PAST, PRESENT AND FUTURE OF PROJECTS-BASED TRAINING IN COLOMBIA[1]

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Abstract

A journey through the history of projects-based training at the National Training Service (Sena), a vocational education institution in Colombia, associated with non-formal, technical, technological and, recently, higher education. The article presents theoretical references, and the comprehensive professional training is analyzed, including its ontological and epistemological aspects. The projects-based training is essentially characterized by a curricular, interdisciplinary, application and resource management approach. Finally, the article formulates the future of the projects-based training.

Key words: Training. Education. Projects. Work.

1. Introduction

The National Training Service (Sena) is the flagship vocational education institution in Colombia. It was founded in 1957 following the Brazilian National Service of Industrial Training (Senai) and accelerated training schemes from France, among other countries (MARTÍNEZ; NOGUERA; CASTRO, 2003).

Throughout its history, the Sena has been part of the Ministry of Labor, although its educational function has been classified in different terms: non-formal education, technical and technological education, job and human development training, and higher education. As part of the Sena's missional nature, emphasis is usually placed on the social and technical development of workers, comprehensive professional training, productivity, competitiveness, inclusion and technological development:

> The SENA is in charge of fulfilling the State's role of investing in the social and technical development of Colombian workers, offering and implementing comprehensive professional training for the incorporation and development of

> people in productive activities that contribute to the social, economic and technological development of the country (SENA, 2018).

The Sena's trajectory is so extensive that it is possible to refer to projects-based training taking a look at its history, and even proposing challenges which will confront the institution in the near future. In the beginning, training programs tailored to the needs of a particular company were called "projects", for which it must be considered that initially a large part of the Sena's training processes were developed in the company. Today, the institution has an important infrastructure, more than 117 Training Centers, so that a large part of the training activity is developed in its own headquarters. Nowadays, the projects-based training in the institution is essentially characterized by a curricular, interdisciplinary, application and resource management approach. In the short run, the Sena faces challenges to implement the projects-based methodology with a pedagogical approach, incorporating research activities proper to its institutional nature.

Training programs tailored to the needs of a particular company were called "projects"

In 2014, the Sena constituted the *Escuela Nacional de Instructores* "Rodolfo Martínez Tono" which depends on the Direction of Vocational Education and manages most of the training orientations and actions, training and development of Sena instructors at the national level, for which it has developed training activities in specific and cross sectional areas of pedagogy, as well as research on pedagogical issues and/or related to the comprehensive professional training developed by the institution. Due to its nature and closeness to instructor training, debates are emerging in the *Escuela* about the relevance of the pedagogical discourse in the vocational education and among them, the impact on the projects-based training for the learners' training.

The following section presents theoretical and contextual references for the projects-based training in general and, particularly, in the Sena. It then discusses the nature of comprehensive professional training, in other countries it is called tertiary education or Vocational Education and Training (VET), including an analysis of ontological and epistemological aspects. After that, there is a journey through the history and present time of training mediated by projects in the institution. Finally, the challenges which can be faced are exposed for the near future of the projects-based training.

2. Theoretical references

On the international contemporary scenario, Amorós (2017, p. 10) points out that good projects-based learning practices share three key elements:

> They place the student in the central axis of their own learning, develop learning models based on *Blended learning* projects and dynamics, and create projects arising from the needs of the environment, thinking of a global impact.

The concept of project is at risk of being polysemic. It can be conceptualized very broadly: "First scheme or plan of any work which is sometimes done as a test before giving it the final shape" (DRAE), leading to almost any activity or work prototype. In addition, the term is often referred to in different scenarios, not only in the education field, for example: life project, bill, productive project, etc.

In the Colombian context, it is common to refer to the logical framework of projects as a tool used to articulate institutional resources and/or to solve problems. Postgraduate studies in project management are increasingly common, as well as the requirements of this kind of studies in public institutions for new employees.

In any case, in the educational field there are traditions, which allow reference to projects-based training methodologies from the beginning of the 20th century in North America (Dewey) and the middle of the same century in London (Bernstein). It can be pointed out more accurately that:

> The projects-based methodology owes its initial development to a set of actions in different parts of the world, especially in Russia, Germany and the United States. Its origin is attributed to researchers of different countries, [...] German historians consider Professors Charles R. Richards and John Dewey based on the *Manual and Industrial Arts Programs* work in 1900, while Americans attribute it to the expert on agriculture Rufus W. Stimson based on his *Home Project Plan* work in 1908, but they consider the educator William H. Kilpatrick as the great promoter based on Stimson (CIRO ARISTIZIBAL, 2012, p. 14, author's faucet).

Currently, there may be coincidences in relation to the goals identified for projects-based learning:

- Training people capable of interpreting the phenomena and events happening around them.
- Developing motivation towards the search for and production of knowledge since through attractive learning experiences involving students in complex, real life projects, skills and knowledge are developed and implemented (CHILE, 2015).

In the Colombian context, there are authors who agree on pointing out, among the benefits of projects-based learning, the integration of subjects supported by documented research activities, such as the research developed by the National University of Colombia (JURADO et al, 2011).

Other benefits of projects-based learning have to do with:

- Organizing activities regarding a common goal defined by the students' interests and commitment.
- Promoting creativity, individual responsibility, collaborative work, critical capacity, decision-making, efficiency and the ability to express personal opinions.
- Students experiencing the ways of interacting that today's world demands.

- Combining positively the learning of important contents with the development of skills that increase the autonomy in learning.
- The development of the person; the students acquire the experience and spirit of working in groups as they are in contact with the project.
- Developing social skills related to the group work and the negotiation, planning, performance, monitoring and evaluation of one's own intellectual capacities, including the problem solving and value judgments.
- Addressing a social need, which strengthens the student's value and commitments with the environment (CHILE, 2015).

The researcher Michael Knoll argues that this subject, in historical terms, has been approved superficially, and considers that this methodology was not the product of the progressive industrial movement in education emerging in the United States at the end of 19th century, but that its first use dates back to the 16th century (CIRO ARISTIZIBAL, 2012, p. 14). For this analysis, five historical periods are proposed to recapitulate the history of projects-based training:

> 1. 1590-1765: Beginning of the projects-based work in the European architecture schools [in the Academy of Saint Luke, in Rome, Academy of Fine Arts];
>
> 2. 1765-1880: The project as a common learning tool and its migration to America;
>
> 3. 1880-1915: Projects-based works in manual teaching and public schools;
>
> 4. 1915-1965: Redefinition of the project method and its migration back to Europe;
>
> 5. 1965-nowadays: Rediscovery of the projects-based philosophy and the third wave of international expansion (CIRO ARISTIZIBAL, 2012, p. 15).

According to Ciro, it is also worth pointing out that projects-based learning emerges from a constructivist approach, which made progress from the work of psychologists and educators such as Lev Vygotsky, Jerome Bruner, Jean Piaget and John Dewey:

> It must be taken into account that the constructivist movement, which seeks to provide students with tools that give them the generation and modification of ideas to elaborate their own knowledge, was what focused the attention of the educational methodologies towards the learning as an active process of the individual. That constructivist thought had great contributions in the educational advances, which allowed to leave the traditional method as sovereign methodology, and, in its developments, had an application towards what was called the projects-based learning, and it is supposed that it was developed precisely by William Heard Kilpatrick.

> At the beginning of the 20th century, within the so-called American progressive movement, Kilpatrick proposed the project method as the first pedagogical model based on the empirical experience supported by John Dewey's theories, proposed at the end of the 19th century. This proposal is based on the scientific experimentation, adopting spontaneous interests in the student to enhance their activity within the autonomy and solidarity framework. The educational practice of pedagogical pragmatism materialized in the project method, inspired by Dewey and formulated by is disciple Kilpatrick in 1918. Its application began at the Columbia University in the City of New York in 1918 but had little popularity in the United States. After that, it was forgotten and only rediscovered in the 1970s when the idea of the project method was again proposed but linked to an overt curriculum concept and community education (CIRO ARISTIZIBAL, 2012, p. 16).

Currently, there are definitions of projects as research strategies, which allow didactic flexibility, addressing the environment's needs:

> A project is an in-depth investigation of a task/problem; its development generates a large number of actions demanding a responsible use of autonomous working time. In training projects, the problems are integrating elements of knowledge, making the training offer more personalized and flexible, because, as Garrik said, the pedagogical flexibility can be understood as breadth of learning, which creates opportunities to carry it out. Thus, pedagogical flexibility, performed through projects, becomes an ideal scenario that creates different learning contexts favoring new forms of interaction and making it possible a great variety of competences (AMORÓS, 2017, p. 12).

3. The nature of the comprehensive professional training

For some thought leaders, the concept of training is broader than the concept of education

Sometimes it is important to make a difference between the formal and non-formal education; differences can be found in the literature in terms of school and non-school education; in social sciences it is possible to make a difference between socialization (common in sociology), "enculturation" (recurrent in anthropology) and learning (frequent in psychology). For some thought leaders, the concept of training is broader than the concept of education (it can be thought of the Kantian concept of adult training), while others believe that the concept of education is broader and involves different scenarios (not just formal schooling).

In the case of Colombia, the concepts of training and instruction in the second half of the 20th century are often associated with educational processes in the employment context. Although the term training is used in the 1991 National Political Constitution, at the beginning of the 20th century, the governmental entity in charge of formal educational processes was called Ministry of Instruction – today it is called Ministry of National Education (MEN).

In Latin America, there are agreements in which the job training processes have had a parallel history, sometimes distant, to that of the traditional academic education processes. However, at present, in different parts of the world, the differences between job and formal education training are diffuse (VELDE, 1999).

With the references, it is interesting to review the institutional ontology (the Sena's nature) in order to allocate the epistemological foundations of the comprehensive professional training (the nature of the knowledge managed). Although the Sena has been part of the Ministry of Labor, initially the categorization of its training process was non-formal education, then technical and technological education, and nowadays job and human development training (technical level programs), and higher education (technological level programs).

In the last decade, the demands of qualified registration by the MEN to meet the requirements of the technological level programs have generated questions within the institution, for some people it is a risk that may blur the Sena's vocational nature by an academic court, as is expected to be found in the stereotype of the average university:

> While some officials within the entity state that the Sena is not prepared to be labeled as a university and its emphasis on 'work' should not be changed by an emphasis on 'academic', others agree that, at the end, an educational function which allows it to be part of the formal and higher education is developed (MARTÍNEZ RAMÍREZ, 2015, p. 56).

In the technical and technological context, according to Mario Bunge, the scientific research seeks to understand cause-effect relationships, while in technological knowledge, the most important thing is to analyze and develop effects and then go to the causes. This idea can help to reflect on the nature of knowledge according to its directionality and functionality.

The Sena is constituted following the scheme of the Brazilian Senai and practices inspired in the schemes of accelerated training of some European countries. There are several discourses around the creation of Sena; for its understanding, it is important to identify the international and local historical context.

In the second half of the 20th century, there were important changes in the consolidation of the economic and geopolitical order at the international level:

> When finished the Second World War in 1945, the humanity had to readapt to another situation. The military industry slowed its production pace and the manufacturing company reconsidered its goals and launched the search for new markets. Small countries-backward, as they were called- began an era of adjustment to suit different circumstances. The universal conflagration left a terrifying aftermath of destruction and disaster, but in order to develop the most formidable military machinery known until then it discovered technologies and systems which changed the economic game worldwide (QUIROZ DE ARENA, 1978, p. 7).

Thus, in the education of the second half of the 20th century, important changes were introduced and marked the notion of the education and its function. Education is now seen as a consumer's good and not just as a luxury for a few elites. Education for empowerment is viewed in most developed countries, and technological transfer is expected for poor countries (SCHUMACHER, 1983).

About the purposes of the Sena beginnings, there are several stories that converge. On the one hand, there is the version that highlights the struggle of the Colombian workers to demand social benefits and training from the government (the Sena and the family compensation funds are born at the same time in Colombia); in this version of the history the following aspects are important: the efforts of the workers to claim better conditions, the church to support the notion of family welfare, the employers to agree to facilitate or collaborate in the process. There is another version of the birth of Sena, which highlights the work of its founder Rodolfo Martínez Tono, for having the vision and led the first big efforts for the entity creation and expansion in line with the need to qualify the workers from the country. There is even a version about the creation of Sena that highlights the international context:

> The SENA was among the first projects through which the United Nations Development Programme (UNDP) began its activities in Colombia. In 1959, the expanded program of technical assistance, after providing advice and funding to two projects from 1950 to 1954, approved two projects in December 1959: one of them for Sena vocational training and the other for soil survey of the Northern part of the Eastern plains (MARTÍNEZ; NOGUERA; CASTRO, 2003, p. 47).

In other American and European countries, reference is often made to the type of education developed by the Sena as VET or tertiary education. In the case of Colombia, the lack of articulation of the educational system has made it difficult for various sectors of the Sena's academic community to accept the concept of tertiary education for the function of the Sena.

The epistemological foundations of the comprehensive professional training are not alien to the ontological, political and economic institution characteristics. The differences between an academic-scientific approach and a labor-technological approach can determine the horizon that the knowledge and the characteristics of the projects developed in the institution may have.

4. The history of projects-based training: past and present

In the first decades of the Sena, reference was made to project structuring to identify the training programs developed to fulfill the training needs of a company or a particular organization, which constituted one of the first forms of projects-based training, not only by name but also by attention to an actual need in the working environment. In the 1980s, this idea became more formally sophisticated through the Agreement 12 of 1985 (Sena, 1985), which defines the project as a management

tool that foresees and organizes planning, technical-pedagogical and administrative actions in order to fulfill a societal need within the framework of the entity's goals and policies. The instrument defines the structuring of the response to fulfill the population needs according to Article 13 in the Technical Unit of the Sena (1985). Thus, technical-pedagogical and resource management aspects are mixed in the project design in such a way that they are intermingled with a systems perspective, and administrative and pedagogical aspects.

> The SENA's Projects-Based Training model implies an expansion of the pedagogical action radius of this methodology, going beyond the traditional application scenarios to create new learning environments, both in our own facilities and in companies and places where students live or work, prioritizing the economic and social needs and demands of the environment. This projects-based model has led to the development of a management guideline for the Centers, which integrates organizational and technical-pedagogical variables (related to the center management, material, pedagogical, and didactic aspects, etc.) (AMORÓS, 2017, p. 14).

It is worth highlighting the administrative emphasis given to the project designs in the Sena. For example, the Agreement 12, Article 15 of 1985 states that a project is constituted in units of: "Programming, Administration, Execution, Budget and Costs, Evaluation"; the Article 16 of this Agreement states that "the Comprehensive Professional Training contemplates, in its phases, administrative processes which ensure the efficient and timely provision and organization of human, physical and financial resources". Thus, although so-called technical-educational aspects are incorporated, the emphasis is still placed on the administrative issues.

Some examples of the projects-based training spirit at the beginning of the Sena, in the sense of developing practical application in real working environments, also applying concepts of integrity and interdisciplinary, including the community work, are the following initiatives:

- The *Programa de Promoción Profesional Popular Rural (PPPR)*, especially in the early 1970s.
- The *Programa de Promoción Profesional Popular Urbana (PPPU)*, since the late 1960s but had its peak in 1970.
- The *Programas Móviles*, especially after 1974.
- The *Capacitación Empresarial Campesina (CEC)*, also since the 1970s.
- The *Laboratorios Experimentales de Organización Socioempresarial (LEOS)*, documented since 1976.
- The *Capacitación para la Participación Campesina (Capaca)*, also since the 1970s.
- The *Capacitación para la Integración y Participación Comunitaria Urbana (Cipacu)*, since the mid-1980s.
- The *Sena Comunitario*, also since the mid-1980s.
- *Jóvenes Rurales*, since 2003.

Projects receive a new meaning, involving the new generation of knowledge

The emphasis on these projects-based training strategies was mainly on achieving an important coverage, especially for populations located in outlying areas or with certain types of vulnerability, so that strategic objectives were combined with pedagogical tools. In the particular case of the LEOS, the emphasis on the use of pedagogical tools with activities of experimentation and simulation was clearer.

In this way, it is possible to identify how the Sena has developed efforts to fulfill the historical and territorial needs of comprehensive professional training, for example, in its first decades; it adapted itself to the national requirements to reach the rural areas, the outlying areas and the most isolated areas from the big capital cities.

In the first decade of the 21st century, with the influence of European trends and the United Nations Educational, Scientific and Cultural Organization (Unesco), speeches that point out the importance of lifelong learning, the interdisciplinary, the importance of innovation in the application of active didactics, the training relevance in accordance with changes in working and technological environments, etc. are propagated. Besides that, a new meaning is given to the training projects in the Sena, seeking to place more emphasis on the pedagogical aspects of the projects-based learning methodology. Thus, projects receive a new meaning, involving the new generation of knowledge instead of giving priority only to business aspects, although it is possible to consider working environments as a pedagogical reference to simulate scenarios of the working world in the teaching-learning-evaluation process.

Precisely at the beginning of the 21st century, a difference is made in the Sena among "productive" projects, which emphasize aspects of entrepreneurship and enterprise, "training" projects, which are focused on the generation of knowledge, and "productive-training" projects, which integrate the two previous horizons.

According to Amorós (2017, p. 14-15), the Sena has adopted the projects-based training as a main strategy for the development of competencies "seeing it from a methodologically integrative perspective that understands the projects as the basis of the training activities proposed to learners in a training program and that also incorporates other didactic techniques as a complement".

In 2007, the institution established a conceptual and pedagogical framework for the implementation of projects-based training in the Sena, in which the following key aspects are pointed out: job skills (generic and transversal); learning principles, such as the tacit dimension of knowledge, problem-based learning, construction of meaning, meaningful learning, metacognition and self-regulation; also some didactic principles, such as: not substitution, anticipation or optimal lag, motivation, individuality, sociality, thematic interdisciplinary, methodological diversity, psychic interfunctionality, predictive homogeneity, dynamic theoretical-practical reciprocity, critical-constructive explanation, and creativity (Sena, 2007, p. 37-50).

In the first decade of the 21st century, the emphasis is placed on projects-based training as an opportunity to simulate real working environments; in this way, different types of infrastructure projects are promoted to simulate actual productive environments in the institution's training environments.

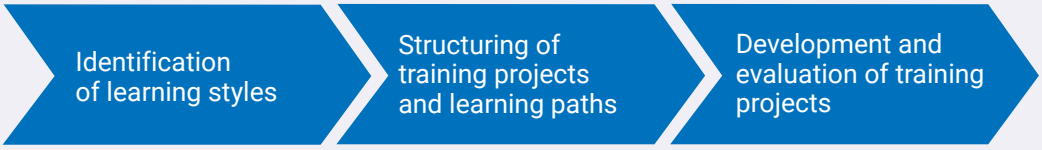
Nowadays, projects-based training is expected to allow the development of theoretical-practical activities, curricular integration, personalization of training processes (learning path is a name given to a set of projects that integrate a training program, such projects may vary according to the needs and characteristics of each learner), integration of the skills approach, development of productive projects and acquisition (and generation) of knowledge.

To exemplify the way in which projects-based training is currently applied in the Sena, in a synthetic manner, it follows two types of practices: those suggested in the available institutional literature (discursive practices) and the way in which specific actions are commonly assimilated and implemented in the training environments (non-discursive practices).

Among the discursive practices, it can be related that the methodology must allow personalization processes, respecting the learning rates and styles, for which it is possible to diversify the training projects in a group of learners according to individual differences; in this way, within a group, different learning paths could be developed (so that each path would contain a different set of projects), making it easy the personalization of the teaching-learning-evaluation process.

The procedures also state that projects can be defined by learners at the beginning of the training process. In the daily application, the policies of coverage extension and the income profile of the learners make it difficult the actual application of these procedures. In the following figure, the exposed scheme is summarized.

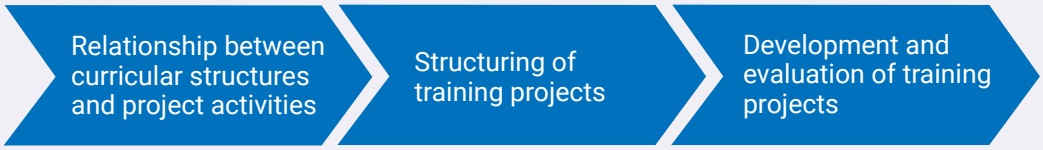
Figure 1 - Discursive practices in the application of projects-based training in Sena



Source: Own depiction.

In the non-discursive practices, emphasis is often placed on a curricular perspective, so that curricular structures (curriculum) are usually related to project activities oriented to field application or designed to integrate different contents. In the following figure, this scheme is summarized.

Figure 2 - Non-discursive practices in the application of projects-based training in Sena



Source: Own depiction.

An interesting advantage in discursive practices has to do with the personalization potential of the teaching-learning-evaluation processes; a disadvantage would be associated with the limitation of experience by privileging a particular learning style or in the limited application of project diversification (since it poses administrative limitations for its operation).

Some identifiable advantages in non-discourse practices have to do with the potential of training projects to develop applications in actual working environments and to solve technological or business problems; a disadvantage would have to do with the limitation of experience when too general learning activities (to make it easy the curricular integration) or too specific learning activities (limited to a single context or a single process) are proposed.

The following table summarizes the advantages and disadvantages of discursive and non-discursive practices associated with the projects-based training in the Sena in the last decade.

Table 1 - Advantages and disadvantages of discursive and non-discursive practices associated with the projects-based training in Sena

	Discursive Practices	Non-Discursive Practices
Advantages	Personalization of teaching-learning-evaluation processes. Integration of activities for entrepreneurship and enterprise and for the generation of knowledge and research.	Applications in actual working environments and for the solution of technological problems or in business contexts.
Disadvantages	Limitation of experience by privileging a particular learning style.	Limitation of experience when too general or too specific learning activities are proposed.

Source: Own depiction.

Some recent success stories in the application of projects-based training in the Sena include the development of research approaches (VARGAS PARGA, 2016), the simulation of business environments (BONILLA CELY, 2016; RINCÓN TRUJILLO, 2016), actions to reduce unemployment (HENAO PUERTA; BOLAÑOS BETANCOURT, 2016), the inclusion of Afro-Colombian populations (AGRONO

MORALES et al., 2016) and populations with cognitive disabilities (FLÓREZ LOZANO, 2016; MALAGÓN; ACUÑA; MARTÍNEZ, 2018), innovation and decentralization of resources (ALDANA VALDÉS, 2016), and the application of mathematics in context (BORJA MONTÑA, 2016), among other cases that have been documented recently, thanks in large part to the editorial support and effort of the *Escuela Nacional de Instructores* "Rodolfo Martínez Tono".

5. The challenges of projects-based training: the future

It is important to generate space of reflection to understand the current scenario and the horizons for improvement. Following Amorós (2017, p. 11), it is possible to state that projects-based learning broadens students' knowledge and develops their skills to make them more competent, but in order to achieve that there is a need for a deep didactic reflection which helps to define "what" we want to teach, "why" we are going to teach it and, above all, "how" we are going to teach it.

It is important to generate space of reflection to understand the current scenario and the horizons for improvement

A recent paradoxical situation in the educational field in general is to place emphasis on improving the coverage policies, which have obtained interesting outcomes in this field, taking risks of ignoring the quality of education. Although policies to increase coverage have had significant results, priority should be given to strategies that do not increase the number of students per classroom. Besides that, it is easier to personalize the educational processes using projects-based learning when a group of learners ranges from 7 and 14 participants, even a number close to 25 or 30 is reasonable (project diversification would be administratively feasible), as opposed to having more than 40 learners per classroom (workshop, lab or training environment).

6. Final considerations

The Sena has successful experiences in the application of projects-based training, such as: the development of productive projects starting from the use of the resources of the Training Centers; the integration of resources of different Training Centers for the development of projects that have been called inter-centers; the project integration for the generation of knowledge and, at the same time, for the development of entrepreneurship and enterprise activities.

An important conclusion is that the incorporation of projects-based learning methods can be assumed as a challenge for the near future, placing more emphasis on the pedagogical aspects with a vision centered on the subject learner and the subject instructor, overcoming the tradition of emphasizing curricular and administrative aspects (without ignoring their importance).

Another interesting challenge is to incorporate with greater precision the development of research projects in the job skill training, leading to the creation of research areas

that tend towards the integration of relevant research activities for and with the productive and technological sectors that impact the institution, recognizing its missional nature, and leading to the research in pedagogy and education in general.

A journey through the history of projects-based training allows us to visualize the very history of the pedagogical movements in the institution, and their institutional and epistemological nature. In order to make an adequate prospective of projects-based training in the Sena, it is important to recognize its history with the purpose of applying innovative developments which respect the own characteristics of the comprehensive professional training.

In recent years, the *Escuela Nacional de Instructores* has generated important debates regarding the pedagogical approach of training projects. In general terms, has sought to improve the enrichment of pedagogical experiences. In operational terms, has discussed the feasibility of diversifying training projects so that a training program can have a wide range of training projects which can optimize meaningful learning and generation of knowledge, without blurring the nature of job training which has historically characterized the institution.

In theoretical terms, it is necessary to generate debates and reflections about the potential of training projects to guarantee the enrichment of the pedagogical experience and evaluate their actual impact, the involvement of research activities, as well as a perspective which contextualizes the strategy with a broader approach that involves the problem-based learning, going beyond the traditionally applied perspective focused on administrative, pragmatic and entrepreneurial aspects, without losing the institutional nature on the horizon.

Nota

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References

AGRONO MORALES, S. et al. Inclusión educativa en poblaciones afrocolombianas, propuesta pedagógica para la paz. **Rutas de Formación**: prácticas y experiencias, Bogotá, n. 2, p. 39-47, jan./jun. 2016.

ALDANA VALDÉS, E. La prioridad en educación terciaria: el caso innovar en el departamento del Tolima. **Rutas de Formación**: prácticas y experiencias, Bogotá, n. 3, p. 15-21, jul./dec. 2016.

AMORÓS, A. Los desafíos didáctico-pedagógicos de la educación técnica: formación profesional del siglo XXI. **Rutas de Formación**: prácticas y experiencias, Bogotá, n. 5, p. 9-15, jul./dec. 2017.

BONILLA CELY, S. M. Modelo de gestión y transferencia de conocimiento para promover la estrategia pedagógica de empresas simuladas. **Rutas de Formación**: prácticas y experiencias, Bogotá, n. 2, p. 64-69, jan./jun. 2016.

BORJA MONTÑA, D. F. Propuesta pedagógica: matemáticas en contexto. **Rutas de Formación**: prácticas y experiencias, Bogotá, n. 3, p. 60-67, jul./dec. 2016.

CHILE. Congreso Nacional. Biblioteca. Departamento de Servicios Legislativos y Documentales. **Aprendizaje basado proyectos**: torneo delibera. Santiago de Chile, 2015. Available from: <https://www.bcn.cl/obtienearchivo?id=documentos/10221.1/55744/1/Aprendizaje%20basado%20en%20proyectos.pdf>. Viewed: nov. 2018).

CIRO ARISTIZIBAL, C. **Aprendizaje basado en proyectos (A.B.Pr) como estrategia de enseñanza y aprendizaje en la educación básica y media**. Medellín: Universidad Nacional de Colombia, 2012. Available from: <http://www.bdigital.unal.edu.co/9212/1/43253404.2013.pdf>. Viewed: nov. 2018.

FLÓREZ LOZANO, M. N. Desafíos en la práctica docente para la inclusión educativa y laboral de personas con discapacidad cognitiva: una experiencia en el marco de la Formación Profesional Integral. **Rutas de Formación**: prácticas y experiencias, Bogotá, n. 2, p. 54-59, jan./jun. 2016.

HENAO PUERTA, A.; BOLAÑOS BETANCOURT, C. X. Formación Sena para contrarrestar desempleo en la industria de la caña de azúcar. **Rutas de Formación**: prácticas y experiencias, Bogotá, n. 2, p. 32-37, jan./jun. 2016.

JURADO, F. et al. **Hacia la integración curricular**: el enfoque por ciclos en la escuela. Bogotá: Universidad Nacional de Colombia, 2011.

MALAGÓN, R.; ACUÑA, S.; MARTÍNEZ, CD. Inclusión educativa en la formación profesional: el caso del Centro Nacional de Hotelería Turismo y Alimentos en el Sena Colombia. **Revista Inclusiones**: revista de humanidades y ciencias sociales, Santiago de Chile, v. 5, p. 19-25, 2018. Número especial.

MARTÍNEZ BOOM, A.; NOGUERA, C.; CASTRO, J. **Currículo y modernización**: cuatro décadas de educación en Colombia. Bogotá: Editorial Magisterio, 2003.

MARTÍNEZ RAMÍREZ, C. D. Reflexiones sobre los retos educativos del Sena. **Rutas de Formación** : prácticas y experiencias, Bogotá, n. 1, p. 52-57, jul./dec. 2015. Available from: <http://revistas.sena.edu.co/index.php/rform/article/view/229/570> Viewed: nov. 2018).

QUIROZ DE ARENA, M. **20 años del Sena en Colombia, 1957-1977**. Bogotá: Editorial Presencia, 1978.

RINCÓN TRUJILLO, H. L. Construyendo aprendizajes en entornos reales de trabajo. **Rutas de Formación**: prácticas y experiencias, Bogotá, n. 3, p. 82-89, jul./dec. 2016.

SCHUMACHER, E. F. **Lo pequeño es hermoso**. Barcelona: [s.n.], 1983.

Sena. **Unidad Técnica. Acuerdo 12 de 1985**. Bogotá, 1985.

Sena. **Marco conceptual y pedagógico para la implementación de la formación por proyectos en el Sena**. Bogotá, 2007.

Sena. **Sistema Integrado de Gestión**: documentos institucionales. Bogotá, 2018.

VARGAS PARGA, L. A. Aplicabilidad de la investigación en la formación por proyectos. **Rutas de Formación**: prácticas y experiencias, Bogotá, n. 2, p. 60-63, jan./jun. 2016.

VELDE, C. An alternative conception of competence: implications for vocational education. **Journal of Vocational Education and Training**, London, v. 51, n. 3, p. 437-444, 1999. Available from: <https://www.tandfonline.com/doi/abs/10.1080/13636829900200087> Viewed: nov. 2018.