Journal of Education and Learning (EduLearn)
Vol. 20, No. 1, February 2026, pp. 339~348
ISSN: 2089-9823 DOI: 10.11591/edulearn.v20i1.22864

Learning styles of Centennial students in a social laboratory

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Article Info

Article history:

Received Jun 29, 2024
Revised Jan 19, 2025
Accepted Mar 19, 2025

Keywords:

Centennial stakeholders
Kolb's learning styles
Social laboratory
Students
Transition design

ABSTRACT

The stakeholder's participation is crucial to analyzing wicked problems. To explore the connection with Centennial stakeholders, this research presents an exploratory, cross-sectional, and quantitative analysis of learning styles (LS) according to Kolb's theory for Centennial stakeholders in a transition design approach. In general, 5 research hypotheses were proposed to determine findings that allow improving the design and development of a social laboratory within the framework of educational institutions as part of a process innovation where students become more involved with wicked problems. The results show that there is some predominant LS, accommodation (LS1) related to feeling and doing, and diverging (LS3) related to feeling and watching. To conclude, according to our survey, Centennial stakeholders have a balance concerning LS that must be considered as part of the design of the approach to wicked problems.

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1. INTRODUCTION

Society is constantly evolving, as well as its problems, that is, the problems have gone from simple to complex or wicked levels. Lönngren and Poeck [1] performed a mapping review of the literature regarding the wicked problems concept and there are many interpretations of that [1]. Even with this, the evidence is clear, it is more challenging to solve particular problems present in society today, such as climate change, energy and water security, public safety, extreme poverty, discrimination, and political instability. In this manner, wicked problems do not have a definitive formulation, they lack a coherent logic to determine when they have already been solved (no stopping rule), the solutions are ambiguous, and there is no way to conclusive prove the solution to a wicked problem [2]. Thereby, if it is decided to address these wicked problems through traditional methodological approaches, the probability of solving the wicked problems is extremely low. This is because traditional methodological approaches are based on linear processes and are not contextualized to the problem framework, that is, methods suitable in certain disciplines are used, but not in others, but due to the popularity of the method, it continues to be used [3]. As a solution to the above, there are more structured approaches to the wicked problems solutions, such as design for social innovation, and meta designs. Even with this, wicked problems continue to be addressed based on a relatively narrow spatial-temporal-collaboration context, that is, only consider very few stakeholders, reduced spatial (i.e., locations) situations, and short-term actions, which implies that the proposed solutions do not be carried out in all localities for long term [4].

Consequently, a holistic approach is necessary where the ways of acting, thinking, and seeing the real world are based on the relationships between stakeholders involved in the wicked problem context, that is,

a systemic practice model (SPM). Wicked problems can also be approached through the action research model (ARM), either through participatory or practical action research [5]–[8]. In the participatory action research method, the stakeholders need to be well-defined, because the lived experiences of the stakeholders are very important for the research process before the implementation of the activities related to the potential solution. While practical action research focuses on the practical approach to solving specific wicked problems. Considering the aforementioned, the transition design approach is a novel wicked problem approach, which is intended to catalyze change at the system level through the active participation of the largest number of stakeholders and disciplines [9]–[11]. It is important to mention that all the wicked problem approaches can be developed within the framework of a social laboratory or living laboratory, which refers to a development process in time and space that allows many stakeholders to address complex social problems from the research stage, experimentation, to the prototyping of potential solutions. This last stage (prototyping), must be understood as an experiment that helps answer questions about how to design and implement a potential solution to a wicked problem through physical prototypes, visual aids, and augmented reality [12]–[14].

Nonetheless, as Matthews *et al.* [15] mentioned, it is relevant to consider not only the approaches to the wicked problems but also the nature of the various stakeholders, since, if this aspect is not addressed, it may affect the active and quality participation of the stakeholders no matter the novel problem approach [16]–[18]. In particular, the analysis of the stakeholders belonging to Generation Z (1995-2010, also called Centennials) will be carried out in this research. Considering this context, various research questions arise concerning the Centennial stakeholders, such as: do they have a specific way of assimilating wicked problems? If there is no specific way, what are the options? How important is gender and level of education of the Centennial stakeholders to assimilate the information related to the wicked problems? and how to improve the quality of participation of the Centennial stakeholders? Potential answers to these questions are related to the learning theory, which seeks to explain how individuals acquire, process, retain, and recall knowledge during the process of learning. Thus, the research problem statement is, what are the learning styles (LS) of the Centennial stakeholders that allow for improving the quality of participation in wicked problems approaches?

Currently, there are a lot of learning theories, learning through taxonomies by Bloom and Krathwohl. But the two most accepted learning analysis frameworks are the visual, aural, read/write, kinesthetic (VARK) model and Kolb's learning theory. Both frameworks with their concerns [19]. Nonetheless, Kolb's theory was used in this research project due to its wider LS analysis and learning cycle. In general, Kolb's learning theory is based on the internal cognitive processes of the person, in this case, the Centennial stakeholders. Since the formal description of Kolb's theory is not in the scope of this journal and manuscript, a general description of that will be given. Kolb's learning theory establishes the experiential learning (EL) cycle, which is made up of four stages, which are: i) concrete experience (EL1) related to feeling; ii) reflective observation (EL2) related to watching; iii) abstract conceptualization (EL3) related to thinking; and iv) active experimentation (EL4) related to doing. This implies that a person can go through various stages of the EL cycle at different stages of his life. Also, four LS are defined, which are: i) accommodation (LS1) related to feeling and doing; ii) converging (LS2) related to thinking and doing; iii) diverging (LS3) related to feeling and watching; and iv) assimilating (LS4) related to thinking and watching. In this manner, when a person has two predominant LS, e.g., LS1 and LS2, it is interpreted that the person seeks active experimentation (doing) (EL4) to assimilate knowledge and make decisions. In the same way, when an individual has a dominant learning style, for example, LS4, it can be said that the individual learns by seeing (EL2) and thinking (EL3) [20].

In general, transition design methodology is conformed by phases and itinerant intention. Firstly, the vision for the transition phase indicates the need for co-creation to generate sustainable solutions with long-term visions, allowing a transition route between the present situation and the desired future. In this phase, cosmopolitan localism, critical/ speculative design, developing future narratives, domains of everyday life, everyday life and lifestyles, experiential futures, future scenarios, and the three horizons, are recommended as main practices [21]. Then, the theories of change phase establish that to achieve a deep understanding, cooperative work must integrate theories from many varied fields and disciplines. The main practices deployed in this phase are alternative economics, critiques of everyday life, design for behavior change, ethnography research, leverage points, living systems theory, social practice theory, social psychology research, socio-technical regime theory, and stakeholder conflict resolution [22]. Next, the posture and mindset phase provokes reflection and openness, as well as a willingness to work collaboratively. In this case, this phase has the following common practices: comfort with ambiguity, chaos and contradiction, embracing transdisciplinary, placed-based knowledge, radical collaboration, shifting values, and stakeholder conflict resolution. Finally, the new ways of designing phase propose new approaches through the following practices, an error-friendly approach to designing, context-based design, the design that amplifies grassroots efforts, linking/ amplifying projects, mapping wicked problems, network and alliance, and transdisciplinary and co-design processes [10]. It is important to mention that the transition

design approach does not consider the LS of the stakeholders (in our case, Centennial stakeholders.) as part of the parameters to be analyzed and considered.

Several researchers have approached how professionals carry out systemic design work in various contexts and disciplines. These studies have generated various findings related to the LS of the stakeholders, such as the necessity to influence the mental models of knowledge assimilation to allow systematic change, and as well as the learning and reflectivity of daily practices related to wicked problems [23], [24]. There is also research related to the ARM in various disciplines [25]–[27]. In particular, Kolb's learning theory has been used in various investigations related to systemic practice and ARMs [28]. In particular, it is clear the importance of stakeholder analysis regarding synergistic relationships in work teams and proposes a stakeholder systems model for performance management in a complex organizational framework. The above can also be adapted to other complex systems where other types of stakeholders participate. Also, Webb *et al.* [29] addresses stakeholder engagement, emphasizing people who are hard to reach or seen as apathetic, who might be engaged using action conversations. In this way, the importance of better understanding stakeholders is evident as part of the wicked problem approach. In general, it has been found that understanding the LS of those involved in the wicked problem-solving process can help improve all aspects of stakeholder participation. Nevertheless, no evidence of an analysis of Centennial stakeholders' LS was found for any wicked problem approaches, including transition design. This clarifies the knowledge gap and the contribution to the field of study of this research. The analysis of the Centennial stakeholders takes on greater importance considering the argument of Burns *et al.* [30], which posed the question, wicked problems or wicked people?

2. METHODOLOGY AND HYPOTHESIS DECLARATION

To identify the LS of Generation Z (Centennials) based on Kolb's learning theory, a survey consisting of 12 statements was developed and validated using the Google Forms digital platform. Table 1 shows the descriptive statistics. It was decided to survey only university and high school students, 54.70% and 45.30%, respectively, both from the private and public sectors, 84.30% and 15.70%, respectively.

For the survey, multiple choice questions were developed using the Likert scale for questions/statements related to Kolb's learning theory. The Likert scale was categorized and quantified as follows, 1) point=strongly disagree, 2) points=disagree, 3) points=neutral, 4) points=agree and, 5) points=strongly agree. The survey (research instrument) statements (S) are shown in Lopez-Leyva *et al.* [31]. It is essential to clarify that the research team designed a data collection instrument (survey) in an interdisciplinary way, intending to use the data collected for a wide variety of research. This implies that the information in this section can be considered for other scientific publications in other scientific disciplines. In this way, the research hypotheses stated are:

- Hypothesis 1: there are dominant LS for the Centennial stakeholders that should be considered as part of systemic practice design in the social laboratory framework, regardless of the academic level (i.e., college and high school students) considered in this research.
- Hypothesis 2: there are dominant LS for the Centennial stakeholders that should be considered as part of systemic practice design in the social laboratory framework, regardless of gender (i.e., male and female).
- Hypothesis 3: there are dominant LS for the Centennial stakeholders that should be considered as part of systemic practice design in the social laboratory framework, regardless of the educational sector, that is, the public and private sectors.
- Hypothesis 4: there is a positive correlation between all LS, regardless of educational level, gender, or educational sector (i.e., public and private sectors) of the respondents.
- Hypothesis 5: there are dominant LS for the Centennial stakeholders that should be considered as part of systemic practice design in the social laboratory framework, regardless of the age range.

Table 1. Descriptive statistics

Parameter	Frequency	Units
Surveyed population	351	People
Gender (male)	47.30	%
Gender (female)	49.30	%
Gender (not mentioned)	2.80	%
Age range	15-31+	years
University level	54.70	%
High school level	45.30	%
Private sector	84.30	%
Public sector	15.70	%

3. RESULTS AND DISCUSSION

This section provides a quantitative analysis of the survey results. Table 2 displays the statistical outcomes for each statement associated with different LS. For example, statement 1 (S1), linked to learning style 1 (LS1), has a mean (M) of 3.764 and a standard deviation (S.D.) of 0.986. These values should be interpreted in the context of the Likert scale's quantitative and qualitative coding. For instance, the M value of 3.764 indicates that respondents generally leaned toward level 4 on the Likert scale, which corresponds to "agree". The Table 2 also summarizes the statistics for each learning style based on its corresponding statements. For example, LS2, comprising S4, S5, and S6, has an M of 3.592 and a S.D. of 1.042. This format allows for interpreting the relationships between statements and LS. Notably, LS3 emerges as the dominant learning style, ranking highest with a M of 3.946 and a S.D. of 0.962. The LS4 is the lowest-ranked LS, with an M of 3.421 and a S.D. of 1.122. However, the differences among LS are minimal, as the average variation in M values is only 4.102%, and for S.D., 4.022%.

Table 2. Statistical results of LS and statements

LS	S	M (S)	S.D. (S)	M (LS)	S.D. (LS)	Ranking (LS)
LS1	S1	3.764	0.986	3.628	1.050	2
	S2	4.014	0.888			
	S3	3.105	1.276			
LS2	S4	3.977	0.978	3.592	1.042	3
	S5	3.068	1.211			
	S6	3.729	0.939			
LS3	S7	3.746	1.063	3.946	0.962	1
	S8	4.333	0.844			
	S9	3.758	0.979			
LS4	S10	3.561	0.949	3.421	1.122	4
	S11	3.450	1.221			
	S12	3.251	1.196			

Tables 3 and 4 present the Pearson correlation coefficients (r) for each statement and learning style. Table 3 specifically highlights the correlations between all survey statements. Notably, S1 and S7, from different LS (LS1 and LS3), show a strong correlation (r=0.418), while S1 and S12, from LS1 and LS4, have a weak negative correlation (r=-0.380). These correlations help identify relationships between statements and LS that can influence the development of processes, tools, and strategies within the systemic practice design of the social laboratory framework.

Table 3. Pearson's correlation coefficients per each statement

S	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S10	S12
S1	1.000	0.306	0.117	0.107	-0.132	0.149	0.418	0.293	0.115	0.117	0.060	-0.380
S2	0.306	1.000	0.162	0.092	-0.049	0.206	0.182	0.180	0.089	0.166	-0.001	0.021
S3	0.117	0.162	1.000	0.036	-0.036	0.024	0.167	0.092	0.091	0.137	0.068	0.037
S4	0.107	0.092	0.036	1.000	0.215	0.086	0.148	0.158	0.042	0.054	0.025	-0.012
S5	-0.132	-0.049	-0.036	0.215	1.000	0.041	-0.004	0.017	0.024	-0.061	-0.003	0.177
S6	0.149	0.206	0.024	0.086	0.041	1.000	0.123	0.085	0.112	0.244	0.221	0.078
S7	0.418	0.182	0.167	0.148	-0.004	0.123	1.000	0.313	0.250	0.285	0.059	-0.228
S8	0.293	0.180	0.092	0.158	0.017	0.085	0.313	1.000	0.525	0.211	0.015	-0.074
S9	0.115	0.089	0.091	0.042	0.024	0.112	0.250	0.525	1.000	0.394	0.027	-0.004
S10	0.117	0.166	0.137	0.054	-0.061	0.244	0.285	0.211	0.394	1.000	0.247	0.027
S11	0.060	-0.001	0.068	0.025	-0.003	0.221	0.059	0.015	0.027	0.247	1.000	0.096
S12	-0.380	0.021	0.037	-0.012	0.177	0.078	-0.228	-0.074	-0.004	0.027	0.096	1.000

Table 4. Pearson's correlation coefficients per each learning style

LS	LS1	LS2	LS3	LS4
LS1	0.463	0.044	0.181	0.025
LS2	0.044	0.410	0.078	0.080
LS3	0.181	0.078	0.575	0.076
LS4	0.025	0.080	0.076	0.415

Similarly, Table 4 presents the Pearson correlation coefficients between LS, calculated as the average of all correlations between their respective statements. For example, the correlation between LS1 and LS2 (rLS1, LS2) is derived from the average of the correlations among all combinations of their related

statements. Considering the above, it can be seen that higher correlation coefficient values exist between the same LS, for example, rLS1, LS1=0.463, so that rLS1, LS1>rLS1, LS2, rLS1, LS3, rLS1, LS4. The above also clarifies that the Statements that make up each LS do not have the same appreciation for the Centennial stakeholders. Table 5 presents the M and S.D. of each learning style across different age ranges. For instance, in the 18–21 age group, LS1 has a M of 3.513 and S.D. of 1.184; LS2 has M=3.619 and S.D.=1.174; LS3 shows M=3.911 and S.D.=1.062; and LS4 has M=3.528 and S.D.=1.169.

Tables 6 and 7 shows the statistical analysis for the university and high school respondents, respectively. Tables 8 and 9 shows the statistical analysis for the respondents belonging to the public and private, respectively. As final results, Tables 10 and 11 shows the statistical analysis for the respondents belonging to the male and female gender, respectively.

Table 5. Statistical analysis of LS for age ranges

Age range	LS1		LS2		LS3		LS4	
	M	SD	M	SD	M	SD	M	SD
14-17	3.513	1.184	3.619	1.174	3.911	1.062	3.528	1.169
18-21	3.764	1.069	3.600	1.070	3.983	0.935	3.345	1.107
22-25	3.495	1.086	3.566	1.027	3.909	0.996	3.424	1.055
26-30	3.879	1.122	3.818	1.113	3.939	1.205	3.303	1.243
30+	3.641	1.025	3.051	1.011	4.051	0.815	3.051	0.986

Table 6. Statistical analysis of LS for university level

LS	S	M (S)	S.D (S)	M (LS)	S.D (LS)	Ranking (LS)
LS1	S1	3.896	0.941	3.715	1.007	2
	S2	4.036	0.850			
	S3	3.214	1.230			
LS2	S4	4.042	0.900	3.573	0.997	3
	S5	3.094	1.182			
	S6	3.583	0.909			
LS3	S7	3.839	0.984	3.967	0.910	1
	S8	4.365	0.786			
	S9	3.698	0.959			
LS4	S10	3.495	0.941	3.326	1.090	4
	S11	3.313	1.171			
	S12	3.172	1.158			

Table 7. Statistical analysis of LS for high school level

LS	S	M (S)	S.D (S)	M (LS)	S.D (LS)	Ranking (LS)
LS1	S1	3.789	0.993	3.629	1.057	2
	S2	4.012	0.902			
	S3	3.084	1.277			
LS2	S4	3.970	0.990	3.601	1.053	3
	S5	3.081	1.221			
	S6	3.753	0.947			
LS3	S7	3.771	1.065	3.964	0.962	1
	S8	4.337	0.847			
	S9	3.783	0.973			
LS4	S10	3.584	0.948	3.427	1.124	4
	S11	3.446	1.220			
	S12	3.250	1.205			

Table 8. Statistical analysis of LS for the public sector

LS	S	M (S)	S.D (S)	M (LS)	S.D (LS)	Ranking (LS)
LS1	S1	3.909	0.939	3.624	0.981	2
	S2	3.836	0.890			
	S3	3.127	1.113			
LS2	S4	3.982	0.944	3.497	0.987	3
	S5	3.127	1.176			
	S6	3.382	0.842			
LS3	S7	3.836	0.890	3.903	0.887	1
	S8	4.255	0.791			
	S9	3.618	0.981			
LS4	S10	3.418	0.928	3.388	1.032	4
	S11	3.545	0.988			
	S12	3.200	1.182			

Table 9. Statistical analysis of LS for the private sector

LS	S	M (S)	S.D (S)	M (LS)	S.D (LS)	Ranking (LS)
LS1	S1	3.736	0.992	3.628	1.060	2
	S2	4.047	0.884			
	S3	3.101	1.304			
LS2	S4	3.976	0.984	3.609	1.047	3
	S5	3.057	1.216			
	S6	3.794	0.942			
LS3	S7	3.730	1.091	3.954	0.973	1
	S8	4.348	0.853			
	S9	3.784	0.976			
LS4	S10	3.588	0.951	3.427	1.136	4
	S11	3.432	1.258			
	S12	3.260	1.198			

Table 10. Statistical analysis of LS for the male gender

LS	S	M (S)	S.D (S)	M (LS)	S.D (LS)	Ranking (LS)
LS1	S1	3.831	0.948	3.586	1.063	2
	S2	3.928	0.902			
	S3	3.000	1.340			
LS2	S4	3.898	0.979	3.556	1.011	3
	S5	2.886	1.194			
	S6	3.886	0.860			
LS3	S7	3.825	1.018	3.928	0.984	1
	S8	4.211	0.917			
	S9	3.747	1.016			
LS4	S10	3.633	0.927	3.510	1.081	4
	S11	3.705	1.110			
	S12	3.193	1.207			

Table 11. Statistical analysis of LS for the female gender

LS	S	M (S)	S.D (S)	M (LS)	S.D (LS)	Ranking (LS)
LS1	S1	3.734	1.008	3.697	1.017	2
	S2	4.116	0.866			
	S3	3.243	1.177			
LS2	S4	4.046	0.961	3.620	1.040	3
	S5	3.225	1.193			
	S6	3.590	0.967			
LS3	S7	3.763	1.040	3.981	0.914	1
	S8	4.434	0.755			
	S9	3.746	0.946			
LS4	S10	3.497	0.971	3.343	1.143	4
	S11	3.243	1.281			
	S12	3.289	1.177			

The following highlights the most significant statistical findings regarding the LS of Centennial stakeholders.

- Finding 1: Table 2 shows that LS3 is the most predominant learning style in Generation Z, with a M of 3.946 and a S.D. of 0.962, while LS4 is the least predominant, with a M of 3.421 and a S.D. of 1.122. Based on these results, all hypotheses are partially confirmed.
- Finding 2: according to Table 2, all LS present similar M and S.D. values, with an average error of 4.102% and 4.022%, respectively. This provides some subjectivity degree respect to the predominant LS. Considering the above-mentioned, all the hypotheses are partially confirmed.
- Finding 3: according to Table 3, the statements of different LS with the highest Pearson's correlation coefficient are S1 and S7, rS1, S7=0.418, corresponding to LS1 and LS3. This is a finding that is also related to Table 2 since LS3 and LS2 are the LS best ranking. Thus, hypothesis 4 is partially confirmed.
- Finding 4: Table 3 shows that the statements of LS3 have the highest Pearson correlation coefficients, with values of rS7, S8=0.313, rS7, S9=0.250, and rS8, S9=0.525. This aligns with finding 1, partially confirming hypothesis 4.
- Finding 5: Table 4 shows that LS3 has the highest average Pearson correlation coefficient for its statements (S7, S8, and S9), with a value of rLS3, LS3=0.575. Therefore, hypothesis 4 is partially confirmed.
- Finding 6: Table 5 shows that LS3 is consistently the dominant learning style across all age ranges in Generation Z, with M values ranging from 3.909 to 4.051 and S.D. between 0.815 and 1.205. Therefore, hypothesis 4 is fully confirmed.

- Finding 7: Table 2 reveals that LS1 and LS3 are the predominant LS among Centennial stakeholders. Specifically, for LS1, they prefer "feel and do," while for ls3, they favor "feel and watch." This indicates that Centennial stakeholders prefer concrete experiences related to feeling (EL1). Based on these findings, all hypotheses are partially confirmed.
- Finding 8: according to Tables 6 and 7, the ranking of the LS remains constant concerning Table 2. This implies no difference between university and high school students concerning predominant LS. Considering the above, hypothesis 1 is accepted.
- Finding 9: according to Tables 8 and 9, the ranking of the LS remains constant in Table 2. This implies no difference between university and high school students belonging to the private and public sectors concerning predominant LS. Considering the above, hypothesis 3 is accepted
- Finding 10: according to Tables 10 and 11, the ranking of the LS remains constant concerning Table 2. This implies no difference between university and high school students belonging to the male and female gender concerning predominant LS. Considering the above, hypothesis 2 is accepted.

The above research findings can be considered in different educational contexts internationally. Furthermore, as mentioned, there are no research results that directly address the hypotheses of this research. Therefore, a direct comparison is not possible. However, the results are comparable with those presented in [23], [24], although there are differences concerning Kolb's theory, i.e., do not relate LS to stakeholders. Considering the above, the research findings are an important starting point for further research.

4. CONCLUSION

This article presents a quantitative analysis of the LS of potential Centennial stakeholders who would participate in approaching wicked problems based on the transition design model in the social laboratory framework. In particular, 5 research hypotheses were raised and 10 findings were obtained, both the hypotheses and findings were analyzed together. In general, it was found that Centennial stakeholders do not have a dominant learning style, that is, there is a balance between Kolb's LS. Although it is also true that the LS1 and LS3 are ranked better than the LS2 and LS4. For future work, it would be important to map the best practices developed in various phases of the transition design model concerning Kolb's LS. This study makes a significant conceptual and methodological contribution. In particular, a straightforward quantitative relationship of the LS of the Centennial stakeholders who participate in activities framed in the transition design model is presented. Considering Kolb's learning theory, it should be emphasized that Centennial stakeholders are balanced in assimilating information of various types related to wicked problems. Thus, the critical analysis of all the practices deployed in each phase of the transition design model is important with the aim of: i) improving the participation of Centennial stakeholders in the wicked problems research; and ii) speeding up the analysis of proposed solutions. In this way, this research contributes to establishing strategies to increase the approach's quality to wicked problems related to Centennial stakeholders. In addition, considering the aforementioned LS, the heterogeneity in the conceptions of the causes of the wicked problems will be taken advantage of considering the perception of the Centennial stakeholders. The above-mentioned enables a better approach to the object of study. This suggests that, before the deployment of practices in the framework of a social laboratory, it is important to categorize the best practices of the transition design model according to Kolb's LS. Thus, it will be ensured that the practices deployed for the analysis of wicked problems are appropriate to the participants in the social laboratory. The findings and hypotheses presented guide as to what should be relevant in the design of such activities in at international context. The implications related to this research are: in the first place, managerial implications refer to the practical use of the results or observations made in this research for making practical smart decisions within the framework of the design and development of practices in the social laboratory framework. The second are policy implications, which could be far-reaching since these results can help to analyze the legal obligation to consider more anthropological aspects of stakeholders that participate in addressing complex problems. Concerning the limitations of this study, since the analysis was of the exploratory and cross-sectional type, the results shown should not be conclusive, rather, they should serve as a starting point to improve the design of the practices developed in the social laboratory framework. Furthermore, due to the cross-sectional nature, the findings shown may vary both qualitatively and quantitatively according to the group surveyed. Even with this, the results show a panorama not addressed in previous research that contributes to reducing the knowledge gap in the discipline.

FUNDING INFORMATION

The authors acknowledge with gratitude the financial support provided by CETYS University within the framework of the fifth internal call for research for the project 504.

AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

Name of Author	C	M	So	Va	Fo	I	R	D	O	E	Vi	Su	P	Fu
Sialia Karina Mellink-Méndez	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Josué Aarón López-Leyva	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gloria Janeth Murillo-Aviña	✓	✓		✓		✓	✓			✓	✓	✓		
José Esteban Chapela-Cerecero	✓	✓		✓		✓	✓	✓		✓	✓	✓		

C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

The authors confirm that there are no conflicts of interest related to financial matters or personal connections that might have influenced the research findings presented in this paper.

INFORMED CONSENT

All study participants provided informed consent. Students who participated were fully briefed on the study objectives and informed of their right to discontinue participation at any time.

ETHICAL APPROVAL

The study adhered to all applicable national regulations and institutional policies in accordance with the Helsinki Declaration principles and received approval from the CETYS University Ethics Committee.

DATA AVAILABILITY

The research data supporting this study's findings can be obtained from the corresponding author [JALL], through reasonable request. The dataset is not publicly accessible due to privacy and ethical considerations, as it contains information that could potentially compromise participant confidentiality.

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