



THE FORMATIVE APPROACH IN A RECYCLABLE MATERIAL COOPERATIVE: CONFRONTING WORK ANALYSIS TO PROMOTE EXPANSIVE LEARNING

Maria Luisa Alves Pereira^{1*}

Iracimara de Anchieta Messias²

Abstract

The organization of solid waste collectors into cooperatives allows for better economic and social integration of these workers. However, from a practical point of view, there are still challenges to be faced in order to guarantee a better quality of life and work for cooperative waste pickers, who still suffer constant negative analyses in terms of work organization, health, safety and ergonomics. In the context of preventing risks at work, studies that address the educational process are important in terms of developing workers' protagonism in prevention. The aim of this study was to find out how work activities are carried out at certain work stations in a recyclable material cooperative, according to the description and perception of the cooperative members themselves, who do or do not carry out this activity on a daily basis. Activity analysis techniques such as self-confrontation and alloconfrontation were used, with Cultural Historical Activity Theory as the theoretical framework. The pressing sector was selected for the activity analysis, and the application of these techniques allowed individuals to make their work an object of reflection and externalize knowledge that is often carried out unconsciously. In this sense, this work has helped the subjects themselves to think of alternatives to modify their working methods and to develop new ones, by analyzing their own work and that of others. However, further applications of the confrontation techniques would still be necessary in order to really prove the technique's effectiveness in promoting expansive learning in solid waste handling.

Keywords: Historical-Cultural Theory of Activity; Techniques for confronting work analysis; Recycling cooperatives.

1. INTRODUCTION

The work of the recyclable material collector, in addition to the issues embedded in his work activity, such as exposure to different risk agents, has an interface with social and sustainability issues.

The main difficulties encountered by these workers are: (i) income instability, due to fluctuations in the prices of recyclable materials and the volume of waste collected; (ii) exhausting work routine, due to excessive working hours, weight carried and long distances traveled; (iii) insufficient remuneration for survival; and (iv) pathologies, with emphasis on:

¹ São Paulo State University (Júlio de Mesquita Filho). <https://orcid.org/0009-0007-9540-513X>. * Email: mla.pereira@unesp.br.

² São Paulo State University (Júlio de Mesquita Filho). <https://orcid.org/0000-0003-2578-3841>.



worms, infections, pain, allergies and nausea. Of the reasons that lead to this work, the following are mentioned: unemployment, low education, advanced age and lack of qualification (Pinhel, 2013).

One way to overcome the obstacles faced by waste pickers, in terms of working conditions and obtaining income, is to organize into cooperatives (Rodrigues & Gonçalves-Dias, 2020). Recycling cooperatives are institutions dedicated to carrying out a set of activities, including collection, transportation, transshipment, treatment and environmentally appropriate final disposal of solid waste for recycling or landfill (Magni & Günther, 2014).

Through organizations such as cooperatives, waste pickers have a better insertion in the economic circuit of recyclables (Dagnino & Johansen, 2017), in addition to contributing to various sectors. Recycling cooperatives contribute to the sanitation system and public health, through the supply of low-cost recyclable material to the industry and the extension of the useful life of products and packaging. In addition, the reduction in municipal spending and the contribution to the sustainability of the environment are mentioned, both by reducing the raw material used, which conserves resources and energy, and by reducing the need for land to be used as dumps and sanitary landfills (Santos, 2012; Souza et al., 2012).

However, the work of waste pickers and the working conditions that permeate waste collection make the profession precarious (Rodrigues & Gonçalves-Dias, 2017). The organization of recyclable material collectors in cooperatives allows for better working conditions and income for these workers, marginalized from the formal market (Rodrigues & Gonçalves-Dias, 2017). However, from a practical point of view, there are still challenges to be faced to ensure the improvement of the quality of life and work of cooperative waste pickers (Pinhel, 2013), who still suffer constant negative analysis regarding work organization, health, safety, and ergonomics (Silva, 2020).

Workers in recycling cooperatives are considered a vulnerable population, due to constant exposure to solid waste, which can generate malaise, contamination and diseases (Cardozo, 2009). In addition, these workers have to deal with unfavorable factors, such as unergonomic work environments, low pay, and exposure to risks of different natures (Jesus et al., 2012).

The development of activities with recyclable material generates physical complaints such as pain throughout the body, often defined as unbearable. The places with the greatest complaints are the spine, especially the lumbar, the shoulders and lower limbs. In addition, the



work is performed in an orthostatic posture (standing), causing the workers to have the need to sit at some moments during their work routine (R. L. R. de Souza et al., 2014). The strong physical load at work and the work routine itself are factors that can be associated with both body pain, osteoarticular problems and hypertension or "nervousness", also mentioned in studies with workers who handle solid waste (Porto et al., 2004). Glass cutting is the most described occupational accident when it comes to working with recyclable material (Fonseca et al., 2014). However, accidents caused by falling transport vehicles, being run over, lack of use of protective equipment and injuries due to inadequate handling of presses and compactors are also cited (Galon, 2015).

In cooperatives, the activity of recyclable material collectors is permeated by occupational risks (Wedderhoff, 2012). The redirection of workers to cooperatives, in the search for social inclusion with income generation, can intensify signs of psychological suffering, physical and mental overload and potentiate financial problems, which demand changes in the organization of work and institutional partnerships (Cockell et al., 2004). Monitoring the work of waste pickers allows the elaboration of an ergonomic diagnosis and suggestions for improvements. However, these improvements would only be implemented to the extent that workers were made aware of the necessary measures for safety and work organisation, thus providing a more appropriate work situation (Wedderhoff, 2012).

Thus, it is important to offer workers information that helps them avoid risky situations, preventing injuries and achieving a higher quality of life and well-being, inside and outside the work environment.

The greater the knowledge and reflection on the activities developed, the greater the transformation to be carried out. In this sense, effectively involving waste pickers in any process of change is one of the aspects considered fundamental to achieve any improvement in their health, life and work conditions (Araujo & Garcia, 2009). It is necessary to know the environment in which workers are inserted, the work routine, the functions performed and the risk factors, so that health promotion and protection occur (PAHO/WHO, 2001).

Occupational health presents, as a formation and complement of its objectives, three concepts that explain some basic criteria for its application, such as: the promotion of environmental conditions; the control of disease-causing factors; and the prevention, reduction and elimination of harmful causes (Dias & Pinto, 2019). Therefore, the educational process is necessary, so that it is possible to contribute to the promotion and improvement of the health of



this population. This process involves the transmission and reception of different information acquired throughout life, through lived experiences, studies, and other tools (Dias & Pinto, 2019).

In this sense, studies that address the educational process in the context of risk prevention at work are important in the sphere of developing the role of workers in its prevention. Knowing the activities performed through the worker's own perspective contributes to him being a protagonist in the modification of work methods to promote health and safety at work. For this reason, the objective of this study was to know how the work activities are carried out in certain jobs of a recyclable material cooperative, according to the description and perception of the cooperative members who perform or not this activity on a daily basis.

1.1. REFLECTION OF THE WORK ACTIVITY

According to Barbier (1985), action research is configured as "*[...] activity of understanding and explaining the praxis of social groups by themselves, with or without specialists in the human sciences, with the aim of improving this praxis*". That is, the suggestions, changes or ideas implemented in a given place or group are defined by those who carry out the study, along with the participation of the group studied. In this way, action research allows us to identify the different spheres of local reality, map the political mediations that interfere at the local level, as well as unveil the way in which the social group organizes its productive practices (Barreto et al., 2013).

The scenario of recycling cooperatives differs from the most urban productive spaces, mainly due to the situation of vulnerability, given the fact that workers are often socially and economically excluded, and because it is a work that involves solid waste, still perceived as garbage, and not as a resource (Gutberlet & Jayme, 2012).

A study developed through an action research with recyclable material collectors allowed the creation and mobilization of knowledge about health and safety in cooperatives. The process of action research allowed the discovery of a range of serious occupational health problems, due to exposure to chemical, biological and physical risks, musculoskeletal injuries, mechanical traumas and frequent psychic suffering. In addition, frustration and dissatisfaction resulting from the lack of transparency and the low participation of management in the cooperative's decisions were mentioned. The main health problem was also mentioned as stressful work relationships among cooperative members (Gutberlet et al., 2016).



The activity can be analyzed directly, that is, observations are made in the workplace itself, at the time the activity is being developed. However, it is worth noting that observation alone is not enough to understand the activity, as it is not limited only to what is observable. Issues such as reasoning, doubts, choices, among others, can only be understood through express verbalizations and manifestations that appear in the course of action. This method is called direct analysis of the work, and therefore covers the techniques of observation of the real work and interviews simultaneous to the observations. In this approach to work analysis, workers can use the analysis of their professional experience to expand their power of action, and thus, live other future work experiences (Nascimento & Rocha, 2021).

The Historical-Cultural Theory of Activity (THCA), in general terms, analyzes the constitution of the human being in social activity, understanding that the individual cannot be seen separately from the sociocultural environment that surrounds him (Cenci & Damiani, 2018).

The third generation of the Activity Theory establishes that all activity systems (as shown in figure 01) are part of a network that constitutes human society and the analysis of interacting systems offers subsidies to understand dialogues, conflicts and changes in activity systems. This new proposition of the Activity Theory is characterized by five principles, which are: (i) a system of collective activity is the primordial unit of analysis taken in the investigations; (ii) multiple voices constitute the system of activity; (iii) historicity, that is, the systems of activity take their form and are transformed over time; (iv) the role of contradictions as sources of change and development; and (v) the possibility of expansive learning in the activity system (Engeström, 2009; Vilas Boas et al., 2020).

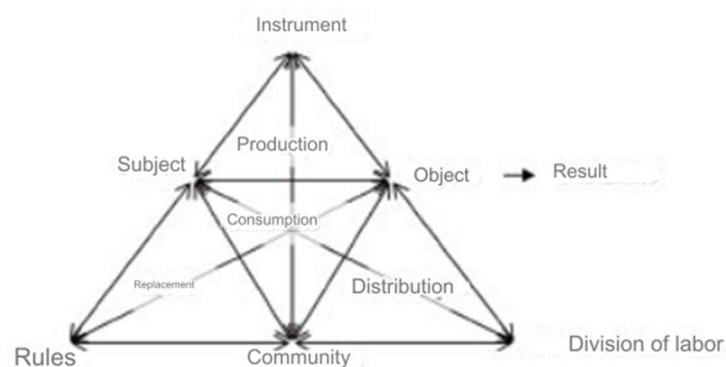


Figure 1 – The model of the activity system. Source: Engeström (1987. p. 78)



Engeström considers that the collective resolution of the contradictions of a system of activity favors its expansive learning. For the author, expansive learning is achieved when the object and motive of the activity are reconceptualized as the contradictions of the system intensify, to encompass a broader horizon of possibilities than in the previous mode of activity (Vilas Boas et al., 2020).

It is important to emphasize that expansive learning is seen in the transformations of the object of the activity and not in individual transformations of the subjects (Engeström, 2007). Engeström, in the development of formative intervention research, directs its attention to promoting and developing expansive learning in different systems of activity, focusing on learning that occurs in real life, in the world of work, in various types of organizations (Lemos et al., 2013). In this way, the very concept that is being learned by the subjects is developed by them, different from the standard theories of learning, in which there is a master and an apprentice, and the skills and knowledge to be learned are already previously established. In Engeström's investigations, what is to be learned is not known at the beginning of the process, but will be produced as the learning process unfolds (Engeström, 2007). Expansive learning implies, therefore, the collective construction of changes.

In the context of this type of intervention, Engeström organizes auxiliary stimuli that can broaden the subjects' perception of the activity in question and their subsequent engagement in new actions (Engeström, 2009). Thus, to achieve expansive learning, it is possible to use techniques to attend to reflective activity. The methodologies for attending to reflective activity are: (i) individual self-confrontation, based on the subject's confrontation with his or her own activity; (ii) individual allo-confrontation, where the subject is confronted and has to verbalize about the activity he practices, but being performed by a colleague, and (iii) collective allo-confrontation or cross-confrontation, where a group of individuals analyzes the record that was made of the activity of one of the members of that group (Mollo & Falzon, 2004a).

In this sense, the analysis of the work works as "*[...] an instrument for the development of the subject's consciousness when he is offered the possibility of changing the status of what has been experienced: from being an object of analysis, what has been lived can become a means to live other lives*", and it is considered that transformations at work are only durable when carried out by the workers themselves (Clot, 2010).

Intervening in work situations should seek to favor transformations in the activity and reestablish the power of work subjects and collectives to act (Vieira, 2003). The role of the



researcher is that of mediator, but the analysts, that is, the participants, are the protagonists of the activity (Vieira, 2003). Thus, the researcher should not judge the actions of the participants, but stimulate dialogue and clarification of the activities carried out or prevented.

The methods of confrontation have as their starting point a period of observation (filming) of the professional environment to produce conceptions shared with and by the workers (Clot, 2001). After the filming, in individual self-confrontation, a participant is invited to confront himself with his image filmed in a work sequence and to make comments about his activity in the presence of the researcher. In collective allo-confrontation or cross-confrontation, in turn, the participant is confronted with his image filmed in the presence of the researcher and another participant who together analyze his activity. Afterwards, the same process is repeated with the second participant (Clot, 2001).

In a collective context, seeing a colleague or oneself in work activities, through an image or video, has a great power not only in raising a different perspective of the collective reality of this same work, but also as a great facilitator for verbalizations and discussions (Godoi et al., 2022).

Reflective thinking is a cognitive strategy that enables a deeper understanding of phenomena and processes, through the perception of relationships, the identification of the elements involved, the analysis and interpretation of senses and meanings, enhancing the learning process. The act of reflective thinking must consist of an educational end, as a process that lasts a lifetime. Reflection makes it possible to transcend purely impulsive and routine action through planning, with a view to deliberate and intentional action to achieve future goals (Gasque, 2011).

As opposed to purely quantitative approaches, the reflective activity is flexible, allowing for greater depth and detail of the data, as well as the possibility of adapting to the object of study. In this approach, there are no fixed and fully defined methodological rules, but guidelines, strategies, and approaches for the various phases of the process. Through the procedures, researchers question and critically review their own interpretations during the research. In this methodology, multiple perspectives must be systematically sought during the investigation, enabling, with the use of procedures, the development of a theory of high density (Gasque, 2011).



2. METHODS

This study is a qualitative action research. The study was carried out in a recyclable material cooperative located in the municipality of Presidente Prudente, in the western region of the state of São Paulo. All operational workers who agreed to participate were included in the study, and those who were on leave for any reasons other than health related in the last six months and/or who received sick leave during the period of the study were excluded, i.e., who were absent from the cooperative during the execution of the project.

Chart 1 presents the stages of the temporal development of the study, which will be detailed in the following topics.

Stage	Activity developed
I	Initial visits to the cooperative - conducting interviews/requesting authorization for the research.
II	Application of the questionnaires - collection of sociodemographic data and information related to health and safety at work
III	Selection of intervention participants - active search for workers
IV	Selection of the technique for confronting the analysis of the activity to be used and the work situation to be analyzed, based on the data obtained in the previous stages
V	Realization of the workshops Workshop 01 - Presentation of the video and description of the activities carried out in the cooperative according to the perception of the cooperative members themselves Workshop 02 - Analysis of participants on health and safety aspects in the activities developed in the cooperative

Chart 1 - Stages of study development. Source: Authors

2.1. Initial visits to the cooperative

To get to know the population, the study site and observations of the work routine, field visits were carried out and, after this initial phase, a direct analysis of the work was carried out. For the direct analysis of the work, the activities developed in the cooperative's workstations were filmed and, then, two questionnaires were applied, one for the collection of sociodemographic data and the other, it was a semi-structured interview, to learn about existing risks and prevention of work accidents.



The workstations were filmed after the verbal consent of all the workers who would appear in the footage. Each of these posts was filmed for thirty minutes uninterruptedly. The recording of images and videos was made with two Sony video cameras, model HDR-CX405 with Exmor R® CMOS sensor, *Handycam, Full HD 1080, 9.2 megapixels*, with a capacity of 115 minutes of continuous capture.

2.2. Application of questionnaires

The questionnaires applied were prepared by the researchers themselves, in order to survey the sociodemographic characteristics of these workers, as well as to know the incidence and prevalence of occupational diseases and accidents and the knowledge of the cooperative members about risk prevention. In general terms, the sociodemographic questionnaire included questions related to age, gender, education, how many years they have worked in the cooperative, how they got to know the cooperative, work routine, repetitive movements and perception of the work environment – whether they consider the lighting and temperature of the work environment pleasant, whether they consider the environment noisy, among other points. The semi-structure interview, on the other hand, asked the workers if they had ever suffered or seen someone suffer a work accident in the cooperative, if they had any pathology or discomfort resulting from working with recyclable material and as to the knowledge of risks – if they considered that there were risks in the work environment, if they received guidance to prevent these risks and who did them.

At the beginning of the research, a list was given with the names of all the workers linked to the cooperative at the time, which totaled eighty-eight people. Of these eighty-eight cooperative members, three could not participate in the interviews, as they fit the exclusion criteria of the study, and two were not interviewed for other reasons. One of these workers was not interviewed because he provides an outsourced service to the cooperative, that is, he is not a cooperative member; and the other worker was not interviewed because he was a cooperative member who became ill and died during the research period. Thus, eighty-three cooperative members were able to participate in the interviews, of which forty-seven were interviewed.



2.3. Selection of intervention participants

For the application of the confrontation techniques, the only prerequisite was that the cooperative member had answered the questionnaires. Participation was voluntary and, therefore, forty-seven cooperative members were able to participate. However, some points, according to the surveys carried out, were considered important. For this reason, an active search was carried out for workers who fell into the following categories: (i) have worked for many years in the cooperative (more than 10 years); (ii) they have been working for a short time in the cooperative (less than 1 year); (iii) they work, mostly on the treadmill; and (iv) work or have worked operating the press machine. The active search for workers who fit into these categories was due to the fact that: (i) there was a considerable contradiction in the statements of workers who have been in the cooperative for many years and those who have been in the cooperative for a few years, when they were questioned about work accidents and the work environment; (ii) most of the cooperative members interviewed answered that the activity developed in the cooperative is to sort the materials on the conveyor belt; (iii) the activity developed by the cooperative members in the press, in a preliminary analysis, drew the attention of the researchers due to the inherent risks apparently involved in the execution of the activity.

2.3. Selection of the technique for confronting the analysis of the activity to be used and the work situation to be analyzed

After verifying the data from the direct analysis of the work, and knowing the situations and areas with fragility in relation to health and safety at work, the confrontation technique was selected as the method to be used to achieve the objective of the study. The choice of techniques was based on the fact that the worker who was in the filming could or could not be present during the application of these methods. Thus, the methods used were self-confrontation, that is, the worker who was filmed and sees himself performing his own activity, and makes an analysis of the situation; and collective confrontation, in which a group of workers verbalizes about another worker (Mollo & Falzon, 2004).

In order to know the activities developed by these cooperative members, a situation was selected in which, in the view of the researchers, the underlying rules of action were not sufficient for the various procedures observed. The selected situation was the activity developed for the baling of materials in the press machine. This situation was chosen because it is a clear example of the benefits of applying confrontation techniques for reflection on the work.



2.4. Workshops

After defining the technique and the filming to be analyzed, meetings were organized for its application, called, in this study, "workshops". After the active search, five cooperative members expressed interest in participating in the workshops. As it is a project of analysis of speeches, discussions and verbalizations, carried out within the cooperative itself during working hours, there was no search for more participants - even though there was prior authorization from the president to carry out the intervention in the cooperative and from the cooperative members for the participants to be absent from work to participate in the study.

Three workshops were held, each lasting an average of 30 minutes. In the first workshop, initially, the commitment not to identify the cooperative members in the dissemination of the results obtained was reaffirmed, for this, they were identified as C1, C2, C3, C4 and C5, and the order of distribution of the numbers for each one was made randomly. The researcher is identified as P. This identification is maintained for all the workshops transcribed in this study. Also, it was clarified to the workers that there is no correct way to carry out the activity, in order to avoid embarrassment. Three themes were selected to be worked on, each in a workshop, in order to get to know the real work of these cooperative members and placing these workers as protagonists. Thus, the first workshop aimed to learn about the activities developed in the cooperative, according to the description of the cooperative members themselves. In the second workshop, the workers should comment on what could be harmful or pose health risks during the performance of the activity shown. At the end of this second workshop, an activity was proposed for the cooperative members, and, in the last meeting, the answers given by the workers in the proposed activity were discussed.

In the workshops, therefore, the worker was encouraged to reflect on what can be changed in the environment or in the work routine to provide better quality of work and risk reduction, among other points. The stimuli used to visualize the worker were based on the data collected in the observations and filming; in the history of the creation of the cooperative; in the previous knowledge necessary to work in the cooperative, among others. The workshops were developed and based on the principles of the Historical Cultural Theory of Activity - THCA, where the worker was stimulated to be the protagonist of the actions for the necessary changes in the prevention actions of his system of work activity, also using the coping techniques of the analysis of work to promote a reflective activity.



3. RESULTS AND DISCUSSIONS

3.1. Characterization of the cooperative

The maximum number of workers who can be simultaneously linked to the cooperative is ninety individuals, that is, new ones are hired only when a cooperative member leaves or leaves, respecting this maximum limit. The management of the cooperative is divided into two parts: administrative and operational. The administrative management of the cooperative is carried out by the cooperative members themselves, who are elected among their peers, every two years, composing a board of directors with a president, a vice president and a secretary. Even exercising the function of administrative manager, the cooperative member continues to carry out operational activities.

The tasks of the operational sector are: waste collection, separation and sorting, organization into batches and/or presses and sale. The existing functions in this route are: (i) to carry out the collection of waste in neighborhoods and condominiums in the municipality on a previously established day; (ii) unloading the trucks that arrive from the collection in the external area of the cooperative; (iii) pile up this waste - also in the external area -; (iv) transfer the waste from the external pile to the conveyor; (v) separate the materials placed on the conveyor belt (according to the type), and then place them in bags; (vi) transport the bags to the press and, after being pressed, the materials are sold. In addition, one cooperative member is responsible for organizing the work shed and another is responsible for selling these materials.

3.2. Characterization of the production process

There is no specific function for each cooperative member. In theory, everyone is able to take on all jobs. However, the report of the cooperative member who presented the cooperative to the researchers was that the same cooperative members always end up taking on the same jobs. In addition, the worker also reported that, as a rule, the younger ones leave with the trucks for the collection and the women stay on the conveyor belt. The justification for this non-formalized division would be the physical demand required during the collection on the streets (in the case of the younger ones being more apt), and the detail and fine dexterity in the selection of materials on the conveyor belt (with women being considered more qualified).



From the tasks of the operational sector, the collection of waste was excluded from the filming, due to the unfeasibility of execution, since the collections are carried out on the street with trucks from the cooperative, and it is not possible to monitor them on public roads. Thus, the stations filmed were those whose activities take place within the cooperative, which are: (i) transfer from the external battery to the conveyor belt; (ii) treadmill (with the beginning, middle and end of it filmed at different times, with the most appropriate camera positioning to focus on each of the parts); (iii) press; and (iv) transfer, made by the forklift, from the press to the outside of the cooperative, where the materials are stored until they are sold. In addition, it was filmed, in the external area, cooperative members who were in the pile also separating the materials and placing them in bags according to the type.

One of the jobs presented to the workers in the workshops was the baling of materials in the press machine. This job position had its own characteristics, which will be described below.

3.3. Pressing of materials

There were three cooperative members conducting the pressing of the materials. Two of them placed the materials of the *bags* that arrived from the conveyor belts in the machine, while the other operated the machine. Right at the beginning, an interesting fact was that one of the cooperative members "entered" the machine to prepare it to receive the materials that would be pressed, as can be seen in Figure 2.



Figure 2 – Cooperative person leaving the press machine. Source: Authors

In addition, some important points observed in this workstation were: (i) the cooperative member who operated the machine had to turn it off four times to "unscrew" materials that were stuck in the machine. To do this, he had to place the trunk and upper limbs (MMSS) inside the machine at times, as can be seen in Figure 3. At other times, the worker put his hands inside the machinery, for the same reason.



Figure 3 – Cooperative member adjusting material to be pressed inside the press machine with the help of the trunk and upper limbs Source: Authors

Understanding the origin of occupational health problems presupposes analyzing the risk determinants of work organization. From a theoretical point of view, there is a clear need



for interventions to reach organizational aspects, increase worker participation, and have the character of transforming work situations, since intervening in these determinants presupposes real transformations in work situations (Hurtado et al., 2022). It was with this motivation and objective that the workshops were held, based on the principles of the Historical and Cultural Theory of Activity.

Placing the components of a system of activities in the model that represents the third generation of TCHA, it is clear that the most frequent interventions are those focused on the subjects and instruments.

This trend of less development can be interpreted as a consequence of a certain limitation to expand the object of the prevention activity, keeping the eye only on the verification of visible aspects, such as compliance with norms, however, the expansive transformation necessarily requires a new object of the activity, without which a new type of collective subject cannot be developed, tools, rules, and principles of division of labor (Hurtado et al., 2022).

3.3.1. Workshop 1

The first workshop was entitled "Knowing the work", because its main objective was for the cooperative members to see themselves, as well as third parties, in a situation of real work activity, so that they could explain, with their own words and perceptions, how the activity was developed.

The first video shown was that of the press machine. After its screening, the following question was asked by (P): *"Can someone explain to me what is being done? For example, I don't know the cooperative, I don't know how you work, I don't know what you do..."* (P).

At first, a description is presented without observing the imminent risk of the activity, as can be seen in the following report:

"It's there pressing the material. There presses cardboard... They were pressing the mixed paper. Then they're pouring it into the mouth of the funnel and it goes up, and down, and presses. Which is this part that goes up here, down here that is the funnel. Here, in this part here, what a press. The boy goes out of here and here all the time, walking like that you can't even see, to move the buttons to control because he has to control the buttons. The time it turns on, the time it turns off, then it controls. Then when



it reaches this part of the end that the bale is ready, they pass the rope to tie it, then press the button, the button pushes and the bale comes out ready." (C4).

Everyone agrees with C4, and when asked if they would like to add something, one of the participants said that it was a difficult job and when asked why, the following answer was obtained:

"It's difficult for this one, he ends up arresting, like this, because he always practices, he only stays in this service sector. Now many are just in the bags there, then we just dump the bags there, because what happens, that you have to collect the drums from the conveyors to pour them into the bags and I came from the conveyor belt pulling until I got to this press there. Then there are two or three who are there, only in that matter that knows how to drive the local machinery there. It ends up not needing many to do, so only one or two that keeps messing around. I, for example, don't even know how to use it. And they don't even teach either." (C2).

The last sentence said by this cooperative member generated a new discussion, since it is a cooperative and, in theory, all cooperative members should be able to develop all the activities required in the cooperative. He presented the rotation of jobs as a mechanism to favor the learning of other work activities:

"I think that's wrong. I think that everyone here in the cooperative should learn all kinds of services. So there should be a rotation, you know? Even if there was only one person there who knows how to teach that other. There should be a rotation. But they didn't even talk about it, there are people here who don't like to explain, but I think there should be a rotation, especially in a machine like this. What happens if the person takes a vacation?" (C1).

Another participant added that this event has already happened in the cooperative with the following phrase: *"yes, sometimes it happens that the person takes a vacation, then the other knows, then something happens to the other, no one knows how to move, then you have to keep calling the one who didn't come 'So-and-so, how do you move? (This is something) that has already happened." (C3).*

When asked if a rotation of stations had already been implemented, the cooperative members answered no. A new discussion was generated by the following statement: *"A lot of people are afraid to touch this machine, this baler, because when it spoils, (...) it has to go*



through the computer and it is very expensive to repair it, to program it again then people are afraid to touch the truth" (C4).

Cooperative has as its apex a work and income distributed equally. Thus, previous expenses with machinery maintenance, among others, should be foreseen in advance and be part of the monthly budget. However, so far such issues had not been clearly discussed. However, reflections on this began to unfold, and we can summarize them in the narrative of a cooperative member:

"No, I think that, the object of the cooperative, the machinery of the cooperative, there is no such thing as breaking and the employee having to pay. We all are... To begin with, we are a cooperative. It has to be collective. We are all together. There's no such thing as that. If you break this here, the girl will pay. 'Oxe', is she going to work for her alone? She's not working there alone, she's working for everyone. It has to be collective, there is no such thing. Anywhere, nowhere, there is no such thing. It's collective, you have to work together. We work collectively, everyone together." (C1).

The analysis of the work activities developed in the cooperative according to the perception of the cooperative members themselves, highlighted that part of the technical knowledge implemented by the subjects is not enough, because it is limited to a description of activities, and does not account for the rules of action underlying the various procedures observed.

3.3.2. Workshop 2

The second workshop had the theme "Worker's health". The cooperative members were presented with the indices related to complaints of work-related musculoskeletal pain and other pathologies also associated with work, obtained with the questionnaire initially applied. Also, they were instructed to watch the same videos shown in the first workshop, now with the following question: - what could be harmful or pose health risks during the execution of the activities developed in the cooperative.

The video of the press was shown, with the following question: *"Do you think there is any dangerous situation / that offers risks here? If so, what would it be and why?" (P).*

One of the cooperative members made the following observation: *"I was jumping into the baler" (C1),* which generated a great discussion among the participants. An important



narrative considered over-reliance on the machine's safety devices, bringing new information to the discussion.

In expansive learning, contradictions are the driving force of transformation (Engeström & Sannino, 2010). The work did not focus on contradiction, but the tensions presented in the workshops regarding the techniques not being enough to account for safety and health at work and the risks in the work of the press, demonstrate that the first learning actions such as questioning, analysis and modeling by the cooperative members occurred.

"Jumping in there is risky. it has a sensor, but... It has a sensor in the door, because the right thing is to work with the door closed" (C4). "Sensor one day fails" (C3). Again participant C4 made an important observation: "So, imagine someone is in there?" Another participant then said that: "If there is a problem with the door, you can move the sensor and you can work with it open" (C5). And the following narrative was:

"Here you have to work very carefully, because it is not registered, what happens if you move away... They only pay 4 months. If you break they pay 3 months, but the INSS if you are not retired, they give you time you need, now if you are retired they don't pay anything" (C1).

In addition, a problem for the execution of the activity was narrated:

"They manually push the bale because they no longer have the machine. The right thing was the forklift is already there waiting. The burden came out they already stuck the forks, it's not right to do that from there and here also when it's time to throw the bags, do it in one. It's very heavy. Harms. Not now because it's new, but in 40 years the will be struggling" (C3).

Another cooperative member added: *"The bag alone is already heavy, imagine full... by night they are finished with pain. It's very heavy" (C5).* There was a report of a cooperative member who has already been unable to walk, due to work in the cooperative. The worker performed the function of baldista, that is, he carried the *bags* full of recyclable material from the conveyor belt to the press machine, and now he helps in the press machine:

"We have a colleague who worked from the beginning in the cooperative, like our colleague here, he only took buckets... and down there was an iron drum, made of tin. We won at the beginning and that's what we had, then what happened? He took it out, it took it out, it took it out, over time he started to drag it from his legs and the controversy came out that he didn't want to work, he was doing "trickery" (...).



Nowadays he had to leave, he is 64 years old, he had to leave because he has a problem with his pelvis, he can't do anything else... And if you have surgery, it's a risky case, you see? What future did he have? Of a twelve, thirteen-year future within the cooperative? He only got sick... Like the day he came here to say goodbye, I wasn't happy that he was leaving, I wanted to leave the way I met him, not sick, with a cane and that will happen to all people who make an effort. Sometimes he says, "ah, it's a man, it's a man", but he makes an effort. Nowadays everything is in the machinery, it's all in the machinery, there is no more manual work" (C1).

In the first workshop, as previously mentioned, it was observed that part of the technical knowledge implemented by the workers is not sufficient, because it is limited to a description of activities, and does not account for the rules of action underlying the various procedures observed. However, in the second workshop, the cooperative members were encouraged to answer more specific questions about the execution of the work activity and it was observed, at this moment, the beginning of the contradictions existing in this system of activity. One of the main points pointed out by the cooperative members was the lack of cooperative members who know how to handle the press machine, although, theoretically, all cooperative members are able to develop all activities within the cooperative. This fact explains some important points that are achieved with the application of techniques for confronting the work activity: in addition to being able to externalize their knowledge through the explanation of the procedures they perform (Leplat, 1990), workers not only declare what they know, but also discover their own implicit knowledge, being considered both operators and analysts. This is the beginning of the reflective activity, which can effectively modify the work, since the subjects are placed as protagonists for change (Mollo & Falzon, 2004).

At the end of the second workshop, an activity was proposed for the cooperative members. They should answer the following question, through drawings or phrases: *"Considering everything we talked about today, do you think your work presents risks? If so, which ones? What do you do or can do to reduce these risks? Remembering that you don't have to talk about the situations that were shown, you can bring up any situation that you think carries risks."* (P). The answers to the question were discussed in the third workshop.

Regarding the activity developed by the participants, the cooperative members had mentioned that the risks existing in the work environment include biological, physical and chemical risks. Then, they were asked if they believe there is any other type of risk in the work



environment. The answers obtained were: *"It's machinery, right? It's a risk, when you're a driver, you have to pay close attention. Within a cooperative you have to drive for him and for another, right? It's a risk too."* (C1).

Expansive learning occurs when the object of an activity is transformed, acquiring qualities that allow it to resolve existing contradictions (Engeström, 2007). The contradiction pointed out was related to the fact that few cooperative members know how to use the press machine, although, in theory, all should be able to develop this activity. Based on the previous meeting, the cooperative members gave suggestions for changes in the object and reason of the activity, such as the implementation of a rotation in the workstations. In this sense, it is verified that in the third workshop, it was possible to observe the reflective activity and, consequently, the beginning of expansive learning, as this study contributed to the subjects themselves thinking of alternatives to modify their work methods and develop new ones through the analysis of their own work and that of others.

Participating individuals possess and develop different individual object-related skills and motives, which form the basis for the development of their professional identity and career expectations. An object of activity is complex and contradictory by its very nature, so various individual aspirations, desires, and motives are attached to it and develop during its creation (Miettinen, 2005). Any collective activity is multi-motivated, since the object of the activity drives and coordinates the actions of the individuals participating in an activity. The very variety of individual motives and capacities makes the collective conceptualization of the shared object of activity a fundamental challenge in the development of an activity. In this sense, the study of collective objects is the key to understanding the reason for actions (Miettinen, 2005).

4. CONCLUSIONS

In this work, we concluded that it was possible to know how the work activities are carried out in certain workstations of a recyclable material cooperative, according to the description and perception of the cooperative members who perform or not this activity on a daily basis, through the application of confrontation techniques.

The reflection and knowledge of the actions developed during the work activity of a group of workers of a recyclable material cooperative favored their protagonism and consequent learning in the face of the risks of their work activities, as it allowed individuals to make their



own work an object of reflection and externalize knowledge that they often are performed unconsciously, also showing that this is an effective technique to promote improvements in the work of this population.

In this work, new questions were raised that were not initially known by the researchers and that are not discussed among the cooperative workers, although many have been against what happens. In this sense, this study contributed to the workers thinking of alternatives to modify their work methods, suggesting that the analysis of work and the application of confrontation techniques are an effective way to attend to reflective activity and understand the contradictions existing in the activity system, resulting in an expansive learning. However, this study is limited by the number of interventions performed. Thus, it is suggested that future studies be carried out with a greater number of interventions with the application of the technique, proving the promotion of expansive learning in the population of recyclable material workers.

FINANCIAL SUPPORT

This work was financially supported by CNPq – PIBIC 6204.

OTHER CONSIDERATIONS

The study was approved by the Research Ethics Committee (CEP) under CAAE number: 52463421.30000.5402, in accordance with CNS Resolution 466/12 on research involving human beings (2012).

REFERENCES

- Araujo, L. C. G. de, & Garcia, A. A. (2009). *Gestão de pessoas: Estratégias e integração organizacional*. In Araujo, L. C. G. de, & Garcia, A. A. *Gestão de pessoas: Estratégias e integração organizacional* (2a ed.). São Paulo: Atlas.
- Barbier, R. (1985). *A pesquisa-ação na instituição educativa*. Trad. Estela dos Santos Abreu. Rio de Janeiro: Jorge Zahar.
- Barreto, J. da S., Barroso, S. C., Nunes, R. M. da S., Silva, A. T. (2013). *Experiencia de pesquisa-ação para inclusão social dos catadores de matérias recicláveis na cidade de Manaus/AM*. In *Anais da VI Jornada Internacional de Políticas Públicas*. Maranhão.



- Cardozo, M. (2009). Percepção de riscos ambientais de trabalhadores catadores de materiais recicláveis em um aterro controlado do município de Duque de Caxias, RJ (dissertação de mestrado). Escola Nacional de Saúde Pública Sergio Arouca, Rio de Janeiro.
- Cenci, A., & Damiani, M. F. (2018). Desenvolvimento da Teoria Histórico-Cultural da Atividade em três gerações: Vygotsky, Leontiev e Engeström. *Roteiro*, 43(3), 919–948. <https://doi.org/10.18593/r.v43i3.16594>
- Clot, Y. (2010). *Fractal: Rev. Psicol.*, 22 (1), 207 - 234. <https://doi.org/10.1590/S1984-02922010000100015>
- Clot, Y. (2001). *Clinique du travail et clinique de l'activité. Nouvelle revue de psychosociologie*, 1, 165-177. <https://doi.org/10.3917/nrp.001.0165>
- Cockell, F. F., Carvalho, A. M. C. de, Camarotto, J. A., & Bento, P. E. G. (2004). A triagem de lixo reciclável: Análise ergonômica da atividade. *Revista Brasileira de Saúde Ocupacional*, 29, 17–26. <https://doi.org/10.1590/S0303-76572004000200003>
- Dagnino, R. S.; Johansen, I. C. (2017). Características demográficas e socioeconômicas dos catadores de material reciclável no Brasil segundo o Censo Demográfico 2010. In Amaro, A. B.; Verdum, R. (Orgs.). *Política Nacional de Resíduos Sólidos e suas interfaces com o espaço geográfico: entre conquistas e desafios*. Porto Alegre: Editora Letras, 2016.
- Dias, É., & Pinto, F. C. F. (2019). Educação e Sociedade. Ensaio: Avaliação e Políticas Públicas em Educação, 27, 449–454. <https://doi.org/10.1590/S0104-40362019002701041>
- Engeström, Y. (1987). *Learning by expanding. An activity-theoretical approach to developmental research*. Helsinki: Orienta-Konsultit Oy. <https://doi.org/10.1017/CBO9781139814744>
- Engeström, Y. (2007). Putting Vygotsky to Work: The Change Laboratory as an Application of Double Stimulation. *The Cambridge Companion to Vygotsky*, 363–382. <https://doi.org/10.1017/CCOL0521831040.015>
- Engeström, Y. (2009). From learning environments and implementation to activity systems and expansive learning. *Actio: An International Journal of Human Activity Theory*, 2, 17–33. <https://doi.org/10.1017/CBO9781316225363.006>
- Engeström, Y., & Sannino, A. (2010). Studies of expansive learning: Foundations, findings and future challenges. *Educational Research Review*, 5(1), 1–24. <https://doi.org/10.1016/j.edurev.2009.12.002>
- Fonseca, M. D., Carvalho, G. C., Corrêa, M. M., & Holanda, R. M. de. (2014). Os riscos relacionados ao ambiente e à atividade de coleta de resíduos sólidos urbanos. *Revista Verde de Agroecologia e Desenvolvimento Sustentável*, 8(5), 96–100. Disponível em: <https://www.gvaa.com.br/revista/index.php/RVADS/article/view/1978>. Acesso em: 12 apr. 2024.
- Galon, T. (2015). Do lixo à mercadoria, do trabalho ao desgaste: Estudo do processo de trabalho e suas implicações na saúde de catadores de materiais recicláveis (tese de doutorado). Universidade de São Paulo, Ribeirão Preto. <https://doi.org/10.11606/T.22.2015.tde-29052015-190523>
- Gasque, K. C. G. D. (2011). Indicador de atividade reflexiva e teoria fundamentada: O pensamento reflexivo na busca e no uso da informação. *Transinformação*, 23, 39–49. Disponível em: [Trans4.pmd \(scielo.br\)](https://doi.org/10.1590/S0103-17132011000100004). Acesso em: 12 apr. 2024.



- Godoi, M., Benites, L. C., & Borges, C. (2022). O uso da autoconfrontação simples e cruzada para analisar o ensino em educação física. *Movimento*, 25, e25071. <https://doi.org/10.22456/1982-8918.88272>
- Gutberlet, J., Baeder, A., Pontuschka, N., Felipone, S., Santos, T., & Souza, D. (2016). Pesquisa-ação em educação ambiental e saúde dos catadores: Estudo de caso realizado com integrantes de cooperativas de coleta seletiva e reciclagem na Região Metropolitana de São Paulo, Brasil. In Pereira, B. C. J., Goes, F. L. (Orgs). *Catadores de Materiais Recicláveis: Um encontro nacional*(p. 201–217). Rio de Janeiro: Ipea.
- Gutberlet, J., & Jayme, B. (2012). A história do meu rosto: Como agentes ambientais percebem a estigmatização (re)produzida pelo discurso.
- Hurtado, S. L. B., Simonelli, A. P., Mininel, V. A., Esteves, T. V., Vilela, R. A. de G., & Nascimento, A. (2022). Políticas de saúde do trabalhador no Brasil: Contradições históricas e possibilidades de desenvolvimento. *Ciência & Saúde Coletiva*, 27, 3091–3102. <https://doi.org/10.1590/1413-81232022278.04942022>
- Jesus, M. C. P. de, Santos, S. M. dos R., Abdalla, J. G. F., Jesus, P. B. R. de, Alves, M. J. M., Teixeira, N., Jesus, R. R. de, Vilela, M. M. P., & Mattos, L. R. (2012). Avaliação da qualidade de vida de catadores de materiais recicláveis. *Revista Eletrônica de Enfermagem*, 14 (2), Artigo 2. <https://doi.org/10.5216/ree.v14i2.15259>
- Lemos, M., Pereira-Querol, M. A., & Almeida, I. M. de. (2013). A Teoria da Atividade Histórico-Cultural e suas contribuições à Educação, Saúde e Comunicação: Entrevista com Yrjö Engeström. *Interface - Comunicação, Saúde, Educação*, 17, 715–727. <https://doi.org/10.1590/S1414-32832013000300018>
- Leplat, J. (1990). Skills and tacit skills: A psychological perspective. *Applied Psychology: An International Review*, 39(2), 143–154. <https://doi.org/10.1111/j.1464-0597.1990.tb01042.x>
- Magni, A. A. C., & Günther, W. M. R. (2014). Cooperativas de catadores de materiais recicláveis como alternativa à exclusão social e sua relação com a população de rua. *Saúde e Sociedade*, 23, 146–156. <https://doi.org/10.1590/S0104-12902014000100011>
- Miettinen, R. (2005). Object of Activity and Individual Motivation. *Mind, Culture, and Activity*, 12(1), 52–69. https://doi.org/10.1207/s15327884mca1201_5
- Mollo, V., & Falzon, P. (2004). Auto- and allo-confrontation as tools for reflective activities. *Applied Ergonomics*, 35(6), 531–540. <https://doi.org/10.1016/j.apergo.2004.06.003>
- Nascimento, A. Rocha, R. (2021). Análise do Trabalho em Ergonomia: modelos, métodos e ferramentas (p. 411-434). In: Braatz, D., Rocha, R., Gemma, S. F. B. (Org). *Engenharia do trabalho: saúde, segurança, ergonomia e projeto*. Santana de Parnaíba, SP: Ex Libris.
- Opas/Oms, B. M. da S. do B. R. no B. da. (2001). Doenças Relacionadas ao Trabalho: Manual de Procedimentos para os Serviços de Saúde. In *Doenças Relacionadas ao Trabalho: Manual de Procedimentos para os Serviços de Saúde* (p. 580–580). Disponível em: http://dtr2001.saude.gov.br/editora/produtos/livros/pdf/02_0388_M1.pdf. Acesso em: 12 apr. 2024.
- Pinhel, J. R. (2013). O catador de materiais recicláveis. In Pinhel et al., *Do lixo à cidadania: guia para formação de cooperativas de catadores de materiais recicláveis* (p. 16-30). São Paulo: Peirópolis.
- Porto, M. F. de S., Juncá, D. C. de M., Gonçalves, R. de S., & Filhote, M. I. de F. (2004). Lixo, trabalho e saúde: Um estudo de caso com catadores em um aterro metropolitano no Rio de



Janeiro, Brasil. *Cadernos de Saúde Pública*, 20, 1503–1514. <https://doi.org/10.1590/S0102-311X2004000600007>

Rodrigues, L., & Gonçalves-Dias, S. (2017). Cooperativas de Catadores de Materiais Recicláveis: Uma proposta de indicadores para segurança e saúde do trabalho. In VIII Encontro Nacional da ANPPAS. Natal.

Rodrigues, L., & Gonçalves-Dias, S. (2020). Indicadores de Segurança e Saúde do Trabalho para Cooperativas de Catadores de Materiais Recicláveis: Revisão, Aplicação e Recomendações (p. 37–62). <https://doi.org/10.5151/9788580394108-02>

Santos, J. G. (2012). A Logística Reversa Como Ferramenta Para a Sustentabilidade: Um estudo sobre a importância das cooperativas de reciclagem na gestão dos resíduos sólidos urbanos. *Revista Reuna*, 17(2), Artigo 2.

Silva, H. (2020). Analysis of the Mental Workload Applied to the Sorting Activity of Recyclable Materials (p. 807–811). https://doi.org/10.1007/978-3-030-25629-6_126

Souza, M. T. S. de, Paula, M. B. de, & Souza-Pinto, H. de. (2012). O papel das cooperativas de reciclagem nos canais reversos pós-consumo. *Revista de Administração de Empresas*, 52, 246–262. <https://doi.org/10.1590/S0034-75902012000200010>

Souza, R. L. R. de, Fontes, A. R. M., & Salomão, S. (2014). A triagem de materiais recicláveis e as variabilidades inerentes ao processo: Estudo de caso em uma cooperativa. *Ciência & Saúde Coletiva*, 19, 4185–4195. <https://doi.org/10.1590/1413-812320141910.09072014>

Vieira, M. (2003). Quando os outros olham outros de si mesmo: Reflexões metodológicas sobre a autoconfrontação cruzada.

Vilas-Boas, D. et al. (2020). A intervenção formativa e a aprendizagem expansiva no desenvolvimento de um novo currículo em uma faculdade de medicina. In *Brazilian Journal of Socio-Historical-Cultural Theory and Activity Research* (p. 1-35). Rio de Janeiro.

Wedderhoff, S. (2012). Análise ergonômica em uma cooperativa de catadores de materiais recicláveis de um município da região metropolitana de Curitiba. [Especialização em Medicina do Trabalho, UFPR]. Disponível em: <https://acervodigital.ufpr.br/handle/1884/39067>