The interface of innovation and activity theory

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Abstract: The phenomenon of learning and innovation can be explained through activity theory (AT) and socio-technical theory (STT), with the Association International des Etudiants en Sciences Economiques et Commerciales (AIESEC) in Curitiba as the empirical field. This association offers a leadership training course to young university students. The methodology used was labour development research (LDR), which studies expansive and remediative learning. The results showed that AT enabled an explanation of the rise and construction of a historical perspective of the object. STT demonstrated the diffusion of innovation in local projects, from the formulation of expectations to summarisation.

Keywords: activity theory; socio-technical theory; learning; innovation.


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1 Introduction

Assuming that every theory is biased and, as a rule, does not explain the phenomenon as a whole, in a multiparadigmatic perspective, two theories defined the line of analysis: activity theory (AT) and socio-technical theory (STT) to explain the phenomenon of learning and innovation. Consequently, the research problem of this study is: What are the principles, convergent, divergent and complementary factors of AT and STT with a view to analysing learning and innovation practices?

It is evident that AT, by understanding the historical perspective of learning as a situated human activity system, provides concreteness to the phenomenon treated by STT at a relation abstraction level.

The empirical field of this research is the object of analysis, the leadership training program of the Association International des Etudiants en Sciences Economiques et Commerciales (AIESEC), a non-governmental organisation (NGO), with AT and STT as the theoretical approaches. The program is structured and focused on college students for the purpose of training and developing leaders to be agents of change, and generate discussion about the social environment where they live and reflect on how leadership may influence society.

The choice of this empirical object is the result of the leadership training program:

1. it was reported as an innovation compared to traditional leadership training programs
2. it is within a (practical) empirical field with potential historical expansive learning compared with the leadership training process.
It is understood that one can start from AT in learning practices considering the elements of the activity system, including subject, object, artefacts, community, rules and division of labour; and the learning growth cycle, with the following action steps: questioning, analysis, modelling, model examination, model implementation, reflection and evaluation. AT and the concept of expansive learning are examined with four questions: Who are the subjects? What do they learn? How do they learn? Why do they learn?

Furthermore, innovation, from a socio-technical system perspective, favours the understanding of social and technical dimensions of human constructions through the location of the phenomenon, dynamic model of socio-technical change, and the location of three levels: micro, meso and macro.

2 Theoretical framework

2.1 Innovation

Innovation can be defined as the implementation of a new or improved product or process, or a new organisational method in business practices. There are two types of innovation: radical (highlighting more intense ruptures) and incremental (affording continuity to the change process).

The evolutionary approach views innovation as process dependent on a trajectory and the systemic approach emphasises interactions among institutions and observes the creation process and knowledge dissemination (OECD, 2006). Collective learning, in the sense of interaction between local companies, institutions and the labour market has positive effects on the development of the innovation process (Limm et al., 2014).

The innovation found in a given context enables a knowledge transfer process, sharing and adaptation to the market (Draghici et al., 2014). Another study highlights the importance of knowing the characteristics of the anchoring of knowledge identified in the innovation process, enabling an examination of its dynamic (Jokela et al., 2015).

Technological innovation is an innovation involving the use of technology, including substantial implementations, technological improvements or the addition of new features of a product or process that implies improvements and effective gains in quality or productivity, resulting in greater market competitiveness (Law No. 10.973 of 11/2004, Art. 2, Subparagraph IV).

2.2 Socio-technical theory

STT is the joint development of technical and social dimensions to optimise organisational systems (Eason, 2008). The technical subsystem comprises the equipment, tools and techniques required to transform production inputs into the organisation’s products. The social subsystem includes the employees, knowledge, skills, attitudes, values and needs found in the workplace. Therefore, the keystone of the socio-technical approach consists of the adjustment and joint optimisation of subsystems. As a result, any design or redesign should seek mutual influence that each subsystem has on the other (Ropohl, 1999).

However, when we consider the construction of the technological context, the formation of the social dimension is measured by the cognitive structures of the groups and the existence of intragroup dynamics.
In order to understand the social dimension in shaping technology, we need to know where the groups are located, the relationship between them, their structural characteristics and the resources that each group has at its disposal (Bijker, 1995). This assumption is critical in the approach to technology in socio-technical systems, where the social world is in creation (Klein and Leinman, 2002).

2.2.1 Technological transitions and multilevel perspective

The socio-technical approach allows us to understand transitions technology (TT) as a reconfiguration process, the main technological and continuing changes, implemented in the form of social functions (Geels, 2001).

To understand the transition from a socio-technical system to another, the multilevel conceptual perspective can be used. Socio-technical systems are filled with social functions, which are a set of aligned elements such as artefacts, knowledge, user practices, markets, regulation, cultural significance, infrastructure and networks (Geels, 2005a).

The multilevel dynamics perspective transition is formed by the following dimensions: technology, user practices, application domains, symbolic significance of technology, infrastructure, industry structure, policy and technical and scientific knowledge (Geels, 2001). Figure 1 shows a representation of the multilevel perspective:

**Figure 1** Multilevel dynamic perspective

![Multilevel dynamic perspective](source: Geels (2001))

2.2.2 Model of the dynamics of socio-technical change and evolution model of sociocognitive technology

The representation of the dynamics of the socio-technical change model shows the change of levels (Figure 2) and the evolution model of the sociocognitive technology
(Figure 3) displays the elements in relation to the process and the structure of the socio-technical system, assuming that the construction of new technologies involves learning processes:

**Figure 2**  Socio-technical change dynamics

![Socio-technical change dynamics](image)

**Source:** Rip and Kemp (1998).

**Figure 3**  Evolution model of sociocognitive technology

![Evolution model of sociocognitive technology](image)

**Source:** Geels and Raven (2006)

2.2.2.1 Micro level

The micro level is a result of technological niches, which act as incubation rooms for radical novelties, protecting them from market selection chain, their locus being radical innovations (Geels, 2005a). At this level, learning can occur via exploration through the
development of technologies) and probing (as an interactive process). The main idea is that activity begins locally with experiments (Raven and Geels, 2010).

The evolution model of sociocognitive technology at the micro level is explanatory, based on pilot projects and experimental demonstration in real-life contexts (Raven and Geels, 2010).

2.2.2.2 Meso level

The meso level consists of socio-technical systems that refer to the cognitive routines shared by engineers and designers in a technical community, which can result in technological trajectories (Geels, 2005a).

At the meso level there is a co-construction concept of new technologies, markets, regulations, involving learning processes (Thomke, 2003), and the form of learning would be sensemaking. Human cognition builds mind-sets and reality maps (Simon, 1957).

Cognitive learning occurs at the meso level, with collective or social learning as a selection mechanism. This learning is not a rational data accumulation process; it is fostered learning, returning to the community level, and the creation process of meaning is collective and negotiated (Weick, 1979).

2.2.2.3 Macro level

The macro level is formed by the socio-technical environment, aspects of exogenous environmental technology such as the macro economy, cultural patterns and the development of macropolitics (Geels, 2005a). At this level, social constructivists coined the term technological structure, which consists of lists of problems, problem solving strategies, heuristic search, theories, test procedures, design methods and criteria (Bijker, 1995). This comprehensive level of cognitive routines and tables acts as a retention mechanism by which communities accumulate knowledge.

2.3 Cultural-historical activity theory

In cultural-historical activity theory, the concept of practice is that history stems from the concept of human activity proposed by Marx, which considers man as a transformer of his surroundings. Therefore, man is the result of this transformation. This concept validates the role of history and mediation. The concept of practice concerning activity is based on a dialectical vision of development, with human beings active and interacting with their environment. Practice has the sense of taking the process of transforming something by someone else as an analysis unit, based on the assumption that the origin of knowledge and development occurs during the activity (practice/labour). When man is in contact with and inserted in a transformation process with/of the object (mediated by tools and symbols), he is able to produce knowledge. By taking an activity as an analysis unit, one can see the subject as a transforming and active agent, transforming the environment, not only influenced and determined by it (Pereira-Querol, 2011).

Vygotsky (1978) initiated cultural-historical activity theory from the 1920s to the early 1930s, creating the idea of mediation. This concept arises from the statement that between stimulus and response there is a complex and mediated act. Man does not come into direct contact with the world; its action is culturally mediated. Understanding the
mediated act would transcend and provide more support for analysing human actions in their cultural surroundings and society, functioning as an agency of individuals who use and produce artefacts. For Vygotsky, cultural mediation in the actions of individuals would enable knowledge of the agency and the context, which is located and anticipated. Figure 4 shows Vygotsky’s representation of mediated action.

**Figure 4** Vygotsky’s representation of mediated action

![Vygotsky's representation of mediated action](source: Vygotsky (1978))

2.3.1 **Collective activity**

Leontiev introduced the critical and complex distinction of the relationship between the individual and the collective. These two dimensions are illustrated with the case of the primitive collective hunt. When members of a tribe hunt, they have different goals individually, and they are in charge of several actions, for which they have immediate goals, but the real reason is beyond hunting. These people, then, together aim to obtain food, clothing and survival (Sannino, 2010).

Activity is oriented for a reason and fits into a system of social relations, in which man appropriates social historical practice and human experience, becoming a person, a citizen (Leontiev, 1978).

Engeström expanded the analysis unit, contributing to the systematisation and graphical representation of activity. Engeström’s triangle (Figure 5) refers to a basic structure model of human activity (Sannino, 2011).

**Figure 5** The general structure model of a human activity system

![The general structure model of a human activity system](source: Engeström (1987))
Engeström (1987) proposed a model of an activity system emphasising the social aspect of mediation, considering that an activity is performed by a human agent (subject) who is motivated to solve a problem or objective (object), and mediated by tools (artefacts) in collaboration with others (community). The structure of activity is defined by cultural factors including conventions (rules) and social strata (division of labour) within the context.

2.3.2 Activity systems

Cultural-historical activity theory needs to develop conceptual tools to understand the multiple perspectives and activity systems of interaction networks, which refer to Engeström’s contribution, through the expansion of the analysis unit, intended for the interaction of multiple activity systems (Sannino, 2011).

Figure 6 Two activity systems

The activity systems model assumes that there is a central activity to be studied and developed, but it is surrounded by a variety of activities that will result in the achievement of a partly shared object. Thus, certain forms of activity are described as forms of co-construction of a potentially shared object (Sannino, 2011).

2.3.3 Expansive learning

Engeström, from AT, proposes the concept of expansive learning. In Bateson’s (1972) learning theory there are three levels of learning. Level of learning (I) refers to conditioning, the acquisition of responses considered correct in a given context. In level of learning (II), people acquire the rules and standards of behaviour, typical of the context itself, which can sometimes be contradictory. This context of pressures may lead to level of learning (III), where an individual or group begins to question the meaning and significance of the context and starts to build a multialternative context collectively.

Expansive learning can be initiated by an individual when questioning and discussing aspects of current practice. This may cause another person to analyse the problem and propose a new model for the activity that others will examine. The idea is that individuals and subgroups can develop through shared learning actions until a new model is ready for
testing and implementation (Engeström, 1999). In an expansive cycle, there are stages of action (Engeström et al., 2005), as shown in Figure 7:

**Figure 7** Expansive learning cycle

- the first action is to question, criticise or reject some aspects of accepted practice
- the second action is to analyse the situation, which involves the transformation, mental or discursive practice to discover causes or explanatory mechanisms
- the third action is the model, the publicly observable and transmissible newly found relationship
- the fourth action is to examine the model, implementation, operation and experiments to understand the dynamics, potential and limitations
- the fifth action is to implement the model using practical applications, enrichment and conceptual extensions
- the sixth and seventh actions are to reflect, evaluate the process and consolidate the results in a stable new practice.

Expansive learning considers activity systems interacting as a minimum analysis unit, enabling knowledge of interorganisational learning opportunities. AT and expansive learning are scrutinised through four questions (Engeström, 2001):

1. Who are the subjects of learning?
2. Why did they learn?
3. What did they learn?
4. How do they learn?
3 Methodology

We analysed learning and innovation in three methodological ways: labour development research (LDR), intervention and interface between AT and STT.

LDR enables the study of a specific type of learning, expansive learning and analysis of the object, an activity in which change processes occur (Engeström et al., 2005). This methodology also allows the study of other types of learning. Remedial learning admits the presence of changes, but these do not change the object, only some elements of the activity system (Engeström and Blackler, 2005).

In the expansive cycles, the new object and motive are typically expanded somehow over the previous object and motive (Engeström and Sannino, 2010).

The cycles show their individual aspects of reality and the cyclical movement of history, internalisation and expansion. Although both cycles present opposing directions, their internal structures are similar in terms of steps of concrete research. This similarity is clearer still when the expansion cycle becomes a development research cycle (Engeström et al., 2005). Figure 8 illustrates the cycle:

Figure 8 Expansive cycle

![Expansive Cycle Diagram](source: Engeström (1987))

In this research, the expansive cycle was used with the following steps:

First: A general description of the phenomenon, characterisation of AIESEC, a current description of AIESEC and a description of the programs at AIESEC Curitiba. This step comprised defining the activity system. The research sources were newspapers of the day, interviews with managers, former presidents, president, alumni and former members of the programs, on-site observations, discussions with those involved, minutes of meetings, intranet and internet research, staff guidelines and regulations. This material provided preliminary insight into the nature of speech and how problems are experienced by those involved.
Second: The object was analysed historically and then empirically. The historical analysis was conducted by building a narrative of the leadership training activity of AIESEC Curitiba, which enabled an identification and analysis of the successive development stages of the system, detecting transitions from one stage of development to another, and understanding the identity of the activity by identifying its object. This allowed the researcher to understand the movement and the organisation dynamics involved. The empirical analysis was conducted at an intervention session, presenting the hypothesis of the researcher to college students to discuss possible solutions. This methodological application proposed by Engeström (1987) enables practitioners to participate in the same analysis as the researcher, accessing the same conceptual tools, and visualising the subject agency. We structured the intervention session with the following script:

a An invitation was e-mailed to members, the president, former presidents and managers of AIESEC Curitiba, announcing a session on the hypothesis of the researcher regarding the Leadership Training research. This invitation contained three questions for the participants to answer by e-mail, structured by the researcher to identify the contradictions that were causing the participants of AIESEC Curitiba to present only remedative learning and not expansive learning. The questions were: What are the events or problematic cases that prevented them from achieving the expected results? Why did these problems exist? What was the concept of leadership at AIESEC Curitiba? These questions complied with the double stimulation method, applying two stimuli: the first is a task to perform or problem to solve; the second a neutral object that can be potentially used as a tool for solving the problem. The idea is to introduce semiotic resources to understand how subjects handle and change the environment with the external activity (Vygotsky, 1978).

b The session began with a presentation of the compiled answers to the e-mailed questions, enabling a screening of current problems, concept of leadership and how the participants expressed themselves and exposed their problems.

c We asked them to identify their problems in the four programs (Global Talent, Global Citizen, Young Talents and Young Leader) and the tools used to form the transforming agent. The problems and tools were checked to gauge their compatibility with the concept they attributed to the leadership.

d The representations regarding the AT and SST hypothesis were introduced, developed by the researcher based on the history of Leadership Training at AIESEC Curitiba. The AT representations used the expansion cycle (Figure 9), and SST used the Geels and Raven model (Figure 10).

e Finally, the subjects answered questions to show whether they corroborated, refuted or changed the hypothesis formulation. We also asked them about their current stage of development. The idea was for the task to be performed not only by the experimenter, but by the practitioner, who always interprets and reconstructs it. Thus, the research was analytical for the analysis to provide a definition for the unity of the object, given the stage of development of the activity.

Focusing on Figures 9 and 10, with the results of the empirical research, the following observations may be highlighted:
An analysis of the cycle enabled the identification of the current phase of the activity, why it was constructed, its movements, contradictions regarding the forecast of a future scenario and the potential for the development of the activity. A historical analysis of the emergence of the activity showed what changed, the development of the actors in this process and what they say about it. It also made it possible to answer why the AIESEC remained in micro and meso cycles for 28 years prior to an expansive learning cycle through the creation of new activity systems.
In the phases of the cycle in Figure 9, there are two forms of learning in activity systems: remediative, where there are smaller learning cycles, with changes of tools and some elements in the system of activity; and expansive learning, which transforms the object. Both systems aim to resolve contradictions within and in the elements of the activity system. In this study, the expansion was due to the concept of the transforming agent, which emerged from the comparison of current historical contradictions. The primary contradiction was seen to remain in the system through the market value and the social value of using the services of the AIESEC.

Figure 10 shows how the process of constructing the innovation took place, in a multilevel perspective involving micro, meso and macro levels, as well as the components that make up this process. In this theory, there are two types of learning: experimental, at the local level, and cognitive, at the meso level, which is consolidated as a trajectory of innovation at the macro level. This learning can be observed in the empirical field in question, characterised as a cyclical movement.

Expansive learning theory, with its expansive cycles and smaller cycles, characterised the learning movements. The object of the activity system underwent smaller and expansive cycles. Decisions are made at the local level, within the expansive cycles, under conditions of uncertainty. In STT, the model of the dynamics of socio-technical evolution of technology made it possible to reveal movements and the levels of the trajectory of innovation. Decisions are made at three levels: local, in niches; meso, involving the community; and macro, considering the external environment.

The expansive cycles characterised by AT are not predetermined courses of one-dimensional development, just as in STT the movement of the technological system does not follow predetermined courses of one-dimensional development. They are characterised by constant cyclical movements, coming and going.

4 Conclusions

Leadership was seen to have developed as a learning practice and as an innovation at the AIESEC Curitiba. As a learning practice, the concept of leadership changed over 28 years as shown in the History of the Formation of Leadership of the AIESEC Curitiba. As an innovation, leadership was expanded, culminating in the concept of the transforming agent. With each new leadership concept, a new cycle began, followed by the contradictions that led to another expansion. AT, with its historical perspective, provided an understanding of how these changes occurred in the object of the activity. Exchange and lectures were interpreted as two parallel cycles that influenced the process. STT, in turn, showed the movement of diffusion in innovation through the socio-cognitive cycle, in the niche considering the formulation of expectations and concrete local projects, the need for experiments, the cognitive appropriation of the community, abstraction and summarisation.

Leadership was understood through its different meanings: 1985 – in exchange, leadership is understood as an international experience; 1985 (2nd semester) – in lectures, leadership is a means of disseminating knowledge reflected in managers, entrepreneurs and consultants; 2011–2013 – leadership is understood through the creation of the concept of the transforming agent, via experimentation of the management process, becoming explicit through four programs.
The innovation in leadership training at the AIESEC Curitiba can be seen through an analysis of the innovation cycle. Between 1983 and 1985, a niche process began through the articulation of expectations created by young university students. This process began with a local pilot project called AIESEC Curitiba, with a socio-technical system of an Exchange program, enabling young people to experience daily work life under real conditions, with a space for experimental learning where they began to articulate, grow and share experiences. This level of experimental articulation was characterised as the micro level. STT explained the passage from the micro level (pilot project) to the meso level (diffusion).

In mid-1985, the youngsters began to rethink whether it was possible to develop practical leadership experience only through exchanges. At this time, they decided to implement a system of lectures, in which leaders of companies and federations and consulting professors would share their professional experience with the young members of the AIESEC. These lectures represented another leadership niche at the AIESEC Curitiba, beginning with the articulation of expectations of some members through the local pilot project, i.e., experiments that are characterised here as lectures. This marked the beginning of another niche at the micro level.

In 2011, another niche was created at the AIESEC Curitiba, marked by the restructuring and formatting of AIESEC programs. This change was discussed at the local, national and international levels, culminating in an AIESEC International Conference. The result of the discussion at the conference led to the creation of a concept known as the transforming agent, made feasible by the systematisation of four programs and a new management tool called LEAD.

In 2013, the AIESEC was seen as moving to a new cycle. There was a demand for more innovations and the creation of other socio-technical systems. This demand was articulated in the form of niches, in which committees were formed for local discussion, resulting in discussions with national and international communities.

Regarding the current possibilities and challenges for learning at the AIESEC Curitiba, one such challenge is to rethink the object, thinking of new integrated programs, what they wish for and the tools that they have are incompatible. It will be necessary to redefine the passage from the abstract to the concrete, making the object more concrete in practice. It is necessary to observe reality, making correlations with the context in a historical and dialectic process to learn the concrete reality.

AT enabled the identification of the contradictions that led to the development of the activity and the primary contradiction that is currently present in the Leadership Training at the AIESEC Curitiba. The primary contradiction was that of the social and the market. The primary contradiction as a driving force for the development of the activity can be seen from the outset in the division between exchange and lectures by market leaders. Therefore, the challenge would be two think of two aspects, the social and business side, leading to questioning and the redesign of another activity system. This movement was explained by AT, as it brought the contradiction to the level of awareness and thus made the actors see what was happening. It would thus be necessary to think of the type of action they should take, rethinking the object and its contradictions regarding the elements. One example that they could view was the incompatibility of the activity system with the LEAD tool for the four programs.

AT, through its principle of historicity and its explanatory base in the driving force of the activity system, enables the participants to see both the present and the past, helping them to understand the future scenario. This is a difference of AT, as it enabled an
understanding of the emergence of the object. In the case in question, the learning challenge is to connect the social and business aspects and the secondary contradiction that should be remedied so that the system can expand again, in addition to the tools, the profile of the subject of learning, the rules and the division of labour. These elements will have to change so that the object, the transforming agent, can be produced.

The application of the analytical categories of AT enabled the preparation of the narrative of the leadership training at AIESEC Curitiba and it was also possible to verify the change in the concept of leadership between 1985 and 2013. This change meant that the leadership object was understood differently. Furthermore, as time went by, the tools that made the activity feasible were changed. The change cycles for learning the object are formed by the subjects of learning located in their respective activity systems, allowing the following questions to be answered: Who are the subjects of learning? What do they learn? Why do they learn? How do they learn? With these answers, a profile of this activity and learning system can be drawn.

The innovation theory, STT, was used to explain the learning and made it possible to understand the inclusion of technology in socio-technical systems and verify their levels. The micro level occurred through local experimental learning in the pilot projects, and at the meso level through social learning, which summarised and abstracted the local experiences. The innovation revealed by STT was the creation of a new socio-technical system and a new cycle caused by incremental innovations at the meso level, represented by the four programs, i.e., Global Citizen, Global Talents, Young Talents and Young Leader.

STT enabled a view of the innovation trajectory, i.e., the learning movement that occurred at the AIESEC Curitiba and later underwent national discussions that were consolidated with those at the international level. These led to the systematisation and creation of a trajectory. This movement was and is a constant, being guided by the AIESEC and the technology of the AIESEC for leadership training for young university students. The change, as mentioned in the theory, was heightened by the articulation of the expectations of members and the passage of levels was consolidated.

Expansive learning through an expansive cycle enabled the phases of questioning, an analysis of the situation, the modelling of the solution, an examination of the model, implementation, reflection and evaluation of the process and consolidation of results in the form of a new practice to be identified. At the AIESEC, following the intervention session, there was a phase of questioning of the model implemented in 2011, as other demands were suggested that the model could not meet due to the increasing number of members, workflow, work dynamic and labour market demand.

STT revealed two forms of learning, experimentation through local projects at the AIESEC Curitiba and cognition through social learning, summarised by the national and international community at the AIESEC. The cognitive level enabled passage to another level of learning, where the community discussed, analysed, theorised and consolidated the model to be used. This cyclical movement is recommended by the dynamic of the socio-cognitive evolution of technology.

The driving force of AT is the contradiction, that a new object and new activity is not always required because it can be resolved through remediative learning. The study was sensitive by revealing how the AIESEC Curitiba emerged, its change in the conception of the object and the current phase of questioning. STT revealed its driving force in the expectations and local projects from the perspective of the community, which are considered spaces to experiment, diverge from the rules and generate varieties. The actors
have reasons to seek certain directions, even if they cannot forecast the result. The variation is guided by the expectations, which are important for technological development by enabling innovative activities and considering the outside world by outlining future innovations. The expectations mediate between the cognitive global rules and local projects, and are influenced by the outside world. In this case, the heightened expectations of the community resulted in the diffusion of incremental innovations through the creation of the transforming agent, made feasible by the four aforementioned programs.

The creation of interaction networks through AT resulted in dialogues, multiple perspectives and voices and interaction networks within and between activity systems. The basic model of the activity system was expanded to include two interacting activity systems. This movement can be seen in the exchanges, lectures, conferences and leadership seminars, events where people speak, discuss and create forms of work considering the diversity of the participants.

STT showed that the emergence of the community through the registration of actors based on results occurs at the meso level when the community begins to disseminate its local experiences and exchange them with other people, until a certain model or form to be followed is consolidated.

Ascension from the abstract to the concrete dialectically is a central tool for revealing expansive learning cycles in At. The programs ended up being the systematisation of the dialectic of creation of the transforming agent, in which the consolidation of the knowledge reflected, negotiated and assigned a meaning by the actors in this leadership training process was enabled. In STT, the ascension generally results from the concrete (pilot project) to the abstract (cognition). The movement shifts from the micro level (concrete, moving to the meso level) of cognition, discussion, reflection and creation of a model, ending its trajectory at the macro level, also considering demand from the external environment. The type of leadership that the world requires and how this can be made possible was considered and discussed with other countries.

In AT, through an analysis of the measurement of artefacts, tools or signals, the nature of the task could be radically altered in the sense of meaning and concept of the object of the activity. In STT, the adoption of certain tools or artefacts in the technological system can change the innovation process, enabling it to spread and determining whether it is easier.

5 Contributions

5.1 Theoretical contribution

A theoretical contribution of this study is in agreement with Kirshner (2006) regarding the difficulty of studying the social phenomenon of leadership training for young people
because administration theories are very broad. They are also very abstract and require studies focusing on concrete reality, practice and daily life (Santos and Alcadipani, 2010). The case of the leadership learning program of the AIESEC aids understanding of organisational practice as a system of activities performed in the daily life of organisations, embedded socially and culturally, enabling understanding of the changes the system has undergone and its change, learning and innovation processes.

On the other hand, the application of STT showed how the innovation process occurred by outlining the concept of the socio-technical system as an analysis unit. Therefore, the cycles of technological development, its components, interaction and articulation of actors can be studied.

The study also confirmed the feasibility of a rapprochement between innovation theory, STT and a historical-cultural theory and AT to aid understanding of the learning and innovation processes (Mursu et al., 2006; Bødker, 1991; Kuutti, 1991; Miettinen, 1997; Rajkumar, 2005; Miettinen and Hasu, 2002).

5.2 Empirical contribution

In empirical terms, the application of the AT and STT analytical models increased the explanatory potential of the study, enabling knowledge of the learning practices and innovation systems of the training program of the AIESEC Curitiba.

Another highlight was the preparation and application of the intervention. This was one of the moments when the researcher learned most through the application of the two theories to analyse the same phenomenon, enabling an opportunity for reflection and learning for the members involved in the research process. On this occasion, the young people mentioned that they had to stop and rethink their activity systems and that they are currently undergoing a time of crisis and rethinking their participation.

Finally, the study itself enabled a perspective of advancing the interface of the two theories. Although epistemologically different, they offered sensitising concepts for bringing them closer together and increasing their explanatory power to identify learning and innovation processes.

5.3 Methodological contribution

From a methodological viewpoint, the contribution of this study was the coherence between the method of intervention used and the ontological and epistemological assumptions of AT, in its version of expansive learning theory. The assumption of AT is that knowledge is generated by the transformation of the object, i.e., by transforming the object the researcher creates knowledge about it. Likewise, from a methodological viewpoint, the joint application of the two theories (AT and STT) enabled the creation of insights to analyse the object of study.

5.4 Practical contribution

For the AIESEC Curitiba, the intervention enabled members to understand how learning was and is constructed, how it developed, when this was done, the phases of the learning cycle, who the learning subject are, what they learn, why they learn and how they learn. Aware of these elements, the members were able to rethink their activity systems and plan new systems as the workings of the learning and innovation processes became
clearer. Therefore, the researcher was a mediator for better understanding of the challenges they face and shaping solutions.

References


