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SCORES SELF-EFFICACY SOURCES OF BASIC EDUCATION TEACHERS

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ABSTRACT

Teaching self-efficacy refers to the belief of teachers in their ability to teach and promote the learning of their students. The aim of this study was to construct indexes of the sources of self-efficacy of Basic Education teachers. Participated in this study 495 teachers of a private network of denominational schools teaching Basic Education located in three states of Brazil, levels: Preschool, Elementary School, Middle School e High School, were used two instruments already validated in Brazil for data collection: participant's characterization questionnaire and its teaching activity and the sources Self-efficacy Scale Lecturer. The results indicate that the Domain Experience is the source of information most important self-efficacy, with higher rates with 46,75%. The Vicarious Experience occupied the fourth and last place among the built indexes with 7,26%, contrary to the findings in the literature that present the Vicarious Experience as one of the strongest influences in the formation of self-efficacy beliefs. It is hoped that this research will contribute to generate repercussions on school management policies that enable the enhancement of self-efficacy sources in teaching practice.

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INTRODUCTION

The beliefs of self-efficacy, while perceptions that people have about their skills in certain activities, are located in the core of the Social Cognitive Theory and are the basis for personal achievements, human motivation and well-being (CASTELO; LUNA, 2017). These beliefs, do not refer to the cleverness that the person has, but the judgments as to what you can do with any abilities that has (BANDURA, 1986). According to Chacón (2005), self-efficacy beliefs have been considered a relevant topic for research in educational practices in the past four decades. From the perspective of teaching, self-efficacy contributes to the determination of how teachers feel, think, and behave, motivated themselves in teaching practice of everyday (IAOCHITE; AZZI, 2012).

Teaching self-efficacy is defined as the belief in one's ability to organize and execute courses of action required to successfully perform a specific task of teaching in a particular context (TSCHANNEN-MORAN; HOY, 1998). The beliefs of teachers on their teaching skills can be indicators of their future behavior, influencing their own decisions and organizations in the classroom (FIVES; LOONEY, 2009). Information sources of self-efficacy beliefs are especially important because they form the theoretical foundation and the practical perspective that can help us interventions processes and educational counseling and can help to enhance and strengthen the perceptions of self-efficacy (ANDERSON; BETZ, 2001). Bandura (1997) points out that as important as identifying the source of the information, this is, the source, is to understand how individuals evaluate this information will

contribute to the establishment of self-efficacy beliefs for a given activity.

Self-Efficacy Sources: Bandura (1986, 1997), developed the supposition that the development of self-efficacy occurs through four sources of information: field experiences, vicarious experiences, social persuasion and emotional and physiological states, which have the function of providing information relevant to the forming such belief (ADAMS; FORSYTH, 2006). In addition to interpreting the results of their own actions, teachers build up their efficacy beliefs through vicarious experience, from observation of their peers, performing a certain action. Importantly, the impact of the influence of the observed pattern in the construction of the person's effectiveness belief that observes depends, among other things, the model similarity with himself (BANDURA, 1997, 2004). Verbal persuasion occurs when a person receives feedback and encouragement from others, which indicates that the person has the ability to perform a certain task (PALMER, 2011). Importantly, the influence of social persuasion in building the effectiveness of belief is seen as smaller than the influences that come from other self-efficacy of construction supplies, because it does not promote an authentic experience, held by the person (BANDURA, 1997, 2004). The emotional and physiological states also contribute to a sense of ability or incompetence, depending on whether they are experienced as a feeling of anxiety or excitement about the performance (TSCHANNEN-MORAN; JOHNSON, 2011). People who have a high sense of efficacy tend to see their emotional and physiological status as an energizing facilitator performance, while those which are characterized by low sense of efficacy consider his excitement as a debilitating (BANDURA, 1998). Efficacy beliefs are dynamic and are subject to fluctuation in their perceived confidence levels, due to the interpretations made in the face of life circumstances and / or the environment (BANDURA, 2000). That is, depending on the situation, two or more sources can operate together, influencing how the self-efficacy belief is perceived. Efforts have been employed in an attempt to better off understand to what extent and how these sources contribute to the formation of these beliefs (IAOCHITE; AZZI, 2012). This article in particular, use the construction of the indexes for increasing the understanding of the sources of self-efficacy.

Indexes Construction: The index construction is an increasingly used resource for monitoring and comparison of certain phenomenal or aspects of reality. (VAITSMAN; FARIAS; MATTOS; SON, 2003). Technically indexes are ordinal measures of variables, built to order the answers to a questionnaire or other data collection instrument in terms of specific variables such as satisfaction, performance and etc. (CUNHA, 2006). The use of the different index allows answers are summarized into a single score, without losing specific details and keeping almost the whole of the information (BABBIE, 2001). The construction of an index is based on an arithmetic average (simple, weighted or geometric) of the scores attributed to aspects, variables, specific items or questions that make up the index, then is a measure based on answers to a questionnaire item, where each reply has a specific value within a defined range (CUNHA, 2006). From the above, this article aims to show the process of building indexes of the sources of self-efficacy of Basic Education teachers. For this, you need to describe the process of building an index and classify information sources of self-efficacy by importance by degree of importance to the participating teachers in this study.

METHODS

Study Population and Sampling: This study was applied to teachers in the states of Pará, Amapá and Maranhão, located in Brazil in school private and religious schools of Basic Education. It was initially obtained the population of teachers in early childhood (82), Education Elementary (814) and high school (183), totaling of 1079 teachers in the three States.

Then we obtained weights proportionally the population of teachers by state and level of education, presenting a quantitative in each level of education of (1.0000), from,

$$\text{Weight} = \frac{\text{population of a particular type of school teachers}}{\text{total population of the state teachers}}$$

The sample size was determined by state, from, For example,

$$n = \frac{N \times n_0}{N + n_0},$$

Where $onde \quad n_0 = \frac{1}{e^2} = \frac{1}{0{,}05^2} \quad (e = Erro\ Amostral\ )$ (e = sampling error).

Then we measured the stratified sample sizes for each of the states and levels education, from: n^1 type of education (State) = whole (weight x n) + 1, where n^1 = Sample size

The sample was taken by the state to improve the calculation of sampling, but it is worth noting that this study will not be performed comparative analyzes. After obtaining the sample size, the study participants were randomly selected from the draw. The final sample has undergone a subtle difference of the initial sample. Be interviewed 486 teachers. However, with the distribution population by level of education and state and also because they were drawn in proportion, by state and level of education, some teachers to questionnaires "reserve", the initial value was increased, so the final sample of 495 teachers. Thus, the sample was selected with all scientific accuracy to be obtained results that portray the reality of teachers schools in the three states, was reduced sampling error of 5% to 3,3%.

Collection Devices: The instruments used in this study were validated in Brazil and to characterize the participants (GUERREIRO CASANOVA, 2011) and evaluate the sources of teacher self-efficacy (IAOCHITE; AZZI, 2012). With this instrument we aim to investigate the origin of the beliefs of teacher self-efficacy. It consists of 16 items distributed at intervals of 1 to 6 (totally false totally true). The instrument is organized as follows: in relation to Domain Experiences - items 5, 10, 12 and 13; Experiments relating vicarious - items 1, 2 and 6; referring to Social Persuasion - items 3, 11, 14 and 15; for the United Affective and Physiological - items 4, 7, 8, 9 and 16.

Procedures: This study was submitted and approved the Ethics Committee that approved by Opinion Nº 766.978. After approval of the ethics committee and general coordination of the network of private and denominational schools in the three states was initiated data collection with advance scheduling of time to carry out a training of the instruments to be used in

data collection. Teachers randomly selected to participate in the study were divided into groups for guidance and monitoring of the fulfillment of the scales, since it was self-administered questionnaires. The questionnaire about participants, followed by questionnaire sources of teacher self-efficacy was first applied.

Data Analysis

For data analysis and construction of index was used factor analysis technique (AF) is a multivariate statistical technique of interdependence that seeks compress the observed relations between a set of interrelated variables in the search for common factors (FAVERO *et al*, 2009). The idea is to represent a set of original variables observed in fewer intrinsic factors, whose main objective is to define the underlying structure of a data matrix (MAROCO, 2007). To perform the factor analysis was carried out using SPSS software, version 20.0.

RESULTS AND DISCUSSION

Construction Process of self-efficacy Sources Index

For the technique of application of factor analysis (FA), it was necessary to meet some assumptions. Initially, we performed the normality test and then the identification of the existence of outliers (outliers in the data set). Met the initial assumptions, the analysis was made of the correlation matrix, in which according to Hair Jr. et al. (2005), most of the correlations should be equal to or greater than 0,30, the correlations are obtained from

$$r_{xy} = \frac{\sum xy - \frac{\sum x \sum y}{n}}{\sqrt{\left[\sum x^2 - \frac{(\sum x)^2}{n}\right]\left[\sum y^2 - \frac{(\sum y)^2}{n}\right]}}$$

Checking the fit of the factor analysis was necessary to analyze the statistics of Kaiser-Meyer-Olkin (KMO), whose values range from 0 (Unacceptable) to 1 (Excellent), the closer to 1 the value, the more appropriate is the use of the technique (MAROCO, 2007). Given the adequacy of the data for the application of multivariate technique, was performed Bartlett's sphericity test, which assesses whether the correlation matrix is equal to the identity matrix and the analysis of the anti-image matrix, which indicates through Measure Sample adequacy of (MAA) if the variable in question is suitable for use in the art, namely, the closer to 1 the value of MAA, most appropriate for the application, values greater than or equal to 0,5 MAA indicates that the variable is important in constructing indices (factors). To determine the amount of extracted factors, this is, number of equations needed to build the indexes, we used the Kaiser's criterion to determine the factors that have values greater than 1, the others were dropped from the analysis. The factors were then rotated through the Varimax method, so that each factor could maximize information of each variable used in the construction of indices. To calculate the factor (indexes) of each teacher were multiplied the individual scores given to each question by the teacher by the factor weights. To facilitate interpretation of the rates for standardization of the values obtained was made so that they could be evaluated on a scale from 0 to 1 or 0 to 100%. In this case, the ith standardized value of an index is obtained by $FP_i = \left(\frac{F_i - F_{min}}{F_{max} - F_{min}}\right)$; where Fi is the i-th score teacher and Fmin and Fmax are respectively the minimum and maximum values observed for the factor scores associated with each teacher.

Application Results of Factor Analysis to Data Set

From the factor analysis (FA) can be seen in Table 1 a considerable number of correlations with descriptive level values (in parentheses) of less than 0,05 (5%) for the variables used in the construction of indexes: Y1 Domain experience; Y2 Vicarious Experience; Y3 Verbal Persuasion and Y4 Affective and Physiological States indicate that all variables are appropriate for the application of factor analysis technique. In Table 2, it can be seen that KMO statistic values for Y1 Field experience; Y2 Vicarious Experience; Y3 Verbal Persuasion and Y4 Affective and Physiological States are greater than 0,50, indicating that there appropriateness of factor analysis to the set of variables (questions). In addition, the descriptive level of sphericity Bartlett test (p = 0,000), this results in the rejection of the hypothesis of correlation matrix is an identity matrix. These results support the use of factor analysis to extract factors and the estimation of factor scores and subsequent construction of the indices. All MAA values for the variables (questions) required for the construction of Y1 rates Domain Experience; Y2 Vicarious Experience; Y3 Verbal Persuasion and Y4 Affective and Physiological States, individually obtained an acceptable area for the application of factor analysis technique, that is, all MAA values are greater than 0,50. The factors obtained were able to restore more than 50% of the variables set information (question), as can be seen from the Var%. However, please note that the standard used to retention factor was not the Var% refunded but the Kaiser standard. Two factors were retained by the Kaiser standard, this is, those with higher value 1 for the Construction of Domain Experience Index (Y1). For the construction of Vicarious Experience Index (Y2); Persuasion Index Verbal (Y3) and Index of Affective States and Physiological (Y4), only one factor was retained. Most variables (questions) had returned their information satisfactorily by retained factors, paralleling the commonality of values greater than 0,50 (50%). The exceptions are the variables (questions) P1 (0,355), P3 (0,170), P4 (0,392), P11 (0,463) and P16 (0,436), but based on the MAA these variables were kept in the building process of the indexes. Most variables had at least moderate correlation ($r \geq 0,50$) with at least one of factors retained exception was the variable (question) P3 has r = 0,413, i.e., a weak correlation with Verbal persuasion index, however MAA based on this variable was retained in this index construction process. Thus, from the factor scores, rates of: Domain Experience (Y1), Vicarious Experience (Y2); Persuasion Index Verbal (Y3) and Index of Affective States and Physiological (Y4), respectively, Domain experience = 0,896 × P5 + 0,388 x 0,341 x P10 + P12 + 0,456 × P13 (6); Vicarious experience = 0,343 × P1 + P2 + 0,430 x 0,597 x P6 (7); Verbal Persuasion = 0,146 × P3 + 0,340 x 0,315 x P11 + P14 + 0,556 × P15 (8); States Affective and Physiological = 0,228 × 0,325 × P7 P4 + 0,307 × 0,265 × P9 P8 + + 0,241 × P16 (9)

In the indexes obtained (Equations 6, 7 8 and 9) the positive values of the variables of the coefficients (questions), indicated that the greater the score obtained value for a given teacher, the greater the influence of particular source of teaching self-efficacy. After getting the Domain Experience Index (Y1),

Vicarious Experience (Y2); Persuasion Index Verbal (Y3) and Index of Affective States and Physiological (Y4), it was really possible to calculate the factor scores for each teacher, for instance, for the first professor of the database. From the factor scores of each teacher the standardization of values was performed, so that they could be evaluated on a scale from 0 to 1 or 0 to 100%. Thus, for the first teacher data base, the following standardized scores were obtained, (*i*) Standardized score Domain Experience Index (EPIED), for the first professor of the database, $\text{EPIED}_1 = \left(\frac{F_i - F_{min}}{F_{max} - F_{min}}\right) x100 = \left(\frac{11,57-2,08}{12,49-2,08}\right) x100 = 91,23\%$; (*ii*) Standardized score Experience Index Vicarious (EPIEV), for the first professor of the database, $\text{EPIEV}_1 = \left(\frac{F_i - F_{min}}{F_{max} - F_{min}}\right) x100 = \left(\frac{8,22-3,08}{8,22-3,08}\right) x100 = 100,00\%$; (*iii*) Standardized score of Verbal Persuasion Index (EPIPV), for the first professor of the database, $\text{EPIPV}_1 = \left(\frac{F_i - F_{min}}{F_{max} - F_{min}}\right) x100 = \left(\frac{7,13-1,36}{8,14-1,36}\right) x100 = 85,01\%$; (*iv*) Standardized score of Affective and Physiological States Index (EPIEAF), for the first professor of the database, $\text{EPIEAF}_1 = \left(\frac{F_i - F_{min}}{F_{max} - F_{min}}\right) x100 = \left(\frac{7,06-1,37}{8,20-1,37}\right) x100 = 83,34\%$. After getting the standardized factor scores of each teacher for the four indexes, a classification of teachers was conducted in five distinct groups. The classification was based on the theory of sampling percentiles (BUSSAB; MORETTIN, 2011). Therefore, the set of standard values of each index scores was divided as follows: Group 1 Teaching with scores from 0 to 50% (teacher group with the lowest scores); Group 2 - Teachers with scores 51-70%; Group 3 -Teachers with scores 71-80%; Group 4 -Teachers with scores 81-90% in Group 5 - Teachers with scores 91-100% (group of teachers with higher scores).

General Index of Self-efficacy Sources: From the Factorial Score produced by each index was obtained the General Index of the sources of teacher self-efficacy. Thus, from the AF was possible to see a considerable number of correlations with descriptive level values (in parentheses) of less than 5% for the indexes used in the construction of the overall index. Correlations were Vicarious Experience / Verbal Persuasion (r = 0,547; p = 0,000); Vicarious experience / Affective States and Physiological (r = 0,371; p = 0,000); Verbal Persuasion / Affective States and Physiological (r = 0,116; p = 0,005). The values were greater than 0,50 KMO, indicating that there was suitable of factor analysis to the set of variables (indices). In addition, the descriptive level of Bartlett test (p = 0,000) and this entails the rejection of the hypothesis of correlation matrix is an identity matrix. These results support the use of factor analysis to extract factors and the estimation of factor and subsequent construction of the overall index scores. All MAA values for the variables, required for the construction of the overall index, individually met in acceptable area for the application of factor analysis technique, that is, all MAA values were greater than 0.50.

The values are respectively: Domain Experience (0,658a), Vicarious Experience (0,729a), Verbal Persuasion (0,695a), Affective and Physiological States (0,732a). The obtained factor could restore more than 50% of the variables set information (questions). However, please note that the principle or standard used to retention factor was not the Var% refunded but the Kaiser standard. One factor was retained by the Kaiser standard, this is the one with the higher value 1 for the construction of the overall index. All variables (indexes) had given back its information satisfactorily by retained factors had commonality of values greater than 0.50 (50%), namely: Domain experience (0.812), Vicarious Experience (0.202), Verbal Persuasion (0.491) and the United Affective and Physiological (0.473). Most variables showed up at least moderate correlation ($r \geq 0.50$) with the factor (General Index) retained the exception occurred in Vicarious Experience Index which showed r = 0.458, this is, a weak correlation with the General Index, but based on the MAA this index has been kept in the General Index construction process. Thus, from the factor scores, the General Index is given by

$$\text{General index} = 0,605 \times Y_1 + 0,094 \times Y_2 + 0,213 \times Y_3 + 0,382 \times Y_4 .$$

Contents in the positive values of variables coefficients (ratios) indicated that the greater the score obtained value for a given teacher, the greater the influence of self-efficacy information sources. After getting the General Index was possible to calculate the factor scores for each teacher.

From the factor scores of each teacher standardization of the values obtained was made, so that they could be evaluated on a scale from 0 to 1 or 0 to 100%. Thus, for the first teacher data base, the following standardized score was obtained, Standardized score the General Index (EPIG) for the first professor of the database, $\text{EPIG}_1 = \left(\frac{F_i - F_{min}}{F_{max} - F_{min}}\right) x100 = \left(\frac{11,99-2,36}{13,19-2,36}\right) x100 = 88,89\%$.

Indexes degree of importance in the construction of contents: Assessing the degree of importance of each of the four indexes developed Domain Experience (Y1), Vicarious Experience (Y2); Verbal Persuasion index (Y3) and Index of Affective States and Physiological (Y4), the construction of the overall index we used the value of the coefficients associated with these indexes. Consider General Index, given by General index = 0.605 × 0.094 × Y1 + Y2 + Y3 + 0.213 × 0.382 × Y4 . It is noteworthy that the sum of the coefficients is = 0.605 + 0.094 + 0.213 + 0.382 = 1.294. The coefficient associated with the Domain Experience Index (Y1) = 0.605, representing 46.75% of the total coefficients, being then the index, the more important and greater contribution in shaping the overall score of the teacher. The prominent position of the related content to domain experience confirms the findings in the literature that emphasize that this type of experience is the main source of effectiveness information as it can provide an accurate assessment of their abilities (BANDURA, 1997; TSCHANNEN-MORAN *et at*, 1998). Studies document the influence of this source in the self-efficacy of teachers. Tshannen-Moran and Hoy (2007) conducted a large-scale research and found that field experiments were the main influence on the self-efficacy beliefs of teachers. Another study by Uzuntiryaki (2008), which aimed to explore the underlying factors in the development of future chemistry teachers self-efficacy in Turkey showed similar results indicating that the domain experience strengthened the self-efficacy beliefs quite often. The Affective States Index and Physiological (Y4) = 0.382 is the second most important in the construction of the overall index, as $\frac{0,382}{1,294} x100 = 29,52\%$, confirming some findings in the literature report that this source exerts considerable influence on self-efficacy beliefs. Ruble, Usher and McGrew (2011) found significant

associations between affective and physiological states and self-efficacy, but no associations with the other sources were observed, this study especially aimed to explore the relationship between the sources of self-efficacy and self-efficacy with teachers students with autism. The third most important rate was the Verbal Persuasion (Y3) = 0.213, as $\frac{0,213}{1,294} x100 =$ 16,46%. The literature has shown up different results regarding the influence of persuasion on the self-efficacy beliefs of Burley teachers, Hall, Villeme and Brockmeier (1991) and Woolfolk Hoy and Spero Burke (2005) found positive relationships between the beliefs of self-efficacy and verbal persuasion coming the administrative body, co-workers, parents and the community, especially for early-stage teachers. In a study by Yeung and Watkins (2000), referring to the teachers' beliefs about their teaching abilities, it realized that the verbal persuasion (through pedagogical supervision) and domain expertise (through the experiences while practicing education) were the most influential sources for effectiveness of teachers.

Importantly, the influence of verbal persuasion in the construction of self-efficacy beliefs is seen as smaller than the influences that come from other self-efficacy of construction supplies, because it does not promote an authentic experience held by the person (BANDURA, 1997, 2004). The result of this study confirms this information, as this source had one of the lowest, ranking third in the overall index of the sources of self-efficacy.

At last, the index Vicarious Experience (Y2) = 0.094, was the least since amounted to $\frac{0,094}{1,294} x100 =$ 7,26%. These data contradict the information postulated in the literature that have the vicarious experience as a strong influence on the beliefs of self-efficacy. Johnson (2010), in a study of future teachers in the US, found that the vicarious experience positively influenced the self-efficacy of teachers for effective literacy. Bandura (1997) states that, depending on the similarity of the models of demographic characteristics, or the competence of the referring person, a sense of efficacy can be increased or decreased by the observation of successes or failures of others.

FINAL CONSIDERATIONS

Research into the sources of information of teaching self-efficacy beliefs is recent, and literary production is scarce. The literature review suggests the pioneer of this research on the sources of teacher self-efficacy in northern and northeastern Brazil. The results of this research show that the domain expertise is the most influential source in forming the beliefs of teachers, followed by emotional and physiological states, and finally verbal persuasion, vicarious experiences. The results for vicarious experiences contradict the published findings that show this as one of the most influential sources in the constitution of self-efficacy beliefs. It is important that further studies be carried out with the construction of indexes to indicate which factors are needed to raise the beliefs of teacher self-efficacy, to enable strategies to improve the teaching beliefs and the quality of education, with which educational institutions can mobilize in search of improvements. It is hoped that this study has contributed to stimulate reflection on the construct here discussed and their implications for teaching practice.

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