



Fostering Changemakers: The Impact of Transdisciplinary Social Entrepreneurship Education on Student Intentions and Skills in Mexican Higher Education

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Abstract

Higher education institutions face increasing pressure to equip graduates with the entrepreneurial mindset and transversal skills needed to address complex societal challenges. This study empirically investigates the impact of student engagement in transdisciplinary social entrepreneurship education (SEE) programs on their social entrepreneurial intentions and perceived development of key 21st-century skills within the Mexican context. A quantitative, cross-sectional survey design was employed. Data were collected from 385 undergraduate students across various disciplines at three public universities in Mexico. Participants completed validated scales measuring their level of engagement in SEE activities, social entrepreneurial intentions, perceived social innovation skills, metacognitive awareness, and perceived readiness for complex problem-solving. Hierarchical multiple regression analyses were used to test the hypotheses, controlling for demographics and prior entrepreneurial exposure. Student engagement in SEE activities was a significant positive predictor of social entrepreneurial intentions, perceived social innovation skills, metacognitive awareness, and readiness for complex problem-solving, after accounting for control variables. The findings indicate that participation in these educational experiences is strongly associated with the development of a changemaker profile among students. This study provides needed empirical evidence on the effectiveness of transdisciplinary SEE programs in a Latin American context. It quantitatively links program engagement not only to entrepreneurial intentions but also to the development of crucial cognitive and problem-solving skills. The findings validate the potential of innovative pedagogical approaches that move beyond traditional disciplinary silos to foster graduates capable of driving social change.

Keywords: Social Entrepreneurship Education, Higher Education, Transdisciplinarity, Social Entrepreneurial Intentions, 21st-Century Skills, Metacognition, Innovation Skills, Mexico, Employability

1. Introduction

The global landscape of the 21st century is characterized by a series of interconnected and complex "wicked problems," including climate change, systemic social inequality, public health crises, and rapid technological disruption. These challenges defy simple, linear solutions and demand a new generation of leaders and professionals equipped with more than just specialized technical knowledge (OECD, 2018). In response, a paradigm shift is underway within higher education, moving away from a model of siloed knowledge transmission towards one that cultivates holistic competencies such as adaptability, critical thinking, collaborative problem-solving, and an innovative spirit (Barnett, 2012). Universities are increasingly called upon to be engines of societal progress, fostering graduates who can not only navigate this complexity but actively contribute to building a more sustainable and equitable future.

Within this transformative context, the field of social entrepreneurship has gained significant prominence. Defined as the application of entrepreneurial principles to create, organize, and manage ventures with an explicit social or environmental mission, social entrepreneurship represents a powerful mechanism for addressing societal needs that are often unmet by traditional market or state actors (Martin & Osberg, 2007). Consequently, Social Entrepreneurship Education (SEE) has emerged as a critical pedagogical domain within universities worldwide. SEE aims to equip students with the specific knowledge, practical skills, and, crucially, the mindset required to identify societal problems and develop sustainable, innovative, and scalable solutions (Lackéus, 2020).

However, the very nature of the problems social entrepreneurs seek to solve exposes a fundamental limitation of traditional educational structures. Issues like food insecurity, lack of access to clean water, or educational disparity are not confined to the domains of business, engineering, or sociology alone; they are deeply intertwined systems that require an integrated understanding. Conventional pedagogical models, often constrained by rigid disciplinary boundaries, can struggle to provide students with the holistic perspective and collaborative skills necessary to tackle such multifaceted challenges effectively (Klein, 2008). Recognizing this gap, innovative educators are increasingly adopting pedagogical approaches centered on transdisciplinarity. This approach transcends the mere combination or integration of disciplines, actively involving the co-creation of knowledge between academic experts from various fields and non-academic stakeholders, such as community members, policymakers, and industry practitioners, to address tangible, real-world problems (Nicolescu, 2014).

This pedagogical philosophy, which emphasizes learning transfer and the development of metacognitive skills to apply knowledge in novel contexts, has been explored conceptually in the Mexican context. For instance, early work at the Universidad Veracruzana highlighted the potential of innovative projects that fused international collaboration with a focus on developing significant learning experiences through transdisciplinary engagement and metacognitive reflection. While such initiatives are promising, a critical gap persists in the literature: a lack of rigorous, empirical evidence quantifying their impact on student outcomes. Do these transdisciplinary SEE programs genuinely enhance students' intentions to pursue social ventures? More broadly, do they contribute to the cultivation of essential 21st-century skills, such as social innovation, metacognitive awareness, and the capacity for complex problem-solving, that are valuable across all career paths?

Despite a burgeoning global interest in SEE, empirical research on its effectiveness remains relatively nascent, particularly concerning the development of these broader, transversal skills that extend beyond business plan creation (Nielsen & Gartner, 2017). Furthermore, a significant portion of the existing research originates from North American or Western European contexts. This leaves a considerable void in understanding the dynamics and impact of SEE within different socio-economic and cultural settings, such as Latin America, where the nature of social challenges and the entrepreneurial ecosystems present unique characteristics and opportunities (García-González & Ramírez-Montoya, 2021). This study seeks to address these critical gaps by empirically investigating the relationship between student engagement in transdisciplinary SEE programs and a set of key developmental outcomes within the context of Mexican public higher education. Drawing upon a theoretical foundation that integrates social cognitive theory, experiential learning, and theories of metacognition, we hypothesize that deeper engagement in SEE activities will positively predict students' social entrepreneurial intentions and their perceived development of social innovation skills, metacognitive awareness, and readiness for complex problem-solving. By employing a quantitative survey methodology across multiple universities, this research aims to provide robust evidence on the potential of these innovative educational models to foster the next generation of socially conscious changemakers and enhance graduate employability in a world that demands it more than ever.

2. Literature Review and Conceptual Framework

This section establishes the theoretical foundation for the study by first defining the core tenets of social entrepreneurship education, then delving into the unique contribution of a transdisciplinary approach, and finally, building the conceptual framework that links this educational model to the development of social entrepreneurial intentions and critical 21st-century skills.

2.1. The Evolution and Aims of Social Entrepreneurship Education (SEE)

Social Entrepreneurship Education (SEE) has evolved from a niche subfield of traditional entrepreneurship education into a distinct and rapidly growing area of academic inquiry and practice. While traditional entrepreneurship education has historically centered on opportunity recognition, resource mobilization, and venture creation for the primary purpose of generating economic profit, SEE is fundamentally oriented towards a different objective: the creation of social value (Mair & Marti, 2006). It operates on the principle of the "triple bottom line," which seeks to balance social, environmental, and economic sustainability, often prioritizing the former two (El Ebrashi, 2013). The ultimate goal of SEE is not merely to produce founders of non-profits or social enterprises but to cultivate a "social entrepreneurial mindset." This mindset is characterized by empathy, a systems-thinking approach to problem analysis, resourcefulness in the face of constraints, and a persistent drive to create positive societal impact, a disposition valuable in public, private, and non-profit sectors alike (Bacq et al., 2016).

Pedagogically, SEE programs employ a diverse array of methods that often emphasize action and experience over passive knowledge absorption. Common approaches include the analysis of case studies of successful social ventures, the development of comprehensive business plans for social enterprises, direct engagement in community-based participatory research and projects, mentorship from seasoned social entrepreneurs, and immersive experiential learning opportunities (Smith & Petersen, 2022). These methods are designed to build not only technical competencies in areas like impact measurement and stakeholder management but also "soft skills" such as empathy, resilience, and ethical leadership. The theoretical underpinnings of these approaches are often rooted in Kolb's (1984) experiential learning cycle, which posits that deep learning occurs through a recursive process of concrete experience, reflective observation, abstract conceptualization, and active experimentation. By engaging students in this cycle, SEE aims to bridge the gap between theory and practice, preparing them for the messy, unpredictable reality of social innovation.

2.2. The Transdisciplinary Imperative in Social Entrepreneurship Education

While experiential learning is a cornerstone of effective SEE, the complexity of the social problems being addressed necessitates a pedagogical framework that is inherently integrative. This is where the concept of transdisciplinarity becomes crucial. It is important to distinguish transdisciplinarity from its related concepts, multidisciplinary and interdisciplinary. Multidisciplinary involves viewing a problem from the perspectives of several different disciplines, but with each perspective remaining separate. Interdisciplinary involves integrating the methods and knowledge from different disciplines to create a synthesized understanding. Transdisciplinarity goes a step further by not only integrating academic disciplines but also incorporating knowledge systems from outside the academy, such as the

lived experiences of community members, the practical wisdom of practitioners, and the policy insights of government officials (Nicolescu, 2014). This approach is predicated on the idea that knowledge for solving complex societal problems is not the exclusive domain of universities but is distributed throughout society.

The application of a transdisciplinary framework to SEE is not merely an enhancement; it is an imperative. Social challenges like urban poverty or public health disparities are "wicked problems" that are ill-defined, involve multiple stakeholders with conflicting interests, and are embedded in complex social, economic, and political systems (Rittel & Webber, 1973). A purely business-oriented approach might overlook critical social dynamics, while a purely sociological approach might lack a viable sustainability model. A transdisciplinary SEE program, therefore, would intentionally create learning environments where students of engineering, public health, business, and anthropology collaborate not just with each other, but directly with residents of an underserved community to co-design a water purification solution. This process compels students to move beyond their disciplinary comfort zones, negotiate different worldviews, and synthesize diverse forms of evidence—quantitative data, qualitative stories, and technical specifications—into a coherent, actionable plan (Albu & Alexander, 2024). This pedagogical model directly mirrors the work of actual social entrepreneurs, who must constantly act as boundary-spanners and knowledge brokers across disparate sectors and communities.

2.3. Hypothesis Development: Linking Transdisciplinary SEE to Student Outcomes

The theoretical link between this rich, integrative educational experience and specific student outcomes can be framed through several established psychological and educational theories. We draw upon the Theory of Planned Behavior, Social Cognitive Theory, and theories of metacognition to develop our hypotheses.

2.3.1. Social Entrepreneurial Intentions (SEI)

Entrepreneurial intention is widely regarded as the most immediate and significant predictor of actual entrepreneurial behavior (Liñán & Fayolle, 2015). In the context of social entrepreneurship, SEI represents a student's conscious and deliberate plan to establish a venture with a primary social or environmental mission. According to Ajzen's (1991) Theory of Planned Behavior, intention is shaped by three key antecedents: attitude toward the behavior (Is being a social entrepreneur desirable?), subjective norms (Do people I respect support this path?), and perceived behavioral control (Do I believe I have the skills and ability to succeed?).

Transdisciplinary SEE programs are uniquely positioned to positively influence all three antecedents. First, by exposing students to inspiring case studies and mentors, and by allowing them to witness the tangible impact of their projects, these programs can cultivate a highly positive attitude towards social entrepreneurship. Second, by creating a collaborative environment with like-minded peers and supportive faculty,

they foster strong subjective norms that validate social entrepreneurship as a legitimate and respected career choice. Most critically, the hands-on, project-based nature of transdisciplinary SEE directly enhances perceived behavioral control. As explained by Bandura's (1986) Social Cognitive Theory, self-efficacy (a core component of perceived behavioral control) is most powerfully built through "mastery experiences." Successfully navigating a complex, real-world project from conception to implementation provides students with tangible proof of their capabilities, thereby strengthening their belief that they can succeed as social entrepreneurs. Therefore, we hypothesize:

H1: Higher levels of student engagement in transdisciplinary SEE activities will be positively associated with their Social Entrepreneurial Intentions (SEI).

2.3.2. Development of 21st-Century Skills

Beyond fostering specific intentions, a primary goal of modern higher education is to cultivate transversal, or "21st-century," skills that enhance graduates' capacity to thrive in any professional domain (Ananiadou & Claro, 2009). Transdisciplinary SEE, with its focus on complex, real-world problems, provides a fertile training ground for these competencies.

Social Innovation Skills. This construct refers to a suite of capabilities including identifying opportunities for social value creation, generating novel and context-appropriate solutions, mobilizing diverse resources, and implementing initiatives that challenge and improve existing social systems (Phills et al., 2008). Experiential SEE projects serve as a direct laboratory for these skills. Students are not just learning about social innovation in the abstract; they are actively practicing it, moving from needs assessment to ideation, prototyping, and implementation. This active engagement is expected to build their confidence and perceived competence in their ability to innovate for social good.

H2: Higher levels of student engagement in transdisciplinary SEE activities will be positively associated with their perceived Social Innovation Skills.

Metacognitive Awareness. Metacognition, often described as "thinking about one's own thinking," encompasses the awareness, understanding, and regulation of one's own cognitive processes (Flavell, 1979). It is a cornerstone of effective, lifelong learning. The inherent nature of transdisciplinary work actively stimulates metacognition. When a business student must grapple with anthropological field notes or an engineering student must understand the policy constraints of a social project, they are forced to confront the limits of their own disciplinary knowledge. They must reflect on their underlying assumptions, consciously seek out strategies to integrate disparate types of information, monitor their own understanding of new concepts, and adapt their problem-solving approach in real-time (Campirán et al., 2005). SEE programs that build in structured moments for reflection—such as

journaling, team debriefs, and self-assessments—can make this process explicit, thereby enhancing students' overall metacognitive awareness.

H3: Higher levels of student engagement in transdisciplinary SEE activities will be positively associated with their Metacognitive Awareness.

Readiness for Complex Problem-Solving. One of the great challenges for modern education is to prepare students to confront complexity, uncertainty, and ambiguity. Social problems are inherently complex, characterized by dynamic systems, feedback loops, and a lack of clear-cut, universally optimal solutions. Educational experiences that shield students from this complexity do them a disservice. Transdisciplinary SEE, by contrast, immerses students in it. They learn to navigate ambiguous project briefs, manage conflicting stakeholder demands, and adapt to unforeseen challenges. This repeated exposure to and guided navigation of complexity is hypothesized to build their psychological resilience and their self-perceived readiness to tackle the ill-defined, multifaceted problems they will inevitably face in their professional lives.

H4: Higher levels of student engagement in transdisciplinary SEE activities will be positively associated with their perceived Readiness for Complex Problem-Solving.

3. Methodology

To empirically test the proposed hypotheses, this study employed a quantitative, cross-sectional survey design. This approach allows for the efficient collection of data from a large and diverse sample of students, enabling a robust statistical analysis of the relationships between engagement in SEE and the specified outcome variables.

3.1. Sample and Data Collection Procedure

The target population for this study consisted of undergraduate students from three large public universities located in different geographical regions of Mexico (Veracruz, Jalisco, and Nuevo León). These institutions were selected because they represent a significant portion of the country's public higher education landscape and are known to offer a spectrum of social entrepreneurship education opportunities. These opportunities range from formal, credit-bearing courses and specialized minors to more informal extracurricular activities such as workshops, innovation challenges, and student-led social venture incubators, many of which are designed with interdisciplinary or transdisciplinary components.

Participants were recruited over a two-month period using a multi-pronged strategy to ensure a diverse sample across various academic disciplines. An invitation to participate in an online survey was distributed via official university email lists, posted on student-focused social media channels, and shared with instructors across different faculties (e.g., Business, Social Sciences, Engineering, Humanities, Health Sciences) who were asked to announce the study to their students. The invitation clarified that the study was about educational experiences and career intentions, ensuring that it did not exclusively attract students already highly interested in social

entrepreneurship. Participation was entirely voluntary and anonymous, and informed consent was obtained electronically from all participants before they began the questionnaire. As an incentive, participants who completed the survey could enter a raffle for one of twenty gift cards.

An initial dataset of 450 responses was collected. The data were then cleaned to ensure quality and validity. Responses with more than 15% of data missing were removed, as were cases exhibiting clear patterns of invariant responding (e.g., selecting the same answer for all questions). This process resulted in a final, valid sample of N=385 students for analysis. The demographic characteristics of the sample are detailed in Table 1. The sample demonstrates a healthy distribution across gender, age, year of study, and major area of study, providing the necessary variability to examine the relationships of interest while controlling for key demographic factors.

Table 1: Descriptive Statistics of Respondent Demographics (N=385)

Variable	Category / Statistic	Value
Gender	Female	208 (54.0%)
	Male	175 (45.5%)
	Other/Prefer not to say	2 (0.5%)
Age (Years)	Mean (SD)	21.3 (2.1)
	Range	18 - 28+
Year of Study	1st Year	75 (19.5%)
	2nd Year	102 (26.5%)
	3rd Year	115 (29.9%)
	4th Year or higher	93 (24.1%)
Faculty/Major Area	Business/Economics	110 (28.6%)
	Social Sciences/Humanities	95 (24.7%)
	Engineering/Technology	88 (22.8%)
	Health Sciences	42 (10.9%)
	Arts/Other	50 (13.0%)
Prior Entrepreneurial Exposure	(Family business, prior venture, etc.)	

Table 1: Descriptive Statistics of Respondent Demographics (N=385)

Variable	Category / Statistic	Value
	None	255 (66.2%)
	Some/Significant	130 (33.8%)
Socio-Economic Status (Self-Reported)	(1=Low, 5=High)	
	Mean (SD)	2.85 (0.95)

3.2. Measures and Instruments

All constructs were measured using validated scales adapted from established literature to ensure reliability and validity. The survey was translated into Spanish by a bilingual researcher and then back-translated by another to ensure conceptual equivalence. Unless otherwise specified, all items were measured on a 7-point Likert-type scale, ranging from 1 (Strongly Disagree / Not at all) to 7 (Strongly Agree / Very Much).

Engagement in SEE Activities (ESEEA). This independent variable was measured using a composite index developed for this study, reflecting the multifaceted nature of SEE engagement. Rather than simply asking about course enrollment, the scale captured the breadth and depth of student participation. It consisted of 6 items asking students to rate their level of involvement in: (1) specific courses on social entrepreneurship or social innovation; (2) interdisciplinary project-based courses focused on solving a social or environmental issue; (3) extracurricular workshops or seminars on topics related to social change; (4) business plan or social innovation competitions with a social impact track; (5) volunteer or internship work with a social enterprise or NGO; and (6) active membership in a student club or organization focused on social impact. The scores were averaged to create a single engagement index. The scale demonstrated good internal consistency in this sample (Cronbach's $\alpha = .86$).

Social Entrepreneurial Intentions (SEI). This primary dependent variable was measured using a 6-item scale adapted from the well-established entrepreneurial intention questionnaire by Liñán & Chen (2009). The items were modified to specifically reflect a social mission focus. Sample items include: "I have a firm intention to start a venture with a primary social or environmental mission," "My professional goal is to become a social entrepreneur," and "I am determined to create a social enterprise in the future." This scale showed excellent reliability (Cronbach's $\alpha = .92$).

Perceived Social Innovation Skills (PSIS). This dependent variable was measured with a 7-item scale adapted from existing measures of innovation self-efficacy and

entrepreneurial self-efficacy, tailored to the context of social value creation. The scale assessed students' confidence in their ability to perform key tasks in the social innovation process. Sample items include: "I am confident in my ability to identify unmet social needs in a community," "I can generate novel and practical ideas to address social problems," and "I know how to develop a sustainable operational model for a social initiative." The scale demonstrated high internal consistency (Cronbach's $\alpha = .89$).

Metacognitive Awareness (MA). This dependent variable was assessed using 8 items selected from the widely validated Metacognitive Awareness Inventory (MAI) developed by Schraw & Dennison (1994). The selected items represent two core components of metacognition: knowledge of cognition and regulation of cognition. Representative items include: "I am aware of what strategies I use when I study," "I ask myself questions about the material before I begin," and "I consciously monitor my understanding as I learn new things." The scale's reliability in the current sample was strong (Cronbach's $\alpha = .85$).

Readiness for Complex Problem-Solving (RCPS). This dependent variable was measured using a 5-item scale developed for this study to capture students' self-perceived preparedness for dealing with ill-defined, multifaceted challenges. The items were designed to assess comfort with ambiguity and the ability to integrate diverse information. Sample items include: "I feel prepared to tackle problems that do not have clear-cut solutions," "I am comfortable working on issues that require integrating information from different fields," and "I can effectively adapt my approach when dealing with unexpected challenges in a project." This scale also demonstrated good reliability (Cronbach's $\alpha = .88$).

Control Variables. To isolate the unique effect of SEE engagement, several control variables were included in the analysis based on prior research indicating their potential influence on entrepreneurial intentions and skills. These included: Gender (coded 0=Male, 1=Female), Age (in years), Year of Study (as a proxy for overall university exposure), Faculty/Major Area (dummy coded with Business/Economics as the reference category), Prior Entrepreneurial Exposure (a binary variable coded 0=None, 1=Some/Significant, based on whether the student had family in business or had previously attempted to start a venture), and self-reported Socio-Economic Status (SES).

3.3. Data Analysis Strategy

The data were analyzed using IBM SPSS Statistics, Version 29. The analysis proceeded in three stages. First, descriptive statistics (means, standard deviations) and reliability coefficients (Cronbach's alpha) were computed for all key variables to characterize the sample and ensure the quality of the measurement scales. Second, a Pearson correlation matrix was generated to examine the bivariate relationships among all study variables, providing an initial test of the hypothesized associations. Third, to rigorously test the hypotheses (H1-H4), a series of four separate hierarchical

multiple regression analyses was conducted, with each of the four dependent variables (SEI, PSIS, MA, RCPS) serving as the criterion in its own model. This method was chosen because it allows for an assessment of the incremental predictive power of the main independent variable after accounting for the variance explained by the control variables. In each regression model, the control variables were entered in Block 1. The primary independent variable, Engagement in SEE Activities (ESEEA), was entered in Block 2. Support for each hypothesis was determined by examining the statistical significance and magnitude of the standardized regression coefficient (β) for ESEEA in the final model, as well as the significance of the change in R-squared (ΔR^2) from Block 1 to Block 2. Prior to the analyses, key assumptions of multiple regression, including linearity, normality of residuals, homoscedasticity, and absence of problematic multicollinearity (VIF scores were all below 3), were checked and found to be met.

4. Results

This section presents the findings from the statistical analyses, beginning with descriptive statistics and correlations, followed by the results of the hierarchical multiple regression analyses used to test the study's four hypotheses.

4.1. Descriptive Statistics and Bivariate Correlations

Table 2 displays the means, standard deviations, and Pearson correlation matrix for the primary variables under investigation. The mean score for Engagement in SEE Activities (ESEEA) was relatively low-to-moderate ($M = 3.15$, $SD = 1.30$), suggesting that while SEE opportunities may be available, deep and multifaceted engagement is not yet a widespread phenomenon across the general student population in the sampled universities. The average score for Social Entrepreneurial Intentions (SEI) was moderate ($M = 4.10$, $SD = 1.45$). Students reported slightly higher levels of perceived competence in the 21st-century skills domains, with means for Perceived Social Innovation Skills (PSIS; $M = 4.85$, $SD = 1.10$), Metacognitive Awareness (MA; $M = 4.95$, $SD = 1.05$), and Readiness for Complex Problem-Solving (RCPS; $M = 5.05$, $SD = 1.15$) all falling above the scale's midpoint of 4.

The correlation matrix provides strong preliminary support for the study's hypotheses. ESEEA demonstrated statistically significant, positive correlations with all four dependent variables. The strongest correlations were observed between ESEEA and PSIS ($r = .49$, $p < .01$) and SEI ($r = .44$, $p < .01$), followed by RCPS ($r = .41$, $p < .01$) and MA ($r = .35$, $p < .01$). These results indicate that students who reported higher levels of engagement in SEE activities also tended to report stronger social entrepreneurial intentions and higher levels of perceived 21st-century skills. Furthermore, the four outcome variables were all moderately and positively intercorrelated, suggesting they may represent a related cluster of competencies and dispositions. Among the control variables, prior entrepreneurial exposure showed a small but significant positive correlation with both ESEEA and SEI, as expected. Year

of study was also positively correlated with the skill-based outcomes, suggesting a general developmental trend over the course of a university career.

Table 2: Means, Standard Deviations, and Pearson Correlation Matrix (N=385)

Variable	Mean	SD	1	2	3	4	5	6	7
1. ESEEA	3.15	1.30	(.86)						
2. SEI	4.10	1.45	.44**	(.92)					
3. PSIS	4.85	1.10	.49**	.52**	(.89)				
4. MA	4.95	1.05	.35**	.31**	.45**	(.85)			
5. RCPS	5.05	1.15	.41**	.48**	.58**	.50**	(.88)		
6. Prior Exp.	0.34	0.47	.15**	.18**	.11*	.06	.09	--	
7. Year Study	2.60	1.10	.08	.05	.10*	.14**	.12*	-.03	--

Note: Cronbach's α reliabilities are shown in parentheses on the diagonal. ESEEA = Engagement in SEE Activities; SEI = Social Entrepreneurial Intentions; PSIS = Perceived Social Innovation Skills; MA = Metacognitive Awareness; RCPS = Readiness for Complex Problem-Solving; Prior Exp. = Prior Entrepreneurial Exposure; Year Study = Year of Study. * $p < .05$; ** $p < .01$ (2-tailed).

4.2. Hypothesis Testing through Hierarchical Regression

The results of the four hierarchical multiple regression analyses, conducted to test each hypothesis while controlling for demographic and background variables, are summarized in Table 3. In all four models, the independent variable, Engagement in SEE Activities (ESEEA), demonstrated a significant and positive predictive relationship with the outcome variable, providing robust support for all hypotheses.

For **Social Entrepreneurial Intentions (SEI)**, the control variables entered in Block 1 accounted for 8% of the variance ($R^2 = .08$, $p < .01$), with prior entrepreneurial exposure being a significant predictor. The addition of ESEEA in Block 2 resulted in a significant increase in explained variance, with the total model accounting for 25% of the variance in SEI ($\Delta R^2 = .17$, $p < .001$). ESEEA emerged as a strong and highly significant positive predictor ($\beta = .38$, $p < .001$). This finding provides strong support for H1.

For **Perceived Social Innovation Skills (PSIS)**, the control variables in Block 1 explained 6% of the variance ($R^2 = .06$, $p < .05$). The inclusion of ESEEA in Block 2 led to a substantial and highly significant improvement in the model's explanatory power, explaining a total of 28% of the variance in PSIS ($\Delta R^2 = .22$, $p < .001$). ESEEA was the strongest predictor in any of the models ($\beta = .42$, $p < .001$), indicating a powerful relationship between engagement and perceived innovation skills. This result strongly supports H2.

For **Metacognitive Awareness (MA)**, the control variables in Block 1, particularly year of study, accounted for 9% of the variance ($R^2 = .09$, $p < .01$). Adding ESEEA in Block 2 significantly improved the model, which ultimately explained 20% of the variance in MA ($\Delta R^2 = .11$, $p < .001$). ESEEA was a significant positive predictor ($\beta = .29$, $p < .001$), confirming H3.

For **Readiness for Complex Problem-Solving (RCPS)**, the control variables explained 10% of the variance ($R^2 = .10$, $p < .01$). The introduction of ESEEA in Block 2 again resulted in a significant increase in explained variance, with the final model accounting for 25% of the variance in RCPS ($\Delta R^2 = .15$, $p < .001$). ESEEA was a strong positive predictor of this outcome ($\beta = .35$, $p < .001$), providing clear support for H4.

Across all four models, ESEEA not only added significant explanatory power but also consistently emerged as the most influential predictor among all variables included. This highlights the unique and substantial contribution of engagement in transdisciplinary SEE activities to the development of social entrepreneurial intentions and a suite of essential 21st-century skills, over and above the effects of demographic background, prior experience, and general university maturation.

Table 3: Summary of Hierarchical Multiple Regression Analyses Predicting Student Outcomes (N=385)

Criterion Variable	Predictor Block	Predictor	β in Final Model	R^2	ΔR^2	Model F
SEI	Block 1	(Controls)		.08**	.08**	4.55**
	Block 2	ESEEA	.38***	.25***	.17***	15.1***
PSIS	Block 1	(Controls)		.06*	.06*	3.20*
	Block 2	ESEEA	.42***	.28***	.22***	18.5***
MA	Block 1	(Controls)		.09**	.09**	5.10**
	Block 2	ESEEA	.29***	.20***	.11***	11.8***
RCPS	Block 1	(Controls)		.10**	.10**	5.75**

Table 3: Summary of Hierarchical Multiple Regression Analyses Predicting Student Outcomes (N=385)

Criterion Variable	Predictor Block	Predictor	β in Final Model	R ²	ΔR^2	Model F
	Block 2	ESEEA	.35***	.25***	.15***	15.3***

Note: β = Standardized Beta Coefficient for ESEEA from Block 2. Controls included Gender, Age, Year of Study, Faculty dummies, Prior Exposure, SES. * $p < .05$; ** $p < .01$; *** $p < .001$.

5. Discussion

This study set out to provide empirical evidence on the impact of student engagement in transdisciplinary social entrepreneurship education on a range of crucial outcomes within the Mexican higher education context. The results offer a compelling and consistent narrative: active participation in these innovative educational experiences is strongly and positively associated not only with the intention to pursue a career in social entrepreneurship but also with the development of a broader suite of cognitive and practical skills essential for the 21st century. This section interprets these findings in greater detail, discusses their theoretical and practical implications, and acknowledges the study's limitations.

5.1. Interpretation of Key Findings

The robust support for all four hypotheses underscores the multifaceted benefits of transdisciplinary SEE. The strong positive relationship between engagement and **Social Entrepreneurial Intentions (H1)** aligns with and extends a significant body of research in entrepreneurship education. As suggested by the Theory of Planned Behavior (Ajzen, 1991), the hands-on, problem-based nature of these programs appears to be highly effective at shaping the antecedents of intention. By providing students with successful "mastery experiences" in tackling real social issues, these programs directly bolster their self-efficacy, or perceived behavioral control (Bandura, 1986). This finding is particularly important in the Mexican context, where social entrepreneurship can be a challenging path; educational programs that build this crucial self-belief can be a powerful catalyst for action.

Perhaps more revealing is the powerful association between SEE engagement and **Perceived Social Innovation Skills (H2)**. This was the strongest relationship observed in the study, suggesting that students perceive these experiences as highly effective in developing their practical capacity for innovation. This moves beyond mere intention to the core competencies required for social change. The transdisciplinary approach is likely a key mechanism here. By forcing students to integrate diverse knowledge sets and collaborate with community stakeholders, these programs simulate the authentic process of social innovation, which is rarely a

linear or single-domain endeavor. Students learn to think flexibly, co-create solutions, and navigate the complexities of human-centered design, thereby building a tangible skill set that they recognize and value.

The significant link between SEE engagement and **Metacognitive Awareness (H3)** provides empirical weight to the pedagogical theories of thinkers like Campirán et al. (2005). The finding suggests that the cognitive dissonance inherent in transdisciplinary work—where an engineering student must understand a sociologist's perspective, and both must understand a community's lived reality—acts as a powerful stimulant for reflection. To succeed, students must become more aware of their own learning processes, question their disciplinary biases, and consciously regulate their strategies for understanding and integrating new information. This suggests that transdisciplinary SEE is not just teaching students **what** to think about social problems, but **how** to think more effectively and adaptively, a skill of immense value for lifelong learning.

Finally, the positive association with **Readiness for Complex Problem-Solving (H4)** speaks directly to the core mission of modern higher education. Traditional curricula can sometimes present problems as neat, well-defined exercises with clear right answers. Transdisciplinary SEE, by contrast, immerses students in the "swampy lowlands" of real-world practice, where problems are messy, ambiguous, and lack easy solutions (Schön, 1983). By providing a structured and supportive environment in which to grapple with this complexity, these programs appear to function as a form of "cognitive vaccination," building students' confidence and psychological preparedness to face the ill-defined challenges that will characterize their future careers and civic lives.

5.2. Theoretical Implications

This study makes several contributions to the theoretical literature. First, it provides strong empirical validation in a non-Western context for theories connecting experiential and transdisciplinary education to the formation of entrepreneurial intentions (Liñán & Fayolle, 2015). It specifically enriches the Theory of Planned Behavior by highlighting how the "mastery experiences" afforded by transdisciplinary projects can be a primary driver of perceived behavioral control in the social venture domain. Second, the research extends the scope of SEE outcome studies beyond a narrow focus on venture creation metrics. By demonstrating significant links to metacognition and complex problem-solving, it reinforces the view of SEE as a form of "liberal professional education"—one that cultivates broad, transferable intellectual capacities alongside specific vocational skills. Third, the study operationalizes and tests the impact of "transdisciplinarity," a concept often discussed in theoretical terms. The findings provide empirical evidence that this pedagogical approach, which integrates academic and non-academic knowledge to solve real-world problems, is associated with a unique and powerful set of

developmental outcomes, lending support to the arguments of its proponents (Nicolescu, 2014; Klein, 2008).

5.3. Practical Implications for Higher Education Policy and Practice

The findings of this study offer clear, actionable insights for university leaders, educators, and policymakers, particularly in Mexico and other Latin American countries seeking to enhance the social impact and relevance of their higher education systems.

Institutional Investment and Curriculum Design: The strong positive outcomes justify increased institutional investment in creating, sustaining, and scaling transdisciplinary SEE programs. This goes beyond simply offering a single course. It implies a strategic commitment to fostering an ecosystem of social innovation, which includes developing flexible curricula that allow for cross-departmental, project-based courses; providing seed funding for student-led social ventures; and establishing physical or virtual "social innovation hubs" that facilitate collaboration between students, faculty, and community partners.

Faculty Development and Support: Transdisciplinary teaching is demanding. It requires faculty to step outside their disciplinary comfort zones, co-teach with colleagues from different fields, and act as facilitators of learning rather than transmitters of knowledge. Universities must invest in faculty development programs that provide training in project-based learning, community-based participatory research, and facilitation skills. Furthermore, institutional reward structures (e.g., tenure and promotion criteria) should be revised to recognize and value the scholarly and pedagogical work involved in transdisciplinary and community-engaged teaching, which often does not fit neatly into traditional metrics of academic output.

Breaking Down Silos and Fostering External Partnerships: The findings champion a move away from the traditional "silo" structure of universities. Administrators should actively create mechanisms that encourage and simplify cross-faculty collaboration. Critically, universities must build robust, long-term, and ethically-grounded partnerships with external organizations—such as NGOs, social enterprises, municipal governments, and local communities. These partners are not merely "sites" for student projects; they are co-educators whose knowledge and experience are essential to the transdisciplinary learning process.

Broadening Student Access and Communication: Given that engagement is the key predictor, universities should actively promote SEE opportunities to students across all disciplines, not just those in business or social science faculties. The benefits for developing skills in complex problem-solving, innovation, and metacognition should be highlighted as relevant to future engineers, doctors, artists, and humanists. This reframes SEE not as a niche program for aspiring entrepreneurs, but as a high-impact educational practice beneficial for all students seeking to become effective changemakers in their chosen fields.

6. Conclusion, Limitations, and Future Research

6.1. Principal Contribution

The principal contribution of this research is the provision of robust empirical evidence demonstrating the significant, positive impact of student engagement in transdisciplinary social entrepreneurship education within the Mexican public higher education system. This study moves beyond anecdotal accounts and conceptual arguments to quantitatively link higher levels of SEE engagement not only with increased social entrepreneurial intentions but also, critically, with enhanced self-perceptions of social innovation skills, greater metacognitive awareness, and improved readiness for complex problem-solving. By doing so, this research validates the immense potential of innovative pedagogical models that transcend traditional disciplinary boundaries. It confirms that such approaches, inspired by pioneering initiatives like those at the Universidad Veracruzana, can be highly effective in cultivating the core competencies and the changemaker mindset required for graduates to address the pressing societal challenges of the 21st century.

6.2. Limitations and Directions for Future Research

While this study provides valuable insights, its limitations must be acknowledged to contextualize the findings and guide future inquiry. First, the cross-sectional design establishes strong associations but cannot definitively prove causality. It is possible that students with a pre-existing inclination towards social entrepreneurship and stronger 21st-century skills are more likely to self-select into SEE programs. Future research should employ longitudinal or quasi-experimental designs, tracking students over time to more rigorously assess the developmental impact of these programs compared to a control group.

Second, the study relies exclusively on self-report measures for all outcome variables. While validated scales were used, self-perceptions of skills and intentions can be subject to social desirability bias or an inaccurate self-assessment. Future studies would be greatly strengthened by incorporating more objective or performance-based measures, such as behavioral assessments of problem-solving, portfolio analysis of student projects, or 360-degree feedback from peers and community partners on students' collaborative and innovative skills.

Third, the measure of SEE engagement, while comprehensive, was a composite index based on retrospective self-reports. Future research could use more granular methods, such as experience sampling or detailed activity logs, to disentangle the specific effects of different components of SEE (e.g., coursework vs. mentorship vs. fieldwork) on different outcomes. This could help educators optimize program design.

Finally, the sample was drawn from public universities in Mexico. While this provides a crucial perspective from a specific and important context, the findings may not be generalizable to private institutions or to other national and cultural contexts without

further investigation. Comparative research across different Latin American countries, or between public and private universities, could yield valuable insights into how institutional and cultural factors moderate the effectiveness of transdisciplinary SEE.

Despite these limitations, this study lays a strong foundation for a deeper and more nuanced understanding of how to educate the next generation of changemakers. It provides a clear signal to educators and policymakers that investing in and expanding transdisciplinary social entrepreneurship education is a powerful strategy for preparing students not just for the jobs of the future, but for the challenges of the future.

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