SELF-EFFICACY IN SPECIAL EDUCATION: A PSYCHOMETRIC PERSPECTIVE FOR CURRICULUM SPECIALIST TEACHERS

AUTOEFICÁCIA NA EDUCAÇÃO ESPECIAL: UMA PERSPECTIVA PSICOMÉTRICA PARA PROFESSORES ESPECIALISTAS EM CURRÍCULO

AUTOEFICACIA EN LA EDUCACIÓN ESPECIAL: UNA PERSPECTIVA PSICOMÉTRICA PARA DOCENTES ESPECIALISTAS EN CURRÍCULO

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ABSTRACT

This chapter investigates the self-efficacy of Curriculum Specialist Teachers (PECs) in Special Education, a vital construct from Bandura's Social Cognitive Theory. The aim was to adapt the Self-efficacy Scale in Higher Education (AEFS) for the context of job performance, resulting in the Self-Efficacy Scale in Function Performance – Education Context (EAEF-Educ), and to analyze its psychometric properties. Sixty-six PECs from São Paulo's state network participated. Confirmatory and exploratory factor analyses (EGA and bootEGA) were employed. The original factor structure of the AEFS was not confirmed in the EAEF-Educ. EGA indicated a five-factor solution with adequate fit and reliability indices. A new nomenclature for these factors is proposed, reflecting dimensions such as knowledge application, social interaction, goal setting, compliance with external demands, and problem-solving. Results indicate a predominance of moderate self-efficacy and the presence of low levels, highlighting the need for interventions to strengthen these beliefs, optimizing PECs' professional development and enhancing Special Education policies.

Keywords: Self-efficacy. Special Education. Teachers. Psychometrics. Factor Analysis.

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RESUMO
Este capítulo investiga a autoeficácia de Professores Especialistas em Currículo (PECs) na Educação Especial, um construto vital da Teoria Social Cognitiva de Bandura. O objetivo foi adaptar a Escala de Autoeficácia na Formação Superior (AEFS) para o contexto de exercício de função, resultando na Escala de Autoeficácia no Exercício de Função – Contexto Educação (EAEF-Educ), e analisar suas propriedades psicométricas. Participaram 66 PECs da rede estadual de São Paulo. As análises fatoriais confirmatória e exploratória (EGA e bootEGA) foram empregadas. A estrutura fatorial original da AEFS não foi confirmada na EAEF-Educ. O EGA indicou uma solução de cinco fatores, com índices de ajuste e confiabilidade adequados. Propõe-se uma nova nomenclatura para esses fatores, refletindo dimensões como aplicação do conhecimento, interação social, estabelecimento de metas, cumprimento de demandas externas e resolução de problemas. Os resultados revelam a predominância de autoeficácia moderada e a presença de níveis fracos, sublinhando a necessidade de intervenções para fortalecer essas crenças, otimizando o desenvolvimento profissional dos PECs e aprimorando as políticas de Educação Especial.

Palavras-chave: Autoeficácia. Educação Especial. Professores. Psicometria. Análise Fatorial.

RESUMEN
Este capítulo investiga la autoeficacia de los Profesores Especialistas en Currículo (PECs) en la Educación Especial, un constructo fundamental de la Teoría Social Cognitiva de Bandura. El objetivo fue adaptar la Escala de Autoeficacia en la Educación Superior (AEFS) al contexto del desempeño en la función, dando como resultado la Escala de Autoeficacia en el Desempeño de la Función – Contexto Educativo (EAEF-Educ), y analizar sus propiedades psicométricas. Participaron sesenta y seis PECs de la red estatal de São Paulo. Se emplearon análisis factorial confirmatorio y exploratorio (EGA y bootEGA). La estructura factorial original de la AEFS no fue confirmada en la EAEF-Educ. El EGA indicó una solución de cinco factores con índices adecuados de ajuste y confiabilidad. Se propone una nueva nomenclatura para estos factores, reflejando dimensiones como aplicación del conocimiento, interacción social, establecimiento de metas, cumplimiento de demandas externas y resolución de problemas. Los resultados indican predominio de autoeficacia moderada y la presencia de niveles bajos, lo que evidencia la necesidad de intervenciones para fortalecer estas creencias, optimizando el desarrollo profesional de los PECs y mejorando las políticas de Educación Especial.

Palabras clave: Autoeficacia. Educación Especial. Profesores. Psicometría. Análisis Factorial.

1 INTRODUCTION

The contemporary educational landscape is marked by constant transformations and challenges, especially regarding the inclusion and support of students with special educational needs. In this context, the role of the educational professional becomes even more complex and strategic. The belief in one's own capacity to perform tasks and achieve goals, known as self-efficacy, emerges as a fundamental psychological construct for understanding the performance, motivation, and resilience of these educators. Originating from Albert Bandura's Social Cognitive Theory, the concept of self-efficacy offers a valuable lens to analyze how teachers perceive their abilities and how this perception influences their pedagogical practice, well-being, and, ultimately, the quality of education offered. This chapter proposes to explore self-efficacy in the job performance of Curriculum Specialist Teachers (PECs) who work in Special Education. PECs play a crucial role in articulating educational policies and classroom practice, being responsible for supporting teacher training and the development of pedagogical practices aligned with the school curriculum in the São Paulo state network. Given the specificity and complexity of their attributions, investigating the self-efficacy of these professionals is essential to identify factors that can optimize their performance and contribute to a more effective and inclusive educational environment. The research underpinning this chapter sought to adapt and validate a self-efficacy scale for the PECs' context, based on an existing instrument focused on higher education. This psychometric adaptation process is vital because self-efficacy is a contextual construct, and its measurement must reflect the specificities of the domain and circumstances in which it is evaluated. The non-confirmation of the original factor structure of the adapted instrument, and the subsequent proposal of a new structure through exploratory analyses, highlights the uniqueness of self-efficacy beliefs in the job performance of PECs, in contrast to the higher education environment. Throughout this chapter, we will detail the theoretical foundation of self-efficacy, the relevance of teacher self-efficacy in Special Education, the methodological design of the research that grounds this discussion, the results obtained in the adaptation and validation of the instrument, and the implications of these findings for educational practice and future investigations. Our objective is to offer a deep understanding of the self-efficacy of Curriculum Specialist Teachers, contributing to the development of strategies aimed at strengthening these beliefs and, consequently, improving the performance of these professionals in promoting quality special education.

1.1 SOCIAL COGNITIVE THEORY AND THE CONSTRUCT OF SELF-EFFICACY

Self-efficacy is one of the pillars of Albert Bandura's Social Cognitive Theory, one of the most influential psychologists of the 20th century. Bandura (1997) postulates that self-efficacy refers to people's beliefs about their capabilities to organize and execute courses of action required to produce given attainments. That is, it is not about possessing skills, but about the belief in the ability to use them effectively to achieve specific goals. This distinction is crucial, as individuals with the same skills can exhibit very different performances, depending on their self-efficacy beliefs. According to Bandura (1993), self-efficacy influences cognitive functioning and human development in several ways. It impacts the choice of activities and environments, the amount of effort expended, persistence in the face of obstacles, and resilience in the face of adversity. Individuals with high self-efficacy tend to approach challenging tasks as opportunities to develop new skills, rather than viewing them as threats to be avoided. This proactive perspective is essential for continuous learning and overcoming difficulties, characteristics inherent to teaching practice. Social Cognitive Theory emphasizes the agentic nature of individuals, who are perceived as self-organizing, proactive, self-reflective, and self-regulating beings (BANDURA, 2001). In this view, self-efficacy beliefs are powerful shapers of the courses of action people choose, the level of effort they dedicate, the time they persist in the face of difficulties, and how their thought patterns are self-inhibiting or self-motivating. In the professional context, especially in roles that demand high capacity for adaptation and problem-solving, such as that of PECs in Special Education, self-efficacy becomes a significant predictor of success and well-being.

Self-efficacy beliefs do not arise from nothing; they are developed and strengthened through four main sources, as outlined by Bandura (1997, 2005):

- *Mastery Experiences (or Performance Accomplishments):* This is the most powerful source of self-efficacy. Previous successes in performing a specific activity strengthen the belief in one's own capacity. Conversely, repeated failures can undermine this belief. For a PEC, successful experiences in implementing a new curriculum or mediating conflicts, for example, reinforce their self-efficacy.
- *Vicarious Experiences (or Social Modeling):* Observing other people, deemed similar, successfully performing a task through sustained effort can elevate the observer's self-efficacy. If a PEC sees an experienced colleague overcoming a complex challenge in Special Education, they may be led to believe that they too are capable.
- *Social Persuasion (or Verbal Persuasion):* Verbal encouragement and positive feedback from significant others (colleagues, supervisors, family members) can strengthen an individual's belief in their capabilities. Being told "you can do this" can

boost effort and persistence, provided the persuasion is credible and the task is not perceived as impossible.

- *Physiological and Emotional States:* Physical and emotional reactions (such as anxiety, stress, or excitement) during an activity also influence self-efficacy. The interpretation of these states is fundamental; for example, feeling an increased heart rate can be interpreted as a sign of weakness and incapacity by some, while others may see it as a sign of excitement and readiness for the challenge. Reducing stress and anxiety, and positively interpreting sensations, contribute to a more robust self-efficacy.

When conceiving instruments to measure self-efficacy, Bandura (2005) emphasizes the need to assess perceived self-efficacy in relation to specific domains of functioning, rather than as a global personality trait. This is because self-efficacy varies significantly across different activities and circumstances. A person might have high self-efficacy for teaching mathematics, but low self-efficacy for handling disciplinary issues, for example. This contextual specificity is a central point in the methodology of the research that underpins this chapter, justifying the adaptation of an existing scale for the particular domain of Special Education PECs. Therefore, self-efficacy, within the scope of Social Cognitive Theory, is not merely an indicator of what people can do, but a powerful determinant of what they will actually do. Strengthening these beliefs is a promising path to enhance motivation, resilience, and achievements in any domain, including the complex and vital field of education.

1.2 TEACHER SELF-EFFICACY IN THE EDUCATIONAL CONTEXT

In the field of education, teacher self-efficacy has been the subject of vast research, due to its substantial impact on teacher performance, motivation, well-being, and consequently, students' learning process (BANDURA, 1989; MARTINS; CHACON, 2019; SKAALVIK; SKAALVIK, 2007; TSCHANNEN-MORAN; HOY, 2001). Teachers with high self-efficacy tend to be more engaged, persistent, innovative, and resilient in the face of the multiple challenges that the profession imposes. Teacher self-efficacy influences a series of behaviors and attitudes in the classroom and school environment. Teachers with high self-efficacy are more likely to:

- Experiment with new teaching strategies and adopt innovative methodologies.
- Persist in teaching difficult or unmotivated students.
- Set higher learning goals for their students.
- Face challenges with a proactive stance, seeking solutions instead of avoiding problems.

- Have a greater sense of professional satisfaction and less propensity for burnout.
- Promote a more positive and supportive learning environment, impacting the school climate.

One of the contexts in which teacher self-efficacy proves particularly relevant is inclusive education. Working with students who have special educational needs demands differentiated pedagogical skills, patience, adaptability, and a solid belief in their ability to make a difference from teachers. Weissenfels, Benick, and Perels (2021) investigated whether teacher self-efficacy can act as a protective factor against burnout in inclusive classrooms. Their results indicated that teachers with high self-efficacy reported lower levels of emotional exhaustion and depersonalization, core components of burnout. This finding underscores the importance of fostering self-efficacy for the well-being and career sustainability of educators working in complex environments. Martins and Chacon (2019), in a review of national and international literature on teacher self-efficacy and Special Education, with a focus on teacher training, emphasize the need to promote self-efficacy during initial and continuing training. This aims to prepare teachers to deal with the inherent challenges of school inclusion, which requires not only theoretical knowledge but also confidence in the ability to apply this knowledge in real and often unpredictable situations.

To strengthen teacher self-efficacy, Bandura's four sources of self-efficacy (1997) can be strategically applied:

- *Mastery experiences:* Create opportunities for teachers to experience success in challenging tasks, such as planning and implementing effective inclusive activities, or managing disruptive behaviors in the classroom.
- *Vicarious experiences:* Facilitate the observation of other successful teachers in similar contexts, through mentoring, visits to other schools, or sharing of good practices.
- *Social persuasion:* Offer constructive feedback and encouragement from colleagues, coordinators, principals, and the school community. Recognize and value teachers' efforts and achievements.
- *Physiological and emotional states:* Develop support and self-care programs to help teachers manage the stress and anxiety inherent in the profession, interpreting challenges as opportunities for growth, rather than as threats.

Collaboration, exchange of experiences, and mutual support among teachers are powerful mechanisms for strengthening teacher self-efficacy (MARTINS; CHACON, 2019). Work environments that promote psychological safety and continuous professional development contribute to educators feeling more capable and confident in their duties.

In summary, teacher self-efficacy is a vital construct for understanding the quality of education. Investing in its development means not only improving the individual performance of teachers but also positively impacting the educational environment as a whole, culminating in better outcomes for students and society.

1.3 THE CURRICULUM SPECIALIST TEACHER (PEC) AND SPECIAL EDUCATION

The complexity of the Brazilian educational system, especially in the state of São Paulo, requires the involvement of professionals with strategic and highly specialized functions. Among these, the Curriculum Specialist Teacher (PEC) stands out. According to SEDUC Resolution 62/2022 (SÃO PAULO, 2022), the PEC is a professional appointed to act as a fundamental link in the articulation between the State Secretariat of Education (SEDUC), the Regional Education Directorates (DREs), and schools. Their role transcends direct classroom teaching, focusing on the implementation of educational policies, the continuing education of other teachers, and curriculum development. This professional is often released from direct pedagogical functions to dedicate themselves fully to the role in the pedagogical core of the education directorate. The PEC plays a role as a knowledge multiplier and pedagogical support. Their responsibilities include planning and executing teacher training, guiding the application of new methodologies and didactic materials, and ensuring that pedagogical practices are aligned with state curricular guidelines. In the context of Special Education, this function takes on even more delicate and crucial contours. Special Education PECs are tasked with ensuring that inclusion policies are effectively implemented, and that common classroom teachers and those in Specialized Educational Support (AEE) receive the necessary support to meet the specific needs of students with disabilities, Global Developmental Disorders (TGD), and high abilities/giftedness. The performance of these professionals is vital to bridge the gap between the macro planning of educational policies and the micro reality of the classroom. They are the "adequate scaffolding" that supports the education network in developing effective pedagogical practices. To this end, it is essential that these PECs possess not only technical-pedagogical knowledge but also a solid belief in their own capacity to influence and generate positive impact – that is, robust self-efficacy. The research that gave rise to this chapter was motivated by the observation that, despite the strategic importance of PECs in Special Education, there was a gap in understanding their self-efficacy in performing their duties. The central question that guided the study was: "what is the self-efficacy of Special Education PECs in the context of the work of the pedagogical cores of the Regional Education Directorates in the São Paulo state network?" This question not only seeks to map self-efficacy levels but also to understand how it manifests in a

professional group with such unique responsibilities. The absence of a specific instrument to measure self-efficacy specifically in the workplace, in a context as particular as that of the Special Education pedagogical cores, prompted the need to adapt a scale. The Self-efficacy Scale in Higher Education (AEFS), developed by Polydoro and Guerreiro-Casanova (2010), based on Bandura's Social Cognitive Theory, served as the basis for the creation of the Self-Efficacy Scale in Function Performance – Education Context (EAEF-Educ). The choice to adapt an existing instrument, rather than creating a new one from scratch, was based on psychometric principles that value the adaptation and validation of instruments, provided that proper permissions and evaluations of their psychometric properties are followed. The relevance of this investigation is amplified by the alternations and tensions in the National Special Education Policy (BRASIL, 2008), which are directly reflected in state policies. Understanding the self-efficacy of PECs can offer valuable subsidies for the development of training and support programs aimed at strengthening these professionals, ensuring that educational policies are implemented more effectively and that inclusion becomes a reality in schools. The research is justified by the hope of contributing new trajectories of studies and ways to understand efficacy in the work context of the curriculum specialist teacher's training in the São Paulo state network. By strengthening the self-efficacy of PECs, it is expected to positively impact the quality of teacher training, the implementation of educational policies, and, consequently, the continuous improvement of education for all students, especially those in Special Education.

2 METHODOLOGY

The present research was designed with the necessary rigor for investigating a psychological construct in a specific educational context. This section will detail the methodological procedures adopted, from the study type to the complex statistical analyses.

2.1 RESEARCH DESIGN

The study is characterized as applied research, as it sought to generate knowledge that can be used in practice to solve specific problems, in this case, the understanding and eventual strengthening of self-efficacy in a professional group. Its nature was observational, given that the researchers did not manipulate variables, but rather observed and measured phenomena in their natural context. In terms of approach, the research was quantitative analytical, using statistical methods to analyze the collected data and test hypotheses. It had an exploratory character in the phase of factor structure analysis, especially when the original theoretical model was not confirmed, leading to the investigation of new dimensional

configurations. The field nature indicates that data were collected directly in the environment where the phenomena occur, i.e., with Curriculum Specialist Teachers (PECs) in their work. Finally, it was a cross-sectional study, as data were collected at a single point in time (in the year 2023), offering a snapshot of the participants' self-efficacy at that moment.

2.2 STUDY PARTICIPANTS

The research participants were Curriculum Specialist Teachers (PECs) from the 91 Pedagogical Cores of the Regional Education Directorates of the State Secretariat of Education of São Paulo. Selection occurred through voluntary adherence, with all PECs in this modality who agreed to participate being invited. The final sample consisted of 66 PECs, representing a participation rate of 72% of the total universe of 91 PECs. It is important to note that 6 PECs (6.6%) read the Free and Informed Consent Form (FICF) but chose not to participate, while the remaining 19 PECs (19%) did not respond to the invitation. The sociodemographic and professional characterization of the sample revealed some important aspects:

- *Gender:* The majority of participants (58, or 87.87%) were female, reflecting a historical predominance of women in education.
- *Age:* All professionals were over 30 years old. Among them, 20% were between 31 and 40 years old, and 80% were over 40 years old, suggesting a sample of professionals with consolidated experience.
- *Professional Activity:* The vast majority (63, or 95.45%) worked full-time, with 75.75% of respondents working 40 hours a week.

2.3 DATA COLLECTION INSTRUMENTS

Data collection was conducted using a self-administered Data Collection Instrument (DCI) in the form of an electronic questionnaire (Google Forms). This DCI integrated three main components:

- **Free and Informed Consent Form (FICF):** Based on the guidelines of CNS Resolution Nº 510/2016, MS, it ensured that participants were duly informed about the study and freely consented to their participation.
- **Sociodemographic and Professional Variables Questionnaire (SPVQ):** Developed by the researchers, this questionnaire collected information on biological sex, gender identity, sexual orientation, age, marital status, number of children, income, religion, prior schooling and parental schooling, and employment status.

- **Self-Efficacy Scale in Function Performance – Education Context (EAEF-Educ):** This was the main instrument for measuring self-efficacy, resulting from the adaptation of the Self-efficacy Scale in Higher Education (AEFS).

2.3.1 Adaptation of the Self-Efficacy Scale in Higher Education (AEFS) for the Educational Context (EAEF-Educ)

The Self-efficacy Scale in Higher Education (AEFS), developed by Polydoro and Guerreiro-Casanova (2010), is a self-report instrument composed of 34 items, with responses on a Likert scale from 1 (little capable) to 10 (very capable). Originally, the AEFS is divided into five dimensions:

- Academic Self-Efficacy (AFA)
- Self-Efficacy in Training Regulation (AFP)
- Self-Efficacy in Social Interaction (AIS)
- Self-Efficacy in Proactive Actions (AAP)
- Self-Efficacy in Academic Management (AGF)

The adaptation of the AEFS for the specific context of Special Education PECs resulted in the EAEF-Educ. This process was meticulous and followed the principles of psychometric instrument adaptation. Items were modified to reflect the reality of the PECs' work, altering terms such as "course" to "function," "students" to "teachers" or "colleagues," and "higher education" to "educational context." For example, the item "How capable am I of understanding the demands of my course" (AEFS) was adapted to "How capable am I of understanding the demands of the function I perform" (EAEF-Educ). Items referring to evaluations were recontextualized to "evaluations of my function" or "training received." This adaptation sought to maintain the essence of the construct but align it with the new domain.

2.4 DATA COLLECTION PROCEDURES AND ETHICAL ASPECTS

Data collection was carried out in 2023, involving PECs from the Pedagogical Cores of the Regional Education Directorates in the state of São Paulo. The procedure followed these steps:

- *Invitation and Information:* PECs were invited to participate via email, which contained a simple presentation explaining the research objective, the reason for their selection as participants, and the importance of their contribution.
- *Access to the Electronic Form:* The email contained a link to the electronic form (Google Forms), which hosted the FICF and the data collection instruments.

- *Consent:* Upon accessing the form, participants were asked to read the FICF and express their consent by clicking "I HAVE READ AND AGREE." Those who did not agree were directed out of the survey.
- *Instrument Completion:* After consent, participants completed the SPVQ and the EAEF-Educ. The estimated time for completion was approximately 8 minutes.
- *Confidentiality and Anonymity:* The confidentiality and anonymity of participants were guaranteed. Their responses would be treated anonymously and confidentially, used only for the research and disclosed in scientific events or journals without individual identification.
- *Ethical Aspects:* The project was duly submitted to the Research Ethics Committee of the São José do Rio Preto Medical School (CEP-FAMERP), receiving CAAE 68134923.3.0000.5415 and an APPROVED opinion on July 10, 2023. All precautions were taken to safeguard the confidentiality and identification of participants, minimizing risks and ensuring the well-being of those involved.

2.5 DATA ANALYSIS

Data analysis was structured in three distinct stages, reflecting the complexity of psychometric investigation and the need to adapt to empirical findings.

2.5.1 Stage 1: Testing the Original Factor Structure

The first stage aimed to verify whether the original five-factor theoretical structure of the AEFS remained valid in the adapted version, the EAEF-Educ, for the PECs sample. To this end, Confirmatory Factor Analysis (CFA) was used. Considering that the scale has ordinal scores (Likert scale from 1 to 10), the analysis was implemented using a polychoric correlation matrix and the Weighted Least Squares Mean and Variance Adjusted (WLSMV) estimation method. Model fit was evaluated using indices such as the Root Mean Square Error of Approximation (RMSEA), the Comparative Fit Index (CFI), and the Tucker-Lewis Index (TLI). Criteria for a good fit, according to the literature, are RMSEA less than 0.08 (with a 95% confidence interval not reaching 0.10) and CFI/TLI equal to or greater than 0.90. However, the original factor model of the EAEF-Educ did not converge. This means that the CFA was unable to adequately estimate the model parameters, resulting in a non-positive covariance matrix. The lack of convergence prevents the evaluation of fit indices and the confirmation of the theoretical structure. This non-convergence can be attributed to two main factors:

- *Small Sample Size (N=66):* Complex CFA models, especially with ordinal data and a high number of items (34 items), require larger samples for stable estimates.
- *Inadequacy of the Original Theoretical Factor Structure:* The strongest hypothesis is that the self-efficacy structure conceived for "higher education" (AEFS) does not directly apply to the "job performance" of PECs (EAEF-Educ).

2.5.2 Stage 2: Exploratory Analysis of the Structure

As the CFA failed to confirm the original model, the second stage employed Exploratory Graph Analysis (EGA) to investigate the factor structure of the EAEF-Educ. EGA is a recent and robust method that estimates the number of dimensions in multivariate data using network models. Considering the sample size, Bootstrap Exploratory Graph Analysis (bootEGA) was also used, which evaluates the stability of the dimensional structure estimated by EGA. BootEGA generates a high number of bootstrap samples (in this study, 10,000 resamples) and applies EGA to each one, forming a sampling distribution of the results.

2.5.3 Stage 3: Construction of Factor Scores

After the identification and validation of the new factor structure, the final stage consisted of constructing the respondents' factor scores. For this, the tenBerge technique was used, which preserves the correlational accuracy of the scores, ensuring that the factor scores reproduce the factor correlations. TenBerge factor scores are calculated as z-scores, with a mean of zero and a standard deviation of one. To facilitate interpretation and visualization, these scores were standardized on a scale of 1 to 10, through a linear transformation.

3 RESULTS AND ANALYSIS

The presentation and analysis of the research results are crucial for understanding the self-efficacy of Curriculum Specialist Teachers (PECs) in Special Education and the psychometric properties of the adapted scale, the EAEF-Educ.

3.1 CHARACTERIZATION OF THE PECS SAMPLE

The final sample consisted of 66 Curriculum Specialist Teachers, representing an expressive participation of 72% of the total universe of Special Education PECs in the state of São Paulo. The sample composition offers a relevant demographic and professional portrait:

- *Female Predominance:* 87.87% of participants (58 PECs) were women, a datum that corroborates the strong female presence in the educational field, especially in pedagogical support and training functions.
- *Experienced Professionals:* All participants were over 30 years old, with 80% over 40 years old. This suggests a sample of professionals with considerable experience in education.
- *Full-time Dedication:* 95.45% of PECs (63 participants) performed professional activity full-time, with 75.75% dedicating 40 hours per week to the function.

3.2 TESTING THE ORIGINAL FACTOR MODEL OF AEFS IN EAEF-Educ

The first stage of the factor analysis sought to verify whether the theoretical five-factor structure of the Self-efficacy Scale in Higher Education (AEFS) was maintained in the version adapted for the educational context of PECs, the EAEF-Educ. For this, Confirmatory Factor Analysis (CFA) was used, employing the polychoric correlation matrix and the WLSMV estimation method, suitable for ordinal data. The result of this stage was that the original factor model of the EAEF-Educ did not converge. This means that the CFA could not adequately estimate the model parameters, and the factors presented a non-positive covariance matrix. The lack of convergence prevents the evaluation of fit indices and the confirmation of the theoretical structure. This non-convergence can be attributed to two main factors:

- *Small Sample Size (N=66):* Complex CFA models, especially with ordinal data and a high number of items (34 items), require larger samples for stable estimates.
- *Inadequacy of the Original Theoretical Factor Structure:* The strongest hypothesis is that the self-efficacy structure conceived for "higher education" (AEFS) does not directly apply to the "job performance" of PECs (EAEF-Educ).

3.3 EXPLORATORY ANALYSIS AND THE NEW FACTOR STRUCTURE OF EAEF-EDUC

Given the non-convergence of the original model, the research proceeded to the Exploratory Analysis of the Structure of EAEF-Educ, using Exploratory Graph Analysis (EGA) and Bootstrap Exploratory Graph Analysis (bootEGA). The EGA retained 5 factors for the factor structure of the scale, the same number of factors as the original theoretical model of the AEFS. However, the distribution of items in these factors was different from expected, indicating that the organization of PECs' self-efficacy beliefs does not perfectly align with the self-efficacy dimensions of higher education.

Table 1

Results of the Bootstrap Exploratory Graph Analysis (bootEGA). São Paulo, Brazil, 2024

Number of factors	Relative frequency
1	0.0056
2	0.0006
3	0.0491
4	0.2272
5	0.3196
6	0.2352
7	0.1132
8	0.0372
9	0.0099
10	0.0021
11	0.0003

Source: Adapted from Lopes (2024, p. 37).

Table 1 demonstrates that the 5-factor solution was the most frequent, occurring in 31.96% of the resamples. This indicates that, even with the variability of bootstrap samples, the 5-factor structure is the most consistently replicated, lending robustness to the solution found by EGA. The analysis of the factor model resulting from EGA and bootEGA, when tested via CFA, presented an acceptable fit: $\chi^2[517] = 629.90$, CFI = .997, TLI = .997, and RMSEA = .058 [95% CI .040 – .073]. These indices are within the limits recommended by the literature (.90 for CFI/TLI and <.08 for RMSEA), allowing the conclusion that the five identified factors are valid for the studied sample.

3.3.1 Proposed Nomenclature for EAEF-Educ Factors

Based on the content analysis of the items that effectively loaded onto each dimension, a new nomenclature is proposed for the EAEF-Educ factors:

- *Factor 1: Self-Efficacy in Knowledge Application and Professional Training* – This factor groups items related to the ability to learn, understand, apply knowledge (from courses, Technical Orientations - OTs), and establish conditions for work development, as well as understanding job demands and defining professional direction.
- *Factor 2: Self-Efficacy in Social Interaction and Professional Development* – This is the most comprehensive factor, uniting items about teamwork, cooperation, relationships with colleagues and trainers, seeking help, updating knowledge, motivation, and contributing to improving performance.

- *Factor 3: Self-Efficacy in Goal Setting and Expression of Opinions* – This factor combines items of self-efficacy in regulating professional training (planning and reflecting on goals) with items of social interaction (expressing opinions and asking for help, advocating for support).
- *Factor 4: Self-Efficacy in Meeting External Demands* – This factor is composed of items reflecting self-efficacy in fulfilling demands from the Education Directorate, completing tasks on time, and planning activities requested by SEDUC/DE.
- *Factor 5: Self-Efficacy in Problem Solving and Resource Seeking* – This factor combines items of self-efficacy in regulating professional training (solving unexpected problems) with items of academic self-efficacy (preparing for evaluations) and proactive actions (seeking information about resources).

3.4 RELIABILITY OF EAEF-EDUC FACTORS

The reliability of factors is an essential indicator of a scale's internal consistency.

Table 2

Summary of factor loadings and reliability indices of the EAEF-Educ instrument. São Paulo, Brazil, 2024. *N = Number of items per factor; SD = Standard deviation; Min = minimum; Max = maximum. Source: Adapted from Lopes (2024, p. 41)*

Factor	N	Mean	SD	Min	Max	Cronbach's Alpha	McDonald's Omega	Composite Reliability
Factor 1	8	0.80	0.11	0.63	0.92	0.90	0.93	0.83
Factor 2	14	0.81	0.08	0.64	0.94	0.94	0.96	0.90
Factor 3	6	0.80	0.15	0.57	0.94	0.87	0.88	0.78
Factor 4	3	0.90	0.05	0.85	0.94	0.88	0.87	0.80
Factor 5	3	0.94	0.02	0.94	0.95	0.92	0.93	0.88

*The results in Table 2 indicate that the EAEF-Educ factors exhibited adequate reliability indices. Cronbach's Alpha ranged from .87 to .94, McDonald's Omega ranged from .88 to .96, and Composite Reliability ranged from .78 to .90. All these values are above the generally acceptable limits in psychometrics (typically >.70 or >.80), confirming that the items within each new factor are consistent with each other and that the scale is a reliable instrument for measuring PECs' self-efficacy in these dimensions.

3.5 FACTOR SCORES AND PECS' SELF-EFFICACY LEVELS

After validating the new factor structure and confirming reliability, factor scores were constructed using the tenBerge technique and standardized to a scale of 1 to 10. The classification of respondents into self-efficacy levels (weak, moderate, and strong) revealed the predominance of moderate levels and the presence of weak levels across all dimensions.

Table 3

Model for interpreting the values of the dimension scores and total self-efficacy.

SCORES	SELF-EFFICACY ASSESSMENT
< 5.9	Weak
≥ 6.0 and ≤ 7.9	Moderate
≥ 8.0 and ≤ 10.0	Strong

Source: Adapted from Polydoro and Guerreiro-Casanova (2010).

This finding is particularly significant. The predominance of moderate levels, combined with the existence of weak levels across all dimensions, suggests that, although PECs demonstrate reasonable self-efficacy for their functions, there is considerable room for strengthening these beliefs.

4 DISCUSSION

The research underpinning this chapter sought to unravel the complex web of self-efficacy beliefs that pervades the work of Curriculum Specialist Teachers (PECs) in Special Education. The adaptation of the Self-Efficacy Scale in Higher Education (AEFS) for the context of job performance (EAEF-Educ) and the subsequent psychometric analysis revealed important nuances that warrant in-depth discussion.

4.1 SELF-EFFICACY AND THE SPECIFICITY OF THE PECS CONTEXT

The primary objective of adapting the AEFS for the PECs context was based on Bandura's premise that self-efficacy is a contextual construct (BANDURA, 2005). The results of the Confirmatory Factor Analysis (CFA) that did not confirm the original structure of the AEFS in the EAEF-Educ strongly validate this premise. The non-convergence of the original model, although partly attributable to sample size, primarily suggests that the self-efficacy beliefs of a university student are intrinsically different from the beliefs of an experienced professional who acts as a trainer and articulator of educational policies in Special Education. The transition from a "higher education" environment to "job performance" implies a radical change in demands, challenges, and expectations. Where in higher education self-efficacy might revolve around "learning content," "preparing for assessments," and "working in groups" for course approval, in the PECs' job performance, these dimensions transform. Self-efficacy shifts to "applying knowledge in practical situations," "understanding job demands," "planning actions to achieve professional goals," "solving unexpected problems," and "interacting with colleagues and trainers" for professional development. The five new factors emerging from the Exploratory Graph Analysis (EGA) – Self-Efficacy in Knowledge

Application and Professional Training; Self-Efficacy in Social Interaction and Professional Development; Self-Efficacy in Goal Setting and Expression of Opinions; Self-Efficacy in Meeting External Demands; and Self-Efficacy in Problem Solving and Resource Seeking – reflect this specificity. They demonstrate that, for PECs, self-efficacy is not just about the individual capacity to perform isolated tasks, but about the ability to work in networks, to influence, to manage complex demands, and to innovate in a dynamic environment. The dimension of "Self-Efficacy in Social Interaction and Professional Development," for example, is particularly relevant. It groups items related to teamwork, cooperating with colleagues, establishing good relationships with trainers, seeking help, and contributing ideas. This underscores that PECs' self-efficacy is interdependent with their relationship skills and their ability to operate within a complex ecosystem of peers, supervisors, and network teachers. For a professional whose central function is articulation and training, confidence in social interaction is as vital as technical-pedagogical mastery.

4.2 CHALLENGES IN ADAPTING PSYCHOMETRIC INSTRUMENTS

The experience of adapting the AEFS to the EAEF-Educ illustrates the inherent challenges of psychometric work in social sciences. The adaptation of an instrument to a new context is not trivial and requires more than a simple change in terminology. It demands a deep understanding of the construct within the new domain and empirical validation of its structure. The impossibility of confirming the original model with CFA, followed by the need to conduct an exploratory analysis (EGA and bootEGA), demonstrates that, no matter how well-founded an original scale may be, its transposition to a significantly different context can fundamentally alter the organization of the factors. This does not diminish the value of the original scale but reinforces the idea that self-efficacy is a dynamic and context-bound construct. The adequate reliability of the emergent factors (Cronbach's Alpha, McDonald's Omega, and Composite Reliability) is a strong indicator of the internal consistency of the EAEF-Educ in its new configuration. This means that, although the factor structure is new, the items composing each of the five factors now cohesively measure the proposed dimension.

4.3 IMPLICATIONS FOR PROFESSIONAL DEVELOPMENT AND EDUCATIONAL POLICIES

The results of this study have significant implications for the formulation of professional development strategies and for the management of educational policies. *Self-Efficacy-Oriented Continuing Education:* Instead of focusing solely on the transmission of technical

knowledge, training programs for PECs should explicitly integrate strategies to strengthen self-efficacy. This can include:

- *Mastery Experiences:* Designing training activities that allow PECs to experience success in applying new strategies or solving complex problems.
- *Modeling (Vicarious Experiences):* Facilitating the exchange of experiences and the observation of successful PECs in different contexts.
- *Feedback and Encouragement (Social Persuasion):* Promoting a culture of constructive feedback and recognition.
- *Stress Management (Physiological and Emotional States):* Including modules for developing resilience skills, time management, and stress management.

Strengthening Specific Dimensions: The new factor structure of the EAEF-Educ provides a map for more targeted interventions. For example:

- For "Self-Efficacy in Social Interaction and Professional Development," invest in workshops on interpersonal communication, conflict mediation, and teamwork.
- For "Self-Efficacy in Goal Setting and Expression of Opinions," promote safe spaces for dialogue, presentation of proposals, and project leadership.
- For "Self-Efficacy in Meeting External Demands," offer clarity on expectations, project management tools, and support for work organization.

Development of Support Policies: Education Secretariats need to go beyond merely allocating tasks and develop support policies that recognize the importance of self-efficacy. This includes creating support networks, making pedagogical and technological resources available, and reducing administrative overloads that divert focus from the PECs' central pedagogical work.

4.4 STUDY LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

It is crucial to recognize the limitations of the present study to contextualize its findings and guide future investigations:

- *Sample Size:* Although representative of the target population in the state of São Paulo, the small sample size (N=66) is a limitation for more advanced statistical analyses and may have influenced the stability of some items in the bootEGA.
- *Contextual Specificity:* The study was conducted with PECs from the São Paulo state network. Although this ensures domain specificity, it limits the generalization of results to other educational contexts.

- *Cross-Sectional Study:* Being a cross-sectional study, the research offers a "snapshot" of PECs' self-efficacy at a given moment. Longitudinal studies would be valuable to investigate the development of self-efficacy throughout these professionals' careers.
- *Possibility of a General Factor:* The mention of the possibility of a general self-efficacy factor, suggested by the high correlations between factors, warrants investigation. Second-order factor analyses or bifactor models could explore whether a global self-efficacy pervades the specific dimensions.

Despite these limitations, the study makes a significant contribution to the field, offering an adapted and validated instrument to measure the self-efficacy of a crucial professional group, and opening pathways for a more nuanced understanding of self-efficacy beliefs in the complex landscape of Special Education.

5 CONCLUSION

Self-efficacy, a cornerstone of Albert Bandura's Social Cognitive Theory, proves to be an invaluable construct for understanding the performance and well-being of education professionals. This chapter investigated self-efficacy in the job performance of Curriculum Specialist Teachers (PECs) in Special Education, a professional group whose work is strategic for quality and inclusion in the São Paulo public network. The process of adapting the Self-Efficacy Scale in Higher Education (AEFS) for the context of job performance, resulting in the Self-Efficacy Scale in Function Performance – Education Context (EAEF-Educ), demonstrated the importance of contextual specificity in measuring self-efficacy. The non-confirmation of the original factor structure of the AEFS through Confirmatory Factor Analysis (CFA) was a crucial finding, indicating that the dynamics of self-efficacy beliefs differ substantially between the academic training environment and the professional performance setting. The subsequent Exploratory Graph Analysis (EGA) and Bootstrap Exploratory Graph Analysis (bootEGA) were fundamental in unveiling a new five-factor structure for the EAEF-Educ. This new structure, composed of dimensions such as "Self-Efficacy in Knowledge Application and Professional Training," "Self-Efficacy in Social Interaction and Professional Development," "Self-Efficacy in Goal Setting and Expression of Opinions," "Self-Efficacy in Meeting External Demands," and "Self-Efficacy in Problem Solving and Resource Seeking," offers a more precise and contextualized representation of PECs' self-efficacy. The validity of this new structure was confirmed by acceptable fit indices in the CFA, and its reliability was attested by high values of Cronbach's Alpha, McDonald's Omega, and Composite Reliability. The predominance of moderate self-efficacy levels and the presence of weak levels across all dimensions, identified in the PECs sample, underscore the need for focused interventions.

This implies that, although these professionals possess a reasonable level of confidence in their capabilities, there is considerable room for strengthening these beliefs, which could optimize their performance and resilience. The practical implications of this study are vast. Educational institutions and secretariats of education should consider self-efficacy as an explicit target in professional development and training programs for PECs. This means going beyond the mere transmission of content, incorporating strategies that promote mastery experiences, social modeling, verbal persuasion, and the management of physiological and emotional states. Investing in strengthening PECs' self-efficacy is not just an individual benefit but a systemic strategy to elevate the quality of teacher training and, consequently, improve the implementation of educational policies, especially in the complex and vital field of Special Education. Finally, this study opens doors for future investigations. The replication of the factor structure in larger samples and in different contexts, the exploration of the hypothesis of a general self-efficacy factor, and the deepening of longitudinal relationships between self-efficacy, well-being, and PECs' performance are promising avenues. By providing a reliable instrument and empirical evidence on the self-efficacy of such a strategic professional group, this work contributes significantly to the advancement of knowledge in psychometrics and education, paving the way for a more effective, inclusive, and sustainable educational environment.

REFERENCES

Bandura, A. (1993). Perceived self-efficacy in cognitive development and functioning. Educational Psychologist, 28(2), 117–148.

Bandura, A. (1997). Self-efficacy: The exercise of control. W. H. Freeman.

Bandura, A. (2001). Social cognitive theory: An agentic perspective. Annual Review of Psychology, 52(1), 1–26.

Bandura, A. (2005). Guide for constructing self-efficacy scales. In F. Pajares & T. Urdan (Eds.), Self-efficacy beliefs of adolescents (Vol. 5, pp. 307–337). Information Age Publishing.

Brasil. (2008). Política Nacional de Educação Especial na Perspectiva da Educação Inclusiva. Ministério da Educação/Secretaria de Educação Especial. http://portal.mec.gov.br/arquivos/pdf/politicaeducespecial.pdf

Brown, T. A. (2015). Confirmatory factor analysis for applied research (2ª ed.). Guilford Publications.

Cangur, S., & Ercan, İ. (2015). Comparison of model fit indices used in structural equation modeling under multivariate normality. Journal of Modern Applied Statistical Methods, 14(1), 152–167.

Christensen, A. P., Garrido, L. E., & Golino, H. (2020). Comparing community detection algorithms in psychological data: A Monte Carlo simulation. Psychological Methods, 28(2), 309–329.

DiStefano, C., McDaniel, H. L., Zhang, L., Shi, D., & Jiang, Z. (2019). Fitting large factor analysis models with ordinal data. Educational and Psychological Measurement, 79(3), 417–436.

Duan, S., Bissaker, K., & Xu, Z. (2024). Correlates of teachers' classroom management self-efficacy: A systematic review and meta-analysis. Educational Psychology Review, 36(2), 1–43.

Ferrari, I. P., Vilaronga, C. A., & Elias, N. C. (2019). Ensinando professores de sala comum a fazer adaptação curricular. Psicologia da Educação, 49, 67–77.

Fortunato, S. (2010). Community detection in graphs. Physics Reports, 486(3–5), 75–174.

Golino, H., & Christensen, A. P. (2022). EGAnet: Exploratory Graph Analysis – A framework for estimating the number of dimensions in multivariate data using network psychometrics (Versão 1.1.0) [Pacote R].

Golino, H., & Epskamp, S. (2017). Exploratory graph analysis: A new approach for estimating the number of dimensions in psychological research. PLoS ONE, 12(6), Article e0174035.

Golino, H., Shi, D., Christensen, A. P., Garrido, L. E., Nieto, M. D., Sadana, R., Thiyagarajan, J. A., & Martinez-Molina, A. (2020). Investigating the performance of exploratory graph analysis and traditional techniques to identify the number of latent factors: A simulation and tutorial. Psychological Methods, 25(3), 292–320.

Grice, J. W. (2001). Computing and evaluating factor scores. Psychological Methods, 6(4), 430–450.

Kline, R. B. (2016). Principles and practice of structural equation modeling (4ª ed.). Guilford.

Lai, K., & Green, S. B. (2016). The problem with having two watches: Assessment of fit when RMSEA and CFI disagree. Multivariate Behavioral Research, 51(2–3), 220–239.

Logan, J. A., Jiang, H., Helsabeck, N., & Yeomans-Maldonado, G. (2021). Should I allow my confirmatory factors to correlate during factor score extraction? Implications for the applied researcher. Quality & Quantity, 55(4), 1221–1245.

Lopes, S. M. M. (2024). Uma perspetiva de rede psicométrica em ciências sociais: Investigando medidas de auto-eficácia na educação especial [Dissertação de mestrado, Faculdade de Medicina de São José do Rio Preto].

Martins, B. A., & Chacon, M. C. M. (2019). Autoeficácia docente e educação especial: Revisão da produção de conhecimento nacional e internacional com ênfase na formação de professores. Revista Educação Especial, 32, 1–22.

McNeish, D., & Wolf, M. G. (2020). Thinking twice about sum scores. Behavior Research Methods, 52(6), 2287–2305.

Mok, S. Y., Rupp, D. E., & Holzberger, D. (2023). What kind of individual support activities in interventions foster pre-service and beginning teachers' self-efficacy? A meta-analysis. Educational Research Review, 40, Article 100552.

Pereira, J. C. (2015). Bioestatística em outras palavras. Edusp; Fapesp.

Polydoro, S. A. J., & Guerreiro-Casanova, D. E. de M. (2010). Escala de auto-eficácia na formação superior: Construção e estudo de validação. Avaliação Psicológica, 9(2), 267–278.

Qualls, L. W., Carlson, A., Scott, S. N., Cunningham, J. E., & Hirsch, S. E. (2024). Special education teachers' preservice experiences with mixed-reality simulation: A systematic review. Teacher Education and Special Education, 47(2), 124–141.

Rodríguez-Oramas, A., Álvarez, P., Ramis-Salas, M., & Ruiz-Eugenio, L. (2021). The impact of evidence-based dialogic training of special education teachers on the creation of more inclusive and interactive learning environments. Frontiers in Psychology, 12, Article 641426.

São Paulo (Estado). (2022). Resolução SEDUC nº 62, de 14 de julho de 2022. Dispõe sobre as funções de Professor Especialista em Currículo, de Coordenador de Equipe Curricular e dá providências correlatas. Diário Oficial do Estado de São Paulo, Seção I.

Schloerke, B., Cook, D., Larmarange, J., Briatte, F., Marbach, M., Thoen, E., Elberg, A., Toomet, O., Crowley, J., Hofmann, H., & Wickham, H. (2021). GGally: Extension to 'ggplot2' (Versão 2.1.2) [Pacote R].

Skaalvik, E. M., & Skaalvik, S. (2007). Dimensions of teacher self-efficacy and relations with strain factors, perceived collective teacher efficacy, and teacher burnout. Journal of Educational Psychology, 99(3), 611–625.

Tschannen-Moran, M., & Hoy, A. W. (2001). Teacher efficacy: Capturing an elusive construct. Teaching and Teacher Education, 17(7), 783–805.

Weissenfels, M., Benick, M., & Perels, F. (2021). Can teacher self-efficacy act as a buffer against burnout in inclusive classrooms? International Journal of Educational Research, 109, Article 101794.

Wickham, H. (2022). ggplot2: Elegant graphics for data analysis (3ª ed.). Springer.