Social Entrepreneurship Intervention Methodology for the Scaling of Perceived Achievement of Social Entrepreneurship Competency and Complex Thinking

José Carlos Vázquez-Parra[1] [a], Carles Lindín-Soriano[2] [b] Marco Cruz-Sandoval[1] [c] and Martina Carlos-Arroyo[1] [d]

[1]Institute for the Future of Education, Tecnologico de Monterrey, Monterrey, Mexico
[2]Universitat de Barcelona, Barcelona, Spain

Abstract: The purpose of this text is to present the results of a pilot test that is part of a validation process of a proprietary methodology, which aims to develop skills and competencies associated with social entrepreneurship, along with the competency of complex thinking. This methodology considers the use of a technological platform that, through self-directed activities, promotes the development of social entrepreneurship and complex thinking skills. From these results, we seek to argue the relevance of this methodology by focusing on the development of capabilities, beyond the generation of entrepreneurial projects. This text exposes the need to develop educational technological tools that allow the development of people, regardless of the institution to which they belong or the specialized human resources to which they have access.

1 INTRODUCTION

Social entrepreneurship is an excellent way to address local problems, even more efficiently than philanthropy and altruism (Ashoka, 2022). Therefore, more and more universities are paying attention to the formation of social entrepreneurship as a valuable competency for any student (Alvarez, Melandet, & Núñez, 2021). However, not all educational institutions have human capital specialized in social entrepreneurship training, causing many ideas and proposals of their students to be diluted and not to be developed.

Seeking to mitigate this need, a group of academics from a university in western Mexico specialized in social entrepreneurship, set out to develop a methodology that would not only aim to develop social entrepreneurship projects, but also the development of skills associated with entrepreneurship, i.e., a methodology for the development of entrepreneurial skills and capabilities. Thus Social Entrepreneurship Learning for Complexity (SEL4C) was born, a proprietary methodology that develops social entrepreneurship and complex thinking competencies as part of a process of ideation of social entrepreneurship projects.

In this context, the present text seeks to share the first results of the validation process of this methodology, which considers a pilot implementation carried out in the summer of 2022, and a wide implementation that is currently being carried out during the August-December 2022 semester. Part of these results, beyond validating the methodology, allow us to appreciate the relevance of scaling joint competencies, by demonstrating the significant relationship between the competencies of social entrepreneurship and complex thinking. Although the results of the broad implementation (i.e., August-December 2022) are not yet available, it is considered

[a] https://orcid.org/0000-0001-9197-7826
[b] https://orcid.org/0000-0002-3640-1258
[c] https://orcid.org/0000-0001-5703-4023
[d] https://orcid.org/0000-0002-5987-1041

that the results obtained at present are valuable to guide and scale the work being done by the research group.

1.1 Social Entrepreneurship Competency

Currently, educational institutions are key factors in the development of social entrepreneurship. This is based on the fact that these institutions act as environments in which people detonate and materialize innovative ideas in complex environments (Tecnologico de Monterrey, 2019). Although programs focused on entrepreneurship have become popular since the 1980s, they have been focused on the development of triggering ideas and business ideas, while ignoring or ignoring the development of competencies in the training of entrepreneurs (Bublitz, Nguyen, & Peracchio, 2020).

Table 1: Social Entrepreneurship Competency and its sub-competencies and indicators.

Sub-competencies	Indicator
Self-Control	Motivation; Perseverance and resilience; Tolerance to uncertainty, ambiguity and mastery of stress.
Leadership	Strategic planning; Communication and persuasion; Mobilizing people; Collaborative work.
Social awareness and value	Social involvement; Empathy; Identification of social/environmental issues; Focus on sustainability; Ethical sense.
Social innovation and financial sustainability	Creativity; Economic and financial literacy; Assessment of ideas, results and impacts on the environment and people; Learning and adaptability; Management of limited resources for social projects

Source: Created by the authors, inspired on García, Ramírez, de León, and Aragón (2020).

Educational work should not be so reductionist in focusing on entrepreneurship per se, but should pay attention to entrepreneurship skills training (According to García-González, Ramírez-Montoya, de León, & Aragón, 2020). Particularly, training in social entrepreneurship should consider domains in cognitive, procedural and attitudinal aspects. In this sense, these domains are expected to detonate in the generation of innovation with a differentiating value for society, always seeking to be sustainable (García-Gonzalez & Ramírez-Montoya, 2021).

In this sense, for this study, social entrepreneurship has been taken into account as a macro-competency made up of four sub-competencies that in turn are related to personal dimensions, self-control, leadership, social innovation, social value and entrepreneurial management (for more information see García-González, Ramírez-Montoya, de León and Aragón, 2020). Table 1 illustrates the sub-competencies of social entrepreneurship, as well as the indicators per sub-competency.

1.2 Complex Thinking Competency

For the present study, complex thinking is understood as the set of knowledge, skills and attitudes that allow the comprehensive analysis of phenomena, developing a broad and interconnected vision of all the elements and factors involved in them (Tobón & Luna, 2021). Due to its versatility of applications, complex thinking is qualified as a general or transversal competency, as it is valued as a relevant skill for any professional, regardless of the disciplinary area in which he/she works (Drucker, 2021).

The competency of complex thinking considers four sub-competencies or types of reasoning: systemic thinking, critical thinking, scientific thinking and creative thinking (Cruz-Sandoval, Vázquez-Parra, & Alonso-Galicia, 2022). Systems thinking is the type of reasoning that allows analyzing problems in an interconnected way, recognizing the elements that make it up and the dynamics between them (Jaaron & Backhouse, 2018). For its part, critical thinking allows evaluating the validity of reasoning from its own vision, rethinking problems beyond existing paradigms (Cui, et al., 2021). Scientific thinking gives people the opportunity to make decisions and solve problems from the adoption of objective and validated methodologies, adopting tools for reasoning, formulating and testing hypotheses (Suryansyah, Kastolani, & Somantri, 2021). Finally, innovative thinking, or also called creative thinking, considers the inclusion of processes that evaluate reality from different angles and perspectives, seeking to generate proposals and solutions that are both original and feasible (Zhou, 2021).

2 METHODOLOGY

As part of the work of an interdisciplinary research group, a methodology for the acquisition and scaling up of social entrepreneurship competency was developed. This methodology comprises nine practical training activities aimed at developing a process of ideation and construction of a social entrepreneurship project at a basic level (the activities were designed by a team of specialists in social entrepreneurship with training in pedagogy and instructional design).

The design of this methodology contemplates the development of other skills and therefore, each of the activities has an objective, instructions and its relationship with the development of the social entrepreneurship competency and its sub-competencies. Likewise, the methodology considers the acquisition and development of the complex thinking competency and its sub-competencies, with the intention of guaranteeing the formative process of both competencies at a basic level.

Aiming to promote the affordability of this methodology to all people with entrepreneurial desires, a technological platform was developed to implement this methodology in a self-managed way.

Along with the design of the methodology, the importance of including validated instruments to measure the development of both competencies was considered:

- Social Entrepreneurship: The instrument entitled Profile of the Social Entrepreneur (García-González et al. 2020), is a scale with 24 questions evaluated with a Likert scale: 1: Strongly disagree, 2: Disagree, 3: Neither agree nor disagree, 4: Agree, 5: Strongly agree. This instrument considers 4 sub-competencies: self-control, leadership, social awareness and value, and social innovation and financial sustainability. As for its validation, Cronbach's alpha was calculated, which yielded an overall reliability of the instrument of 0.86, in addition to each of the dimensions: leadership for change: 0.76, social innovation 0.60, social value 0.72 and management for change 0.77.

- Complex thinking: The E-Complexity instrument has the objective of measuring the perception of the participants' level of mastery of the complexity reasoning competency and its sub-competencies. It is an instrument validated both theoretically and statistically, as well as by a team of experts in the field. The averages obtained for the criteria evaluated by the experts were: Clarity (3.31), Coherence (3.38) and Relevance (3.54). Based on the theoretical and content validation by means of expert judgment, it was determined that the eComplexity instrument is highly valid and reliable (Castillo-Martínez et al., 2021). The instrument consists of 25 items divided into four sub-competencies: Systemic Thinking, Scientific Thinking, Critical Thinking and Innovative Thinking. Its implementation is self-applicable and each item is evaluated by means of a Likert scale: 1: Strongly disagree, 2: Disagree, 3: Neither agree nor disagree, 4: Agree, 5: Strongly agree.

Thus, the implementation process was carried out in three stages:

a) Initial diagnosis: Comprises the implementation of a validated instrument that measures the initial state of social entrepreneurship and complex thinking competencies and their sub-competencies.

b) Training activities: Considers the implementation of the nine activities designed by means of a technological platform that allows the realization of these activities in a self-managed way.

As part of these activities, we have considered the identification of international problems, their contextualization in their environment, the discovery of causes and possible consequences, the ideation of a value proposal that addresses some of these needs, the socialization and validation of this proposal and the capacity of abstraction to communicate their idea. These activities were only implemented in the experimental group, as this was the group that was involved in the methodology.

c) Final diagnosis: Includes the implementation of the diagnostic instrument to evaluate the development of both competencies once the intervention of the training activities has been carried out.

It is important to point out that although the activities can be carried out individually or in teams, the diagnosis and evaluation of the acquisition and development of the competencies and their sub-competencies is done individually.

3 RESULTS

As part of the validation process of this methodology, during the month of July 2022 a pilot test was carried out on a small group of students. The objective was to verify that the proposal did have a significant impact on an experimental group, in contrast to a control group. This pilot study was regulated by the interdisciplinary research group R4C, with the support of the Writing Lab of the Institute for the Future of Education of the Tecnológico de

Monterrey, who, since it is an experimental study involving people, suggested that it be limited to a single experimental group of students.

Thus, this pilot study was carried out with a convenience sample of 35 students, divided into two groups. The first group, composed of 17 students (10 males and 7 females) was considered for the pedagogical intervention, i.e., it was the group that carried out the three phases of the implementation process and was called the Experimental Group. On the other hand, the second group, composed of 18 students (9 men and 9 women) was not intervened with the training methodology in social entrepreneurship, so it only carried out the initial diagnosis and the closing evaluation, and was called the Control Group. The differentiation between the two groups had the objective of identifying whether the methodology and the proposed intervention were effectively valid for the development of both competencies and their sub-competencies.

Overall, this pilot test yielded positive results (see Table 2), as it showed an increase of 5.9% in the perception of achievement of the social entrepreneurship competency in the group of intervened students, also impacting all its sub-competencies: Self-control (+1.3%), Social Awareness and Value (+5.6), Social Innovation and Financial Sustainability (+10%) and Leadership (5.8).

Table 2: Experimental group. Results of the Social Entrepreneurship Competency and its sub-competencies. Initial Diagnosis and Final Diagnosis.

		Men	Women
Diag	Concept	Mean	Mean
I	Self-control	4.47	4.64
F	Self-control	4.47	4.78
I	Soc. awareness and value	3.87	4.77
F	Soc. awareness and value	4.33	4.73
I	Soc. Innov & fin. Sust.	3.84	3.91
F	Soc. Innov & fin. Sust.	4.34	4.16
I	Leadership	4.25	4.28
F	Leadership	4.53	4.50
I	Social Entrepreneurship	4.06	4.30
F	Social Entrepreneurship	4.41	4.51

Source: Created by the authors.

On the other hand, the violinplot in Figure 1 shows the development of the social entrepreneurship competency of the experimental group. It is evident that the mean values in the development of the competency have increased from the methodology. That is, the smoothed histogram shows a higher density of distribution in higher mean values of the competency in the final diagnosis of the students.
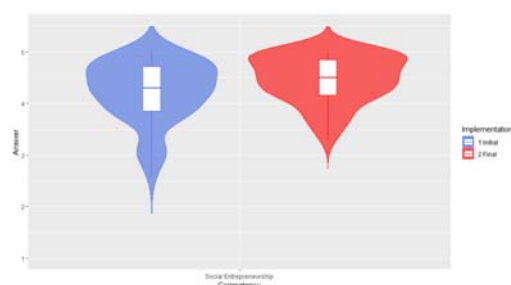

Figure 1: Results of the Social Entrepreneurship Competency of the experimental group (Initial Diagnosis-Final Diagnosis). Source: Created by the authors.

Likewise, Figure 2 shows the boxplot analysis of the initial and final diagnosis with respect to the sub-competencies of the macro competency of social entrepreneurship of the experimental group. The figure shows that there is a development in each of the sub-competencies resulting from the methodology through the final diagnosis.
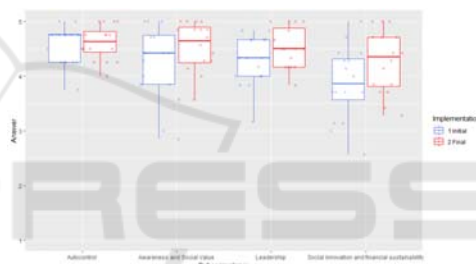

Figure 2: Results by sub-competency of the Social Entrepreneurship Competency of the experimental group (Initial Diagnosis-Final Diagnosis).

Table 3: Results of the Complex Thinking Competency and its sub-competencies of the experimental group and the control group (Pre-Post Diagnosis).

	Control		Experimental	
Thinking	I Mean	F Mean	I Mean	F Mean
Scientific	3.92	4.07	4.16	4.57
Critical	4.29	4.25	4.32	4.56
Innovative	4.12	4.16	4.28	4.53
Systemic	4.32	4.37	4.50	4.60
Complex	4.15	4.21	4.31	4.56

Source: Created by the authors.

Regarding the perceived level of achievement of the complex thinking competency, a considerable difference was demonstrated between the control and experimental groups (see Table 3). Regarding the competency in general, the control group managed to increase 5.4%, in contrast to the experimental group that scaled 5.8%, as for the sub-competencies, the results were similar: Critical Thinking (Control group: no change, experimental group: +5.5%),

Innovative Thinking (Control group: no change, experimental group: +5.8%), Scientific Thinking: Control group: +3.8%, experimental group: +9.8%), Systemic Thinking: Control group: +1.1%, experimental group: +5.8%).

In order to observe the distribution of the results shown in Table 3, Figure 3 shows the violin plot of the initial and final diagnoses in the experimental group. The results show higher mean values in the development of complex thinking in the final diagnosis, as well as a higher distribution density in mean values close to five.
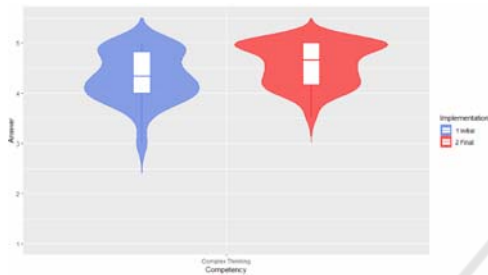

Figure 3: Results of the Complex Thinking Competency. Experimental Group (Initial-Final Diagnosis). Source: Created by the authors.

Thus, although this pilot study yielded limited results due to the small sample size, it did allow us to appreciate a differentiated development between the two groups, as well as shed light on the relationship between both competencies, arguing for the need to scale the test in a larger population.

On the other hand, Table 4 shows the correlation analysis between the social entrepreneurship competency and complex thinking. The table analysis shows the correlation analysis of the initial and final diagnosis of the experimental group. It should be noted that the analysis seeks to find a significant relationship between the competencies (p value <= 0.05) and does not seek a predictive capacity (i.e., R^2 close to one). The results of the table show that there is a significant correlation between both competencies. This correlation is higher in the final diagnosis of the experimental group.

Table 4: Correlation of development of Social Entrepreneurship and Complex Thinking Competencies (Initial-Final). Experimental Group.

Diagnosis	R2	pvalue
Initial	0.55	0.02
Final	0.75	0.00

Source: Created by the authors.

As a complement to the results described above, Figure 4 shows a scatter plot with a trend line with 95% reliability. In addition to showing a positive correlation between social entrepreneurship competency and complex thinking, the figure illustrates that both competencies increase with the implementation of the methodology comprising nine practical training activities aimed at developing a process of ideation and construction of a social entrepreneurship project at a basic level.
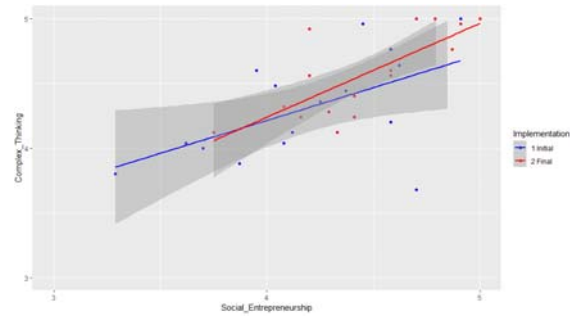

Figure 4: Results of the positive correlation between Social Entrepreneurship and Complex Thinking Competencies (Initial-Final). Experimental group. Source: Created by the authors.

After the pilot implementation, the responsible institution authorized a new implementation with a larger population, which will be carried out during the August-December 2022 semester. The implementation format of the methodology is face-to-face, with the support of a group of facilitators who supported the intervened groups. Five experimental groups and one control group have been considered for this study.

Table 5: Experimental and control group characteristics.

Experimental Group			
Men		Women	
n	%	n	%
45	40	67	60
Control Group			
Men		Women	
n	%	n	%
14	44	18	56

Source: Created by the authors.

As noted above, this study is ongoing, with results expected by mid-2023.

4 CONCLUSIONS

A relevant feature of competency-based training is usually the correspondence that can occur between several of them, considering that when a person develops certain skills, he/she can acquire and scale

some others at the same time. Thus, the present study not only corroborates the viability of the methodology designed, but also the correspondence between the competencies of social entrepreneurship and complex thinking. It also demonstrates the efficiency of the use of a technological platform for competency-based training, which makes knowledge accessible to anyone, regardless of the institution to which they belong, their socio-economic or geographical situation.

In conclusion, it can be pointed out that favorable results were obtained from the pilot implementation, which show that the proposed methodology is valid both for the scaling of the social entrepreneurship competency and its sub-competencies, as well as for the complex thinking competency and its sub-competencies. These results are not only academically valuable, as they raise the need to continue deepening the relationship between these two competencies, but also allow us to appreciate ample opportunities for practical implementation both for universities that have entrepreneurship programs, as well as for other institutions that work directly with social entrepreneurs and seek alternatives for the development of their skills when devising, proposing or developing a social entrepreneurship project. In conclusion, although we recognize that this article may be perceived as limited because it is based on the results of a pilot test with a very limited population, it is proposed as a necessary precedent to be documented as part of a broader study with more conclusive and significant results. We know that the results at this stage cannot be generalized, but they shed light on the path and process to be followed.

ACKNOWLEDGEMENTS

REFERENCES

Alvarez, I., Melandet, J., & Núñez, M. (2021). Social Entrepreneurs as Role Models for Innovative Professional Career Developments. Sustainability, 13(23), 13044. doi:https://doi.org/10.3390/su132313044

Ashoka. (2022). Emprendimiento Social. Recuperado el 11 de 05 de 2022, de https://www.ashoka.org/es-mx/focus/social-entrepreneurship

Bublitz, M., Nguyen, L., & Peracchio, L. (2020). Rise Up: Understanding Youth Social Entrepreneurs and Their Ecosystems. Journal of Public Policy & Marketing, 40(2), 206-225. doi:https://doi.org/10.1177/0743915620937702

Castillo-Martínez, I. M., Ramírez-Montoya, M. S., & Torres-Delgado, G. (2021). Reasoning for complexity competency instrument (e-Complexity): content validation and expert judgment. Assessment & Evaluation in Higher Education. In evaluation

Cruz-Sandoval, M., Vázquez-Parra, J. C., & Alonso-Galicia, P. E. (2022). Student Perception of Competencies and Skills for Social Entrepreneurship in Complex Environments: An Approach with Mexican University Students. Social Sciences, 11(7), 314. https://doi.org/10.3390/socsci11070314

Cui, L., Zhu, Y., Qu, J., Tie, L., Wang, Z., & Qu, B. (2021). Psychometric properties of the critical thinking disposition assessment test amongst medical students in China: a cross-sectional study. BMC Medical Education, 1-8. doi:https://doi.org/10.1186/s12909-020-02437-2

Drucker, J. (2021). Sustainability and complexity: Knowledge and authority in the digital humanities . Digital Scholarship in the Humanities, 26(2), 86-94. doi:https://doi.org/10.1093/llc/fqab025

García, A., Ramírez, M., de León, G., & Aragón, S. (2020). El emprendimiento social como una competencia transversal: construcción y validación de un instrumento de valoración en el contexo universitario. REVESCO. Revista de Estudios Cooperativos.

García-Gonzalez, A., & Ramírez-Montoya, M. (2021). Social entrepreneurship education: changemaker training at the university. Higher Education, Skills and Work-Based Learning, 11(5), 1236-1251. doi:https://doi.org/10.1108/HESWBL-01-2021-0009

Jaaron, A., & Backhouse, C. (2018). Operationalisation of service innovation: a systems thinking approach. The Service Industries Journal(38), 561–583. doi:https://doi.org/10.1080/02642069.2017.1411480

R Core Team. (2017). A Language and Environment for Statistical Computing. R Foundation for Statistical Computing. https://www.r-project.org/

RStudio Team. (2022). RStudio: Integrated Development for R (2022.2.2.485). RStudio, PBC. http://www.rstudio.com/

Suryansyah, A., Kastolani, W., & Somantri, L. (2021). Scientific thinking skills in solving global warming problems. IOP Conference Series: Earth and Environmental Science, 683(1). doi:https://doi.org/10.1088/1755-1315/683/1/012025

Tecnologico de Monterrey. (2019). Competencias Transversales Tec21. Monterrey: ITESM.

Tobón, S., & Luna, J. (2021). Complex Thinking and Sustainable Social Development: Validity and Reliability of the COMPLEX-21 Scale. Sustainability, 13(12). doi:https://doi.org/10.3390/su13126591

Williamson, D. F. (1989). The Box Plot: A Simple Visual Method to Interpret Data. Annals of Internal Medicine, 110(11), 916. https://doi.org/10.7326/0003-4819-110-11-916

Zhou, Q. (2021). Development of creative thinking skills through aesthetic creativity in middle school educational music course. Thinking Skills and Creativity(40), 100825. doi:https://doi.org/10.1016/j.tsc.2021.100825