Socio-educational self-regulation from sustainability: a documentary analysis

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Summary

This article is the product of research based on the CIFE (2016) methodology for documentary records to know the state of the art of studies on learning self-regulation in children and identify possible links between this, the socio-educational approach and sustainable development. Scientific articles published in the last three years in Latin America and the world were consulted in databases. The concept of self-regulation is similar to others such as: self-study, self-learning, self-improvement, co-regulation, metacognition and executive functions; it has been associated to variables such as academic performance, motivation, physical activity, learning styles, teaching practices, neurodidactics, among others. A definition is proposed for sustainable socio-educational self-regulation as a result of the research.

Keywords: Self-regulation, sustainable development, education, meta-cognition, socio-training.

Introduction

The article presented focuses on the categories of self-regulation (Dignath and Büttner, 2018; Pardos & González, 2018), socio-education (Tobón, 2017; Tobón, Martínez, Valdez & Quiriz, 2018) and sustainable development (Alghamdi, Ernest & Hafiz, 2018); Murga-Menoyo, 2018), applying the methodology of documentary research (CIFE, 2016), to know the state of the art of learning self-regulation in children and identify possible links between this, the socio-educational approach and sustainable development.

The deterioration in the planet's environmental balance, which has become an ecological crisis, is the result of human activity as a reflection of economic and social inequality (López, Arriaga & Pardo, 2018).

The concept of sustainable development, coined in the international context, refers to development capable of satisfying the needs of society without putting future generations at risk in the satisfaction of their own needs (Alghamdi, et al., 2018; López et al., 2018). Concepts that were once considered unfounded, such as global warming or ecological crisis, are scientifically proven to have an impact on natural resources, such as water, and are thought to be the result of anthropogenic factors (Luna-Nemecio, 2019).

Other challenges are being faced. The apparent shift from an industrial society to an information society, and the transition to knowledge society, lead to a crisis of traditional educational models (Tobón, 2017); programs are questioned and teaching strategies are proposed to raise awareness and mobilize students towards sustainability (Torres-Porras & Arrebola, 2018), new concepts emerge to name the skills in which students should be trained at school, such as self-regulation (Muchiut, 2018), and new approaches to education, such as socio-training (Tobón, 2017).

This article is the product of a documentary research that integrates the categories of socio-training, knowledge society and sustainable development from the concept of self-regulation and proposes a concept of socio-training self-regulation, in response to a gap in theory that integrates and explains these categories, and to the scarce methodology that guides the educator to promote self-regulation in the classroom in view of the knowledge society and the challenges of sustainable development.

The documentary research that has been undertaken seeks to be a reference for new studies and decision-making by education professionals. To this end, the following goals have been defined: 1) What is the state of the art in research on learning self-regulation and other related concepts in Mexico and in the international context, specifically the case of elementary education? 2) How can self-regulation be explained according to the socio-educational approach in order to arrive at a concept of socio-educational self-regulation? 3) What does self-regulation contribute to knowledge society and sustainable development? And once this analysis has been achieved, 4) What challenges can be seen in the future so that socio-formal self-regulation can become a reality from the perspective of sustainability within education?

Methodology

Type of Study

A documentary analysis has been implemented applying the CIFE (2016) methodology for documentary records, which includes the following steps: 1) Understand the categories in which the information is to be searched and organized; 2) determine the essential and complementary words to make the search in the databases; 3) search the articles in databases considering that their publication is from the last three years, if possible; 4) download all the articles and organize them by year and type of document; 5) obtain the complete reference of each article; 6) review each article and extract the information through textual and non-textual citations; and 7) share the documentary record with other researchers and improve it from time to time.

Analysis categories

The categories used for the search, organization and analysis of information are: self-regulation (Pardos & González, 2018), socio-education and knowledge society (Tobón, 2017), and sustainable development (Alghamdi et al., 2018).

Document selection criteria

The documentary research was oriented exclusively to scientific articles no older than three years (2017 to 2019), with exceptions in the cases of articles that have set a precedent in the field and provide relevant information for the goals of this research. Guidelines, such as those used by Tobón, Guzmán, Hernández and Cardona (2015) were used: 1) The author, year of publication and journal were identified, 2) a humanist perspective of the categories exposed was adopted, 3) they correspond to key words related to the categories and subcategories of the research. For this research, the key words chosen were: self-regulation, executive functions, autonomous learning, knowledge society, socio-education, pedagogical practices, metacognition, sustainable social development, ecology, environmental education, children's education, among others. Scholar Google, WoS, Science Direct, Scielo, Redalyc and Latindex were the databases used, selecting only articles from journals indexed within the period 2017 and 2019.

Documents analyzed

The scientific articles referenced in this research add up to a total of 51 titles, of which 19 correspond to theoretical articles and 32 to empirical articles that reflect the situation in the context of Latin America and the world (Table 1).

Table 1. *Documents Analyzed in the Study*

Documents	About the topic	Complementary or contextualization	Latin American	American	European	From other regions
Theoretical articles	16	2	9	1	8	0
Empirical articles	33	0	18	2	11	2

Analysis of results

1. Learning Self-regulation

Self-regulation is explained on the basis of the learning process. Different research works (Berridi & Martínez, 2017; Díaz, Pérez, González-Pineda & Núñez-Pérez, 2017; Dignath & Büttner, 2018; Raaijmakers, Baars, Shaap, Paas, Van Merrienboer & Van Gog, 2017; Olivo, 2017; Sanabria, Valencia & Ibáñez, 2017; Seufert, 2018) are based on Zimmerman's (2002) definition of self-regulation as a level of metacognition, motivation and behavior, which manifests itself in thoughts, feelings and actions that lead to the achievement of self-established study goals and, at the same time, as a cyclical process. Students monitor their knowledge, motivations, and behaviors to regulate them (Diaz et al., 2017) and are able to control emotions, interact positively, and act appropriately and favorably (Pandey, et al., 2019).

Self-regulation is a cognitive skill and, as such, should be taught without regard to a particular age (Dignath & Büttner, 2018 and Muchiut et al, 2018). Thus, from stages prior to schooling, from 0 to 6 years, there are programs designed to stimulate emotional competences and self-regulation (Housman, Denham & Cabral, 2018) or perceptual-motor development and self-regulation (Morera-Castro, Herrera-González, Arguedas-Víquez & Fonseca-Schmidt, 2018), there are also proposals to work on self-regulation in the adult stage (Arenas, 2017; Díaz et al, 2017; Fosado, Martínez, Hernández & Ávila, 2018; Freiberg, Ledesma & Fernández, 2017; García, Vilanova, Señoriño, Medel & Natal, 2017; Kelly, 2017; Melgar & Elizondo, 2017; Miño-Puigcercós, Domingo-Coscollola & Sancho-Gil, 2019; Sanabria et al.)

Learning self-regulation in children has been explained from executive functions (Pardos & González, 2018; Vandenbroucke, Spilt, Verschueren, Piccinin & Baeyens, 2018). Self-regulation is one of the elements that make up executive functions, along with others such as planning, mental flexibility and attention control, among others. Qualitative teacher-student interactions support executive functions in children by creating an emotionally positive, structured and stimulating learning environment (Vanderbroucke et al., 2018) in addition to other factors, such as physical activity in school in the case of elementary school children, as Aadland (2018) refers to in his research with 10-year-old students with low arithmetic performance. As a whole, executive functions are given an important role in the academic activities of reading, writing, and mathematical thinking, as well as in the social and emotional regulation of the child (Bausela-Herrera & Luque-Cuenca, 2017).

There are concepts with similar characteristics to learning self-regulation, such as self-study and self-learning (Contreras-Colmenares & Garcés-Díaz, 2019); self-improvement (Rodríguez & González, 2018), co-regulation, which refers to the achievement of personal goals through cooperation between a certain number of people (Arenas, 2017); autonomous

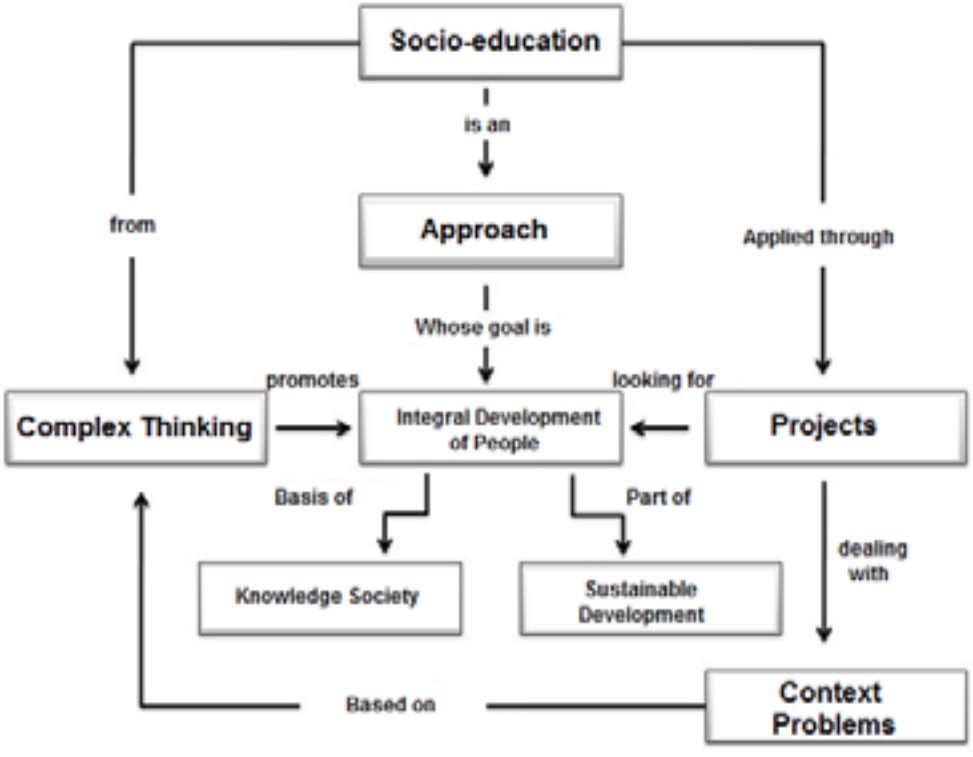
learning (Fernández, Polo, Fernández, Tallón & Hervás, 2018); metacognition, which refers to knowledge about cognitive processes and their regulation (Álvarez, Barón & Martínez, 2018; García et al., 2017; Melgar & Elizondo, 2017;) and executive functions, also identified as determinants of self-regulation (Bausela-Herrera & Luque-Cuenca, 2017; Durán & Gásperi, 2018; Pandey et al. , 2019; Pardos & González, 2018; Vandenbroucke et al., 2018).

Following Zimmerman's (2002) model of learning self-regulation, this occurs in three phases: the initial phase (which involves the determination of objectives, strategy, among others), the realization phase (which includes processes that help the student stay focused on the task) and the self-reflection phase (which involves personal judgments); it can be worked on in the classroom through direct promotion through implicit and explicit strategies, or through indirect promotion (Dignath & Büttner, 2018). In all cases, the intervention of the educator, whether intentional or unintentional, stands out. It is up to the teacher to guide the student toward new learning strategies and to encourage reflection on what is effective for his or her own learning (Álvarez, 2017).

2. Socio-training in the knowledge society

Socio-training is a curricular, didactic and evaluative approach (Figure 1), aimed at forming individuals, groups, organizations and communities to face the challenges of the knowledge society (Tobón, 2017). The methodological and philosophical change that socio-training brings with it is its attention to the problems of the context, needs, difficulties or gaps that arise in the personal, family, community or institutional sphere, instead of focusing on curricular content (Prado, 2018). However, it is an approach with a flexible and open perspective applicable to curricular projects that are organized according to objectives, purposes, standards, or competencies (Tobón, 2017).

Figure 1. *Concept map about socio-education and similar concepts. Own elaboration*



From the social training, the ethical project of life and actions such as entrepreneurship, collaborative work, management and co-creation of knowledge (with the support of the ICT) and metacognition are promoted. The ethical life project, alludes to personal goals, towards a continuous improvement manifesting universal values; this personal project, in turn, contributes to the environment, which involves socioeconomic development and environmental sustainability (Brito-Lara, López-Loya & Parra-Acosta, 2019; Tobón, 2017). Metacognition, on the other hand, is a core process for the resolution of a problem; it refers to the knowledge of one's own cognitive processes and their control and involves reflection on acting based on a certain goal, establishing flexible strategies, improving the achievement of the goal and the process of acting based on universal values, and preventing errors in specific actions (Tobón, 2017).

The development of socio-training occurs through co-creation, knowledge management, collaboration, ethics, transdisciplinarity, linkage and inclusion processes (Tobón, 2017; Tobón et al., 2018). Steps to be followed or actions to be executed in educational processes are identified as an approach; they are: 1) Identification of the problem in the context, 2) Previous analysis, recognizing the problem detected, its impact and the knowledge about it; 3) Collaborative work, in which participants assume roles and responsibilities for the achievement of the goals and objectives established; 4) Knowledge management; 5) Contextualization, that is, the application of knowledge to the solution of the problem; 6) Sharing the results that emanate from the previous steps, and 7) Evaluation (Prado, 2018).

Knowledge society is a category that has been used to explain socio-education (Tobón, 2017). In the knowledge society, the core is quality of life with inclusion and sustainable development. In the knowledge society, the tendency is to solve social, economic,

environmental problems, etc. by integrating three elements: collaboration, ICTs and universal values (respect, honesty, responsibility and equity). The coordinated work of leaders, politicians, researchers, those responsible for the training process, companies and the media activate the elements of the model.

Sustainable development

The United Nations General Assembly agreed on 2030 Agenda and the Sustainable Development Goals, with a view to changing paradigms to address the problems facing the global community, including poverty, gender inequality and climate change (Cumming, Regger, De Haan, Zweekhorst, Bunders, 2017; Collazo & Geli, 2017) so that development moves away from a purely economic approach to address social and environmental dimensions (Borquez & Lopicich. 2017). Thus, the concept of sustainable development has been empowered, in its three facets: environmental sustainability, economic sustainability and social sustainability (Carrillo, 2018).

There is still a debate around the concept of sustainability: sustainability refers to the economic, social, and environmental dimensions with the system of values; sustainability considers these subsystems separately (Zarta, 2018). Education for sustainability implies working on real transformation projects, while curricular sustainability seeks to go beyond environmental content in the curriculum, promoting changes in teaching processes and applying a complex vision (Collazo and Geli, 2017).

Sustainable development has been linked to the knowledge society and education (Cummings et al., 2017), as one of its goals refers to ensuring the knowledge and skills needed to promote sustainable development, inclusion, through education for sustainable development, sustainable lifestyles, human rights, gender equality, as well as the promotion of a culture of peace, appreciation of cultural diversity and the contribution of culture to development.

Education for sustainable development is part of 2030 Agenda; however, this does not exhaust the approaches of education for environmental justice, the most radical core of sustainability, which implies equity and thus enters the field of social justice (Murga-Menoyo, 2018). UNESCO proposes new curricular content (climate change and sustainable consumption) based on a pedagogy that promotes self-regulated learning, participation and collaboration. There are critical positions that consider these measures aimed at socio-ecological efficiency to be insufficient (Murga-Menoyo, 2018) and proposals that give environmental education a multidisciplinary character that seeks a balance within a systemic framework (Aguilar, Mercon & Silva, 2017; Fragoso, Santos & Aguilar, 2017).

Discussion

There is no proportion in the number of research studies conducted on learning self-regulation and similar concepts at different educational levels. Higher education has the largest number of research studies that contain the variables of self-regulation of learning, metacognition, autonomous learning or self-regulatory capacity (Arenas, 2017; Díaz et al., 2017; Fosado et al., 2018; Sanabria et al., 2017; Freiberg et al., 2017; García et al., 2017; Melgar & Elizondo, 2017; Miño-Puigcercós et al., 2019; Kelly, 2017; Sun et al., 2018). At the upper-middle level, two studies from Mexico were identified (Berridi & Martínez, 2017; Rodríguez & González, 2018), while at the secondary level or equivalent, eight studies from Spain, Colombia, Argentina, the Netherlands, China and Scotland were found (Alvarez et al, 2018; Badia & Daura, 2018; Gasco-Txabarri, 2017; Muchiut et al., 2018; Muñoz-Muñoz & Ocaña, 2017; Olivo, 2017; Pitkethly, Lau & Maddison, 2018; Raaijmakers, et al, 2018). At the elementary education level or equivalent, the number of investigations is reduced a little more (Table 2).

Table 2. *Empirical research with self-regulation, metacognition, self-study or executive function variables at the primary education level or equivalent*

Country	Variables contained in the research	Results
Norway	Physical activity, academic performance in numeracy, mediating effects of executive function, self-regulation of behavior, and school well-being (Aadland et al., 2018)	The effect of intervention on arithmetic performance is not explained by change in executive function, behavioral self-regulation, or school well-being.
Belgium	Peer rejection, parent and teacher support, and working memory performance (self-regulation component) (Vandenbroucke et al., 2018).	There was no effect of peer rejection and parent-teacher support. Social acceptance moderated the effect of teacher support on working memory.
Spain	Executive functions (planning, working memory and reasoning) and mathematical competencies (problem solving) (Diez-Reviriego & Bausela-Herrera, 2018).	There is no statistically significant relationship or association between executive functions (planning, working memory, and reasoning) and mathematics (problem solving) in elementary education.
Germany	Direct and indirect promotion of self-regulated learning by the teacher (Dignath & Büttner, 2018)	Direct instruction of self-regulated learning strategies in the classroom rarely occurs.
Venezuela	ADHD, executive functions and self-regulation (Durán & Gásperi, 2018)	There are failures of self-regulation in the population studied with ADHD (emotional, behavioral and cognitive self-regulation)
Colombia	Self-study and virtual learning environments (Contreras-Colmenares & Garcés- Díaz, 2019)	Students do not have the self-learning skills to work in a virtual environment

Reference: Own elaboration.

Self-regulation and the socio-educational approach show points of convergence and discrepancies. They coincide in the concept of metacognition (Cabanes & Colunga, 2017; Gasco-Txabarri, 2017; Olivo, 2017; Tobón, 2017) and are different in their orientation: while the self-regulation presented by Dignath & Büttner (2018) tends towards personal goals, the socioformation tends towards problems of context and integral formation based on an ethical life project (Prado, 2018; Tobón, 2017; Vázquez et al, 2016), as it considers personal and socioeconomic goals, with an attachment to sustainability, applying universal values: responsibility, respect, honesty and equity (Tobón, 2017).

What does self-regulation contribute to the socio-educational approach and what does socio-education contribute to the concept of self-regulation of learning? Is it possible to speak of socio-educational self-regulation? For the first of the questions, there is evidence that self-regulation can positively influence the achievement of goals beyond school preparation and academic performance, reaching areas such as physical and mental health (Pandey et al., 2018). For the second question, socio-educational self-regulation could integrate thoughts (metacognition), feelings (motivation) and actions (behavior) that are planned and adapted cyclically to the achievement of personal goals that come from a critical analysis of the context and the needs of the community, oriented towards learning, comprehensive training and the resolution of real problems in the context.

Thus, a student with learning self-regulation from socio-training is characterized by the use of cognitive strategies, personal initiative, perseverance in the task and the competences exhibited, regardless of the favorable or not favorable conditions in which the learning occurs (Díaz et al., 2017), focusing his/her learning towards the solution of problems of the context, through collaborative work and the use of ICT, recognizing his/her own

ethical life project (Brito-Lara et al., 2019; Tobón, 2017). In this way, socio-educational self-regulation is a skill that contributes to the integral development of people and guides students towards knowledge societies (United Nations Educational, Scientific and Cultural Organization, 2005; Tobón, 2017) and sustainable development, and this responds to the third goal of the research.

There is no single form of educator's intervention to promote self-regulation. The educator's intervention will be related to the characteristics of the students, such as their age and the school level they are attending. Thus, primary school students can benefit from direct promotion strategies by their teacher, as they need to learn strategies to regulate themselves. Studies show that not only are they capable of learning these skills, but that this training is more effective in students in the first grades of primary school (Dignath & Büttner, 2008). In the case of secondary school students, they respond better to the indirect promotion of self-regulation, which refers to a more open learning environment in which they can take charge of aspects of their own learning process (Dignath & Büttner, 2018).

In higher education, non-attendance models are optimal (Díaz et al., 2017), based on the educational teaching process referred to by Cabanes & Colunga (2017) or on the pedagogical practices of socio-education (Tobón, 2017; Tobón et al., 2018) that respond to real problems of the context from the perspective of complex thought. A problem is dealt with in its complexity by understanding its various components, dimensions and dynamics of change, arriving at a multidimensional vision that demands actions from different elements of the system in question for its solution.

Can socio-educational self-regulation be a reality from the point of view of sustainability within elementary education? There are research gaps regarding self-regulation of student learning in the early years of school. Although it has been recognized that it is feasible and beneficial to train primary school students in this area, the challenge is to design work strategies and to evaluate teachers' intervention with respect to their students' self-regulation.

One of the limitations of the research is the search ranges of academic articles published from 2017 to date, 2019; also, given the goal of recognizing the state of the art of learning self-regulation, the analysis is oriented to different educational levels, so it has not gone deep enough at a certain level or in a range of student ages. Thus, one of the future lines of research is the development of learning self-regulation at the elementary education level, a level that shows gaps in research. Another line of research is the methodology that teachers have applied to promote self-regulation in their students and its results. The case of research in Mexico, both in the area of learning self-regulation and in the area of socio-education in elementary education, represents a broad field of opportunities for future research.

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