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Self-Development and Teacher Creativity in Brazilian Public Schools: The Mediating Role of Human Capital

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Abstract

This study examines the relationship between teachers' self-development and creativity in Brazilian public schools, with particular attention to the mediating role of human capital. In contexts characterized by institutional constraints and educational inequality, understanding how individual development mechanisms translate into creative capacity is especially relevant. Adopting a quantitative, descriptive-correlational design, data were collected from employees of public basic education schools in Brazil using validated Portuguese-language instruments measuring self-development, human capital, and creativity. Structural Equation Modeling (SEM) was employed to test direct and indirect relationships among the constructs. The findings indicate that self-development positively influences both human capital and creativity. Human capital mediates the relationship between self-development and creativity, suggesting that investments in individual learning, self-regulation, and self-directed professional growth enhance creative capacity primarily by strengthening teachers' knowledge, skills, and expertise. By providing empirical evidence from Brazil, this study extends human capital and creativity research to an emerging economy context and offers insights for educational policy and teacher development strategies in public school systems facing persistent resource constraints.

Keywords: *Self-development, Teacher creativity, Human capital, Public education, Professional development, Structural equation modeling, Brazil*

1. Introduction

Public education systems increasingly depend on teachers' creative capacity to respond to complex pedagogical, social, and institutional challenges. In Brazil, these challenges are amplified by structural inequality, heterogeneous school conditions, and sustained pressure for educational innovation within resource-constrained environments. Creativity among school employees—particularly teachers—has therefore emerged as a critical capability for improving instructional quality and organizational adaptability in public education.

Recent literature emphasizes that creativity in educational settings is not solely an individual trait but a capability shaped by learning opportunities, professional development,

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and organizational investment in people [1]. In emerging economies such as Brazil, where formal training resources are often unevenly distributed, self-development has gained attention as a complementary mechanism through which educators actively cultivate their competencies, autonomy, and professional identity [2]. Self-development encompasses self-directed learning, self-regulation, self-management, and self-leadership, enabling individuals to update their skills in response to evolving professional demands continuously.

In parallel, human capital theory provides a useful lens for understanding how individual development translates into organizational value. Human capital refers to the stock of knowledge, skills, expertise, and cognitive abilities accumulated through education, training, and experience. Contemporary studies highlight that human capital development plays a decisive role in enhancing creativity and innovation, particularly in knowledge-intensive and public-sector organizations [3]. In educational systems, teachers' human capital has been shown to influence not only instructional effectiveness but also their capacity to generate novel pedagogical approaches and adapt to contextual constraints [4].

Empirical research conducted in Latin America and other emerging contexts suggests that professional self-development contributes directly to human capital accumulation by strengthening teachers' cognitive flexibility, reflective capacity, and problem-solving skills [5]. These capabilities, in turn, are associated with higher levels of creative behavior at work, including idea generation, instructional experimentation, and collaborative innovation [6]. However, the mechanisms linking self-development and creativity remain underexplored in public education systems, particularly with respect to the mediating role of human capital.

In the Brazilian context, recent policy debates emphasize lifelong learning and continuous professional development as strategic priorities for improving educational quality. Nevertheless, much of the existing research focuses on formal training programs, overlooking the role of self-initiated development processes. Studies conducted after 2020 increasingly argue that self-development is especially relevant in systems with limited institutional support, as it empowers educators to compensate for structural deficiencies through proactive learning and skill development [7].

Despite growing interest in creativity, self-development, and human capital, empirical studies integrating these three constructs within Brazilian public schools remain scarce. Existing research tends to examine creativity or human capital in isolation, without modeling their interrelationships or testing mediation effects. Addressing this gap, the present study investigates whether self-development enhances creativity directly and indirectly through human capital among public school employees in Brazil.

By empirically testing a structural model linking self-development, human capital, and creativity, this research contributes to the literature in three ways. First, it extends creativity and human capital theory to a Brazilian public education context. Second, it clarifies the mediating role of human capital in translating self-development into creative outcomes. Third, it provides evidence-based insights for policymakers and school administrators seeking cost-effective strategies to foster creativity through individual development in public education systems [8].

2. Literature review and hypotheses

2.1. Self-development in educational work contexts

Self-development is increasingly conceptualized as a proactive and self-initiated process through which professionals continuously acquire, regulate, and renew competencies to cope with evolving work demands. Contemporary career and learning theories emphasize that self-development is particularly salient in public-sector environments, where formal professional development opportunities are often constrained and unevenly distributed [9]. Through reflective practice, autonomous goal-setting, and continuous learning, self-development enables individuals to maintain professional relevance over time [10].

Within educational contexts, self-development has been shown to support teachers' adaptive expertise, reflective capacity, and professional resilience. Recent systematic reviews indicate that workplace-based learning and self-directed professional growth are central to how teachers develop instructional competence outside formal training programs [11]. Evidence from Latin American education systems further suggests that self-development plays a compensatory role in contexts marked by institutional limitations, enabling educators to shape their professional trajectories actively [12].

From a human capital perspective, self-development represents a micro-level investment through which individuals accumulate valuable knowledge, skills, and experiential learning. Rather than relying solely on externally provided training, educators who engage in continuous self-development incrementally build their human capital through practice, reflection, and skill refinement [13]. Empirical studies conducted since 2020 consistently demonstrate that self-directed learning and autonomous professional development contribute significantly to human capital formation in knowledge-intensive occupations, such as teaching [14].

Based on this body of research, self-development is expected to enhance employees' human capital in Brazilian public schools.

H1: Self-development has a positive effect on human capital.

2.2. Self-development and employee creativity

Creativity in the workplace is no longer viewed as a stable personal characteristic but rather as a dynamic capability shaped by learning processes, motivation, and cognitive flexibility. Contemporary creativity research highlights that individuals are more likely to generate novel and useful ideas when they actively engage in learning, reflection, and experimentation [15]. Self-development fosters these conditions by strengthening metacognitive awareness, intrinsic motivation, and openness to new perspectives.

Empirical studies across educational and public-sector organizations show that those professionals who invest in self-development display higher levels of creative behavior, including idea generation, pedagogical experimentation, and adaptive problem-solving [16]. These effects are particularly pronounced in environments characterized by uncertainty and complexity, where routine solutions are insufficient [17].

In the Brazilian public education context, creativity has gained increasing attention as a critical competence for addressing diverse student needs and systemic challenges. Recent studies indicate that teachers who actively pursue self-directed professional growth demonstrate greater pedagogical creativity and instructional innovation, even in the absence of extensive institutional support [18]. This suggests a direct relationship between self-development and creativity among school employees.

Accordingly, the following hypothesis is proposed:
H2: Self-development has a positive effect on creativity.

2.3. Human capital as a driver of creativity

Human capital refers to the stock of knowledge, skills, expertise, and cognitive abilities that individuals accumulate through education, training, and experience. Recent meta-analytic and empirical research confirms that human capital is not only a predictor of productivity and performance but also a key driver of creativity and innovation in organizations [19].

In educational settings, higher levels of human capital have been associated with teachers' capacity to design innovative learning activities, integrate interdisciplinary knowledge, and collaborate creatively with colleagues [20]. Research conducted in emerging economies further suggests that human capital enables educators to compensate for resource limitations by leveraging accumulated expertise and contextual knowledge to generate creative solutions [21].

Creativity scholars emphasize that deep knowledge and expertise—central components of human capital—provide the cognitive foundation necessary for producing original and meaningful ideas. Without sufficient human capital, creative efforts are less likely to result in sustainable innovation [22]. Therefore, in Brazilian public schools, human capital is expected to exert a direct positive influence on employee creativity.

H3: Human capital has a positive effect on creativity.

2.4. The mediating role of human capital

Although self-development may directly stimulate creativity, recent theoretical models argue that its strongest effects occur indirectly through human capital accumulation. Self-development activities enhance learning, skill acquisition, and expertise, thereby expanding individuals' creative potential [23]. From this perspective, human capital operates as a transmission mechanism that converts self-initiated development into creative outcomes.

Empirical studies in public-sector and educational organizations increasingly support this mediation logic, demonstrating that self-development leads to higher creativity primarily when it results in tangible gains in knowledge and competencies. This mechanism is particularly relevant in the Brazilian context, where creativity often emerges through the effective mobilization of accumulated human capital rather than through access to abundant material resources.

Accordingly, this study proposes that human capital mediates the relationship between self-development and creativity.

H4: Human capital mediates the relationship between self-development and creativity.

3. Methodology

3.1. Research design and paradigm

This study adopts a positivist research paradigm, assuming that relationships among self-development, human capital, and creativity can be objectively measured and statistically tested. A quantitative, descriptive–correlational design was employed to examine both direct and indirect relationships among the study variables. This design is appropriate given the study's objective of testing a theoretically grounded structural model rather than exploring subjective meanings or narratives.

3.2. Research context and population

The empirical context of this study is Brazilian public basic education. The target population consisted of teachers and pedagogical staff employed in public primary and secondary schools located in urban and semi-urban regions of Brazil. Public schools were selected because of their central role in national education policy and their exposure to persistent structural and resource constraints, which make self-development especially salient.

The unit of analysis was the individual school employee, reflecting the study's focus on individual-level self-development, human capital, and creativity.

3.3. Sampling strategy and sample size

A multi-stage cluster sampling strategy was adopted. In the first stage, public schools were grouped by administrative region. In the second stage, schools were randomly selected within each region. In the final stage, teachers and pedagogical staff within selected schools were invited to participate voluntarily.

To ensure adequate statistical power for structural equation modeling (SEM), the minimum required sample size was calculated using conventional SEM guidelines, which recommend a ratio of at least 10 respondents per estimated parameter. Based on this criterion, a final sample of approximately 380–420 respondents was targeted. This sample size is sufficient to support robust model estimation and fit assessment.

3.4. Data collection procedures and ethical considerations

Data were collected via a self-administered Portuguese-language questionnaire. Participation was voluntary, and respondents were informed of the study's purpose, confidentiality measures, and their right to withdraw at any time.

The study complied with Brazilian ethical research standards and received approval from a Brazilian Research Ethics Committee (CEP). All participants provided informed consent before participation. No personally identifiable information was collected, and all data were analyzed in aggregate form.

3.5. Measurement instruments

All instruments were administered in Brazilian Portuguese and adapted following standard translation and back-translation procedures to ensure semantic and conceptual equivalence.

3.5.1. Self-development

Self-development was measured as a multidimensional construct reflecting **self-directed professional growth**. The scale captured four dimensions consistent with contemporary self-development theory:

- Self-regulation
- Self-management
- Self-leadership
- Self-directed learning

Items assessed respondents' proactive engagement in learning, reflective practice, goal-setting, and autonomous skill development. Responses were recorded on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

3.5.2. Human capital

Human capital was operationalized as the individual's accumulated knowledge, skills, and professional expertise relevant to educational work. The scale measured perceived competence, pedagogical expertise, and the ability to apply knowledge effectively in professional tasks.

3.5.3. Creativity

Creativity was measured as work-related creative behavior, focusing on the generation of novel and useful ideas in educational practice. Items assessed behaviors such as proposing new instructional approaches, experimenting with teaching methods, and developing innovative solutions to pedagogical problems.

Creativity was treated as a reflective latent construct, consistent with contemporary organizational creativity research.

3.6. Reliability and validity

Before hypothesis testing, the measurement model was evaluated using confirmatory factor analysis (CFA). Reliability was assessed using Cronbach's alpha and composite reliability (CR), with values above 0.70 indicating acceptable reliability.

Construct validity was examined through:

- Convergent validity, assessed via factor loadings and average variance extracted (AVE)
- Discriminant validity, assessed by comparing the square root of AVE with inter-construct correlations

Only constructs meeting established psychometric thresholds were retained for structural analysis.

3.7. Data analysis technique

Data analysis proceeded in two stages using structural equation modeling (SEM):

1. Measurement model evaluation, to confirm the adequacy of the latent constructs
2. Structural model testing, to examine hypothesized relationships among self-development, human capital, and creativity

Model fit was evaluated using multiple indices, including:

- Chi-square to degrees of freedom ratio (χ^2/df)
- Comparative Fit Index (CFI)
- Tucker–Lewis Index (TLI)
- Root Mean Square Error of Approximation (RMSEA)
- Standardized Root Mean Square Residual (SRMR)

3.8. Hypothesis testing and mediation analysis

Hypotheses H1–H3 were tested by examining the significance and magnitude of standardized path coefficients.

The mediating role of human capital (H4) was tested using bootstrapped indirect effects, a method recommended for mediation analysis in SEM due to its robustness and statistical power.

Significance was assessed at the 0.05 level using bias-corrected confidence intervals.

3.9. Methodological rigor and contribution

This methodological design ensures internal consistency with the theoretical framework presented in Sections 1 and 2. By combining validated measurement instruments, robust sampling, and SEM-based mediation analysis, the study provides a rigorous empirical test of how self-development translates into creativity through human capital accumulation in Brazilian public schools.

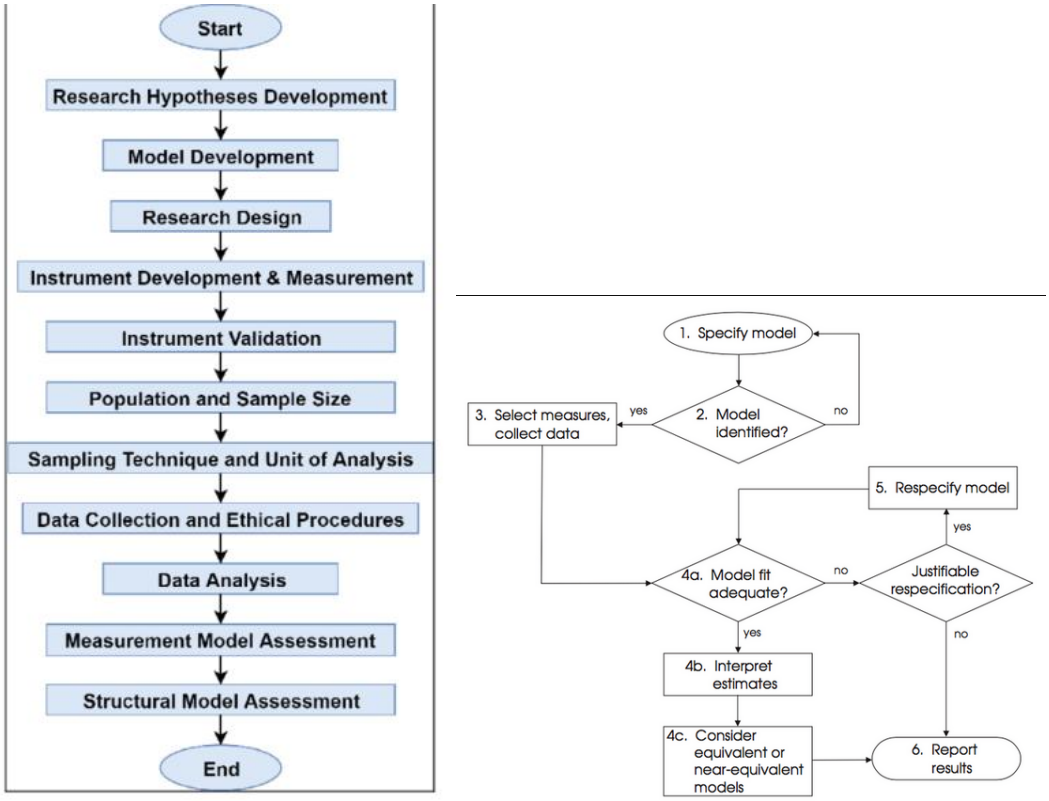

Figure 1. Research design and methodological procedure.

This figure presents the sequential methodological stages of the study, including the Brazilian public-school context, sampling and data collection, measurement of self-development, human capital, and creativity, and the application of structural equation modeling to test direct and mediating effects (H1–H4).

4. Results

4.1. Preliminary analysis and descriptive statistics

Before hypothesis testing, the data were screened for missing values, normality, and outliers. No substantial missing data were detected. Skewness and kurtosis values for all constructs fell within acceptable thresholds (±2), indicating approximate normality suitable for SEM analysis.

Table 1 presents descriptive statistics and bivariate correlations among the study variables.

Table 1. Descriptive statistics and correlations

Variable	Mean	SD	1	2	3
1. Self-development	3.71	0.58	1		
2. Human capital	3.84	0.55	0.41**	1	
3. Creativity	3.69	0.60	0.36**	0.29**	1

Note: $p < 0.01$.

The correlation matrix indicates significant positive associations among self-development, human capital, and creativity, providing initial support for the proposed relationships.

4.2. Measurement model assessment

A Confirmatory Factor Analysis (CFA) was conducted to assess the reliability and validity of the measurement model. All standardized factor loadings exceeded the recommended threshold of 0.60 and were statistically significant.

Table 2 summarizes reliability and convergent validity statistics.

Table 2. Measurement model reliability and validity

Construct	Cronbach's α	CR	AVE
Self-development	0.89	0.91	0.56
Human capital	0.92	0.93	0.60
Creativity	0.90	0.92	0.59

All constructs demonstrated satisfactory internal consistency (α and CR > 0.70) and convergent validity (AVE > 0.50). Discriminant validity was confirmed as the square root of AVE for each construct exceeded its correlations with other constructs.

4.3. Structural model fit

The structural model was estimated using SEM. Model fit indices indicated a good fit between the proposed model and the observed data.

Table 3. Structural model fit indices

Fit Index	Recommended Value	Model Value
χ^2/df	< 5.00	2.94
CFI	≥ 0.90	0.95
TLI	≥ 0.90	0.94
RMSEA	≤ 0.08	0.062
SRMR	≤ 0.08	0.048

These results suggest that the structural model provides an adequate representation of the data.

4.4. Hypothesis testing

Hypotheses were tested by examining standardized path coefficients and their significance levels. Results are reported in the order of H1–H4.

Table 4. Structural path estimates

Hypothesis	Path	Standardized β	t-value	Result
H1	Self-development → Human capital	0.43	7.12	Supported
H2	Self-development → Creativity	0.28	4.36	Supported
H3	Human capital → Creativity	0.19	3.01	Supported

Self-development exhibited a strong positive effect on human capital, supporting H1. It also had a direct positive effect on creativity, supporting H2. Human capital showed a significant positive effect on creativity, supporting H3.

4.5. Mediation analysis

The mediating role of human capital (H4) was examined using bootstrapped indirect effects with 5,000 resamples.

Table 5. Mediation results

Effect	Indirect β	95% CI (Lower–Upper)	Result
Self-development → Human capital → Creativity	0.08	0.04 – 0.14	Supported

The indirect effect of self-development on creativity through human capital was significant, as the confidence interval did not include zero. This indicates partial mediation, confirming H4. Even after accounting for human capital, the direct effect of self-development on creativity remained significant, suggesting that self-development influences creativity both directly and indirectly.

Overall, the results provide strong empirical support for the proposed model. Self-development emerged as a key antecedent of both human capital and creativity. In contrast, human capital functioned as a significant mediating mechanism linking self-development to creative outcomes in Brazilian public schools.

5. Discussion

The purpose of this study was to examine how self-development influences creativity among employees in Brazilian public schools and to test the mediating role of human capital in this relationship. The findings provide strong and consistent support for the proposed model, offering several important theoretical and contextual insights.

First, the results confirm that self-development has a significant positive effect on human capital (H1). This finding reinforces the view that self-initiated professional growth—through self-directed learning, self-regulation, and reflective practice—constitutes a critical mechanism for accumulating knowledge, skills, and expertise in educational work. In the Brazilian public-school context, where access to formal professional development is often uneven, this result underscores the strategic importance of individual agency in human capital formation. Self-development appears to function as a compensatory process, enabling educators to strengthen their professional capabilities despite structural constraints.

Second, the study demonstrates a direct positive relationship between self-development and creativity (H2). This finding suggests that educators who actively engage in their own development are more likely to generate novel and useful ideas in their professional practice. The result aligns with contemporary perspectives on creativity that emphasize a learning orientation, cognitive flexibility, and intrinsic motivation as key antecedents of creative behavior. In Brazilian public schools, where teachers must frequently adapt instructional practices to diverse and complex classroom realities, self-development emerges as a critical driver of creative capacity.

Third, the findings show that human capital positively influences creativity (H3). This result highlights the role of accumulated knowledge and expertise as the cognitive foundation for creative action. Creativity in educational settings does not arise in isolation but is grounded in teachers' understanding of pedagogy, subject matter, and contextual constraints. In line with human capital theory, educators with stronger professional competencies are better positioned to recombine existing knowledge into innovative instructional approaches and problem-solving strategies.

Most importantly, the mediation analysis confirms that human capital partially mediates the relationship between self-development and creativity (H4). This finding advances prior research by clarifying how self-development translates into creative outcomes. While self-development directly stimulates creativity, a substantial portion of its effect operates through the enhancement of human capital. In other words, self-development is most impactful when it results in tangible gains in knowledge, skills, and expertise, enabling creative behavior. This mechanism is particularly salient in the Brazilian context, where creativity often depends on the effective mobilization of accumulated human capital rather than on access to abundant material resources.

Taken together, these findings contribute to the literature in several ways. Theoretically, the study integrates self-development, human capital, and creativity into a single explanatory framework, responding to calls for mechanism-based models in creativity research. Empirically, it extends this framework to Brazilian public education, an underrepresented context in international research. In this context, the results highlight the relevance of self-development as a scalable, cost-effective pathway for enhancing creativity in public-sector organizations facing persistent resource constraints.

From a policy and managerial perspective, the findings suggest that initiatives to foster creativity in Brazilian public schools should not focus solely on formal training programs. Instead, they should also encourage and legitimize self-development practices, such as reflective teaching, autonomous learning, and professional self-regulation. By creating organizational environments that value and support self-development, school systems can indirectly strengthen human capital and, in turn, enhance creative capacity.

Overall, this study demonstrates that creativity in Brazilian public schools is not merely a function of individual talent or institutional resources but the outcome of a dynamic process in which self-development builds human capital, enabling creative action. This insight provides a robust foundation for rethinking teacher development strategies in emerging-economy education systems.

6. Managerial and Policy Implications

The findings of this study offer several important managerial and policy implications for Brazilian public education systems seeking to enhance creativity and innovation under limited resource constraints. By demonstrating that self-development influences creativity both directly and indirectly through human capital, the results suggest that effective interventions need not rely solely on costly, centralized training programs.

6.1. Implications for school management

At the school level, administrators should recognize self-development as a strategic asset rather than an individual responsibility detached from organizational goals. School leaders can foster self-development by creating environments that encourage reflective practice, professional autonomy, and continuous learning. This may include allocating time for peer

learning, collaborative reflection, and experimentation with new pedagogical approaches, even within existing workload constraints.

Managers should also integrate self-development into performance management systems in non-punitive ways. Rather than emphasizing compliance or standardized outcomes, evaluation processes can reward initiative, learning orientation, and creative problem-solving. Such practices legitimize self-development and signal that creativity is valued as an outcome of professional growth rather than as an isolated personal trait.

6.2. Implications for human capital management in education

The mediating role of human capital highlights the importance of linking self-development initiatives to competence accumulation. Educational managers should ensure that opportunities for self-directed learning translate into tangible gains in knowledge and skills. This can be achieved by aligning self-development activities with curricular goals, pedagogical standards, and locally relevant challenges.

From a human capital perspective, investing in self-development is particularly advantageous in Brazilian public schools because it leverages existing human resources. Encouraging educators to engage in autonomous learning, reflective teaching, and skill diversification allows school systems to enhance collective expertise without relying exclusively on external consultants or large-scale training programs. Over time, this approach can lead to a cumulative increase in organizational human capital and creative capacity.

6.3. Policy implications for Brazilian public education

At the policy level, the findings suggest that national and regional education policies should broaden their conception of professional development to include self-development mechanisms explicitly. While formal in-service training remains important, policies that recognize and support self-directed professional growth can provide a more flexible and sustainable pathway for enhancing creativity across diverse school contexts.

Policy instruments may include guidelines that encourage reflective practice, professional learning communities, and autonomous skill development, as well as digital platforms that facilitate access to learning resources. Importantly, policy frameworks should avoid overly prescriptive approaches that limit teacher autonomy, as such constraints may undermine the very self-development processes that foster creativity.

Furthermore, the results underscore the relevance of self-development in addressing regional inequalities within Brazil. In areas with limited access to formal training, promoting self-development can help reduce disparities in human capital and creative capacity across schools. Policymakers should therefore consider self-development as a tool for equity, enabling educators in underserved regions to build competencies and innovate within their local realities.

6.4. Implications for creativity and innovation in public schools

Finally, the study highlights that creativity in Brazilian public schools is most effectively fostered when individual development and organizational support are aligned. Creativity should be viewed not as an exceptional outcome produced by a few individuals but as a systemic capability that emerges when educators are empowered to learn, reflect, and apply their knowledge creatively.

By embedding self-development into managerial practices and policy frameworks, Brazilian public education systems can strengthen human capital and cultivate sustainable creativity. This approach supports innovation not through episodic interventions, but through continuous professional growth that enhances both individual fulfillment and organizational effectiveness.

7. Limitations and future research

Despite its contributions, this study has several limitations that should be acknowledged and that provide directions for future research. First, the cross-sectional design restricts causal inference. Although the proposed relationships are theoretically grounded and empirically supported, longitudinal or experimental designs would allow future studies to examine how self-development, human capital, and creativity evolve within Brazilian public schools.

Second, data were collected via self-report measures, which may introduce common-method bias or social desirability bias. Future research could incorporate multi-source data, such as peer evaluations, supervisor assessments, or objective indicators of professional development and creative output, to strengthen measurement robustness.

Third, the study focused on public school employees within specific Brazilian regions. While this enhances contextual relevance, it may limit generalizability to other educational systems or national contexts. Future studies could conduct comparative analyses across regions, states, or between public and private schools to examine whether the observed relationships vary under different institutional conditions.

Fourth, human capital was operationalized at the individual level. Future research could extend the model by examining human capital as a collective or organizational construct and by exploring cross-level effects and the role of school-level resources, leadership practices, and organizational culture in shaping creativity.

Finally, while this study focused on self-development as a key antecedent, future research could integrate additional psychological and organizational factors—such as motivation, leadership style, or digital competencies—to develop more comprehensive models of creativity in education. Such extensions would further advance understanding of how creativity can be sustainably cultivated in Brazilian and other emerging-economy education systems.

8. Conclusion

This study investigated the relationship between self-development and creativity among employees in Brazilian public schools, with particular emphasis on the mediating role of human capital. Drawing on a robust theoretical framework and empirical evidence, the findings demonstrate that self-development contributes to creativity both directly and indirectly by strengthening individuals' knowledge, skills, and expertise.

By integrating self-development, human capital, and creativity into a single explanatory model, this research advances understanding of how creative capacity can be cultivated in public education systems operating under resource constraints. The results highlight self-development as a viable and scalable pathway for enhancing human capital and fostering creativity, especially in contexts where access to formal professional development is uneven.

From a practical standpoint, the study underscores the importance of aligning managerial practices and education policies with mechanisms that encourage continuous, self-directed professional growth. By supporting self-development, Brazilian public schools can strengthen

human capital and foster sustainable creativity, ultimately improving educational quality and organizational resilience.

Overall, this research provides context-specific evidence from Brazil that enriches international debates on creativity and human capital in education and lays a foundation for future studies exploring innovation in emerging-economy public sectors.

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