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Published Date: 3/1/2020

Page.333-344

Vol 8 No 03 2020

DOI: <https://doi.org/10.31686/ijer.vol8.iss3.2234>

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Abstract

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1. Introduction

After the early stages of mercantilist primitive capital accumulation from the sixteenth to eighteenth centuries, the competitive capitalism in the second half of the eighteenth century began to fuel class struggles which stem from the contradictions between capital and labour. In addition to responding violently to workers' protest movements, the bourgeoisie began to use the threat of unemployment as technology advanced reducing the need for workers. Machines began to automate many production processes which were highly dependent on human work. Innovations operated as powerful weapons in the hand of the bourgeoisie in the class struggle, and the state served to repress workers, maintain the ideal external conditions for capitalist accumulation and the right to property, and secure public order to keep workers framed in the logic of capitalist domination (Netto & Braz, 2006).

At that point, according to Marx (2014), modern industry began to develop mechanical and

technological inventions that were supposed to lighten the burden of labour, but they were used to produce surplus value. In this process, mental conceptions were separated from the physical labour, and workers were reduced to the lifelong task of serving machines. Work has thus assumed an alienating character in the worker's life, since it submitted him/her to fragmented activities that resulted in the production of goods and prevented him/her from enjoying what they produced. Harvey (2013) argues that the workplace acquired a material mode of existence that conditioned the replacement of human force and was based on the conscious application of natural science.

According to Netto & Braz (2006), in the last third of the nineteenth century, it is possible to see the great progress in the development of productive forces, machinery and industry. The capital tended to accumulate, smaller companies were crushed by the larger and more efficient ones, which arose from technological improvement and capital accumulation. The spill-over of monopoly capital beyond the borders of countries and its fusion with banking capital – which led to the sharing of colonial areas among imperialist powers – started a new phase of capitalism. Today, capitalism is characterized by globalization, which promotes an international division of labour. It has developed in a more unevenly – as there are growing asymmetries in the development of countries – and combined way, as less developed countries combine more modern techniques with archaic social and economic relations and remain as dependent and exploited economies.

Faced with the growing hypertrophy of the tertiary sector and the submission of education, health, culture and leisure to the logic of capital, contemporary capitalism – which takes a better defined form from the 1970s on – brought as its fundamental characteristics financialism, rentism and the misconception that conflicts could be remedied by the consensus drawn through representative democracy. However, these characteristics faced resistance. The pressure exerted by the organized movements of workers, the counterculture movements and the revolution in customs projected new actors in the political scene as agents of anti-capitalist mobilization. The unions, which had been defined since the nineteenth century as workers' associations seeking negotiations between the collective representation of these workers and their respective employers, discussed the terms and conditions associated with employment (Farber, 2001). Understood as coalitions of workers who sought to negotiate the sharing of economic earnings with employers, they operated as vehicles through which such workers gained voice opportunities to bring labour-related demands (Hirschman, 1970).

However, the restructuring of capitalism on a neoliberal basis has pointed not only to flexible accumulation and flexibilization of labour processes, markets, products and consumption patterns, but to lower worker stability in employment, precariousness in labour relations and the defragmentation of workers' class consciousness, which generated the loss of rights, the increasing unemployment and the reduction of the unions' strength. Disunited workers started to lose their resilience to capital attacks. The working class became more demobilized in its struggle through the extreme fragmentation of the modes of mobilization (Beaud, 1987). However, the importance of the unions' struggle cannot be ruled out, nor can the death of the "revolutionary subject" be decreed, but the conditions of the workers' political protagonism need to be revised to persist in the struggle against the oppressive action of capital (Netto & Braz, 2006).

For the worker to be aware of the exclusionary processes that characterize the capitalist economy, the need for education of the working class for the radical reconfiguration of conditions of reproduction of this

economy becomes evident. In this sense, Marx and Engels (1983) argue that the education of the working class should be multilateral and include 1) intellectual education; 2) physical and body education, such as that achieved with gymnastic and military exercises; 3) technological education, which unites the general and scientific principles of the entire production process and, at the same time, initiates children and teenagers in the management of elementary tools of the various industrial branches (Marx & Engels, 1983). In a Marxist conception of education, work is understood as an educational principle and aims at social transformation. In this sense, intellectual, technological and physical education is combined with material production to provide every worker with a full understanding of the production process (Saviani, 2003). Among researchers in the fields of work and education, there is a consensus that “polytechnic education” can be understood as the synonym of a Marxist conception of education (Rodrigues, 1998). Nowadays, despite the difficulties mentioned above, several unions have transcended the role of means of mobilization of the working class to act in the process of workers’ polytechnic formation in the light of an adverse context of precarious work with the advance of neoliberal reforms and globalization (Santos, 2000).

In Brazil, some unions developed such functions in the context of what Santana (1999) calls the “new unionism”. According to the author, the “new unionists” claim that pre-1964 unionism was not autonomous and independent, because the unions were then created by political interests for the benefit of those in power. The new unionists sought to distinguish themselves from past leaderships by distancing themselves from the corporate union structure linked to the interests of the state. They radically criticize the union’s state-linking mechanisms and claim for the democratization of the union structure (Santana, 1999). By taking the place that other forces had occupied in the past, the “new unionism” guaranteed the working class a fundamental channel for the representation of their demands, including educational initiatives.

However, there is much question as to whether unions in Brazil today are effectively seeking to provide workers with an awareness of reality transformation – compatible with the notion of polytechnic education – or, by proposing initiatives for intellectual, technological and physical / body education, union leaders intend to mask electoral or political manoeuvres and undermine not only the representativeness of the working class, but the effectiveness of its struggle strategies in the light of the contemporary reconfigurations of capitalism.

The aims of the article are to identify the role of unions in intellectual, technological and physical education of the workers and examine the main motivations of Brazilian union centrals for proposing educational initiatives, according to the existing literature on the subject. The central arguments point out that:

- 1) The intellectual education initiatives provided by unions should seek primarily to demonstrate the importance of dialogue in the educational process rather than merely transmit knowledge. These initiatives should seek to improve socioeconomic, political and cultural reflections and stimulate transformative actions by workers to free them from oppressive relationships through generative themes that departed from their reality and fostered dialogue, learning and respect for differences.
- 2) The technological education initiatives provided by unions may take the form of courses, workshops and lectures promoted by such entities, which could predominantly aim at raising workers’ awareness of the notion of “social technology”. Social technology starts from the view that the questioning of the technological bases of a process could allow the recovery of citizenship

of the most penalized segments in society, the interruption of social fragmentation and economic strangulation processes, the construction of a more sustainable style of development and the inclusion of actors situated across a broad spectrum of ideological interests and visions. These social innovations would be conceived as processes from which a type of knowledge emerged. This knowledge would address the problems facing an organization or group of actors. Social technology refers to a knowledge – tacit or codified, intangible or incorporated into people or equipment – which aims to increase the effectiveness of processes, services and products related to meeting social needs.

- 3) The physical and body education initiatives provided by unions – many focused on sports practices and body awareness – could predominantly move away from hygienist projects, get closer to the promotion of physical and mental well-being not to improve the workers' performance in the workplace, but their quality of life outside the workplace, and achieve greater social integration.
- 4) The most important union centers in Brazil sought educational initiatives as ways of garnering workers' support for personal projects that served the capitalist interests. They use opportunistic strategies and distance themselves from social projects aimed at improving the quality of workers' lives.

2. Theoretical framework

2.1. *The social metabolic capital system and its structural crisis*

A few decades ago, it has been possible to extract apparently significant concessions from capital through labour advocacy organizations, such as unions. Capital was able to grant these gains, but they were absorbed by it during its self-expanding process. Today, the global capital system seeks to thwart interference attempts to take on an uncontrollable form of an extremely dynamic and singular, expansion-oriented and accumulation-driven social metabolic control that eludes human control, because it has historically emerged as a powerful totalizing structure to which everything – including human beings – must fit into all its productive and distributive functions and prove its viability, even though many of its propagandists regard this system as inherently democratic. In this system, not only workers lose control of decision making, but even richer capitalists cannot exercise control over the global dynamics of the capital and must obey the imperative goals of the whole system. The life chances of individuals under such a system are determined according to where the social groups to which they belong are situated within the hierarchical structure of capital's command, and capital retains its primacy over the person through the legal and political body (Mészáros, 2011).

First, it is necessary to understand that, in this system, individuals must reproduce their existence through the primary functions of mediation established among them and in the exchange and interaction with nature, given by the uniquely human ontology of work, through which self-production and societal reproduction develop (Lukács, 2010). The vital functions of the first order of mediation include the regulation of reproductive biological activity in conjunction with existing resources; the regulation of the work process, whereby the necessary community exchange with nature can produce the fundamental goods, work tools, productive enterprises and knowledge for the satisfaction of human needs; the establishment

of an exchange system compatible with the historically changing required needs, aiming to optimize existing natural and productive resources; the organization, coordination and control of the multiplicity of material and cultural activities, aiming at meeting an increasingly complex social reproduction system; the rational allocation of available material and human resources, fighting forms of scarcity, in line with existing levels of productivity and socioeconomic limits; and the constitution and organization of societal regulations designated for all social beings, in conjunction with the other primary mediation determinations and functions. The advent of a second order of mediations corresponds to a specific period of human history, which ultimately profoundly affects the functionality of first-order mediations by introducing fetishizing and alienating elements of social metabolic control. Among the conditions necessary for the validity of second order mediations, one can mention the separation and alienation between the worker and the means of production; the imposition of objectified and alienated conditions upon workers as a separate power that exercises control over them; the embodiment of capital as a selfish value – with its usurped subjectivity and pseudo-personality –, aimed at meeting the expansionist imperatives of capital; and the equivalent personification of the workers as labour, destined to establish a relationship of dependence with historically dominant capital. Such personification reduces the identity of the subject of this work to its fragmentary productive functions. Each form of first-order mediation is altered and subordinated to the imperatives of capital reproduction. The productive and controlling functions of the social work process are radically separated between those who produce and those who control. By constituting itself as the most powerful and all-encompassing system of social metabolism, the second-order mediation system has a constitutive core formed by the capital, labour, and state, and these three fundamental dimensions of the system are materially interrelated, making it impossible to overcome them without eliminating all the elements that comprise this system (Antunes, 2009).

The hierarchical social division of labour stems from the unsurpassable condition, under the domain of capital, that society is antagonistically structured in the light of the separation between the production and control functions of the labour process and their attribution to different classes of individuals. In its social metabolic control, capital extracts and accumulates surplus labour and, to this end, it must free itself from the restrictions on its self-sufficiency. Given the close relationship between economy and politics, the state assumes the exercise of a comprehensive control over the submissive centrifugal forces emanating from productive units isolated from capital. The state acts as a corrective and rectifying structure, compatible with the structural parameters of capital. It is clear, therefore, that the structuring principle of the state is its vital role in protecting the general conditions of extracting surplus value and ensuring that potential recalcitrance and rebellion are under control. However, the alienation of control and the antagonisms it generates are of the very nature of capital. Thus, recalcitrance is reproduced daily through normal system operations; so that the deterrent state guarantee against potential political rebellion cannot eliminate completely the emancipatory aspirations of the labour force. The inability to bring the interest of the capital system to its fundamental logical conclusion results from the structural dissonance between the imperatives emanating from the social metabolic process of capital and the state as the comprehensive political command structure of the system. The state cannot be truly comprehensive or totalizing to the degree that it “should be”, for this is no longer in agreement even with the already attained level of social metabolic integration, even less with the one required to get the global order rid of all its increasing

difficulties and contradictions (Mészáros, 2011).

The contemporary crisis sees the outbreak of more frequent and continuous precipitations, which has motivated a widespread offensive of the capital and the state against the working class. This crisis occurs in a scenario also characterized by the deregulation of capital, trade, technology and working and employment conditions, as well as the strong expansion and liberalization of financial capital. New workforce management techniques, coupled with commercial liberation and new forms of techno-scientific mastery, accentuated the centralizing, discriminatory, and destructive character of this process. In addition to the destructive action against the human labour force, the intensity of structural unemployment levels and the global environmental degradation are increasing (Antunes, 2009). In the light of these changes, it is necessary to develop the critical perspective of workers regarding this system and its crisis, and polytechnic education can be a constructive way to stimulate this.

2.2. The polytechnic education

To achieve a critical perspective on the social metabolic capital system and its structural crisis, the development of polytechnic education can be an important element. This perspective on human formation is based on the idea that modern society, which generalizes the demands of systematized knowledge, is characterized by a contradiction: as it is a society founded on the private ownership of the means of production, the maximization of men's productive resources is triggered for the benefit of the portion that owns the means of production, to the detriment of the vast majority of workers who have only their labour force. In the capitalist society, science was incorporated into productive work and became a type of material power. Knowledge turned into a productive force and therefore a means of production. Thus, the contradiction of capitalism also cuts across the question of knowledge: if this society is based on private ownership of the means of production and science as knowledge is a means of production, it should be a private property of the ruling class. The notion of polytechnics is moving towards overcoming the dichotomy between manual and intellectual work, professional and general instruction. Polytechnic education is multidimensional and encompasses elements of intellectual, technological and physical formation (Saviani, 2003).

Regarding the intellectual formation, the polytechnic education demonstrates how important the development of dialogue in the educational process is and how it is opposed to the uncritical and mechanical method of transmitting knowledge. Freire (1987) bases dialogue on love and also addresses praxis, which has as its dimensions reflection and transformative action. The word has a transformative value in the world and the people, in that it enables the oppressed to be freed from their domination condition through dialogue. As the word is a right of all people – not a privilege – and a loving action, Freire (1987) describes as one of the key elements of his method the use of generative themes to foster dialogue and learning, which refer to the reality of people and investigate their action on this reality, not the mobilization of pre-established contents, as in traditional education. There needs to be an investigation and a collection of these themes that are parts of the social life, given that they are the drivers of new dialogues. Exchanging experiences removes the idea of “absolute truths” in which others cannot interfere. With no dialogue, society divides and becomes an easy target for oppressors, who manipulate weak and selfish people. It is also important to emphasize that dialogue does not nullify the self, because it starts from people's own experiences in

communion with others, who also bring their experiences, share their needs and build new visions in this exchange of knowledge. Freedom is thus achieved through a critical consciousness in praxis, where Self and Other will be in constant dialogue in the transformation of reality and the liberation of relations of oppression. Dialogue is important because it grants participants of the teaching and learning processes the freedom of expression, so that the right to reflect is not restricted to the teacher, who only transmits his/her worldview, and opens space for the students to express themselves, their perception of reality and contributions to social transformation (Freire, 1987).

The technological formation, in the perspective of polytechnic education, starts from the questioning of the notion of “technology” itself. Dagnino (2004) defines “technology” as the result of the action of a social actor on a work process that he/she controls. However, due to the characteristics of the context of the social agreement and the productive environment in which this social actor operates, the generated product may be appropriated by someone else other than this social actor. According to Feenberg (1991), technology is not neutral, and it shapes or conditions lifestyles. It is also selected from a process permeated by the correlation of social and political forces that delimit the space of its consolidation (Feenberg, 1991, 2010). The author proposes a subversive rationalization of technology to democratize the process of development, control and use of technologies and give greater human control over means and ends. This would be a way of extending democracy to the technical domain, as well as the process of technological conception and application, and going beyond the search for profit. In the process of construction of a polytechnic education, the concept of “social technology” disseminates the concern with the technological bases of a process that would enable the citizenship recovery of the most penalized segments, the interruption of the path of social fragmentation and internal economic strangulation of the community and the stimulus to sustainable development. Social technology is connected to a process of social innovation, which refers to the provision of some new good or service to increase the satisfaction of social needs (Dagnino et al., 2004). In opposition to conventional technology, social technology starts from a critique of the neutrality of science, and its construction considers the need to adapt the current technology to the construction of a society with new social relations of production. (Henriques et al., 2015).

In this sense, polytechnic education focuses on the sociotechnical adequacy, which means the process of adaptation of scientific and technological knowledge not only to the requirements and purposes of a technical-economic nature, but to the set of socioeconomic and environmental aspects that constitute the relationship among science, technology and society. In defining a new sociotechnical code from which conventional technology would be deconstructed and redesigned in the direction of social technology, one can emphasize the democratic participation in the work process, the fulfilment of requirements related to the environment, the ampliation of the useful life of machines and equipment, the preoccupation with the health of workers and consumers and their self-management training. In this “sociotechnical construction”, technological artefacts have their characteristics defined through negotiation among relevant social groups. This can be done by changing the way in which the surplus generated by the adoption of traditional technologies is shared, increasing the worker’s knowledge about the productive and managerial aspects and revitalizing and upgrading equipment, for example (Dagnino et al., 2004).

Finally, the physical and body formation is related to the development of concrete pedagogical practices that enable workers to break simultaneously with close professionalization and generic education,

separated from the world of work. The basis of the renewal movement that aims at a socio-cultural perspective of physical education is found in the work of Marinho (2010, 2011), which provided contributions to break the paradigm of body education based on a purely positivist technique. This perspective allowed the development of physical education from a critical and humanistic point of view (Dias et al., 2019). Marinho's ideas challenge medical science and sportsmanship paradigms in the way of thinking about physical education when dialoguing with education, politics and society. According to the author, the humanistic conception of body education uses games, sports, dance and gymnastics – as well as their respective techniques – as ways to achieve educational goals. In this conception, the transfer of learning goes far beyond sports performance, in addition to moving away from technicality when understanding that the technique is no longer conceived as the engine of the historical process (Marinho, 2010). For Marinho (2011), body education transcends the care of the physical aspects of the human being by facilitating human development under its physical, moral and intellectual dimensions. In this perspective of the body dimension of human formation, physical activity allows the process of techno-intellectualization, which means the intellectualization integrated into the action. In this context, the excess of technicality ends up limiting the construction of intelligence and creativity.

The activities of physical and body education must be conceived critically, in the light of philosophy and the human and social sciences, since human beings cannot be understood in a fragmented way. They are integral beings, consisting of body, mind and spirit, therefore their corporal education must also be philosophically grounded, so that the technique present in games and sports should not be understood as the end of the educational process, but as a means to educate (Dias et al., 2019). In line with Vieira Pinto (2005), technique – which is a conscious and immanent act of the human being – allows the constitution of man as a social being, capable of transforming nature through intellectual faculties. Marinho (2010) argues, by incorporating Marxist thought into his reflections, that social agents can choose techniques and methodologies that do not merely lead to a reproduction of historical reality, but to its transformation, so that technical choices are also political by creating syntheses that, in conjunction with historical reality, allow people to see a way for human emancipation.

3. Methodology

The bibliographic research consisted of reading, selecting and organizing topics on the concepts of polytechnic education and Brazilian new unionism and identifying their possible intersections, as well as the social metabolic capital order and its crises to which polytechnic education might represent a way out. The qualitative analysis of the results focused on the indication of the main educational initiatives by the most important union centrals in Brazil from 1964 on and then the investigation of the motivations of union leaders in proposing such initiatives, according to the existing literature.

4. Results and analysis

In the negotiation process between employers and employees in the capitalist economy, unions seek to maximize the welfare of their members. The aims of the negotiation may be limited to raising wages (monopoly model) or payroll (right-to-manage model), which combines employment and wage objectives.

In this context, the bargaining power of a union is characterized by the ability of union structures to mobilize workers to impose loss of profits on companies and bear the costs inherent to strikes. The conventional way of empirically determining the bargaining power of a union is to gauge its mobilizing capacity through the union rate, and the extent of its influence through the union coverage afforded by the legislative context (Portugal & Vilares, 2013). The participation in unions gives the worker a set of personal and collective benefits. Examples of collective benefits include claims for better working conditions, the promotion of worker health and safety and the provision of appropriate channels for reporting bullying. As an example of personal benefits, it is possible to indicate investment in training and education (Farber, 2001).

The functions of the unions became more diversified in the context of the Brazilian new unionism, which aims to turn unions into more autonomous and independent institutions than the pre-1964 institutions, seen as entities created by political interests linked to the state. The new unionism criticizes links between unions and the state and claim for the democratization of the union structure (Santana, 1999). It sees that citizenship is not merely an attempt to eliminate the burden of poverty at the lowest levels of society, but it has taken on the action aspect, promoting a total change in the pattern of social inequality. In the case of new unionism, citizenship does not only intend to raise the level of the lower floor below the social building, but intends to remodel the whole building (Marshall, 1967).

The new unionism in Brazil sees that the world situation becomes unsustainable as there is a deepening of competitiveness, a production of new totalitarianisms, and the growing impoverishment of the great masses. In this scenario, where the tyranny of money and information appear “as the pillars of a situation in which technical progress is exploited by a small number of global actors for their exclusive benefit” (Tavares, 2000), it is necessary to fight for social inclusion, which requires a critical perspective of the world and the role of workforce that polytechnic education can bring. In the light of the process of exclusion, unemployment is becoming commonplace, poverty increases, and all of this is the result of the deterioration in the value of labour in a “world of exclusions”, aggravated by social unprotection, a hallmark of the neoliberal model, which is also a creator of insecurity (Santos, 2000). However, as Tavares (2000) argues, a new centrality of the social actors forms the basis for a new policy. In contrast to the alienation of the masses, a new consciousness of solidarity and citizenship arises, with a new moral philosophy opposed to that of mercantile values. Nevertheless, one may question if unions in Brazil today are effectively seeking to transform this reality of exclusion – for which an effective polytechnic education would be fundamental – or operate electoral or political manipulation strategies of the working class, destroying the effectiveness of its struggle against the reconfigurations of capitalism.

When the most important union centrals in Brazil are considered, Souza (2009) argues that their actions and formulations that aim to promote the qualification of their members are consistent with those of the state and the business sector. The unions, which use different arguments, understand that Brazil should be inserted in the dynamics of the globalized world market, which turns the qualification of the worker an essential element for this purpose, that is, the worker must be prepared according to the dictates of the globalized market so that he/she has conditions of employability and becomes a citizen, as he/she is able to increase the productivity and competitiveness of the companies in which he/she is employed (Souza, 2009).

For example, the Central Única dos Trabalhadores (CUT)'s Department of Socioeconomic and Political Studies prepared a 1988 document based on its studies about automation processes and their repercussions for the working class. The immediate aim of this initiative was to contribute or develop new strategies by which the Brazilian union movement could minimize the harmful effects of microelectronic automation for the working class (CUT, 1988). The Força Sindical and the Comando Geral dos Trabalhadores (CGT) did not present proposals for in-depth productive restructuring and recognized that workers were increasingly required to have skills such as problem solving, decision making, teamwork and self-organization (Souza, 2009). In documents from the early 1990s, CUT recognized that the increasing use of automation, linked to new forms of production organization, was leading to the fragmentation and dispersion of labor and the flexibilization of labor relations. This has shaken the ties of solidarity and sociability among workers and significantly altered the profile of the working class, leading to the relative loss of bargaining power of the working and peasant classes in the union movement. This same process has intensified the exploitation of capital over labor, which expanded the proletarianization of increasingly broad contingents of society (CUT, 1992).

However, this Central consented to bourgeois initiatives, placing itself as a representative of the working class in spaces of public participation, but within the limits of capital appreciation. CUT's educational initiatives were already part of the bourgeois renewal of the mechanisms of mediation of class conflict to consolidate bourgeois hegemony. The union central adopted a less aggressive stance aiming at finding spaces in the political arena. Nowadays, CUT and the other union centers still recognize that the new technologies under capital control are destroying historic labor rights, reducing the relative weight of the industrial working class and expanding indirect work in the service sector (Souza, 2009). Nevertheless, the intellectual, technological and physical education initiatives developed by such centers did not stimulate the questioning of workers in relation to capitalism but aimed at training such workers for the preservation of the hegemonic capitalist order.

CUT argued that the automation of new production processes could improve working conditions if there were direct interventions by workers in areas, such as workers' control over innovations and production through struggle and negotiation on investment decisions (CUT, 1988). However, there was no prospect of educating the worker as to the fundamentals of the capitalist and liberal order, so that the mere training to deal with innovations and production seemed to meet the demands of the market. CGT did not make any judgment, in its education initiatives, about the application of science and technology in production. It limits itself to improving the training of workers for productive activities with vague and imprecise criticism of the effects of rationalizing the work of the working class (CGT, 1999). This central did not develop a critical perspective in its education actions and only seeks options that mitigate the harmful effects of the productive use of science and technology in the capitalist order (Souza, 2009). The Força Sindical valued the technological revolution as a diffuser of technologies that established new production paradigms. Its education initiatives emphasized the development of skills to accompany technical progress and incorporate product and process innovations, as well as the proper mastery of basic and product engineering, to allow effective absorption and improvement of imported technologies, and the generation of capacities for the elaboration of new processes and products (Força Sindical, 1993).

5. Conclusion

According to Souza (2009), the current stage of development of the productive forces imposes management measures to guarantee greater flexibility to production processes and increase the possibility of adapting the workforce to changes. The capital shows multiple uses of work capacity and develops the multifunctionality or polyvalence of the worker. These reformulations guarantee an increase in the productivity of companies and the extraction of both absolute and relative surplus value. Such reformulations are necessary to guarantee productivity and competitiveness, essential to the reproduction of capital.

Despite the critical efforts in the 1980s, especially those of the second half of that decade, and the 1990s, reflection on science and technology by central unions in Brazil did not take into account the revolutionary purpose, which a truly anti-capitalist union center should seek to accomplish, reducing science and technology to an economic perspective. Dias (1996) argues that the concept of social formation disappears if faced with the concept of mode of production.

There is a loss of the class character of the analysis on the meaning of the intellectual, scientific and technological advance for capitalism in the name of a technocratic understanding, as if technology were immune to the contradictions of the capital accumulation process. For unions and union centers not to limit their education initiatives to the mere reproduction of capitalism, it would be necessary that technological education, together with other modalities (intellectual and physical, for example), compose a real “polytechnic education”, which incorporates, in Rodrigues’ (1998) perception, aspects related to professional qualification around work processes in a context of technological transformations, but also concrete pedagogical practices that simultaneously break with the narrow professionalization and generic education. By overcoming the Taylorist-Fordist pattern of work organization and professional training, polytechnic education contributes to the advancement of broader social transformations (Rodrigues, 1998). However, it can be said, from the analysis of the data, that the Brazilian union centrals considered in the research have considerably distanced themselves from a polytechnic formation and their educational initiatives served as means of training workers to meet market needs.

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