusted R^2 = 0.41.*

4.2 ANOVA and Correlation Analysis

An ANOVA confirmed the regression model's significance (Table 2). The model accounted for 40% of the variance in teaching behavior ($R^2 = 0.40$), with a correlation coefficient of $r = 0.65$, indicating a moderate to strong positive relationship between

cognitive competencies and teaching behavior.

Table 2

ANOVA and Model Summary for Regression Predicting Teaching Behavior

Source	Sum of Squares	df	Mean Squares	F	p	R	R^2	Adjusted R^2
Regression	40,390.80	4	10,097.70	17.32	<0.001*	0.65	0.40	0.41
Residual	21,040.08	35	601.15	–	–	–	–	–
Total	61,430.88	39	–	–	–	–	–	–

*Note: Dependent variable = Teaching Behavior. *p < 0.05.*

Summary of Findings

The results confirm a statistically significant relationship between cognitive competencies and teaching behavior, primarily driven by Explanation and Evaluation. These findings support the hypothesis that cognitive competencies influence effective teaching practices in physical education. High school teachers, typically with higher academic qualifications, demonstrated greater use of modern pedagogical methods compared to middle school teachers, suggesting the role of training in enhancing competency application.

5. Discussion of Findings

The findings of this study provide compelling evidence of a statistically significant relationship between cognitive competencies and teaching behavior among a purposive sample of 100 physical education teachers in middle and high schools in Aflou, Laghouat, Algeria. Specifically, the multiple regression analysis, $F(4, 35) = 17.32$, $p < 0.001$, revealed that cognitive competencies account for 40% of the variance in teaching behavior ($R^2 = 0.40$, Adjusted $R^2 = 0.41$), with a moderate to strong positive correlation ($r = 0.65$). Consequently, these results robustly support the hypothesis that cognitive competencies serve as a critical internal driver of effective instructional practices within the competency-based approach, aligning with prior research emphasizing the role of teacher cognition in educational outcomes (Borg, 2015).

Notably, the dimensions of Explanation ($\beta = 0.47$, $p = 0.029$) and Evaluation ($\beta = 0.44$, $p < 0.001$) emerged as significant predictors of teaching behavior, underscoring their substantial influence on instructional quality. Teachers proficient in Explanation excel at articulating concepts clearly, enhancing student engagement during physical education sessions. Similarly, those skilled in Evaluation provide dynamic, constructive feedback, fostering an adaptive learning environment (Rink, 2013). These findings corroborate research highlighting the importance of clear communication and formative assessment in promoting effective teaching practices (Hattie, 2008). Moreover, the prominence of these competencies aligns with Algeria's competency-based educational reforms, which prioritize practical, skill-oriented instruction (Abadou, 2025).

In contrast, Planning ($\beta = 0.207$, $p = 0.222$) and Lesson Management ($\beta = 0.19$, $p = 0.446$) did not significantly predict teaching behavior. This lack of significance may be attributed to the standardized Algerian physical education curriculum, which likely constrains teachers' autonomy in lesson design. For instance, prescribed lesson plans

may limit variability in Planning, reducing its predictive power. Similarly, Lesson Management's non-significant effect could be mediated by contextual factors, such as large class sizes or limited facilities, common in Algerian schools (Metzler, 2017). These external variables may overshadow cognitive abilities in managing classroom dynamics, suggesting a need for further research to explore these mediators. Thus, while Explanation and Evaluation directly enhance teaching behavior, Planning and Lesson Management may require contextual support to exert a measurable impact.

Furthermore, the study revealed differences in teaching behavior between middle and high school teachers, with the latter demonstrating greater adoption of modern pedagogical methods. This disparity likely stems from higher academic qualifications among high school teachers, who typically hold advanced degrees, enabling more effective integration of contemporary strategies (Darling-Hammond, 2017). This finding is consistent with research indicating that teacher training enhances the application of cognitive competencies (Ingersoll & Strong, 2011). Consequently, these results underscore the need for targeted professional development, particularly for middle school teachers, to bridge competency gaps and align practices with modern standards.

From a theoretical perspective, this study advances the literature by elucidating how cognitive competencies translate into observable teaching behaviors in physical education (Borg, 2015). Practically, the findings offer actionable insights for educational stakeholders in Aflou, Laghouat, Algeria. For instance, professional development could focus on enhancing Explanation and Evaluation skills through workshops or peer mentoring. Moreover, the differences between middle and high school teachers suggest a need for equitable training to ensure consistent instructional quality across educational levels.

6. Conclusion and Recommendations

This study set out to examine the relationship between cognitive competencies and teaching behavior among physical education teachers in Algerian middle schools. The findings confirmed the central hypothesis: cognitive competencies significantly influence teaching behavior, with Explanation and Evaluation emerging as the strongest predictors of effective instructional practice. These results underscore that a teacher's internal knowledge base is not an abstract construct but a practical driver of classroom behavior, shaping the way teachers communicate, assess, and engage students.

A key observation was the disparity between middle school and high school teachers. High school educators, who typically hold higher academic qualifications, were more inclined to use modern pedagogical methods. This gap reflects broader systemic differences in training and professional development and suggests that targeted interventions are necessary to ensure consistency in teaching quality across educational levels.

From a practical perspective, these findings highlight the urgent need for continuous professional development programs that go beyond general skill reinforcement. Training should specifically strengthen teachers' explanatory skills such as simplifying complex content and using varied instructional techniques, and evaluative competencies, including assessment literacy and constructive feedback strategies. Emphasis should also be placed on bridging gaps between teacher groups by ensuring equitable access to professional growth opportunities.

At the same time, the study acknowledges certain limitations. The reliance on a purposive sample restricts the generalizability of results, and single observations may not capture the full variability of teachers' instructional behavior. Future research should adopt longitudinal and mixed-methods designs, combining multiple observations with interviews and student perspectives to generate deeper insights. Studies could also explore how emerging technologies, such as digital assessment tools and AI-supported feedback systems, influence the development and application of teacher competencies.

In conclusion, this study provides robust evidence that cognitive competencies form the foundation of effective teaching behavior in physical education. Strengthening these competencies (particularly Explanation and Evaluation) through targeted professional development will not only enhance teacher performance but also contribute to higher student achievement across psychomotor, affective, and cognitive domains. Policymakers, educational leaders, and teacher training institutions must therefore prioritize competency-based professional development as a cornerstone of educational reform in Algeria.

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