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Impact Of Training At Work In An Electrical Energy Organization

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Abstract
The study aimed to examine the relationship between transfer support and the impact of training at Eletronorte, considering two aspects: depth and breadth according to the perception of employees. Additionally, it sought to understand how these employees perceive the elements of transfer support and the impacts of training and whether personal and functional data influence this perception. Self-assessment and hetero-assessment questionnaires were used with 57 participants from different training sessions. The impact assessment conducted three months after the training focused on the impact in depth (direct effects of training at work), transfer support (support to apply the learning), and impact in breadth (effects on more general skills). The results indicated that the training had applicability and a positive impact at work but not necessarily on broader skills. Transfer support was generally perceived as positive, but no significant correlations were found between transfer support and the impact of training, nor was the influence of individual characteristics considered relevant. The study also highlights limitations and suggestions for future research in the area.

Keywords*: Training, Development, and Education; Training Impact at Work; Transfer Support.*

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I. Introduction

This article aims to examine the relationship between transfer support and the impact of training at work, considering the depth and breadth of these impacts. Training plays a crucial role in organizational development, adapting to the constant technological, economic, and social changes that mark the global scenario (Abbad, Pilati, & Pantoja, 2003; Pantoja, Lima, & Borges-Andrade, 2001). The acceleration of technological innovations and globalization demands new competencies, highlighting the importance of continuous learning for the competitiveness and survival of organizations (Tamayo & Abbad, 2006).

The transformations in the economic scenario, including outsourcing, new management models, and automation, intensify competition and define new competencies, increasing the need for professional qualification (Pantoja, Lima, & Borges-Andrade, 2001). The Industrial Revolution and globalization reinforced the need for labor specialization and professional training that meets the demands of an increasingly competitive market (Mourão & Puente-Palacios, 2006).

Training emerges as a fundamental strategy to face these challenges, being considered a key element for quality, productivity, and the employability of workers. The evolution of Training, Development, and Education (TD&E) processes reflects the pursuit of meeting the needs of a workforce that requires constant updating of knowledge, skills, and attitudes (Carvalho & Abbad, 2006; Mourão & Puente-Palacios, 2006).

The effectiveness of TD&E programs can be influenced by contextual variables such as transfer support that affect the application of competencies at work. The importance of training evaluation lies in the ability to measure the impact of these actions on the performance of individuals and the organization, also considering external factors that can influence these results (Leitão, 1996; Freitas et al., 2006; Salas & Cannon-Bowers, 2001 as cited in Mourão, Borges-Andrade, & Salles, 2006).

This study focuses on analyzing Transfer Support and the Impact of Training at Work, seeking to understand how these variables interact and influence the effectiveness of training. It recognizes the need for training that produces tangible results and the importance of considering additional variables that may affect the practical application of acquired competencies. The investigation centers on an organization that continuously invests in training for its technical-operational staff, aiming to analyze the effectiveness of these initiatives in generating concrete improvements in organizational performance.

II. Theoretical Framework

Modernity and Innovative Practices in Human Resource Management and TD&E

Organizations face challenges imposed by globalization and technological advances, requiring adaptations in their structures and management practices. Gonçalves (1997) emphasizes the importance of innovating in response to the demands of the new business environment, highlighting the need for strategies and policies that promote competencies aligned with modernity. Fleury and Fleury (2001 as cited in Kilimnik & Sant'Anna, 2006) reinforce that integration, communication, and innovation are essential, as well as the role of Human Resources management in attracting, retaining, and developing talents. This scenario requires a reevaluation of traditional management models in favor of practices that stimulate continuous learning and creativity (Castro, Kilimnik, & Sant'Anna, 2008).

Innovation arises as a response to the need for change, being fueled by creativity and transformation within organizations (Gondim et al., 2006). John Kao (1996 as cited in Terra, 2000) highlights the importance of innovative ideas translated into value through well-structured processes. Implementing innovative practices requires not only managerial decisions but also the involvement and training of employees, promoting an environment that fosters learning and innovation.

The evolution of management practices is driven by the need to adapt to the new competencies required at both individual and organizational levels, questioning the effectiveness of current management models in promoting the necessary development to face modern challenges (Kilimnik & Sant'Anna, 2006). Competency-based management is pointed out as an alternative, assuming the development of skills that enhance organizational results (Freitas & Brandão, 2006).

Competence, seen as the synergy between knowledge, skills, and attitudes applied in the professional context, is fundamental for aligning individual actions with organizational strategies. It is crucial that organizations create conditions that not only allow the development of competencies but also their effective application, promoting a culture that supports innovation and continuous development (Castro, Kilimnik, & Sant'Anna, 2008; Freitas & Brandão, 2006).

This overview highlights the importance of innovative and adaptive human resource management that recognizes and fosters individual competencies in line with organizational objectives, ensuring competitiveness and sustainability in the globalized scenario.

Training, Development, and Education (TD&E)

Organizations face significant challenges due to environmental changes and globalization, requiring adaptations in their strategies, structures, and management practices to remain competitive. Gonçalves (1997) argues that modernity requires organizations to adopt new approaches beyond traditional management practices to meet the demands of the current business environment. This implies the need for innovation, creativity, and creative solutions that enable organizations to face competition and modern demands.

Fleury and Fleury (2001 as cited in Kilimnik & Sant'Anna, 2006) and Castro, Kilimnik, and Sant'Anna (2008) highlight the importance of organizational designs that promote integration and communication, valuing competencies geared towards innovation and a more strategic Human Resources function. This involves transforming the organizational culture, the roles of managers and employees, and promoting a continuous learning and development environment.

Innovation is seen as crucial in this new scenario, directly related to creativity and change. According to Gondim et al. (2006), the ability to innovate depends not only on management but also on the involvement and training of all members of the organization, requiring an environment that stimulates creativity and continuous learning.

Loiola et al. (2003 as cited in Gondim et al., 2006) and Kilimnik and Sant'Anna (2006) emphasize the need to evaluate and adapt management practices to respond to contemporary demands, especially in human resource management, to develop and apply new competencies required by the market.

Competency-based management emerges as an alternative model to face instability and promote organizational development (Freitas & Brandão, 2006). This model emphasizes the importance of developing competencies aligned with organizational objectives, considering the organization's expectations and the professionals' individual aspirations (Freitas & Brandão, 2006)..

Competence, defined as the combination of knowledge, skills, and attitudes expressed in professional performance (Freitas & Brandão, 2006, p. 98), is fundamental to link individual actions to the organization's strategy. Le Boterf (1994 as cited in Castro, Kilimnik, & Sant'Anna, 2008) argues that competence depends on the context and the ability to mobilize knowledge and skills in work situations, being influenced by organizational policies and practices.

Therefore, organizations must adapt to the new business context, adopting human resource management practices that favor the development, application, and retention of necessary competencies,

creating an environment that supports organizational modernity and contributes to competitiveness and innovation.

The literature in the field of training and development indicates, as in any other area of knowledge, a plurality of concepts and definitions. According to Lawrie (1990, as cited in Vargas & Abbad, 2006), even professionals working in the areas of people management in organizations cannot distinguish between training, development, and education. It is important to work on these concepts because it is from a clear definition that one can better understand their meaning and application (Vargas & Abbad, 2006), as these terms have often been used interchangeably. From this perspective, a historical analysis of the T&D field highlights the dimension that the training process has come to occupy in work organizations.

Processes in T&D&E

The system of training, development, and education (T&D&E) is viewed as an integrated set that includes needs assessment, planning and execution, and final evaluation. Borges-Andrade (2006) describes this system as a continuous cycle of feedback and improvements, where each component influences and is influenced by the organizational context, including essential internal and external variables for training success.

The needs assessment identifies competency gaps at organizational, task, and individual levels, considering both current and future demands. This process is crucial for defining training objectives aligned with organizational strategies and needs to consider factors beyond technical skills, such as organizational support and the climate for learning and knowledge transfer (Abbad, Freitas, & Pilati, 2006).

The planning and execution of training involve transforming the identified needs into specific instructional objectives and applying appropriate methods and strategies to achieve them. This includes choosing the course modality, developing sequential content, and selecting instructional procedures that facilitate learning and practical application of acquired knowledge (Abbad et al., 2006b).

Finally, training evaluation is a systematic data collection process that allows analyzing the effectiveness of T&D&E, providing valuable information for future adjustments and improvements. This stage evaluates whether the training objectives were met, participant satisfaction levels, and the applicability of the learning in the work context, thus contributing to the continuous improvement of the T&D&E system (Borges-Andrade, 2002; Carvalho & Abbad, 2006).

Therefore, the T&D&E system is a dynamic process that requires the effective integration of needs assessment, detailed planning and execution, and rigorous evaluation to ensure that training efforts are aligned with organizational needs and contribute to the professional development of individuals and the improvement of organizational performance.

Training Evaluation

Training evaluation is crucial to determine the effectiveness of instructional activities, aiming for necessary improvements and adaptations. According to Meneses and Abbad (2003) and Hamblin (1978), this stage not only measures the direct and indirect impacts of training but also evaluates its relevance and capacity to induce organizational changes. Evaluation, integral to the training process, must be continuous, encompassing both positive and negative aspects, to constantly enhance training.

There are two main types of evaluation: formative, which monitors the learning process, allowing real-time adjustments, and summative, which measures the final results of instruction. Both are complementary, offering insights for refining training programs. Additionally, confirmatory evaluation focuses on long-term retention and effective transfer of learning to the work environment.

Borges-Andrade (2006) and Kirkpatrick (1976) propose levels of evaluation ranging from participants' immediate reaction to the final impact on the organization, including the transfer of learning to job performance. This multifaceted approach highlights the importance of considering both immediate results and long-term impacts, including organizational changes and economic benefits.

The Integrated and Summative Evaluation Model (ISEM), developed by Borges-Andrade (1982), suggests a comprehensive evaluation that includes inputs, procedures, processes, results, and the environment, emphasizing the need for a detailed analysis to understand training success and identify areas for improvement. This model underscores the crucial role of the organizational environment, both internal and external, in training effectiveness, indicating the importance of adequate organizational support for the effective application of acquired skills and knowledge.

Impact evaluation, as discussed by Abbad (1999) and Meneses and Abbad (2003), focuses on the long-term effect of training on participants' performance, considering not only the transfer of learning but also the organizational factors that facilitate or hinder the effective application of this learning. This focus on long-term impact and transfer to work reflects a deeper and holistic understanding of training effectiveness.

Finally, considering contextual variables, such as organizational support and working conditions, is fundamental to understanding the complexity of training transfer and impact on performance. Analyzing these

variables provides valuable insights for developing strategies that maximize the return on investment in training, promoting work environments that support the effective application of acquired competencies.

III. Methodology

Sample Description

The research was conducted with two distinct groups of employees within the Eletrobras workforce: employees who effectively participated in the training (self-assessment) and their immediate managers (hetero-assessment). The hetero-assessment sample consisted of 38 managers, but personal and functional data were not collected from this group. The self-assessment sample consisted of 57 employees who completed the course. The following sections present the personal characteristics (gender, age, and educational level) and functional characteristics (length of service and job position) of this group.

Tabela 1 –

Descriptive results of personal and functional data

Variable	F	%	Variable	F	%
Gender			Age		
Male	46	80.7	Up to 25 years	3	5.3
Female	1	1.8	26 to 35 years	9	15.8
Education			36 to 45 years	12	21.1
Completed Elementary School	2	3.5	46 to 55 years	15	26.3
Incomplete High School	2	3.5	Above 56 years	8	14.0
Completed High School	32	56.1	Length of Service		
Incomplete Higher Education	5	8.8	Up to 5 years	7	12.3
Completed Higher Education	6	10.5	6 to 10 years	5	8.8
Job Position			11 to 15 years	3	5.3
System Operator	24	42.1	16 to 20 years	6	10.5
Production Operator	2	3.5	21 to 25 years	9	15.8
Operations Technician	13	22.8	Above 26 years	17	29.8
Power Plant Production Operator	3	5.3			
Electrical Maintenance Technician	3	5.3			
Maintenance Specialist	1	1.8			
Engineering Technical Assistant	1	1,8			

The majority of the sample consists of male participants (80.7%), making it a homogeneous sample. Most respondents are between 46 and 55 years old, which represents 26.3% of the sample. However, there is also a significant number of individuals aged between 36 and 45 years, corresponding to 21.1% of the sample. Regarding the level of education, a large portion of the respondents have completed high school (56.1%).

As for the positions held within the organization, a significant number of employees are System Operators (42.1%), with a considerable number of Operations Technicians, accounting for 22.8% of the sample. It is also noteworthy that most employees (29.8%) have been with the company for more than 26 years. This sample is composed of older individuals with substantial tenure in the organization.

Research Instrument

The development of the research instrument was based on Hamblin's (1978) concepts and the theoretical assumptions of Borges-Andrade's MAIS model (1982) previously explained. The instrument used by the Training Evaluation System (SAT) aims to provide reliable information to Eletronorte regarding the effectiveness (efficiency and efficacy) of the educational activities carried out and/or sponsored by the company.

For the construction of the questionnaires used, the technicians from Eletronorte's corporate education area were trained in the theoretical assumptions related to training evaluation and its levels—reaction, learning, impact, efficacy, and satisfaction of the requesting clients—from which the items for the Reaction and Impact evaluation questionnaires were formulated. These questionnaires underwent two extensive and intensive statistical validation processes (semantic and psychometric), being considered accurate and consistent.

The instrument was designed to evaluate a Technical-Operational training offered by the organization, which is part of the System Operators Recycling Program (ROSI). This course is divided into modules, which include: interpersonal relationships; institutional processes; Portuguese; communication; mathematics; professional ethics; operations planning; occupational safety; electrical engineering; arrangements and maneuver theories; and electrical machines. This training was offered to all power system operators, aiming to improve operational efficiency and effectiveness, promoting the recycling and updating of knowledge related to standards, techniques, and operation procedures.

The self-assessment questionnaire addresses three areas: Deep Impact, evaluating specific competencies acquired; Transfer Support, measuring the psychosocial and material support received to apply the learned skills; and Broad Impact, investigating the general effects of training. These areas are evaluated on a 5-

point scale, ranging from "none" to "very large" impact or support. The hetero-assessment questionnaire, completed by managers, follows a similar structure, but with changes in Transfer Support and maintains the same evaluation for Deep and Broad Impact, excluding only one item from the self-assessment. Both assessments aim to understand the training's effectiveness in professional and operational development.

Data collection was conducted in two ways: using a self-assessment questionnaire, completed by the trainees themselves, and a hetero-assessment questionnaire, completed by the immediate manager. The evaluation instruments were sent by email three months after the course ended, with deadlines for returning the completed questionnaires. The return deadline was twenty-one days, divided into three stages: a first email with a delivery deadline of eight days, the second with a deadline of eight days, and the last of five days. Once returned, these were forwarded to the person responsible for the process in the Training Evaluation area (SAT), and the data were tabulated by a team member. The research was conducted using already collected data, utilizing information from an existing database. The responses obtained through the evaluation instruments were recorded in a file using SPSS (Statistical Package for the Social Sciences).

IV. Results

Descriptive Results of the Deep Impact Variable (Self-Assessment)

Table 2 shows the descriptive results of the Deep Impact variable, which aimed to measure employees' perception of the competencies acquired during the training, as specified in the course objectives. This was evaluated using a 5-point frequency scale: 0 – No result at work; 1 – Little result at work; 2 – Moderate result at work; 3 – Great result at work; 4 – Very great result at work.

Tabela 2

Descriptive Results of Deep Impact

Itens		Mean			Standard Deviation	
1. Writing operation documents correctly.		3,52			0,60	
8. Practicing maneuvers safely on SEP equipment.		3,46			0,80	
5. Identifying the actions of electrical protections in SEP disturbances.		3,35			0,74	
4. Identifying load rejection schemes at Eletronorte.		3,35			0,72	
6. Using standard communication in SEP operation.		3,28			0,84	
3. Identifying the laws governing the National Electric System.		3,07			0,65	
9. Identifying ANEEL, ONS, and INMETRO requirements in instrument calibration.		2,84			0,78	
2. Identifying the environmental impacts of the Electric System.		2,792			0,76	
7. Identifying the main results of the annual and monthly operation plan.		2,63			0,90	
Deep Impact Factor		**3,14**			**0,51**	

The mean scores of the factor range from 2.63 to 3.52, indicating that the competencies developed in the training are important for the employees, who are applying the acquired knowledge in their work context. The competencies addressed through the training action are perceived as having a moderate to a great result in the work.

In this 5-point scale, standard deviations above 0.94 were considered high. In this factor, no standard deviation value exceeded 0.94, indicating that, in all activities, employees perceive the learned competencies homogeneously, meaning that people tend to perceive the value of these competencies similarly and compatibly. Probably, the employees perform similar functions in predominantly operational areas, assigning similar values to the competencies.

Item 1 ("Writing operation documents correctly") obtained the highest mean and the lowest standard deviation (M=3.52, SD=0.60), which means that employees perceive this competency as important for their job performance and tend to think similarly about its importance and usefulness. On the other hand, item 7 ("Identifying the main results of the annual and monthly operation plan") obtained the lowest mean and the highest standard deviation (M=2.63, SD=0.90), indicating that employees express these competencies reasonably, with a certain homogeneity of opinions.

The Deep Impact factor obtained M=3.14 and SD=0.51, indicating that the competencies developed in the training, as expressed in the course objectives, generated a great result in the work, meaning they were in accordance with the activities performed by the employees and thus contributed to the effectiveness of the training and better results in terms of performance and utilization of the learned content. There is a homogeneity in the perception of employees who evaluate the development of competencies and their utility similarly.

Descriptive Results of Transfer Support (Self-Assessment)

Tables 3, 4, and 5 show the descriptive results regarding Transfer Support. This scale aimed to measure employees' perception of the support offered by the organization for the application of acquired knowledge and subsequent improvement in performance. The Transfer Support factor presented M=3.08 and SD=0.41, showing that the organization frequently provides favorable working conditions for good performance of activities and applicability of the new competencies acquired. The low standard deviation indicates that employees perceive the support offered for knowledge transfer similarly. This variable was evaluated concerning psychosocial support (Table 3); material support (Table 4); and opportunities to apply the knowledge (Table 5), using a scale that presented the points: 0 – Never; 1 – Rarely; 2 – Sometimes; 3 – Frequently; 4 – Always.

Table 3

Descriptive Results of the Psychosocial Support Factor

Items	Mean	Standard Deviation
5. In my work environment, my suggestions regarding what was taught in this training are taken into consideration.	2.89	0.74
6. When I have difficulties in effectively applying new skills, I receive guidance from people at my work on how to apply them.	2.81	0.74
3. I have been encouraged by my immediate manager to apply what I learned in this training to my work.	2.79	0.92
4. I have received the necessary information from people at my work for the correct application of new skills.	2.79	0.70
Psychosocial Support Factor	**2.82**	**0.54**

The means of this subfactor range from 2.79 to 2.89, indicating that psychosocial support for learning transfer occurs only sometimes; that is, employees do not always perceive support from their peers and supervisors. Standard deviations above 0.94 were considered high for a 5-point scale. All listed support actions presented values below this threshold, indicating homogeneous responses regarding the psychosocial support provided for applying the acquired knowledge..

Item 5 ("In my work environment, my suggestions regarding what was taught in this training are taken into consideration") had the highest mean with M=2.89 and SD=0.74, indicating that supervisors and colleagues only sometimes take suggestions into account in the work environment, and it is rare to have a space to suggest what was learned. This opinion is shared by the majority of employees.

Item 4 ("I have received the necessary information from people at my work for the correct application of new skills") had the lowest mean with M=2.79 and SD=0.70, showing that only sometimes do employees receive the necessary information to correctly apply what they have learned. This indicates communication problems in the work environment, where necessary information is not provided for better performance of activities.

The Psychosocial Support subfactor had M=2.82 and SD=0.54, indicating that there is only occasional support from peers and supervisors to apply new skills acquired in training at work. The low standard deviation shows that employees tend to perceive the received support similarly.

Next, Table 4 presents the descriptive results for transfer support regarding Material Support. Employees used the same scale described in Table 3..

Tabela 4 –

Descriptive Results of the Material Support Factor

Itens	Mean	Standard Deviation
7. The place where I work, in terms of space, lighting, ventilation, and/or noise level, is suitable for the correct application of the skills I acquired in this training.	3,37	0,67
8. ELN has provided the necessary material resources (equipment, materials, furniture, and similar) for the proper use of the skills I learned in this training at work.	3,23	0,73
Material Support Factor	**3,29**	**0,57**

The subfactor has similar means ranging from M=3.23 (SD=0.73) to M=3.37 (SD=0.67). It presented M=3.29 and SD=0.57. These values indicate that employees perceive the material resources and physical working conditions as frequently adequate for the transfer of knowledge obtained in training. In other words, the organization provides a conducive work environment for applying what was learned. As with other evaluated

factors, the standard deviation for both items was below 0.94, indicating homogeneity in the responses. This means there is not much divergence of opinion among employees regarding the material resources provided by the organization.

In Table 5, employees evaluated the Opportunities factor using the same scale as for psychosocial support and material support. This scale aimed to assess the existing opportunities in the work context for applying the acquired knowledge.

Tabela 5
Descriptive Results of the Opportunities Factor

Items	Mean	Standard Deviation
1. In my work, there are situations where I can use the skills I learned in this training.	3,53	0,57
2. I have had time to apply what I learned in this training to my work.	3,28	0,70
Opportunities Factor	**3,40**	**0,55**

Considering 0.94 as a high standard deviation value, both items listed in the questionnaire presented lower values, indicating homogeneity in the participants' responses regarding the opportunities provided for applying the obtained knowledge. This subfactor presented M=3.40 and SD=0.55, with item means ranging from M=3.28 (SD=0.70) to M=3.53 (SD=0.57). These results indicate that situations where learning can be transferred are frequent; however, the item evaluating time to apply the learned skills had a lower mean, indicating that there may not always be sufficient time to utilize the competencies.

Descriptive Results of the Broad Impact Variable (Self-Assessment)

Table 6 presents the descriptive results of the Broad Impact variable, which aimed to measure employees' perception of the effects produced in more general dimensions of behavior, beyond those directly related to the competencies covered in the training. This was evaluated using a scale with the following points: 0 – No impact at work; 1 – Little impact at work; 2 – Moderate impact at work; 3 – Great impact at work; 4 – Very great impact at work.

Tabela 6
Descriptive Results of Broad Impact

Items	Mean	Standard Deviation
13. Execution of activities within safety standards.	3,30	0,60
17. Dissemination of the knowledge acquired in the training among my team members.	3,03	0,51
5. Conducting root cause analysis of equipment defects.	2,85	0,67
9. Increasing the period of equipment availability (longer time without breakdowns).	2,85	0,58
3. Early detection of equipment defects.	2,85	0,57
4. Reducing the frequency of equipment failures when they occur with the same characteristics.	2,80	0,76
1. Increasing improvements in inspections.	2,80	0,64
7. Reducing the average repair intervention time for equipment.	2,66	0,55
8. Increasing the mean time between equipment failures.	2,66	0,55
2. Reducing equipment defects.	2,55	0,51
6. Blocking equipment defects.	2,53	0,54
14. Preparing step-by-step lessons on the equipment.	2,45	0,49
10. Eliminating the recurrence of equipment failures.	2,43	0,46
12. Eliminating rework on equipment.	2,36	0,38
16. Implementing innovations in equipment (innovation in performing a task).	2,19	0,48
15. Implementing improvements in equipment (enhancement/refurbishment).	2,15	0,47
11. Eliminating manual work.	2,00	0,50
Broad Impact Factor	**2,61**	**0,37**

The means obtained ranged from 2.00 to 3.30, indicating that the training had a reasonable effect regarding the general performance of employees in the organization, a performance not only tied to the specific activities of their roles. In other words, the knowledge obtained through training is perceived as reasonably useful and contributes to the exercise of other activities. The standard deviations remained below 0.94, showing

no significant divergence of opinions among employees, who tend to perceive the training effects on more general dimensions similarly. This homogeneity might exist because they perform similar activities, all with a technical-operational character.

Item 13 ("Execution of activities within safety standards") had the highest mean (M=3.30) and a standard deviation of 0.60, indicating that the training had a great impact regarding the use of safety standards in their activities. The training was effective in this respect, and the acquired knowledge was highly relevant for aligning their activities with these standards. Item 17 ("Dissemination of the knowledge acquired in the training among my team members") had a mean of 3.03, also indicating the training's effectiveness regarding this performance, significantly contributing to knowledge sharing among team members. The low standard deviations indicate that opinions are relatively cohesive.

Item 11 ("Eliminating manual work") obtained the lowest mean (M=2.00, SD=0.50), showing that the training had a moderate impact on eliminating manual tasks, meaning there were no significant changes in manual work routines. This might be because the training group is involved in typically manual tasks given their technical-operational nature. The low standard deviation indicates that people tend to have similar views on the few modifications to manual work routines.

The Broad Impact factor had M=2.61 and SD=0.37, indicating that the training had a moderate impact on work. The competencies developed through training actions are not always useful and greatly contribute to other activities. Depending on the functions and activities of each employee, the competencies will be of greater or lesser utility. The low standard deviation shows cohesion in the item responses.

Descriptive Results of the Deep Impact Variable (Hetero-Assessment)

Table 7 shows the descriptive results of the Deep Impact variable obtained through the hetero-assessment questionnaire. This aimed to measure the immediate manager's perception of the competencies addressed in the training, as specified in the course objectives. This was evaluated using a 5-point frequency scale: 0 – No result at work; 1 – Little result at work; 2 – Moderate result at work; 3 – Great result at work; 4 – Very great result at work.

Table 7

Descriptive Results of Deep Impact

Itens	Mean	Standard Deviation
8. Practicing maneuvers safely on SEP equipment.	3,66	0,53
5. Identifying the actions of electrical protections in SEP disturbances.	3,50	0,55
6. Using standard communication in SEP operation.	3,37	0,71
3. Identifying the laws governing the National Electric System.	3,29	0,49
1. Writing operation documents correctly.	3,21	0,81
4. Identifying load rejection schemes at Eletronorte.	3,11	0,60
9. Identifying ANEEL, ONS, and INMETRO requirements in instrument calibration.	2,75	0,95
2. Identifying the environmental impacts of the Electric System.	2,70	0,62
7. Identifying the main results of the annual and monthly operation plan.	2,64	0,69
Deep Impact Factor	**3,13**	**0,45**

The means of the factor range from 2.64 to 3.66, indicating that the competencies developed in the training are important for employees and useful in the work context. The competencies addressed through the training are perceived by the manager as having a moderate to great result at work, meaning there is applicability of the acquired knowledge.

For a 5-point scale, standard deviations above 0.94 are considered high. In this factor, only item 9 ("Identifying ANEEL, ONS, and INMETRO requirements in instrument calibration") showed a standard deviation above this value, with SD=0.95. This indicates that not all managers perceive this competency the same way, showing a divergence of opinions regarding its impact on work, i.e., its effects on performance levels. Some may judge that developing this competency will not generate effects, while others may believe it will.

In the other items, the standard deviation did not exceed this value, indicating that the management perceives the importance of the learned competencies homogeneously, meaning they tend to perceive the value of these competencies similarly and compatibly. They probably manage groups of employees who perform similar functions in predominantly operational areas, assigning similar values to the competencies.

Item 8 ("Practicing maneuvers safely on SEP equipment") had the highest mean (M=3.66, SD=0.53), meaning that managers perceive this competency as important for activity performance and tend to think similarly about its importance and usefulness. On the other hand, item 7 ("Identifying the main results of the annual and monthly operation plan") had the lowest mean (M=2.64, SD=0.69), indicating that managers perceive it as reasonably important in the work context, but with some homogeneity of opinions.

The Deep Impact factor had M=3.13 and SD=0.45, indicating that the competencies developed in the training generated a great result at work, being considered by managers as important and useful in the work context. Their applicability would generate satisfactory results in task performance, which are directly related to the course objectives. There is homogeneity in the managers' perception, who evaluate the development of competencies similarly.

Descriptive Results of Transfer Support (Hetero-Assessment)

Tables 8 and 9 show the descriptive results regarding Transfer Support obtained through the hetero-assessment questionnaires. This aimed to measure the immediate managers' perception of the support offered by the organization for applying the acquired knowledge and subsequent improvement in their employees' performance. The Transfer Support factor presented M=3.67 and SD=0.18, showing that the organization frequently provides favorable working conditions for good performance of activities and applicability of new competencies. The low standard deviation indicates cohesion in the item responses, indicating that managers perceive the support offered for knowledge transfer similarly. This variable was evaluated concerning material support (Table 8) and opportunities for knowledge application (Table 9), using a scale with the following points: 0 – Never; 1 – Rarely; 2 – Sometimes; 3 – Frequently; 4 – Always.

Table 8
Descriptive Results of the Material Support Factor

Items	Mean	Standard Deviation
4. ELN has provided the necessary material resources (equipment, materials, furniture, and similar) for the proper use of the skills the employee learned in this training at work.	3,80	0,39
3. The place where the employee works, in terms of space, lighting, ventilation, and/or noise level, is suitable for the correct application of the skills acquired in this training.	3,74	0,44
Material Support Factor	3,75	0,39

This subfactor has similar means ranging from M=3.74 to M=3.80. These values indicate that managers perceive the physical working conditions and provided material resources as frequently adequate for transferring the knowledge obtained in training. In other words, they believe the organization provides a conducive work environment for applying what was learned. As with other evaluated factors, the standard deviation for both items was below 0.94, indicating homogeneous responses, meaning there is not much divergence of opinion among managers regarding the material resources offered by the organization.

In Table 9, managers evaluated the Opportunities factor using the same scale used for the material support items. This scale aimed to assess the existing opportunities in the work context for applying the knowledge acquired by employees.

Table 9
Descriptive Results of the Opportunities Factor

Itens	Mean	Standard Deviation
2. The employee has had time to apply what they learned in this training to their work.	3,72	0,44
1. There are situations at work where the employee has applied the skills they learned in this training.	3,45	0,50
Opportunities Factor	**3,56**	**0,38**

Considering 0.94 as a high standard deviation value, both items listed in the questionnaire presented lower values, indicating homogeneous responses from managers regarding the opportunities provided to employees for applying the acquired knowledge. The Opportunities subfactor presented M=3.56 and SD=0.38, with item means ranging from M=3.45 (SD=0.50) to M=3.72 (SD=0.44), indicating that situations where learning can be transferred are frequent. However, the item evaluating the existence of situations to apply the learned skills had a lower mean, indicating that there may not always be situations where these employees can apply what was developed in training.

Descriptive Results of the Broad Impact Variable (Hetero-Assessment)

Table 10 presents the descriptive results of the Broad Impact variable, also obtained through the hetero-assessment questionnaires. This aimed to measure the immediate managers' perception of the effects produced by the training actions in more general dimensions of behavior, beyond those directly related to the competencies specified in the objectives. This was evaluated using a scale with the following points: 0 – No impact at work; 1 – Little impact at work; 2 – Moderate impact at work; 3 – Great impact at work; 4 – Very great impact at work.

Table 10

Descriptive Results of Broad Impact

Items	Mean	Standard Deviation
13. Execution of activities within safety standards.	3,48	0,59
16. Dissemination of the knowledge acquired in the training among my team members.	2,90	0,81
5. Conducting root cause analysis of equipment defects.	2,89	0,32
4. Reducing the frequency of equipment failures when they occur with the same characteristics.	2,81	0,44
1. Increasing improvements in inspections.	2,58	1,31
3. Early detection of equipment defects.	2,40	0,77
9. Increasing the period of equipment availability (longer time without breakdowns).	2,26	0,45
14. Implementing improvements in equipment (enhancement/refurbishment).	2,23	1,13
10. Eliminating the recurrence of equipment failures.	2,15	0,42
6. Blocking equipment defects.	2,05	0,67
15. Implementing innovations in equipment (innovation in performing a task).	1,90	1,06
12. Eliminating rework on equipment.	1,73	0,93
2. Reducing equipment defects.	1,66	0,91
11. Eliminating manual work.	1,66	0,91
7. Reducing the average repair intervention time for equipment.	1,14	0,69
Broad Impact Factor	2,19	0,61

The means obtained ranged from 1.14 to 3.48, indicating that the training had little effect on employees' overall performance in the organization, in activities not directly related to their specific job roles. The knowledge obtained through training is perceived in some cases as having little impact on work, in others as reasonably useful, and in only one case, described in item 13, as making a significant contribution to the exercise of other activities. In items 1, 14, and 15, the standard deviations are above 0.94, showing divergence of opinions among employees, who tend to perceive the effects of training on more general dimensions differently.

Item 13 ("Execution of activities within safety standards") had the highest mean (M=3.48) and a standard deviation of 0.59, indicating that the training had a great impact regarding the use of safety standards for performing their activities. The training was effective in this respect, and the acquired knowledge was highly relevant for aligning their activities with these standards.

Item 7 ("Reducing the average repair intervention time for equipment") and item 8 ("Increasing the mean time between equipment failures") had the lowest mean, both with M=1.14 and SD=0.69, showing that the training had little impact on reducing the time to repair equipment. Consequently, there was no increase in the time between equipment failures. The low standard deviation indicates that people tend to think similarly regarding the few changes in work routines.

The Broad Impact factor had M=2.19 and SD=0.61, indicating that the training had a moderate impact on work. The developed competencies are not always considered by managers as useful and significantly contributing to the exercise of other activities. There is homogeneity in managers' perception regarding the development of these competencies.

Using Pearson's Correlation, it was observed that there were no significant correlations between these variables in the analysis of self-assessment and hetero-assessment data, initially indicating that there is no relationship between the variables deep impact, broad impact, and transfer support and personal and functional data. Additionally, no relationship between deep impact, broad impact, and transfer support was observed. Perhaps the characteristics of the sample overcome the support limitations. The sample predominantly consisted

of people aged 46 to 55 years, with most having been in the company for more than 26 years. These individuals may have greater mastery of their activities, overcoming possible support condition limitations, especially regarding psychosocial support, which is not always present in the work context. It is worth noting that the subjects in the sample took the course at different times and completed the questionnaires at different times. One might also consider that if favorable support conditions exist, their predictive nature on the impact might not be evident.

V. Conclusions

The study aimed to identify Eletronorte employees' perceptions regarding the impact of training both on performance in activities directly related to their job roles and on more general activities not necessarily tied to the course's specified objectives. Additionally, it aimed to understand the perception of the support provided by the organization to transfer the acquired knowledge to the actual work situation. Possible predictive relationships between training impact and transfer support were also investigated, considering individual characteristics as an additional predictor element of this impact.

Descriptive results show that the competencies developed in training have applicability and effect on activities performed in the work context. However, when considered concerning different activities, perceptions show that the training did not result in significant effects. Perceptions regarding transfer support indicate that the organization frequently provides favorable working conditions for good performance of activities and applicability of new competencies. However, psychosocial support is only sometimes present, indicating that employees do not always receive support from peers and supervisors to apply what was learned in training.

The analysis of correlations between the dependent variable—deep and broad impact—and the independent variables—transfer support and personal and functional data—did not show significance. Since it was not possible to verify a relationship between these elements, it is not possible to make assertions about the influence of components such as transfer support and individual characteristics on the training's impact on work. It was only possible to identify employees' perceptions of these variables without drawing conclusions about the relationship established between them and the influence they might have exerted on the results. In both self-assessment and hetero-assessment results, homogeneity in perception was observed, meaning people have similar perceptions of the research elements.

The study made it possible to determine whether the training program was achieving its objectives of developing the necessary competencies in its target audience for better performance of activities in their real work context. It allowed the understanding that other variables may be present and influence the application of developed competencies. A favorable reaction and learning alone are not sufficient; there must be the possibility of generalization, i.e., application at work, and favorable conditions for transfer to occur satisfactorily. Conducting evaluations like this allows for a broader view of training programs, considering the existence of various aspects that need to be present for them to be effective. Among these aspects is the importance of all its stages, including needs assessment and the planning process, which, when done correctly, lead to better results and greater training effectiveness.

One limitation of the research is that immediate managers, when evaluating transfer support factors, did not have items related to psychosocial support in their questionnaires. They only assessed the conditions of material support and opportunities provided to their employees to apply what was developed in training. It would be interesting for them to also evaluate their posture as supervisors and the relationship established with their subordinates, observing whether the group they manage provides their peers with the necessary support for transferring new skills.

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