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## **PARTICIPATORY ERGONOMICS: STUDY IN A COMPANY IN THE EDUCATION SECTOR**

**Bianca Souza Jordão:** [jordaobianca@yahoo.com.br](mailto:jordaobianca@yahoo.com.br); Pontifícia Católica Universidade do Paraná

**Rosimeire Sedrez Bitencourt:** [rosimeire.bitencourt@pucpr.br](mailto:rosimeire.bitencourt@pucpr.br); Pontifícia Católica Universidade do Paraná

### **ABSTRACT**

This paper proposes an ergonomic demand appraisal based on participatory method in an educational sector enterprise. In the first place, there were individual interviews to collect Ergonomic Demands (EDs). Furthermore, these items were classified in demands and suggestions. Finally, there was crossing between negative demands and participants suggestions. In view of their ideas were possible identified participants desires to contribute with actions improvement in the enterprise, consequently, this proposal solutions attend theirs demands the best. In conclusion, there was realized the importance of participatory method in the solutions proposal in improvement in an educational sector enterprise.

**KEYWORDS:** ergonomic; participative ergonomics; ergonomic demands; educational sector.

## 1. INTRODUCTION

Education policies in Brazil have had an effect, at least in terms of internal indicators. Between 2010 and 2017, the dropout and failure rates in high school decreased by 4.2% and 1.8%, respectively, according to data released by Inep (National Institute for Educational Studies and Research Anísio Teixeira) (Inep, 2010; Inep, 2017). Despite this, even with the illiteracy rate decreasing from 9.6% in 2010 to 7.0% in 2017, according to IBGE (Brazilian Institute of Geography and Statistics), it was still not enough to reach the target set in 2015 of 6.5% (IBGE, 2018).

Not only did the goal to reduce the illiteracy rate fail to be achieved, but also the quality of education stagnated. According to the OECD (Organization for Economic Co-operation and Development), Brazil remained in the 8th worst position in the PISA (Programme for International Student Assessment) both in 2012 and 2015. Furthermore, in 2015, it is the worst-ranked country in Mathematics knowledge and the third worst in Science and Reading. Considering all these factors, Brazilian education not only needs greater incentives for improving the quality of teaching but also assertive investments in the sector (OECD, 2012; OECD, 2015).

Based on this current scenario in the country, companies that foster education need to establish a concrete plan of action. For this, the role of Ergonomics in contributing to the improvement of both the system's performance and that of those involved is important for the efficiency of this sector. Among its approaches, Participatory Ergonomics stands out, which, according to Fisher and Guimarães (2001), ensures greater engagement of participants through a sense of responsibility (Fisher and Guimarães, 2001).

Through Participatory Ergonomics, it is possible to encompass the interaction among all stakeholders in the system, which further contributes to achieving positive results. Based on Fisher and Guimarães (2001), there are reports of the importance of applying this type of ergonomics since even after ergonomic intervention, improvements continued to be made in both micro and macro aspects (Fisher and Guimarães, 2001). Therefore, it is understood that research applying participatory ergonomics in the education sector can directly contribute to improving the performance of education in the country.

## **2. OBJECTIVE**

This work aims to present a survey of Ergonomic Demands (DE) in a company in the education sector using Participatory Ergonomics to propose improvements.

## **3. METHOD**

In order to fulfill the proposed objective, an applied research was conducted since it involves the interests of a restricted group, according to Silva and Menezes (2005). The approach is qualitative in nature because, as Silva and Menezes (2005) state, it involves interpretation and granting of meanings. Additionally, it is a descriptive research due to the data collection involved (Silva and Menezes, 2005). Finally, the technical procedure is a survey, as the research involves interviews with participants (Silva and Menezes, 2005).

For this purpose, the method used was the Macroergonomic Work Analysis (AMT), proposed by Guimarães (1999), which suggests the phases of project launching (phase 0), ergonomic survey or assessment (phase 1), ergonomic diagnosis analysis (phase 2), proposal of solutions (phase 3), validation of solutions (phase 4), and finally, ergonomic detailing (phase 5). This ergonomics-linked method has a participatory approach that integrates scientific knowledge with the social environment in order to transform it. It is noteworthy that the scope of this research was the application of phases 0 and 1.

Phase 0 or project launching occurs when the company's ergonomics committee (COERGO) together with the employees discuss all implementation phases and define the schedule that should be followed for the next steps.

Once the schedule is defined and all doubts are cleared, the initial survey phase (assessment) occurs. For this phase, problems are identified through information collection via non-induced interviews with employees, the first stage of the Macroergonomic Design (DM) tool by Fogliatto and Guimarães (1999). It is worth noting that in this phase, participants signed the confidentiality agreement as provided for in the Code of Ethics of the Certified Ergonomist.

The second stage of DM is also used in the assessment phase of this work. This stage corresponds to the Prioritization of Ergonomic Demand Items (IDEs) already identified by employees in the previous stage. In this stage, a weight is assigned to each DE mentioned in stage 1, inversely proportional to the Order of Mention (OM), and organized in a table with the sum and percentage of each item.

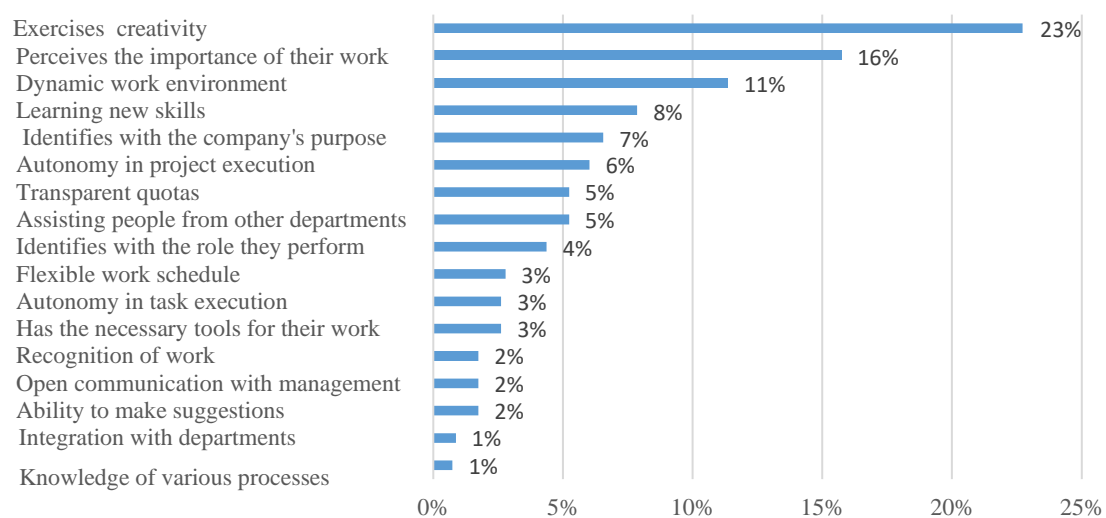
## **4. RESULTS**

A total of eleven employees from the company participated in this research (population = sample), including managers and staff. At the project launch, a meeting was held with all employees regarding how the IDEs survey process would occur. In this case, it was explained that interviews would be conducted individually with everyone, with the assurance, through signing a commitment form, of confidentiality of the recorded information.

After this meeting, the assessment phase began, during which all employees were given the option to choose the location for their interviews. The majority opted for interviews to take place in reserved rooms of the company, while two preferred locations of common access.

The interviews were conducted based on two questions: "tell us about your work and what are the good and bad aspects?" and "do you have any suggestions for improvement?" The objective of the first question was to identify the Ergonomic Demands of the participants, while the second aimed to obtain solutions to these demands in a participatory manner.

Graph 1: Positive Aspects in Job Performance

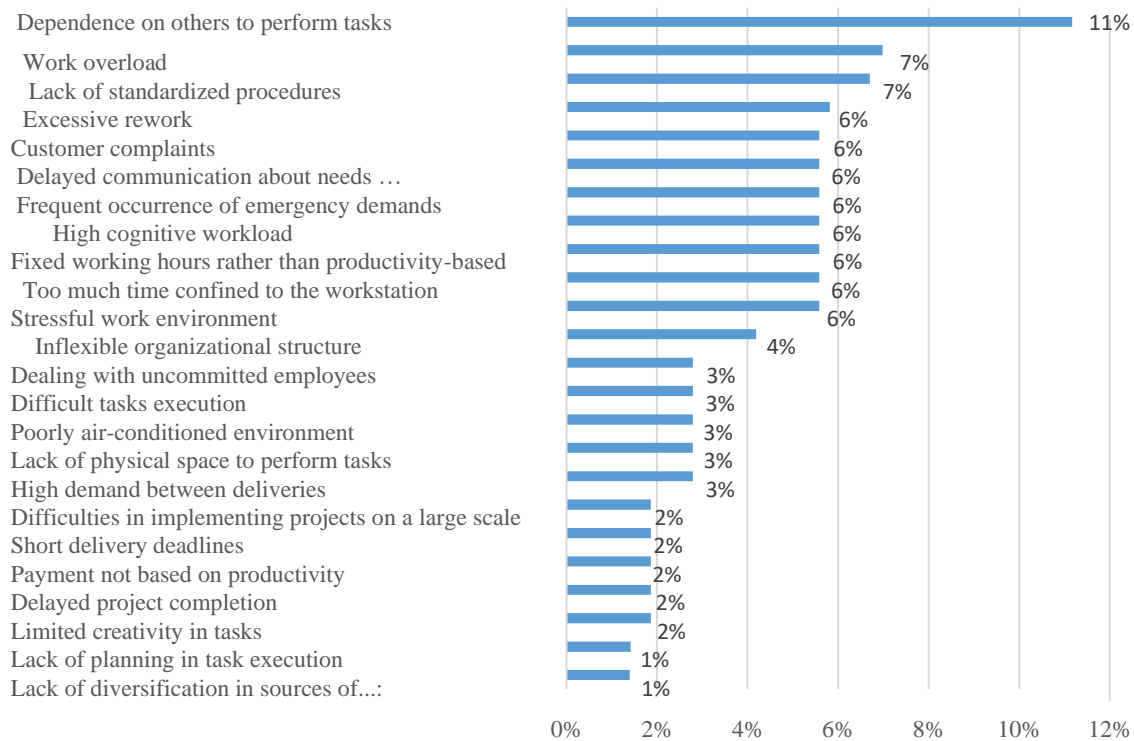


Source: the authors, 2019

For the analysis of this research, the first question was broken down into positive and negative aspects of the work. Thus, the prioritization of Ergonomic Demands was carried out according to stage 2 of the Macroergonomic Design proposed by Fogliatto and Guimarães (1999).

Related to the positive aspects, the employees' highest prioritization was regarding creativity, followed by the perception of the importance of their work and its dynamic nature, as illustrated in Graph 1.

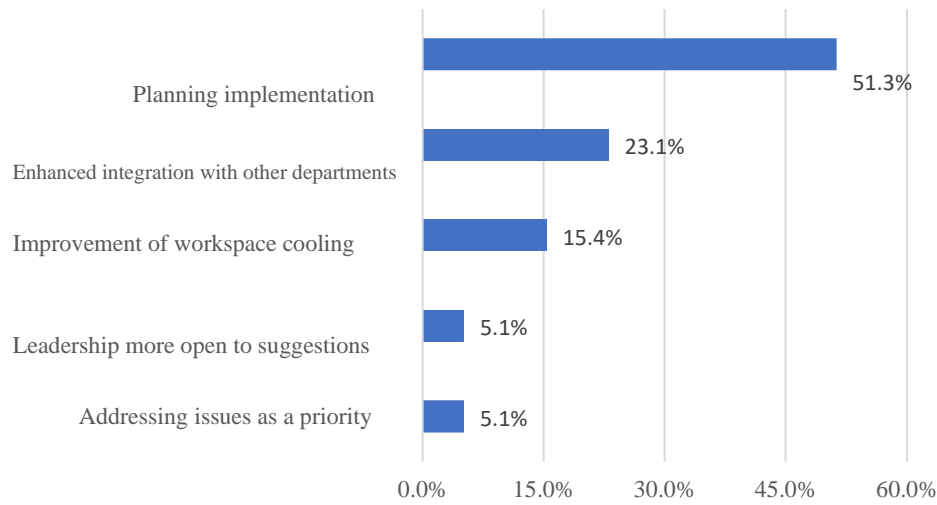
Graph 2: Negative Aspects in Job Performance



Source: the authors, 2019

In the classification of Ergonomic Demand Items, considering the factors identified as negative during the interview, the highest prioritized item corresponds to dependence on others to perform tasks, followed by work overload and lack of standardized procedures, according to Graph 2.

Graph 3: Suggestions for the work environment



Source: the authors, 2019

After tabulating the responses regarding improvement suggestions, which were also categorized as described in the DM, the most frequently mentioned suggestion was planning implementation (Graph 3).

Following the tabulation of Ergonomic Demand Items, the negative points mentioned were related to the suggestions made by employees, as illustrated in the table. In this relationship, a correlation note between demands and suggestions was inserted, assigning a number between 0 and 5, where 0 means the suggestion does not contribute to solving the respective demand, and 5 means the suggestion strongly contributes to solving the respective Ergonomic Demand.

Table 1: Relationship between negative points and suggestions

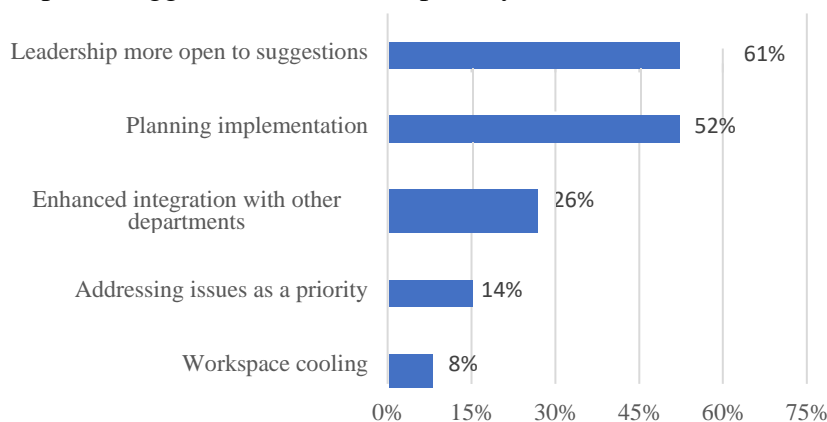
Ergonomic Demands (Negative Points)					
		Planning implementati			Workspace cooling
Dependence on others for task completion	3	3	5	3	0
Work overload	3	5	0	0	0
Lack of standardized procedures	1	3	0	0	0
Excessive rework	5	5	0	0	0
Fixed working hours rather than productivity-based	5	1	0	0	0
Delayed communication about company needs	5	5	5	3	0
Customer complaints	5	3	3	3	0
Too much time confined to the workstation	3	0	0	0	3
High cognitive workload	3	0	1	0	0

Stressful work environment	1	3	1	0	0
Frequent occurrence of emergency demands	5	3	1	5	0
Little flexibility in organizational structure	5	1	1	0	0
Difficult tasks execution	0	0	3	0	0
Dealing with uncommitted employees	3	1	0	0	0
Lack of physical space to perform tasks	3	0	0	0	0
High demand between deliveries	3	5	0	0	0
Poorly air-conditioned environment	0	0	0	0	5
Limited creativity in tasks	0	0	3	0	0
Short delivery deadlines	1	3	0	0	0
Delayed project completion	1	3	0	0	0
Payment not based on productivity	1	0	0	0	0
Difficulties in implementing projects on a large scale	1	3	3	0	0
Lack of planning in task execution	5	5	0	0	0
Lack of diversification in company revenue sources	0	1	1	0	0
<b>Total</b>	<b>62</b>	<b>53</b>	<b>27</b>	<b>14</b>	<b>8</b>

Source: the authors, 2019

As illustrated in Graph 4, the suggestion that most comprehensively addresses the employees' demands is for leadership to be more open to suggestions. This means that employees want to be more participative in the work environment, contributing more to the definition of goals and procedures for carrying out activities. This result reinforces the importance of Participatory Ergonomics, not only during ergonomic intervention but also in everyday work actions. According to Taveira Filho (1993), participants in Participatory Ergonomics are valuable sources for problem-solving and are indispensable in the methodology, as it aims to empower individuals to solve these problems themselves.

Graph 4: Suggestions in order of priority



Source: the authors, 2019

Therefore, it is recommended to continue this study in order to develop stages of diagnosis, validation, and implementation aimed at improving the performance of this company in the education sector.

## 5. CONCLUSION

In order to achieve the objective of this research, the Participatory Ergonomic Demand Assessment was conducted using Guimarães' (1999) Macroergonomic Work Analysis tool in conjunction with Fogliatto and Guimarães' (1999) Macroergonomic Design (DM) tool.

Based on this application, it was possible to prioritize the positive aspects of job performance, with the most prominent being the opportunity to exercise creativity. Additionally, negative points were identified, with the greatest emphasis being on dependence on the actions of others or other departments to carry out tasks. Through participatory methods, the main suggestions were raised, highlighting planning implementation, enhanced integration with other departments, and leadership openness to suggestions.

Finally, a correlation between demands and suggestions was established. It was observed that the suggestion that best addresses the needs of these employees is leadership openness to suggestions, demonstrating the employees' interest in participating in the company's actions. Therefore, it is believed that these proposals can contribute to improving the performance of this education company. However, it is necessary to conduct diagnosis and other stages to identify the real problems and implement improvement suggestions. The continuation of this study in a participatory manner is essential.

## REFERENCES

AGÊNCIA IBGE NOTÍCIAS. Analfabetismo cai em 2017, mas segue acima da meta para 2015. Disponível em: <<https://agenciadenoticias.ibge.gov.br/agencia-noticias/2012-agencia-de-noticias/noticias/21255-analfabetismo-cai-em-2017-mas-segue-acima-da-meta-para-2015>>. Acesso em: 29 jan. 2019.

BRAZIL COUNTRY NOTE (2012): RESULTS FROM PISA 2012. OECD.



FISCHER, Daniela; GUIMARÃES, Lia B. M (2001). Efeitos positivos da Ergonomia Participativa: estudo de caso ABB. Anais ABERGO, Gramado, 6 set.

FOGLIATTO, F.; GUIMARÃES, L.B.M. (1999). Design Macroergonômico: uma proposta metodológica para projeto de produto. Produto & Produção. v3, n.3, p. 1-15.

GUIMARÃES, L. B. de M. (1999). Abordagem Ergonômica: o Método Macro. In: Guimarães. Ergonomia de Processo. 3. ed. [Porto Alegre: UFRGS/PPGEP, 1999]. cap. 1.1. v. 1.

INEP. (2019). Indicadores Educacionais: taxas de rendimento. Disponível em: <<http://portal.inep.gov.br/indicadores-educacionais>>. Acesso em: 29 jan.

OECD. (2019). Reading performance (PISA). Disponível em:<<https://data.oecd.org/pisa/reading-performance-pisa.htm#indicator-chart>>. Acesso em: 29 jan.

OECD. (2019). Mathematics performance (PISA). Disponível em:<<https://data.oecd.org/pisa/mathematics-performance-pisa.htm#indicator-chart>>. Acesso em: 29 jan.

OECD. (2019). Science performance (PISA). Disponível em:<<https://data.oecd.org/pisa/science-performance-pisa.htm#indicator-chart>>. Acesso em: 29 jan.

OECD. (2015). PISA 2015:PISA RESULTS IN FOCUS.

SILVA, Edna L.; MENEZES, Estera M. (2005). Metodologia da Pesquisa e Elaboração de Dissertação. Florianópolis: UFSC.

TAVEIRA FILHO, Alvaro D. (1993). Ergonomia Participativa: uma abordagem efetiva em macroergonomia. Produção.