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## Action research in interdisciplinary studies: analysis on criteria that can be revealed only through practice

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This paper proposes a reflection on the criteria for the methodology of action research, with the aiming of contributing towards meeting the premises required for application and improvement of the quality of participatory research in socioenvironmental and healthcare contexts. To construct this approach structure, the results from analysis of dissertations and thesis on action research were used in an interdisciplinary manner, at the interfaces between the fields of health, education and the environment. Analysis on practical situations made it possible to identify elements favoring attainment of the objectives of action research and understanding of the organizational dynamics. The following criteria were established: methodological flexibility; combination of multiple research and intervention tools; and levels of cooperation and participation among subjects and researchers. Action research was shown to be an appropriate proposal in the light of the interdisciplinary challenges when applied taking into account the criteria studied here.

**Keywords:** Action research. Interdisciplinarity. Participation. Health.

In light of the multiple dimensions – biological, social, cultural, political, economic, ethical, among others – that involve, nowadays, socio-environmental and health problems, participatory research methodologies such as those designated by *Community-Based Participatory Research* (CBPR) have been gaining increased recognition. This is due to the fact that the direct and collaborative involvement among different stakeholders (subjects of the investigated theme, researchers and representatives of organizations/decision makers) in all the methodological stages, giving “true voice” to communities, has favored the development of successful interventions<sup>1,2</sup>. Among diverse participatory methodologies, this paper highlights action research. Due to its participatory, reflective, dialogic, dynamic and interdisciplinary character, action research has the potential for developing a process of collaborative production of knowledge<sup>3-8</sup>, which enables to face current

socio-environmental and health dilemmas and contributes to shared decision-making<sup>9</sup> by means of a cyclic process of planning-action-interpretation<sup>10</sup>.

Guided by the same concern, that is, of amplifying the dialog between science and the society, other approaches have searched for new dialectical forms<sup>(d)</sup> of interacting with social actors to understand and act on complex realities, sharing experiences and decisions. For example, in Post-Normal Science, amplified peer communities act in knowledge production and in the management of uncertainties<sup>13</sup>; in the Ecohealth approach, based on the pillars of cross-disciplinarity, participation and equity, participation aims to achieve consensus and cooperation not only within the community, in the academy of science and with decision-makers, but also among them<sup>14</sup>; in Social Learning – “learning together to manage together” -, based on the recognition by the subjects and on the explanation of conflict situations originating from certain problems in which they are involved, a cooperative and dialogic work is developed, favoring a process of mutual learning that aims at transforming complex realities<sup>15</sup>.

Under this perspective of participatory research, the analysis of the current socio-environmental and health problems, or of education-related issues, which involve physical, social, economic, political, and cultural aspects, among others, either as object of investigation or as a process and/or product of such investigation, strengthens the idea, according to Alvarenga et al.<sup>16</sup>, that today the advance of knowledge depends on taking into account complex phenomena, both of nature and of society, as the disciplinary knowledge generated by modern science has been conventionally characterized as a model of simplifying thought.

To Morin<sup>17</sup>, science models that simplify knowledge, fragment the complex reality, isolate the components and, therefore, destroy totality, end up producing blindness rather than elucidation, and it is necessary to search for new forms to understand reality – for example, by means of interdisciplinary thought.

<sup>(d)</sup> Dialectics is present within any pair in multiple relationships, which can be of contradiction and/or complementation, in a continuous movement, not only of ideas, but of people's practice in social groups. Uncertainties and certainties, conflict and consensus, organization and chaos, among other countless pairs, are not mistakes, but the reality in movement<sup>11</sup>. These contradictory and asymmetric relations are, many times, present among subjects involved in participatory approaches/research (subjects of the investigated issues, researchers and decision-makers). And, according to Freire<sup>12</sup>, dialogic actions are those of respect for the other, even in asymmetric contexts of power, and which can generate, in the human being, conscience of his/her praxis in/over the world, favoring possible transformations and more symmetric relations.

Therefore, interdisciplinarity presents itself as an alternative and complementary field of knowledge that is under construction. At the same time, it is innovative because, in addition to relating different types of knowledge, it aims to connect theory and practice, philosophy and science, science and the humanities, and science and technology. In view of this new logic, new methodological challenges to research are identified because of the interaction and exchange among different disciplines/types of knowledge, and also because of a new relationship between the *observing subject* and the *observed object* in knowledge production. This implies counting on the predisposition of scientists with a background in the disciplinary sciences to enter into this line of thought that is marked by uncertainties, provisional truths and dialog<sup>16</sup>.

Criteria presented by Jean Piaget, quoted by Alvarenga et al.<sup>16</sup>, are presented below to strengthen what the authors of the present paper are considering as interdisciplinarity:

A 'second level'<sup>(e)</sup> of collaboration among diverse disciplines or among heterogeneous sectors of the same science that leads to proper interactions, that is, some reciprocity within the exchanges, so that there is an overall mutual enrichment.<sup>16</sup> (p. 36)

Thus, interdisciplinarity emerges as a critical reflection on the principles and meanings of knowledge, on its fissures, and in the perspective of reintegrating different types of knowledge that had been fragmented by positivistic science<sup>18</sup>.

Likewise, the emergence of action research is associated not only with a situation of dissatisfaction with classic research paradigms and methods, but also with the need of promoting greater articulation between theory and practice in knowledge production, by means of the direct involvement of social groups in the understanding and in the search of solutions to their problems, especially those of a complex nature<sup>3,4,7,10</sup>.

Among the main precursors of action research, Kurt Lewin is the most mentioned<sup>4,6,7,19</sup>, with his organizational and educational studies conducted in the post-war context, in 1946, when he worked to the North American government. Lewin was interested in contributing to raise the self-esteem of minority groups and, by means of action research, sustained by peer communication and cooperation, he attempted to strengthen the social relations of these groups<sup>19,20</sup>.

El Andaloussi<sup>21</sup> argues that action research allows dealing with complexity and also producing it, which requires, therefore, an interdisciplinary approach. Such complexity

<sup>(e)</sup> This "second level" of collaboration of interdisciplinarity refers to the existence of a "lower level" of interaction, occupied by multidisciplinary, where there is the collaboration of two or more sciences, without necessarily having mutual enrichment. And, in a "higher level" in relation to interdisciplinarity, we would have cross-disciplinarity, where the interactions and reciprocities among sciences are situated inside a total system, without disciplinary borders.

asks us to think about concepts without ever considering them as concluded, in order to break the closed spheres, to reestablish the articulations between what has been separated, to try to understand multidimensionality, to think of singularity together with locality and temporality, so that we never forget the integrative totalities.<sup>22</sup> (p. 192)

In view of this demand to cope with complex realities, the present paper proposes to reflect on the elements that an action research must have to fulfill its objectives: its methodological dynamism; the utilization of multiple research and intervention instruments; and the participation and cooperation of subjects and researchers towards contributing to comply with premises that are necessary to the development of studies of this nature and also to improve their quality.

Many studies have demonstrated the increasing application of the action research methodology to academic research, both in the Master's and in the Doctoral levels<sup>23-26</sup>. Thiollent and Toledo<sup>3</sup> have approached its viability in the university context, in research studies, teaching activities and extension programs. Thus, elements presented and discussed in the construction of this structure of approach are based on results obtained by means of a bibliographic review of the theme, as well as through a systematization of the application of this methodology to São Paulo's state-run universities (*Universidade de São Paulo* – USP, *Universidade Estadual de Campinas* – UNICAMP and *Universidade Estadual "Júlio de Mesquita Filho"* – UNESP), in the areas of education, health, natural/environmental sciences, or in their interface, in the period 1990 to 2010. The research demanded a survey of Master's theses and doctoral dissertations in the Digital Libraries of Theses and Dissertations (Dedalus/USP, Nou-Rou/Unicamp and Athena/Unesp) of the respective universities, whose studies were available at the moment of the search. Overall, 148 studies were developed at USP (71 Master's theses and 47 doctoral dissertations), 75 at UNICAMP (42 Master's theses and 33 doctoral dissertations) and 50 at UNESP<sup>(f)</sup> (37 Master' theses and 13 doctoral dissertations), totaling 273 studies. The trend of the emergence of studies using the research action methodology was revealed: from 1990 to 2000, 45 studies were identified, and from 2001 to 2010, this figure increased to 228.

<sup>(f)</sup> In the Digital Library of Theses and Dissertations of UNESP (ATHENA), studies were found only from 2001 onwards.

In this context, the proposed investigation is based on the following question: Considering that action research has been applied among public higher institutions of the state of São Paulo, is it possible, based on their production of dissertations and theses, to identify qualification criteria and challenges inherent in these investigation and intervention practices within an interdisciplinary context involving health, environment and education? The inclusion criterion that was adopted in this second stage of screening was that the abstract of the dissertations or theses must contain the expression “action research” and, after the analysis of the abstract, we should investigate whether the study used this methodology and whether there was an interrelation among the above-mentioned areas of interest.

In the construction of the present paper and to subsidize the proposed reflections, results of the analysis of theses and dissertations of an interdisciplinary character were considered, depending on whether they established a dialog or some form of interrelation among the areas: health-education; health-environment; environment-education; and education-health-environment, according to Chart 1. A final number of 17 selected studies underwent a thorough analysis concerning the execution of the action research methodology.

**Chart 1.** Interdisciplinary research selected and analyzed and their interface areas.

AREAS	REFERENCES
HEALTH AND EDUCATION	Moizés JS. <i>Educação sexual, corpo e sexualidade na visão dos alunos e professores do ensino fundamental</i> . 2010. Tese (Doutorado) – Escola de Enfermagem de Ribeirão Preto, Universidade de São Paulo. Ribeirão Preto, SP.
	Silva MMF. <i>Promoção da saúde: percepção dos agentes comunitários de saúde a partir de sua formação e da sua prática</i> . 2009. Dissertação (Mestrado) – Faculdade de Saúde Pública, Universidade de São Paulo, São Paulo.
	Rangel FO. <i>Ambientes multimidiáticos de aprendizagem: entidades mediando a autonomia</i> . 2004. Dissertação (Mestrado) – Instituto de Artes, Universidade Estadual de Campinas, Campinas, SP.
	Rodrigues MC. <i>O lazer e o idoso: uma possibilidade de intervenção</i> . 2002. Dissertação (Mestrado) – Faculdade de Educação Física, Universidade Estadual de Campinas, Campinas, SP.
	Bonfá AC. <i>Educação física na escola: uma proposta de implementação de um programa de saúde</i> . 2007. Dissertação (Mestrado) – Instituto de Biociências, Universidade Estadual Paulista “Júlio de Mesquita Filho”, Campus de Rio Claro, Rio Claro, SP.
	Parenti LC. <i>Reorientação das práticas de cuidados com o diabetes mellitus: a construção compartilhada profissionais-usuários</i> . 2010. Dissertação (Mestrado) – Faculdade de Medicina, Universidade Estadual Paulista “Júlio de Mesquita Filho”, campus Botucatu, Botucatu, SP.
	Vendrametto L. P. <i>Educação ambiental em unidades de conservação: um estudo de caso na Área de Proteção Ambiental de Serras e Joaquim Egídio</i> . 2004. Dissertação (Mestrado) – Escola Superior de Agricultura “Luiz de Queiroz”, Universidade de São Paulo, Piracicaba, SP.
	Scatena ML. <i>Ações em educação ambiental; análise multivariada da percepção ambiental em diferentes grupos sociais como instrumentos de apoio à gestão de pequenas bacias: estudo de caso nas microbacias do córrego da Capituva, Macedônia, SP</i> . 2005. Tese (Doutorado) - Escola de Engenharia de São Carlos, Universidade de São Paulo, São Carlos, SP.

<b>ENVIRONMENT AND EDUCATION</b>	Ikemoto E. <i>Espécies arbóreas, arbustivas e herbáceas do Parque Taquaral(Campinas, SP): subsídios para atividades de ensino não-formal de Botânica</i> .2007. Dissertação (Mestrado) – Instituto de Biologia, Universidade Estadual de Campinas, Campinas, SP.
	Faria DR. <i>A paisagem como tema de estudo na 5ª série do ensino fundamental</i> . 2007. Dissertação (Mestrado) – Instituto de Geociências, Universidade Estadual de Campinas, Campinas, SP.
	Teixeira RC. <i>Desenvolvimento de tecnologia educacional para o uso racional de energia</i> . 2008. Tese (doutorado) – Faculdade de Engenharia de Guaratinguetá, Universidade Estadual Paulista “Júlio de Mesquita Filho”, Campus de Guaratinguetá, Guaratinguetá, SP.
	Del Mônico G. <i>Construção participativa de conhecimentos sobre resíduos no Programa de Coleta Seletiva da Unesp-Bauru : reflexões e ações</i> . 2005. Dissertação (Mestrado) – Faculdade de Ciências, Universidade Estadual Paulista “Júlio de Mesquita Filho”, campus de Bauru, Bauru, SP.
<b>HEALTH AND ENVIRONMENT</b>	Mendes PBMT. <i>Percepção de risco ambiental em cortiço vertical: uma metodologia de avaliação</i> . 2006. Tese (Doutorado) – Faculdade de Saúde Pública, Universidade de São Paulo, São Paulo, SP.
	Boaretto RC. <i>Velhos à Margem na Margem das Ruas: a experiência de uma moradia provisória no município de São Paulo</i> . 2005. Dissertação (Mestrado) – Faculdade de Educação, Universidade Estadual de Campinas, Campinas, SP.
<b>EDUCATION HEALTH AND ENVIRONMENT</b>	Silva MM. <i>Olhares e perspectivas sobre a educação ambiental, a democracia participativa e o empowerment de crianças e adolescentes em escolas da rede municipal de ensino de São Paulo</i> . 2009. Tese (Doutorado) – Faculdade de Saúde Pública da Universidade de São Paulo, São Paulo, SP.
	Mello AL. <i>Metodologia participativa e biomonitoramento: promoção da saúde no distrito de Vicente de Carvalho, Guarujá, SP</i> . 2010. Tese (Doutorado) – Faculdade de Medicina, Universidade de São Paulo, São Paulo, SP.
	Ferrareze MPS. <i>A influência da atividade física na melhora de qualidade de vida do homem</i> . 1997. Tese (Doutorado) – Faculdade de Educação, Universidade Estadual de Campinas, Campinas, SP.

It was found that many of the themes and issues investigated in the selected studies involved diverse aspects such as environmental, social, cultural, ethical, esthetic, political, and economic aspects, among others, which required, therefore, an interdisciplinary approach. When this approach was developed in this perspective, it contributed to the systemic understanding of the different realities that were investigated and, at the same time, to “unify” and “enrich” the generated knowledge. It is highlighted that interdisciplinarity was also present in the use of research and intervention strategies which, even when they were specific to the health or environmental areas, due to their dialogic nature, they contributed to promote reflections and stimulate the autonomy and empowerment of the subjects involved, elements that are directly related to the area of education.

Due to their relevance as structuring elements and/or pre-requisites for the development of action research, we will present below, based on the analysis of dissertations and theses of this systematic review, criteria related to the fulfillment of their objectives (investigation, intervention and knowledge production) and to their organization, concerning: 1) dynamic methodology, with adjustments during the investigation and intervention process; 2) combination of multiple research

and intervention instruments; and 3) participation and cooperation of/among subjects and researchers.

### **Investigation, intervention and knowledge production**

Action research aims to investigate and intervene favorably in the way in which a given problem is addressed throughout its development and, as a result of this process, to produce new knowledge<sup>3,4,6,27</sup>. The investigations demand interventions that, in turn, lead to new investigations, in accordance with a cyclic spiral proposed by Lewin<sup>10</sup>: planning-action-interpretation of facts/results.

However, when we analyzed the objectives and results of the studies that were part of this systematic review, we identified initiatives that merely investigated/understood a given set of issues without intervening or developing a collective proposal for intervention aimed at facing the problem. On the other hand, we also identified studies whose objectives were: planning and executing educational actions/programs; developing and testing educational tools, as well as methodological and evaluation strategies; promoting the re-signification of concepts; creating new learning environments, among others.

Mendes<sup>28</sup> developed an action research about environmental risk perception in a vertical slum and states that "action, in the context of a research, as a methodological act, necessarily requires visibility of the effort undertaken by its target audience, of its leading role and the appropriation of the results that had been predicted and that were achieved" (p. 163).

The stimulus to this 'collective action' and its due recognition are roles that must be played by the researcher in charge, who should, according to the cyclic movements proposed for the development of an action research,

build new knowledge with the people involved in the research, based on the undertaking of actions and reflection, and create conditions so that the group becomes autonomous to raise other problems, generate knowledge and actions that transform their reality.<sup>29</sup> (p. 30)

Problematization according to the Freirean pedagogy<sup>12,30,31</sup> was considered by Rodrigues<sup>32</sup> as an element that facilitated and generated the actions taken in the action research that this author developed about leisure in the life of elderly individuals. When Rodrigues problematized the challenges identified in the group, new actions were systematized and, consequently, during the actions, new problematizations emerged, which were recognized as transforming sources of knowledge, as they attempted to intervene in real situations.



## Open and dynamic methodological system

As action research is an open and dynamic methodology, it allows that different paths are taken during its development, according to the demands that are found. This occurs because the direct involvement of representatives of the issues in all the stages of the process, with their needs, yearnings, values and knowledge, will interfere in methodological adjustments. Thus, results of the actions should be analyzed and incorporated in the next stage of resumption of planning and so on, which requires constant reflection on action at all the stages of the process<sup>4, 6,7,10,19,20,33</sup>.

This “flexibility” of action research, which allows the making of methodological adjustments, was considered, in some of the analyzed studies, a characteristic that favored the achievement of the proposed objectives<sup>28,29,34-36</sup>.

Scatena<sup>35</sup>, in a study about environmental management and education in hydrographic micro-basins, emphasizes that the procedures adopted to the activities of raising information, collecting and processing data, identifying problems, and developing and implementing environmental education actions, did not necessarily follow this order, as the dynamic of an action research allows to make adjustments whenever necessary, due to the emergence of unforeseen events, new data, new information and/or new demands.

Likewise, Del Mònaco<sup>29</sup> argues that the moments of reflection that were undertaken were essential so that the methodology acquired new contours during its development, due to the participatory and process-like character of action research. Vendrametto<sup>36</sup>, referring to her research into environmental education in a conservation unit, goes beyond when she states that

in the long path taken by this research, some shortcuts were gradually delineated over time. [...] stones that were found in the way were fundamental to interrupt prejudices, expectations, certainties, to rest and walk among doubts, uncertainties, questionings, and to discover that this process would be much more enriching than the ceaseless search for more immediate answers.<sup>36</sup> (p. 81)

## Combined application of dialectical and non-dialectical instruments

Although there is no specific rule concerning the types of instruments and techniques of research and intervention that should be used in an action research process, their diversified use is recommended. In addition, it is recommended that the collected information is discussed cooperatively, with the participation of the researchers and subjects involved in the investigated issues. Furthermore, the researchers should receive an appropriate didactic preparation to apply them.

In fact, in the 17 interdisciplinary studies that were analyzed and systematized, a large variety of data collection, data analysis and intervention instruments were used, such as:

participatory observation with the use of field diary; interview; questionnaire; discussion circle/reflection workshop; activity workshop; seminar; field trip/experience; collective development of action plans; documental analysis; multivariate exploratory technique of multiple correspondence factor analysis and cluster analysis; lecture; group dynamics; preliminary hazard analysis spreadsheet; georeferencing; photographic register/panel; focus group; construction of a talking map; drawing; theoretical-expository class; environmental biomonitoring technique; reading and discussion of texts; tabulation and statistical data analysis; and multimedia learning environment.

The use of dialectical and non-dialectical instruments in the same research, as well as the benefits of their combination to the success of the achieved results, especially concerning the capacity for conducting and directing the investigation and promoting the subjects' participation in a feedback process, could be identified in some of the studies that were analyzed<sup>32,35-44</sup>.

Regarding this aspect, it is important to mention the categorization of participatory processes and the promotion of the expansion of peer communities, carried out by Giatti<sup>45</sup>, concerning the application and combination of research and intervention instruments: a) specific: in which there is only one instrument of dialectical power involving the subjects; b) multi-instrument: in which distinct instruments are combined, but without characterizing a feedback process; c) cyclic/continued: an application of distinct instruments, combined and in a feedback chain, with a highly critical participation of the subjects, who provide questions to be answered by the research process, characterizing the collaborative involvement in the dynamic or methodological redesign.

The analyzed studies showed that dialectical techniques and instruments, due to their reflective, dialogic and educational essence, such as discussion circle/reflection workshop and activity workshop, talking map, focus group, photography workshop and sensitization of the look, field trip/experience, among others, can contribute more directly to stimulate reflection and to favor the participation of the subjects involved, offering, many times, immediate evidences as research results, at the same time that they contribute to methodological adjustments (direct/immediate feedback). In turn, non-dialectical instruments such as questionnaire, georeferencing, documental analysis, observation and analysis spreadsheet, among others, provide results that are necessary to the research and also contribute, indirectly, to the cyclic process of planning-action-interpretation (indirect/non-immediate feedback) because, when the results of these instruments are discussed with the participants, answers to the questions are provided, and this favors the credibility of the methodology (reducing the resistance) and contributes to the understanding of the people involved about the relevance of the issues under focus.

About this aspect, Mendes<sup>28</sup>, in her action research about risk perception, states that

The inclusion of the population's participation in the projects is not a new idea, and neither is the utilization of instruments like: group dynamics, use of photographs, theoretical-practical classes. It was the combination of communication, reflection and action strategies that enabled the

success of your project. The population's direct participation in the construction of a risk management plan, in their daily experience, allowed them to analyze, understand, confront and discuss the best solutions for their daily routine and, consequently, to obtain a good result in management based on the feeling of belonging and on the appropriation of the program.<sup>28</sup> (p. 175)

Mello<sup>37</sup> argues that in health promotion for youths and adolescents in a situation of socio-environmental vulnerability, the diversified use of didactic resources and activities of sensitization of the look, like the technique of pinhole photography<sup>(9)</sup>, contributed to a critical reading of the reality and to the development of social actions in the community. This revealed the need to choose carefully the strategies that are capable of stimulating the interest both in the investigation of the reality and in social action.

Rodrigues<sup>32</sup> also recognized that the articulation of dialectical and non-dialectical research instruments was important in the structuring of the action research that he developed. He stated that he decided to use a diversity of instruments, such as: dialogs, coordinated and spontaneous actions, semi-structured interviews, filming, photographs and information obtained in formal events (cycle of study) or informal ones (action situations of individual or collective construction). The instruments were gradually selected as the research developed. To the author, "empirical investigation and theoretical interpretations completed each other in a dialectical way, bringing reflections that were necessary to structure the work"<sup>32</sup> (p. 54).

### **Challenges to participation**

Before approaching participation in the methodological context, we would like to highlight that it is a broad "concept" that involves practical, theoretical and institutional meanings. This multidimensionality or polysemy hinders the attempts to define the value or the effects of participation. This happens

not only because of the diversity of expectations placed on it and because the assessment of effects is an operation that is known to be complex, but due to the fact that there is no consensus regarding the expected effects of participation, or even worse, concerning the relevance of evaluating it based on its effects. After all, assessing the value of participation based on its utility is equal to undervaluing it or to making it become secondary in relation to the desired effect.<sup>48</sup> (p. 101)

<sup>(9)</sup> A photography technique that utilizes handmade cameras without a lens, by means of the principle of the light-proof box in which the light passes through a small hole to project onto the photosensitive paper. They can be made from empty cans or boxes<sup>46,47</sup>.

Thus, when we analyzed the participation of the subjects of the issues investigated by the systematized interdisciplinary studies, as well as the interaction of the researchers in the process, we identified different 'levels' of involvement/action, which range from the subjects' active participation in all the developed stages (diagnostic or exploratory, reflection and analysis of results, development and implementation of actions, socio-educational interventions, etc.), to situations in which the subjects were involved only in the moments of intervention (their participation was not observed in the process of surveying their own needs and/or reflecting critically on them, as it is expected from action research, so as to offer subsidies to the production of new knowledge and to a possible transformation of the reality). In addition, we identified a passive posture of participation, that is, the action of the research's subjects was limited to providing information on the investigated issues; this was not characterized as action research.

The fragments transcribed below show the researchers' recognition of these different levels of participation, as well as of benefits of the subjects' direct/active involvement and of the researchers' interaction.

The students' participation (in the study) underwent modifications during the process. It changed from spontaneous participation (without well-defined purposes) to an effectively voluntary participation (a group with objectives established collectively for a purpose). In this process the importance of the decisions made and the members' degree of control over the decisions were modified – from receptors of information to makers of proposals. The students gradually conquered spaces while the main researcher gradually reduced the position of coordination.<sup>29</sup> (p. 42)

This converges with the arguments presented by Cashmanet et al.<sup>2</sup>. According to them, in participatory research there are complementary roles between researchers and subjects, and there will be moments of higher or lower collaboration between them, which does not invalidate the participatory process.

Likewise, Ikemoto<sup>43</sup> considered that "the forms of approach (in the activities) were evaluated according to whether they opened space to students' participation (subjects of the intervention) and according to the participation that was effectively detected" (p.49).

Boaretto<sup>49</sup>, about the relationship of coexistence and involvement established between her (researcher) and the research's subjects, states that "participating and, above all, observing and acting together with the subjects was essential to the analysis presented here" (p.64).

Some aspects directly related to participation contributed to the positive results achieved in the research developed by Mello<sup>37</sup>, such as the atmosphere of respect and trust among the subjects involved and between them and the researcher – "their opinions were really important for the construction of this study"<sup>37</sup> (p. 217) and subsidized decision-making in relation to the pedagogic interventions that were defined to the proper conduction of the process.

In the action research developed by Faria<sup>41</sup>, the dialogic relations established between students/participants and teacher/researcher/mediator in the teaching-learning process contributed to the re-signification of knowledge and values as, according to the author, "action research combined with pedagogic mediation is capable of teaching in an expressive way, as children learn what provides them with some cultural meaning. This can only be conceived with this approach"<sup>41</sup> (p. 120).

Mendes<sup>28</sup> recognizes the researcher's responsibility, in an action research process, not only in terms of offering subsidies to participation; also, such participation should result in social interventions, as the author states that "the researchers should assume, when dealing with this population, roles of mediation in information and action, aggregators of social assets of the group and of the environment, like social advocates" (p. 163).

Therefore, it is possible to notice that the challenge to participation in action research processes is constant. List<sup>50</sup> discusses the distinct forms of subjects' involvement, and argues that it is possible to propose a scale of seven levels of participation, starting from step 1 – manipulative co-option, towards step 6 – interactive co-learning, up to step 7 – self-mobilization and empowerment.

However, to face complex problems like those investigated in the studies that were systematized and analyzed here, participation cannot be limited to a simple dissemination or democratization of information, or to popular consultation; rather, it demands the awakening of a pro-active posture on the part of the subjects in the decision-making process, as well as its constant monitoring and assessment. This participation occurs, according to List<sup>50</sup>, from interactive co-learning towards self-mobilization and empowerment, that is, at the same time that it requires social mobilization and the construction of knowledge about the theme, when it becomes concrete, it offers a process of mutual learning and strengthening of the community. This enables that, at the end of the process, the social actors who are involved in it can "walk by themselves" (autonomy/pro-active posture) – even in view of the possibility of discontinuity of public policies. It is worth remembering that such level of participation depends not only on transformations in the forms of collective action, but also, many times, in the management process.

Therefore, participation is not only an indispensable element for approaches/methodologies of this nature, but also a determinant element for the quality and sustainability of this process, in the sense of favoring the collaborative production of knowledge, empowerment and the making of shared decisions in order to face undesirable situations.

## Final remarks

The analysis of the dissertations and theses that composed this systematic review allowed the identification of criteria that contribute to qualify an action research, in such a way that only a

thorough analysis of the practice can reveal. The reason is that the certainties and uncertainties, the rights and wrongs that are inherent in the development of an academic research that is interdisciplinary, participatory and characterized by intervention, give visibility, at the same time, to facilitating aspects and challenges that emerge during the action research process.

It was considered that the criteria that were identified and analyzed here favor the fulfillment of the objectives of an action research (investigation simultaneously with intervention and knowledge production), as well as the better understanding of its organizational dynamic. As for the latter, we highlight: methodological flexibility, allowing adjustments during the investigation and intervention process; the combination of multiple research and intervention instruments; and the level of participation and cooperation of/among subjects and researchers.

It is worth mentioning that the qualification of an action research can also be favored by the interrelation of these criteria, as it was possible to observe in the analyzed studies. Therefore, due to its methodological dynamism, different paths can be taken during its development, according to the demands that emerge, which, in turn, are recognized precisely because of the participatory character of an action research. That is, the greater the interaction between the subjects of the issues and the researchers, the more easily new practical and/or cognitive needs are identified.

Furthermore, this methodological dynamism contributes to the utilization of dialectical and non-dialectical instruments that, in a combined way, can favor participation and adjustments. Processes of direct/immediate feedback and indirect/non-immediate feedback enabled by these different research and intervention instruments will provide answers to the questions raised by the subjects and by the researchers, which, in turn, will contribute to stimulate participation and the necessary adjustments to the cyclic process of planning-action-interpretation.

Although the relevance of participation and of the interaction of subjects and researchers in an action research has already been broadly discussed, there are still many challenges to their legitimation, as it was possible to notice in the different levels in which participation was present in the systematized and analyzed studies. In addition, Lavalle and Vera<sup>48</sup> recall the fact that several desirable effects have already been attributed to participation, implicitly or explicitly: pedagogic, psychological, economic and functional effects, as well as effects of integration and rationalization or social control of power, and mainly its educational function concerning the construction of self-confidence, self-perception and belonging. Thus, its positive effects would be capable of generating virtuous circles in which participation generates more participation – an indispensable element in an action research.

Thus, in view of socio-environmental, health and educational problems of a complex nature, like the ones that motivated the investigations (and actions) of the analyzed studies, the action research methodology, when developed based on the principles of participation, reflection, action and knowledge production, and adopting the criteria analyzed in this paper as reference, proved to be adequate to face the challenges imposed by the interdisciplinary character of these

issues and, consequently, by the need of appropriation of new knowledge, values and skills by subjects and researchers.

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