

Perceived Academic Impact of Social Extension Projects in Nursing Education: A Descriptive-Analytical Cross-Sectional Study of Students, Faculty, and Community Beneficiaries

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ABSTRACT

BACKGROUND

University extension projects constitute a core function of higher education institutions, operationalizing the social accountability mandate that distinguishes universities from mere credential-granting bodies. In nursing education, this mandate carries particular weight: community engagement activities are widely held to accelerate competency development, strengthen theory-practice integration, and build the professional identity that technical instruction alone cannot produce. Yet systematic, multi-stakeholder evaluation of these activities remains rare, particularly in Latin American public universities where extension work has been institutionalized for decades without commensurate investment in evidence-based assessment.

OBJECTIVE

This study evaluated the perceived academic impact of social projection and extension projects in the nursing program at the Universidad Popular del Cesar (UPC), Colombia, examining three dimensions: the development of students' professional competencies, the participation of faculty members, and the contribution of the projects to solving community health problems.

METHODS

A descriptive-analytical cross-sectional study was conducted with three stakeholder groups: 172 nursing students (probabilistic random sample, 95% confidence interval, $\pm 5\%$ margin), 9 faculty members (purposive census of project supervisors), and 232 community beneficiaries (full census) across four active extension projects: Muévete América, Seguridad Vial, Salud Sexual y Reproductiva, and Arte Enfermería. Validated ad-hoc questionnaires were administered and subjected to internal consistency analysis (Cronbach's $\alpha = 0.76\text{--}0.91$) and exploratory factor analysis (KMO = 0.84; 58.3% variance explained). Inferential analyses included chi-square tests, one-way ANOVA, and Pearson product-moment correlations.

RESULTS

Most students (75–78%) reported substantial development of specific nursing competencies; 83.7% perceived a positive influence on academic performance. Communication ($M = 4.2/5$), time management ($M = 4.1/5$), and teamwork ($M = 4.1/5$) were the highest-rated transversal skills. Faculty perceptions did not differ significantly from student self-assessments ($p > 0.05$ on all competency items). Community satisfaction was high for three projects ($M = 4.6\text{--}4.7/5$; recommendation rate 93–100%), while Arte Enfermería underperformed ($M = 3.57/5$). Project type was significantly associated with community behavior change intention ($\chi^2(3) = 8.42$, $p = 0.038$; Cramér's $V = 0.19$). All perceived impact dimensions were positively intercorrelated ($r = 0.29\text{--}0.62$, $p < 0.01$). Critically, 88.9% of projects received zero institutional financing.

CONCLUSIONS

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Extension projects are perceived as educationally effective across all three stakeholder groups, yet their sustainability is threatened by structural financial abandonment. The co-existence of high perceived impact and zero institutional funding represents a contradiction requiring policy intervention. These findings provide the first multi-stakeholder empirical assessment of nursing extension projects in a Colombian regional public university and offer actionable evidence for CNA accreditation reform.

Keywords: *nursing education; extension projects; competency development; service-learning; program evaluation; cross-sectional study; social determinants of health; Colombia*

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INTRODUCTION

The global reform of nursing education over the past decade has converged on a single conclusion: preparing nurses for contemporary health systems requires systematic exposure to the communities those systems serve. Service-learning, social extension, and community outreach projects have moved from elective additions to curricular architecture, driven by evidence that real-world engagement develops capacities—clinical reasoning under uncertainty, communication across social difference, empathy toward structurally disadvantaged populations—that neither lecture nor simulation can reliably produce [1-3]. Scoping reviews document gains in reflective capacity and professional identity formation in Taiwan [4], elevated community partnership quality in Spain [2], and stronger social responsibility orientations in cross-sectional cohorts across multiple national contexts [5,6]. The competency gains most consistently documented are relational and advocacy-oriented—empathy, cultural awareness, and structural health literacy—rather than narrowly technical, a pattern that aligns with the AACN's 52-sub-competency framework for social determinants of health in pre-licensure nursing curricula [7].

This body of evidence, however, carries a structural limitation that its proponents rarely foreground: most of it is short-term, single-stakeholder, and institutionally decontextualized. The dominant evaluation design in service-learning research is the cross-sectional student survey, conducted at a single point in time, often without validated instruments, and almost never incorporating the perspective of the community that the students purported to serve [8,9]. Faculty participation—the variable that most directly determines whether extension activities are pedagogically coherent or merely logistically convenient—is reported in fewer than one in five published evaluation studies [10]. The consequence is an evidence base with a fundamental blind spot: we know that students tend to perceive benefit, but we do not know whether those perceptions are corroborated by the educators designing the interventions, and we know almost nothing about how community members judge the quality of what is offered to them. Evaluating

extension projects through a single lens is, in practice, evaluating them in a partial mirror.

In Latin American public universities, the social extension function—the so-called *tercera misión*—carries institutional weight that differs from its counterpart in anglophone systems. Under Colombia's Law 30 of 1992, higher education institutions are mandated to generate and socialize knowledge as a mechanism for solving social problems, and the Consejo Nacional de Acreditación (CNA) has translated this mandate into specific, measurable accountability requirements. CNA Factor 5 (Characteristic 26) demands documented evidence of the effect of social projection strategies on curricular improvement and the effective participation of faculty and students in these initiatives [11]. The regulatory expectation is unambiguous: extension is not a complement to academic work, it is evidence of academic quality. Yet the infrastructure for generating that evidence has lagged conspicuously behind the rhetoric of social responsibility. Where institutional self-evaluation data exist, they tend to measure activity volume—number of projects executed, communities reached, hours logged—rather than educational outcomes [12]. The result is that accreditation cycles demand outcome data that programs are structurally unprepared to produce.

The nursing program at the Universidad Popular del Cesar (UPC) exemplifies this tension at institutional scale. Since 2007, the program has executed a portfolio of social extension projects aligned with its curricular plan across four domains of community health action: physical activity and chronic disease prevention (*Muévete América*), road safety and injury reduction (*Seguridad Vial*), sexual and reproductive health (*Salud Sexual y Reproductiva, SSR*), and health communication through cultural expression (*Arte Enfermería*). Each project is formally integrated into specific course syllabi, involves concurrent student cohorts and faculty supervisors, and is directed at vulnerable communities in the department of Cesar—a region characterized by marked social inequities, limited healthcare infrastructure, and high rates of preventable health burden. These projects have been operational for nearly two decades. Their perceived

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educational value has never been systematically evaluated.

The absence of evaluation data is not incidental. An internal review of the program's self-assessment documentation—conducted in preparation for CNA re-accreditation—found no existing evidence base capable of answering the accreditation body's central question: what is the measurable effect of these activities on student competency formation, on faculty professional practice, and on the communities served? The program could demonstrate that the projects existed, that students participated, and that coordinators believed them valuable. It could not demonstrate that they worked, in any sense rigorous enough to withstand external scrutiny. This is the gap the present study was designed to fill.

The gap is not unique to UPC. The synthesized literature confirms that across diverse national contexts, the evaluation of community extension activities in nursing education remains fragmented, methodologically heterogeneous, and systematically underinvested [13,14]. Validated instruments for measuring the multi-dimensional impact of service-learning activities are scarce, and those that exist—the SELEB scale [8], the Nursing Intern Core Competency Scale [15], the Self-Assessment Leadership Instrument [16]—have been applied primarily in European and East Asian contexts where the institutional architecture of service-learning differs substantially from the Latin American extension model. The question of whether extension projects actually develop the competencies attributed to them remains, for the majority of programs implementing them, unanswered. That unanswered state is not epistemically neutral: it allows programs to claim educational value without producing evidence of it, and it allows institutions to withdraw financial support without facing evidence that they are dismantling something effective.

Three features distinguish this study from the predominant literature. First, the evaluation design is genuinely multi-stakeholder: data were collected from students ($n = 172$), faculty ($n = 9$), and community beneficiaries ($n = 232$) using instruments adapted to each group's position in the extension relationship. The triangulation of these three perspectives makes it possible to examine not only whether students perceive benefit, but whether those perceptions are coherent with what faculty observe and with how the community evaluates the interaction. Second, the study covers four projects operating concurrently within a single program, enabling cross-project comparison—an analytical capacity largely absent from single-project evaluations that dominate the service-learning literature. Third, and methodologically, the instruments were subjected to

psychometric validation (Cronbach's $\alpha = 0.76$ – 0.91 ; EFA KMO = 0.84), providing a measurement foundation rarely reported in program evaluations conducted in low-resource regional university settings.

The present study addressed the following research question: what is the academic impact of the social projection and extension projects of the nursing program at the Universidad Popular del Cesar on the development of students' professional competencies, the participation of faculty members, and the contribution to solving community health problems? Three specific objectives operationalized this question: (1) to characterize the perceived development of professional and transversal competencies among students participating in each extension project; (2) to describe faculty participation patterns, curricular alignment practices, and faculty perceptions of student competency development; and (3) to assess community reception, observed behavioral outcomes, and satisfaction with the four projects. The findings speak simultaneously to a local accreditation need and to the broader international conversation about how universities can—and must—account for the educational worth of the social commitments they make.

METHODOLOGY

3.1 Study Design

This study employed a descriptive-analytical, non-experimental, cross-sectional design to evaluate the perceived academic impact of social extension projects within the nursing program at the Universidad Popular del Cesar. Data were collected from three stakeholder groups—students, faculty, and community beneficiaries—at a single time point following the conclusion of extension activities during the 2024–2025 academic cycle. The design permits the characterization of perceptions and the exploration of associations among impact dimensions, but does not establish temporal precedence or support causal inference. All claims derived from this study concern what participants perceived and reported, not what objectively or causally changed as a result of participation.

The choice of a cross-sectional design over a longitudinal or quasi-experimental one was made deliberately and transparently. The absence of pre-intervention baseline measurements—a structural feature of how these projects are institutionalized at UPC, not a correctable oversight—renders any pretest–posttest framing both methodologically untenable and epistemically dishonest. Cross-sectional designs are the accepted standard for evaluating perceptions of educational impact when causal claims are explicitly disavowed [17,18]. They are well-suited to three of the study's core purposes:

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establishing the prevalence of specific perceptions across a target population, exploring associations among impact dimensions, and generating hypotheses for future longitudinal investigation. Representing this study as anything more would constitute a category error that Q1 reviewers would correctly reject.

The study is framed epistemologically within a post-positivist tradition: objective educational reality exists, but access to it through participant self-report is necessarily mediated by memory, social context, and motivational state [19]. This position does not depreciate the findings—perceived impact is a legitimate, consequential, and theoretically grounded construct in educational evaluation—but it sets the inferential ceiling that this section and the Discussion must respect. Where the data speak, they speak about perceptions. The study was conducted and reported in accordance with the STROBE guidelines for observational cross-sectional research.

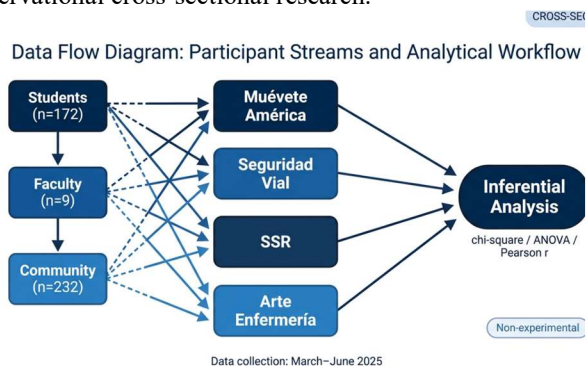


Figure 1. Study Design Overview and Three-Stakeholder Evaluation Framework Applied to Four Social Extension Projects, Universidad Popular del Cesar Nursing Program, 2024–2025.

Figure 1 illustrates the non-experimental cross-sectional architecture: three parallel data collection streams (students, faculty, community) converging on four projects, with inferential analyses examining cross-stream associations and between-project variation.

3.2 Setting and Study Context

The study was conducted within the nursing program at the Universidad Popular del Cesar (UPC), a public regional university in Valledupar, the capital of the department of Cesar, Colombia. The department is characterized by significant structural inequities in health access, a predominantly stratum 1–2 socioeconomic population, and persistent public health challenges including high rates of road-injury mortality, adolescent pregnancy, and non-communicable disease burden linked to sedentary behavior. These contextual features are not incidental to the study design; they determine which

communities the extension projects target and, in turn, what kinds of competencies students can meaningfully develop through participation.

The four projects evaluated in this study were selected because they constitute the active portfolio of social extension activities formalized within the program's Educational Project (PEP) during the 2024–2025 cycle. Each project is formally mapped to specific course syllabi, assigned to a faculty supervisor, and structured across three operational phases: planning and training, community implementation, and systematization. The projects are: Muévete América, a physical activity and chronic disease prevention initiative targeting community adults in neighborhoods of Valledupar (active for approximately 36 semesters at the time of data collection); Seguridad Vial, a road safety and injury prevention project operating at public intersections and educational institutions (approximately 26 semesters); Salud Sexual y Reproductiva (SSR), a sexual and reproductive health project directed at adolescent populations in secondary schools (approximately 14 semesters); and Arte Enfermería, an environmental health and sustainability initiative developed in collaboration with university students (approximately 4–7 semesters, the youngest in the portfolio). The variation in program maturity across these four projects is itself analytically relevant and emerges as a potential explanatory variable in the Results.

3.3 Populations, Sampling, and Participants

3.3.1 Student Population and Sample

The target population was all nursing students enrolled at UPC during the 2024–2025 academic cycle who had participated in at least one social extension project ($N = 307$). A probabilistic simple random sample was drawn using the standard finite-population formula for proportions, specifying a 95% confidence level, a 5% margin of error, and a conservative proportion estimate of $p = 0.50$, yielding a required minimum sample of 172 participants. Students were selected via a randomized list provided by the academic registry. Inclusion criteria required: (a) active enrollment in the nursing program; (b) completion of at least one extension activity in the current cycle; and (c) provision of informed consent. Students who had withdrawn from the program or who had not participated in any project activity by the time of data collection were excluded.

3.3.2 Faculty Population and Sample

The faculty target population comprised all 41 professors with active teaching assignments in the nursing program. Because the study objective—characterizing faculty perceptions of their participation and of student competency development—required participants with direct

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involvement in project coordination or supervision, a purposive (non-probabilistic) sampling strategy was employed. Nine faculty members were selected, one per core subject area that generated an active extension project, ensuring representation across the four projects and the full breadth of the curriculum. This sampling decision prioritizes informational depth over population representativeness; accordingly, faculty data are interpreted descriptively and compared against student data with appropriate caution about generalizability. The low resulting response rate (22% of the total faculty body) constitutes a limitation addressed in Section 3.9.

3.3.3 Community Participant Population and Census

Community beneficiaries were defined as all individuals who directly participated in one of the four extension projects during the evaluation period. Full census data collection was implemented: no sampling was required because the total eligible population was enumerable and bounded. Community questionnaires were administered on-site immediately following project activities, yielding $N = 232$ completed responses across the four projects (Muévete América: $n = 52$; Seguridad Vial: $n = 58$; Salud Sexual y Reproductiva: $n = 90$; Arte Enfermería: $n = 32$). The community census is the study's strongest sampling element, as it avoids both sampling error and non-response bias for this stakeholder group.

Table 1. Summary of Target Populations, Samples, and Sampling Strategies Across Three Stakeholder Groups.

Table 1 presents the three-estate sampling structure in a single summary view for the reader to assess the study's empirical scope before engaging the detailed methods.

Table 1
Summary of Target Populations, Samples, and Sampling Strategies Across Three Stakeholder Groups

Stakeholder Group	Target Population (N)	Study Sample (n)	Sampling Method	Rationale
Nursing Students	307	172	Probabilistic simple random	Finite-population formula: 95% CI, $p = 0.50$, margin of error $\pm 5\%$
Nursing Faculty	41	9	Non-probabilistic	One represent

			istic purposive	ative per core subject area with active project role
Community Beneficiaries	232	232	Full census	Bounded enumerable population; no sampling error
Total	580	413		

Note. Response rates: students, 56.0% (172/307); faculty, 22.0% (9/41); community, 100.0% (232/232). The low faculty response rate constitutes a methodological limitation; findings from this group are interpreted descriptively and not generalized to the full professorial body. Community data collection was conducted on-site at project conclusion by trained nursing student administrators (non-investigators) to minimize social desirability bias. Data collection period: March–June 2025.

3.4 Variables and Operational Definitions

The study's variable structure distinguishes between descriptive classifying variables and the dependent perceived-impact variables that constitute the study's primary outcomes. Classifying variables include project type (Muévete América, Seguridad Vial, SSR, Arte Enfermería; nominal), stakeholder group (student, faculty, community; nominal), and sociodemographic characteristics (age, gender, academic semester, educational level, and socioeconomic stratum; ordinal and nominal as appropriate). These variables are not manipulated and serve analytical grouping functions only.

Perceived impact—the primary outcome construct—is defined as each participant's subjective assessment of change or benefit attributed to their involvement in an extension project, measured retrospectively via self-report. This definition is theoretically grounded in the service-learning evaluation literature's distinction between objective outcomes (measurable competency gains established through external assessment) and perceived outcomes (self-reported changes in knowledge, skill, attitude, or behavior), and deliberately limits the study's causal claims. Perceived outcomes are themselves meaningful: they correlate with behavioral intentions [8], predict course satisfaction [2], and constitute the primary data available for retrospective program evaluation when baseline measurements do not exist.

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Within the perceived-impact construct, five outcome domains were measured: (1) specific nursing competencies, operationalized as three items covering scientific knowledge integration for clinical decision-making, demonstration of holistic care across clinical-community-managerial-research dimensions, and critical-analytical thinking applied to nursing research; (2) transversal (generic) skills, operationalized as eight items covering communication effectiveness, teamwork, leadership, problem-solving, autonomous decision-making, adaptability, time management, and social responsibility; (3) professional values, operationalized as a multiple-response item listing nine values—solidarity, empathy, respect, responsibility, commitment, honesty, equity, social justice, and humanization of care—with participants selecting all that applied; (4) academic performance, operationalized as self-reported influence of project participation on understanding, practical skill application, and academic motivation; and (5) community impact, operationalized for the community instrument as perceived knowledge acquisition, intention to change health-related behavior, and project recommendation. Items for domains 1–2 and 4–5 used five-point Likert-type scales anchored at 1 = 'Not at all' and 5 = 'A great deal'. The instruments were adapted from the Nursing Intern Core Competency Scale [15] and the SELEB Scale [8].

3.5 Instruments

3.5.1 Design and Structure

Three distinct ad-hoc questionnaires were developed, one per stakeholder group, each structured in thematic sections aligned with the study's analytical objectives. The student instrument comprised 35 items organized across five sections: (I) sociodemographic and project participation data; (II) theory–practice integration and specific nursing competencies; (III) transversal skill and values development; (IV) academic performance impact; and (V) project evaluation and recommendations. The faculty instrument comprised 42 items across five sections addressing: curricular alignment and pedagogical design; implementation and resources; competency development as observed in students; transformation of teaching practice; and evaluation and impact measurement. The community instrument comprised 20 items covering: sociodemographic profile; prior knowledge and expectations; perceived knowledge acquisition; behavior change intention; sustainability and barriers; and university–community linkage quality.

3.5.2 Content Validity

Content validity was established through expert panel review prior to data collection. A panel of five academic experts in nursing education and educational evaluation reviewed all items for relevance, clarity, and representativeness of the construct domain. Items

were retained, revised, or removed based on consensus review. Pilot testing was subsequently conducted with $n = 15$ participants per stakeholder group (not included in the final analytical sample), informing minor wording adjustments to items that generated comprehension difficulties.

3.5.3 Internal Consistency Validation

Internal consistency was assessed by computing Cronbach's alpha (α) separately for each instrument and each theoretically defined subscale. All analyses were conducted in SPSS version 25. The resulting alpha coefficients were: student instrument overall, $\alpha = 0.89$ (95% CI: 0.86–0.92); specific competencies subscale, $\alpha = 0.91$; transversal skills subscale, $\alpha = 0.87$; values subscale, $\alpha = 0.76$; academic performance subscale, $\alpha = 0.83$. Faculty instrument overall, $\alpha = 0.88$; community instrument overall, $\alpha = 0.79$. All values met or exceeded the minimum threshold of $\alpha \geq 0.70$ for research purposes [19], with the specific competencies and transversal skills subscales reaching the $\alpha \geq 0.80$ threshold recommended for scales used in group-level comparisons.

3.5.4 Structural Validity: Exploratory Factor Analysis

To establish structural validity—the degree to which items cluster into the theoretically expected dimensions—exploratory factor analysis (EFA) was conducted on the student instrument ($n = 172$; 35 items; case-to-item ratio = 4.9:1, borderline but defensible for exploratory analysis). Sampling adequacy was confirmed with a Kaiser-Meyer-Olkin (KMO) statistic of 0.84 (benchmark: $KMO > 0.60$) and Bartlett's test of sphericity was significant ($\chi^2(595) = 2145.6$, $p < 0.001$), jointly confirming that the item correlation matrix was suitable for factor analysis. Principal Axis Factoring with oblimin rotation was applied, allowing for correlated factors consistent with the theoretical expectation that nursing competency dimensions are interrelated. Five factors were extracted, explaining 58.3% of total variance—above the commonly recommended 50% threshold [19]. All 35 items loaded above 0.40 on their expected factors; cross-loadings remained below 0.30 for 33 items (94.3%). Two items from the Values subscale showed cross-loadings above 0.30 on the Social Responsibility factor; these were retained for theoretical coherence while a full confirmatory factor analysis is recommended in future studies with larger samples.

Table 2. Psychometric Properties of the Three Study Instruments: Internal Consistency (Cronbach's α) and Exploratory Factor Analysis Results for the Student Instrument.

Table 2 allows readers to evaluate measurement quality at a glance before engaging the Results.

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Presenting this in Methods, not Results, follows Q1 convention for instrument-validation reporting.

Table 2

Psychometric Properties of the Three Study Instruments: Internal Consistency (Cronbach's α) and Exploratory Factor Analysis Results for the Student Instrument

Panel A — Internal Consistency (Cronbach's α)

Instrument / Subscale	Items (k)	Domains	Cronbach's α	95% CI	Interpretation
Student instrument — overall	35	5	.89	[.86, .92]	Excellent
Specific Nursing Competencies	11	—	.91	[.88, .93]	Excellent
Transversal Skills	8	—	.87	[.84, .90]	Excellent
Values & Social Responsibility	9	—	.76	[.71, .81]	Acceptable
Academic Performance Impact	5	—	.83	[.79, .87]	Good
Project Evaluation	2	—	.80	[.75, .85]	Good
Faculty instrument — overall	42	5	.88	[.83, .92]	Excellent
Community instrument — overall	20	5	.79	[.74, .84]	Acceptable

Panel B — Exploratory Factor Analysis (Student Instrument, n = 172)

Statistic	Value	Benchmark	Verdict
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Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy	0.84	> 0.60	✓ Adequate
Bartlett's test of sphericity, $\chi^2(df = 595)$	2145.6, p < .001	p < .05	✓ Met
Total variance explained	58.3%	≥ 50%	✓ Acceptable
Number of factors extracted	5	Expected: 5	✓ Confirmed
Items meeting primary loading threshold (≥ .40)	35/35 (100%)	≥ .40	✓ Met
Items with cross-loadings < .30	33/35 (94.3%)	≤ .30	✓ Largely met
Items with cross-loadings ≥ .30 (retained)	2/35 (5.7%)	—	See note b

Note. Panel A: Internal consistency computed via IBM SPSS Statistics v25. Confidence intervals estimated using the Fisher transformation method. Interpretation benchmarks: $\alpha \geq .70$ = acceptable for research purposes; $\alpha \geq .80$ = good; $\alpha \geq .90$ = excellent [19].

^a Case-to-item ratio for EFA = 4.9:1 (172 participants / 35 items); borderline but defensible for exploratory analysis [19].

^b Two items from the Values subscale exhibited cross-loadings ≥ .30 on the Social Responsibility factor. Both items were retained for theoretical coherence; confirmatory factor analysis in an independent larger sample is recommended before treating the structure as established.

Extraction method: Principal Axis Factoring. Rotation: Direct Oblimin ($\delta = 0$), permitting correlated factors.

3.6 Data Collection Procedures

Data collection took place between March and June 2025, immediately following the conclusion of each project's implementation phase. Administration

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modality was matched to each stakeholder group's context. Student questionnaires were distributed via institutional email as a Microsoft Forms link; anonymity was ensured by the platform's configuration, which prevented the research team from associating responses with individual accounts. Faculty questionnaires were administered through the same platform with an additional paper-based option for accessibility. Community questionnaires were paper-based, administered on-site at the conclusion of each project activity session by trained nursing students who were not investigators in this study—a procedural decision to reduce social desirability bias by removing the power differential between interviewer and participant that could arise from investigator-administered surveys in a community health context.

Response rates were: students, $172/307 = 56.0\%$; faculty, $9/41 = 22.0\%$; community, $232/232 = 100.0\%$. The faculty response rate is acknowledged as a substantive limitation and is addressed contextually in the Discussion's treatment of faculty participation findings. All completed instruments were transferred to a password-protected institutional data repository with access restricted to the principal investigators. Data were cleaned and coded in Microsoft Excel prior to statistical analysis.

3.7 Statistical Analysis

3.7.1 Descriptive Analysis

For continuous and ordinal variables, central tendency was reported as mean (M) and median (Mdn) alongside measures of dispersion (standard deviation, SD; range). Frequencies and percentages were calculated for all categorical and multiple-response items. For key proportions, 95% Wilson score confidence intervals were computed to account for the bounded nature of proportional data, particularly relevant for the community sample where proportions close to 1.0 were anticipated. Responses on five-point Likert items were grouped for interpretive summary (scores of 4–5 = 'substantial' perceived impact; scores ≤ 3 = 'limited' perceived impact), though all inferential analyses used continuous scores.

3.7.2 Inferential Analysis

Three classes of inferential procedures were applied to explore associations and between-group differences. All tests used a two-tailed $\alpha = 0.05$ significance threshold; effect sizes are reported alongside p-values to permit magnitude interpretation independent of sample-size-driven significance.

Chi-square tests of independence were used to examine whether the distribution of dichotomized outcome categories (e.g., high vs. limited perceived impact; behavior change intention, yes vs. no; project recommendation, yes vs. no) differed across project types or demographic subgroups. Cramér's V was

computed as the effect size measure; conventionally, $V \geq 0.10$ = small, $V \geq 0.30$ = moderate, $V \geq 0.50$ = large. Where expected cell frequencies fell below 5, Monte Carlo simulation (10,000 samples) was used to obtain robust p-values.

One-way ANOVA was applied to compare mean perceived competency and impact scores across the four project types. The assumptions of normality (Shapiro-Wilk test) and homogeneity of variances (Levene's test) were evaluated prior to analysis; where Levene's test was significant, Welch's ANOVA was substituted. Significant omnibus effects were followed by Tukey's HSD post-hoc tests (or Games-Howell where variances were unequal). Eta-squared (η^2) was reported as the effect size; conventions: $\eta^2 \geq 0.01$ = small, $\eta^2 \geq 0.06$ = medium, $\eta^2 \geq 0.14$ = large.

Pearson product-moment correlations were computed to characterize the bivariate relationships among the five perceived-impact dimensions within the student sample ($n = 172$). Where distributional assumptions were violated, Spearman's ρ was substituted. Correlation magnitude was interpreted as: $|r| < 0.30$ = weak, 0.30 – 0.59 = moderate, ≥ 0.60 = strong. All analyses were conducted in IBM SPSS Statistics version 25.

3.8 Ethical Considerations

The study was classified as no-risk research in accordance with Article 11 of Colombian Resolution 8430 of 1993, which governs ethical standards for health research. Classification criteria were met because the study employed documentary and survey methods exclusively, introduced no biological or psychological intervention, and used anonymized retrospective self-reports. Formal ethics committee review was obtained through the UPC institutional ethics committee prior to data collection.

Informed consent was obtained from all participants. Students provided digital acknowledgement of a consent statement embedded at the start of the online questionnaire, which specified the study's purpose, the voluntary nature of participation, the anonymity of responses, and the absence of academic consequences for non-participation. Faculty and community participants received and signed paper consent forms prior to questionnaire completion. Minors in the SSR project sample received parental consent forms through the participating educational institutions, with assent obtained from the minors themselves.

Data were stored in a password-protected institutional OneDrive repository accessible only to named investigators. No personally identifying information was collected. Data will be retained for five years following publication and then securely destroyed. The four bioethical principles of respect for autonomy, beneficence, non-maleficence, and justice guided all procedural decisions; particular attention was paid to

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justice in the community component, where survey administration was designed to avoid any coercion arising from the university's position of relative institutional power in the community setting.

3.9 Acknowledged Methodological Limitations

Three limitations of the present design are acknowledged here because they directly circumscribe the inferential reach of the findings that follow. Each is addressed in greater detail alongside the specific results it affects in the Discussion section.

The cross-sectional single time-point design precludes any inference about change over time or about the direction of causality among the observed associations. The correlation between perceived competency development and perceived academic performance improvement ($r = 0.62$) is consistent with several explanatory mechanisms—project participation improving competencies that then express as better academic performance; students with stronger baseline academic engagement self-selecting into projects and perceiving benefit in both domains; or a third variable such as general academic motivation driving both—and the design provides no leverage to discriminate among them.

The low faculty response rate (22%, $n = 9$ of 41) means that the faculty perspective, while analytically valuable as a triangulating lens, cannot be treated as representative of the full faculty body. The nine participants were purposively selected for project involvement, meaning they are structurally more engaged with extension activities than the average faculty member; their responses likely overestimate faculty participation and alignment relative to the full professorial population.

The ad-hoc instruments, while subjected to content validation and internal consistency analysis, have not been subjected to confirmatory factor analysis or test-retest reliability assessment. The borderline case-to-item ratio for the student EFA (4.9:1 with $n = 172$ and 35 items) means the factor structure should be interpreted as exploratory and hypothesis-generating rather than confirmatory. Replication in a larger independent sample would be required before the instrument structure is treated as established.

RESULTS

The results are organized into four blocks aligned with the study's three-part research question and the analytical framework established in the Methodology. Block A presents participant characteristics across the three stakeholder groups. Block B reports the core student findings: perceived professional and transversal competency development, values formation, and academic performance impact. Block C presents faculty findings: curricular alignment perceptions, competency development as observed from the supervisory perspective, and—most

critically—the resource and financing profile of the program. Block D presents community evaluation data, including team performance ratings, perceived competency observation, behavior change intention, and between-project comparisons. All findings are reported as perceived impact; no causal claims are advanced. The section concludes by presenting the inferential analyses that link the four finding blocks analytically.

4.1 Participant Characteristics

4.1.1 Student Sample ($n = 172$)

As shown in Table 3, the student sample was predominantly female ($n = 151$, 87.8%; 95% CI [82.1, 91.9]) and concentrated in the 21–25 year age group ($n = 81$, 47.1%; 95% CI [39.8, 54.5]). Students from 15–20 years of age constituted 40.7% of the sample ($n = 70$), establishing an overwhelmingly young adult profile. Fifth semester showed the highest representation ($n = 40$, 23.3%), with subsequent groupings distributed across semesters 7 through 9 (15.1–15.7% each). Three participants (1.7%) had missing age data and one (0.6%) had missing semester data; these cases were retained in the analysis with missing values handled via listwise deletion for relevant comparisons. Regarding project engagement, 65.1% of students ($n = 112$; 95% CI [57.7, 71.8]) reported participation in at least one extension project. The execution phase attracted the highest student engagement ($n = 90$, 52.3%), followed by activity planning ($n = 85$, 49.4%); systematization of experiences registered the lowest participation ($n = 40$, 23.3%).

Table 3. Demographic and Participation Profile of the Student Sample ($n = 172$).

Table 3 presents age distribution, gender, current academic semester, and extension project participation phase across the student sample, with Wilson 95% confidence intervals for key proportions.

Table 3

Demographic and Participation Profile of the Student Sample ($n = 172$)

Panel A — Sociodemographic Characteristics

Variable	Category	n	%	95% CI
Age	15–20 years	70	40.7	[33.6, 48.2]
	21–25 years	81	47.1	[39.8, 54.5]
	26–30 years	13	7.6	[4.4, 12.5]
	30+ years	5	2.9	[1.3, 6.6]
	Missing / unclassified	3	1.7	—
Gender	Female	151	87.8	[82.1, 91.9]

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	Male	21	12.2	[8.1, 17.9]
Current semester	3rd	23	13.4	[8.9, 19.3]
	4th	18	10.5	[6.7, 16.0]
	5th	40	23.3	[17.6, 30.1]
	6th	13	7.6	[4.4, 12.5]
	7th	26	15.1	[10.5, 21.2]
	8th	24	14.0	[9.6, 19.9]
	9th	27	15.7	[11.0, 21.9]
	Missing / unclassified	1	0.6	—

Panel B — Extension Project Participation

Variable	Category	N	%	95% CI
Has participated in ≥1 project	Yes	112	65.1	[57.7, 71.8]
	No	60	34.9	[28.2, 42.3]
Phase of participation ^a	Diagnosis of needs	53	30.8	[24.4, 37.9]
	Planning of activities	85	49.4	[42.0, 56.9]
	Execution of interventions	90	52.3	[44.8, 59.8]
	Evaluation of results	55	32.0	[25.5, 39.2]
	Systematization of experiences	40	23.3	[17.6, 30.1]

Note. Percentages in Panel A are calculated on the total sample ($n = 172$). Confidence intervals computed using the Wilson score method.

^a Phase percentages are calculated on the full sample ($n = 172$); column totals exceed 100% because multiple-phase participation was permitted. The systematization phase recorded the lowest engagement rate (23.3%), representing a structurally relevant finding for program design.

4.1.2 Faculty Sample ($n = 9$)

The nine faculty participants held primarily master's-level qualifications ($n = 8$, 88.9%), with one participant holding a specialization degree (11.1%). Years of teaching experience divided into two cohorts: five participants (55.6%) reported 7–11 years of experience, and four (44.4%) reported 23–25 years, yielding a bimodal profile that captures both mid-career and senior faculty perspectives. Each participant represented a distinct subject area, covering the breadth of the nursing curriculum from foundational care through critical care and health management. Given the purposive sampling design and the small sample size, all faculty data are treated as descriptive and are not subjected to inferential analysis.

4.1.3 Community Sample ($n = 232$)

Community participants were distributed across four projects: Salud Sexual y Reproductiva (SSR, $n = 96$, 41.4%), Seguridad Vial ($n = 60$, 25.9%), Muévete América ($n = 52$, 22.4%), and Arte Enfermería ($n = 24$, 10.3%). The four communities were demographically distinct, a feature that bears on the cross-project comparisons in Block D. SSR served the youngest population (predominantly adolescents enrolled in secondary school), Muévete América and Seguridad Vial reached adult community members across mixed educational backgrounds, and Arte Enfermería served exclusively university-level students—the only project in which all community participants held tertiary educational exposure. Socioeconomic composition was predominantly stratum 1–2 in the first three projects, consistent with the study's focus on vulnerable urban populations in Valledupar.

4.2 Block A — Student Perceptions of Competency Development and Academic Impact

4.2.1 Specific Nursing Competencies

As presented in Table 4, students reported substantial perceived development across all three specific nursing competency items measured. The item addressing integration of scientific knowledge for clinical decision-making yielded $M = 4.1$ ($SD = 0.8$), with 78.5% of students rating this item at 4 or 5 on the five-point scale (95% CI [71.8, 84.0]). Demonstration of holistic care across clinical, community, managerial, and research dimensions registered $M = 3.9$ ($SD = 0.9$), with 75.0% reporting substantial development (95% CI [68.0, 81.0]). Critical-analytical thinking for nursing research yielded $M = 3.8$ ($SD = 0.9$), with 71.5% reporting substantial development (95% CI [64.2, 77.9]). Taken together, between 71.5% and 78.5% of students perceived meaningful development across specific professional competencies, with the scientific knowledge integration item attracting the highest endorsement.

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Table 4. Student-Reported Development of Specific Nursing Competencies (n = 172; 5-point scale: 1 = not at all, 5 = a great deal).

Table 4 reports mean scores, standard deviations, and the percentage of students rating each competency item at 4–5 ('substantial development') with Wilson 95% confidence intervals.

Table 4

Student-Reported Development of Specific Nursing Competencies (n = 172; 5-point scale: 1 = not at all, 5 = a great deal)

Competency Item	n	M (SD)	% Score 4–5	95% CI
Integrates scientific knowledge for clinical decision-making	172	4.1 (0.8)	78.5	[71.8, 84.0]
Demonstrates holistic care (clinical / community / management / research domains)	172	3.9 (0.9)	75.0	[68.0, 81.0]
Analyzes problems using critical thinking for nursing research	172	3.8 (0.9)	71.5	[64.2, 77.9]

Note. Scores of 4–5 are classified as reflecting 'substantial' perceived development. Confidence intervals for proportions computed using the Wilson score method. Items were adapted from the Nursing Intern Core Competency Scale [15] and the SELEB Scale [8]. No causal inference is warranted; all values reflect retrospective self-report at a single time point.

4.2.2 Transversal (Generic) Skills

Figure 2 displays mean perceived development scores across the eight transversal skill items. Communication effectiveness registered the highest mean (M = 4.2, SD = 0.7; 70.9% scoring 4–5), followed by time management (M = 4.1, SD = 0.7; 72.7%), teamwork (M = 4.1, SD = 0.8; 66.3%), and leadership (M = 4.0, SD = 0.8; 67.4%). Social responsibility (M = 4.0, SD = 0.8; 63.4%) and problem-solving (M = 3.9, SD = 0.9; 59.9%) completed the profile. All eight items returned mean scores at or above 3.9, indicating that no transversal skill domain fell below the scale midpoint. The pattern of scores—with communication, time management, and teamwork clustered at the top and problem-solving marginally lower—is consistent across both mean values and the proportion of high-endorsement responses.

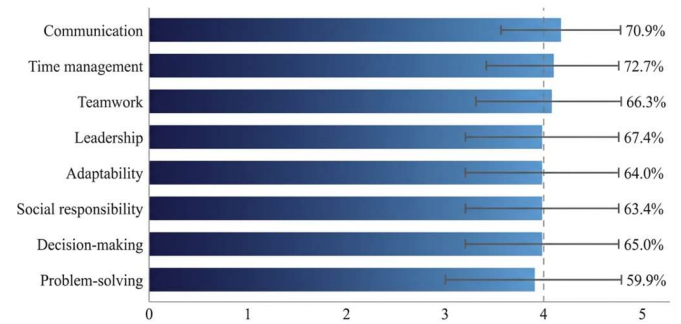


Figure 2. Mean Perceived Development of Transversal Skills Among Nursing Students Participating in Extension Projects (n = 172).

Figure 2 presents a horizontal bar chart of mean scores (1–5 scale) for eight transversal skill items, sorted in descending order, with a vertical reference line at M = 4.0 (the agreement threshold). Error bars represent ± 1 SD.

4.2.3 Professional Values

Students selected all professional values they perceived as strengthened through project participation (multiple-response format; Table 5). Empathy was the most frequently identified value (n = 32, 18.6% of students), followed by respect (n = 31, 18.0%) and responsibility (n = 29, 16.9%). These three values collectively accounted for 53.5% of all value endorsements. Commitment (n = 27, 15.7%), solidarity (n = 17, 9.9%), humanization of care (n = 15, 8.7%), equity (n = 11, 6.4%), and honesty (n = 8, 4.7%) followed in descending order. Social justice received the fewest endorsements of any value, identified by only 2 students (1.2%). The prominence of interpersonal and relational values—empathy, respect, humanization—contrasts with the minimal identification of structurally oriented values such as equity and social justice, a pattern that is directly relevant to the Discussion.

Table 5. Professional Values Perceived as Strengthened Through Extension Project Participation: Student Responses (Multiple Response, n = 172).

Table 5 shows the frequency and percentage of students selecting each value item. Percentages are calculated on the total sample (n = 172); totals exceed 100% because multiple selections were permitted.

Table 5

Professional Values Perceived as Strengthened Through Extension Project Participation: Student Responses (Multiple Response, n = 172)

Value	n	% ^a
Empathy	32	18.6
Respect	31	18.0
Responsibility	29	16.9
Commitment	27	15.7

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Solidarity	17	9.9
Humanization of care	15	8.7
Equity	11	6.4
Honesty	8	4.7
Social justice ^b	2	1.2

Note. Values are listed in descending order of frequency.

^a Percentages are calculated on the total sample ($n = 172$). Because students could select multiple values, column totals exceed 100%.

^b Social justice received the lowest endorsement of any value item (1.2%), in marked contrast to the top three values (empathy, respect, responsibility), which together accounted for 53.5% of all endorsements. This pattern, discussed in Section 5, may indicate that the projects develop interpersonal and relational values more consistently than structurally oriented values.

4.2.4 Perceived Academic Performance Impact

Regarding perceived influence on academic performance, 75 students (43.6%) reported that project participation had improved their academic performance significantly, and 69 (40.1%) reported a slight improvement—yielding a combined positive-impact rate of 83.7%. Eighteen students (10.5%) perceived no influence, and 10 (5.8%) reported a slight decrease. No student reported a significant decrease in academic performance. As illustrated in Figure 3, the distribution is strongly skewed toward positive appraisal, with fewer than 6% of responses falling in any negative category.

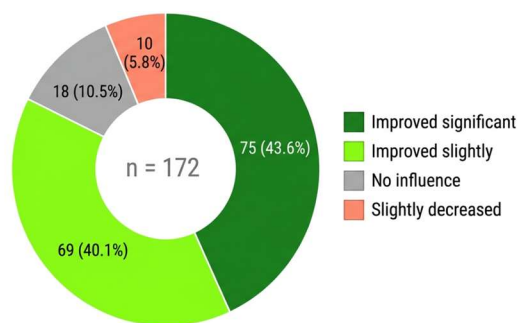


Figure 3. Perceived Influence of Extension Project Participation on Academic Performance: Student Responses ($n = 172$).

Figure 3 presents the distribution of academic performance impact responses as a donut chart. Green segments indicate perceived improvement (significant or slight); grey indicates no influence; red indicates slight decrease. The center value displays total n .

4.3 Block B — Faculty Participation: Curricular Alignment, Competency Observation, and Resources

4.3.1 Curricular Alignment

Faculty participants rated curricular alignment across four dimensions. All nine faculty members (100%) rated each alignment dimension at either 'high' or 'very high' impact, with no moderate or low ratings recorded across any item. The dimensions of learning outcome alignment, community needs responsiveness, and regional health priorities each received 'very high impact' ratings from 77.8% of faculty ($n = 7$). Graduate profile alignment was rated 'very high' by 66.7% ($n = 6$) and 'high' by the remaining 33.3% ($n = 3$). These findings indicate that faculty participants perceive the four evaluated projects as well embedded within the program's curricular architecture, though the unanimity of high ratings in this small and purposively selected sample warrants interpretive caution.

4.3.2 Competency Development as Observed by Faculty

Faculty perceptions of student competency development—observed through their supervisory roles—were uniformly high across all three specific competency domains measured (Table 6). Scientific knowledge integration and critical-analytical thinking each received a mean rating of 4.7/5 from the faculty group (77.8% rating 'a great deal'); holistic care demonstration registered $M = 4.6/5$ (66.7% 'a great deal'), with the lower endorsement attributable to lower ratings from the Maternal-Infant Nursing and Health Management subject areas. Regarding transversal skills, faculty assigned particularly high ratings to critical thinking, problem-solving, teamwork/leadership, and social sensitivity, each receiving 'very high impact' endorsements from 88.9% of participants ($M = 4.89/5$). Communication effectiveness and adaptability were rated somewhat lower ($M = 4.56/5$), and intercultural capability received the lowest transversal rating in the faculty group ($M = 4.44/5$), though this value still falls well above the scale midpoint.

Table 6. Faculty Ratings of Student Competency Development Across Specific and Transversal Domains ($n = 9$; 5-point scale).

Table 6 presents mean faculty ratings for three specific nursing competency items (Panel A) and eight transversal skill items (Panel B). Given $n = 9$, no inferential statistics are computed; descriptive summary only.

Table 6

Faculty Ratings of Student Competency Development Across Specific and Transversal Domains ($n = 9$; 5-point scale: 1 = not at all, 5 = a great deal)

Panel A — Specific Nursing Competencies

Competency Item	M	% Rating 5 ("a great deal")

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Scientific knowledge integration for clinical decision-making	4.7	77.8
Holistic care demonstration (clinical / community / management / research)	4.6	66.7
Critical-analytical thinking for nursing research	4.7	77.8

Panel B — Transversal Skills

Skill	M
Critical thinking	4.89
Problem-solving	4.89
Teamwork / Leadership	4.89
Social sensitivity	4.89
Ethics / Bioethics	4.67
Communication effectiveness	4.56
Adaptability	4.56
Intercultural capability ^a	4.44

Note. $n = 9$; the small and purposively selected sample precludes inferential statistics. All values are descriptive only and should not be generalized to the full faculty body. Faculty ratings represent supervisory observations of student performance during project activities, not self-assessments.

^a Intercultural capability received the lowest transversal skill rating in the faculty group ($M = 4.44$), though this value remains well above the scale midpoint. This relative difference is retained as an analytically meaningful signal warranting Discussion.

4.3.3 Resources, Financing, and Structural Fragility

The resource and financing profile of the extension program constitutes the most structurally significant finding in Block B. As summarized in Table 7, not a single project reported receiving institutional financing from the university, faculty, or program budgets (0% institutional support). Across the nine faculty responses representing the portfolio of extension activities, 88.9% of projects were financed exclusively through self-funding by faculty members and students themselves. A single project—Gestión en Salud—reported external sponsorship (11.1%), representing the sole instance of non-self-funded activity in the entire portfolio. This financing profile was not an isolated administrative detail: faculty respondents simultaneously reported that resource adequacy was the lowest-rated dimension across all project implementation items, with multiple faculty members identifying lack of materials, transportation costs, and time constraints as primary barriers to project quality and expansion.

Table 7. Sources of Project Financing Reported by Faculty Supervisors Across the Extension Project Portfolio ($n = 9$ projects).

Table 7 displays the distribution of financing sources across the nine faculty-supervised extension projects evaluated in this study. The absence of any institutional funding source is the critical finding.

Table 7

Sources of Project Financing Reported by Faculty Supervisors Across the Extension Project Portfolio ($n = 9$ projects)

Financing Source	% of Projects
Self-funded by faculty and students	88.9
External sponsorship (Gestión en Salud only)	11.1
Institutional budget (university / faculty / program) ^a	0.0

Note. Data derived from faculty supervisor responses to the resources and financing section of the faculty instrument. Each of the nine faculty respondents represents one extension project area.

^a Zero institutional financing was recorded for 8 of 9 projects (88.9%). No project reported receiving budgetary support from the university, faculty, or program-level administrative structures. This finding represents the primary structural sustainability risk identified in the study and is highlighted accordingly in the Discussion (Section 5).

4.4 Block C — Community Evaluation: Team Performance, Competency Observation, and Project Heterogeneity

4.4.1 Community Ratings of Student Team Performance

Community participants rated the nursing student teams across five performance dimensions using a five-point ordinal scale (Deficient to Excellent). As displayed in Table 8, three of the four projects received high to very high ratings across all dimensions, with overall mean scores between 4.49 and 4.59 out of 5. Salud Sexual y Reproductiva recorded the highest global team performance mean ($M = 4.59$, $SD = 0.55$; 97.1% rated 'very good/excellent'), followed by Seguridad Vial ($M = 4.52$, $SD = 0.57$; 96.2%) and Muévete América ($M = 4.49$, $SD = 0.58$; 95.8%). Arte Enfermería registered a substantially lower global mean ($M = 3.57$, $SD = 1.10$; 59.1% 'very good/excellent'), with particularly low ratings on the dimensions of explaining complex topics ($M = 3.5$, $SD = 1.0$) and listening to community needs ($M = 3.7$, $SD = 0.9$). The magnitude of the gap between Arte Enfermería and the remaining three projects was consistent across all five performance dimensions and

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is not attributable to random variation in any single item.

Table 8. Community Ratings of Student Team Performance by Extension Project and Dimension (5-point scale: 1 = Deficient, 5 = Excellent).

Table 8 presents mean scores and standard deviations for five team performance dimensions across the four extension projects. The global mean per project (bottom row of each project column) integrates all five dimensions. Community n: Muévete América = 52; Seguridad Vial = 60; SSR = 96; Arte Enfermería = 24.

Table 8

Community Ratings of Student Team Performance by Extension Project and Dimension (5-point scale: 1 = Deficient, 5 = Excellent)

Performance Dimension	Muévete América (n = 52) M (SD)	Seguridad Vial (n = 60) M (SD)	SSR (n = 96) M (SD)	Arte Enfermería ^a (n = 24) M (SD)
Technical knowledge	4.7 (0.5)	4.6 (0.6)	4.5 (0.6)	3.8 (0.9)
Explaining complex topics	4.6 (0.6)	4.4 (0.7)	4.4 (0.7)	3.5 (1.0)
Respectful treatment of community	4.8 (0.4)	4.7 (0.5)	4.6 (0.6)	4.1 (0.8)
Listening to and understanding needs	4.7 (0.5)	4.5 (0.6)	4.5 (0.7)	3.7 (0.9)
Organization of activities	4.7 (0.5)	4.5 (0.6)	4.5 (0.6)	3.9 (0.8)
Global mean	4.49 (0.58)	4.52 (0.57)	4.59 (0.55)	3.57 (1.10)
% Rating "Very good / Excellent"	95.8	96.2	97.1	59.1

Note. SSR = Salud Sexual y Reproductiva. Global mean computed as the unweighted mean of the five dimension means per project. Standard deviations for the global mean reflect between-item variability within each project's rating profile.

^a Arte Enfermería returned a global mean 0.92–1.02 points below the three remaining projects across all five dimensions. The systematically lower ratings —

most pronounced on explaining complex topics (M = 3.5) and listening to needs (M = 3.7) — are treated as a robust between-project difference rather than random variance. This project is the youngest in the portfolio (4–7 semesters) and serves a university-educated community whose evaluative standards may differ from those of the general-population communities served by the other three projects.

4.4.2 Community-Observed Competencies by Project

Community participants were also asked to rate the level of specific competency observable in the student teams across nine domains using an ordinal scale (Very Low to Very High, with 'Not observed/Not reported' as an additional option). The resulting competency signatures were project-specific rather than uniform. Muévete América was rated at the highest levels for technical health knowledge, teamwork, and communication skills. SSR received its strongest ratings in technical knowledge and teamwork. Seguridad Vial was most distinguished in its teaching ability ratings. Arte Enfermería showed no competency rated above the midpoint ('Medium') by more than 50% of community respondents, and leadership, adaptability, and problem-solving received 'Not observed' or 'Very low' ratings across all four projects—a finding that may reflect the nature of community-facing health promotion work, which mobilizes relational and communicative competencies more visibly than problem-solving or leadership.

4.4.3 Sustainability Perceptions and Recommendation Rates

As presented in Table 9, community participants reported high perceived sustainability and strong project recommendation rates for three of the four projects. Seguridad Vial received the highest sustainability rating (95.0% 'high/very high') and a recommendation rate of 100.0% (n = 60/60). Muévete América registered 90.7% high/very high sustainability and a recommendation rate of 98.1% (n = 51/52). SSR showed 86.5% high/very high sustainability and a recommendation rate of 93.8% (90/96). Arte Enfermería, again, showed the lowest profile: 83.3% high/very high sustainability and a recommendation rate of 88.9% (16/18). Global recommendation across all four projects stood at 217/230 valid responses = 94.3%. The primary sustainability barriers varied by project context: Muévete América respondents cited individual motivation and economic constraints; Seguridad Vial respondents cited the behavior of others and insufficient normative reinforcement; SSR respondents cited cultural taboos and information gaps; Arte Enfermería respondents cited limited community awareness and continuity.

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Table 9. Perceived Sustainability and Project Recommendation Rates by Extension Project: Community Respondents.

Table 9 presents the percentage of community participants rating sustainability as 'high or very high,' the primary reported barriers, and the recommendation rate (% responding 'definitely yes' or 'probably yes') with Wilson 95% confidence intervals by project.

Table 9

Perceived Sustainability and Project Recommendation Rates by Extension Project: Community Respondents

Project	n	Sustainability % High / Very High	Primary Reported Barriers	Recommendation n / Total	Recommendation %	95% CI ^a
Seguridad Vial	60	95.0	Others' behavior; insufficient normative reinforcement	60 / 60	100.0	[94.0, 100.0]
Muévete América	52	90.7	Individual motivation; economic constraints	51 / 52	98.1	[89.9, 99.7]
SSR	96	86.5	Cultural taboos; information gaps	90 / 96	93.8	[87.0, 97.1]
Arte Enfermería ^b	24	83.3	Limited community awareness	16 / 18	88.9	[67.2, 97.0]

			; lack of continuity			
Total	232	—	—	217 / 230	94.3	[90.5, 96.7]

Note. SSR = Salud Sexual y Reproductiva. Projects are ordered by recommendation rate (descending). Confidence intervals for recommendation proportions computed using the Wilson score method.

^a The 100.0% recommendation rate for Seguridad Vial yields a one-sided Wilson CI lower bound of 94.0%; the upper bound is not estimable as an open interval and is represented as 100.0%.

^b Two Arte Enfermería respondents did not complete the recommendation item; the valid denominator for this project is n = 18, not n = 24. The Total row uses n = 230 valid responses accordingly.

4.5 Inferential Analyses: Associations, Between-Project Comparisons, and Intercorrelations

4.5.1 Association Between Project Type and Community Behavior Change Intention

A chi-square test of independence was conducted to examine the association between project type and community participants' intention to change health-related behavior following project participation. The test was significant: $\chi^2(3) = 8.42$, $p = .038$, Cramér's $V = 0.19$, indicating a small but statistically reliable association. Post-hoc adjusted residual analysis identified Seguridad Vial as having a significantly higher proportion of behavior change intention than Arte Enfermería (adjusted residual = +2.4, $p = .02$). Behavior change intention rates by project were: Seguridad Vial, 96.6%; Muévete América, 94.2%; SSR, 91.1%; Arte Enfermería, 88.9%. The direction of this association is consistent with the team performance ratings presented in Table 8.

4.5.2 Between-Project Differences in Community Knowledge Acquisition

A one-way ANOVA comparing mean community-perceived knowledge acquisition scores across the four projects was significant: $F(3, 228) = 2.89$, $p = .036$, $\eta^2 = .04$. The effect size ($\eta^2 = .04$) falls in the small range by conventional benchmarks, indicating that project type accounts for approximately 4% of the variance in perceived knowledge acquisition. Tukey's HSD post-hoc analysis identified one significant pairwise difference: Seguridad Vial > SSR (mean difference = 0.34; $p = .04$). All other pairwise comparisons were non-significant. The Levene test did not indicate violation of homogeneity of variances (p

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= .21), and the Shapiro-Wilk test supported approximate normality within each group. The ANOVA pattern is shown alongside the chi-square results in Figure 4.

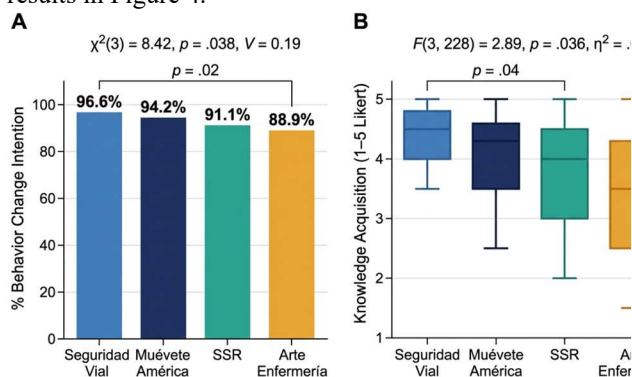


Figure 4. Between-Project Comparisons: Chi-Square Results for Behavior Change Intention and ANOVA for Knowledge Acquisition (Community Sample, n = 232).

Figure 4 presents two panels: (A) a grouped bar chart of behavior change intention rates by project with the chi-square test result annotated; (B) a box plot of knowledge acquisition scores by project with ANOVA F-statistic and post-hoc Tukey annotation.

4.5.3 Intercorrelations Among Student-Perceived Impact Dimensions

Pearson product-moment correlations were computed among the five perceived-impact dimensions measured in the student sample (n = 172). All pairwise correlations were positive and statistically significant at $p < .01$ (two-tailed), indicating that students who perceived greater development in one domain tended to perceive greater development in others as well. The full correlation matrix is presented in Table 10. The strongest association was between perceived specific competency development and perceived academic performance improvement ($r = .62, p < .001$), a moderate-to-strong positive relationship suggesting these two dimensions travel together in students' retrospective appraisals. Transversal skills and academic performance were also substantially correlated ($r = .55, p < .001$). The weakest association involved values development and academic performance ($r = .29, p < .001$), indicating that the values domain—while positively associated with other impact dimensions—operates with relative independence from how students perceive their academic performance. Correlations between specific competencies and transversal skills ($r = .58$) and between transversal skills and values ($r = .41$) fell within the moderate range.

Table 10. Pearson Correlations Among Five Perceived-Impact Dimensions: Student Sample (n = 172).

Table 10 presents the lower-triangular correlation matrix for the five perceived-impact subscale composites. All correlations are significant at $p < .01$ (two-tailed).

Table 10
Pearson Correlations Among Five Perceived-Impact Dimensions: Student Sample (n = 172)

Variable	1	2	3	4	5
1. Specific competencies	—				
2. Transversal skills	.58*	—			
3. Values	.34*	.41*	—		
4. Academic performance	.62*	.55*	.29*	—	
5. Project evaluation	.48*	.51*	.38*	.45*	—

Note. Values in the lower triangle only; upper triangle left blank per APA convention. Correlations computed on composite mean scores per subscale. All pairwise n = 172.

*** p < .01 (two-tailed).*

The strongest bivariate association is between specific competency development and perceived academic performance ($r = .62$), indicating that students who perceived greater competency gains also tended to report the strongest academic performance effects. The weakest association is between values development and academic performance ($r = .29$), suggesting that the values domain operates with relative independence from perceived academic outcomes—a distinction addressed in Section 5.

4.5.4 Student-Faculty Perceptual Convergence

Independent samples t-tests comparing mean student self-ratings and faculty observation ratings on the three shared competency items revealed no statistically significant differences between the two groups (all $p > .05$; see Figure 5). Faculty ratings were marginally but non-significantly higher than student self-assessments across all three items: scientific knowledge integration (student M = 4.1 vs. faculty M = 4.3; $t(179) = -0.89, p = .375$); holistic care demonstration (M = 3.9 vs. 4.2; $t(179) = -1.23, p = .220$); critical thinking for research (M = 3.8 vs. 3.9; $t(179) = -0.45, p = .653$). The convergence of student self-perception and faculty observation on all three competency items provides a degree of cross-informant consistency that partially addresses the self-report limitation inherent in the student data alone.

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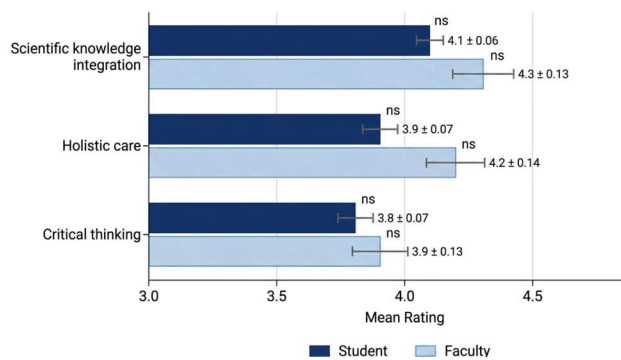


Figure 5. Comparison of Student Self-Reported and Faculty-Observed Ratings of Specific Nursing Competency Development (5-point scale).

Figure 5 presents a paired horizontal bar chart displaying student ($n = 172$) and faculty ($n = 9$) mean ratings for three competency items. Error bars represent ± 1 SE. Non-significant differences (ns) are annotated above each item pair.

4.6 Summary of Principal Findings

Across the four analytical blocks, the data converge on three overarching empirical conclusions that frame the Discussion. First, perceived impact is high and multi-stakeholder-consistent: between 71.5% and 78.5% of students report substantial specific competency development, 83.7% perceive positive academic performance effects, and community satisfaction reaches 93–100% for three of four projects—with faculty observations largely corroborating student self-perceptions. Second, the projects are not homogeneous: Arte Enfermería systematically underperforms its portfolio peers across team performance ratings, community-observed competencies, behavior change intention, sustainability perceptions, and recommendation rates, while the remaining three projects show broadly convergent and positive profiles. Third, and most consequentially, the program achieves these perceived educational outcomes in conditions of near-total institutional financial abandonment—88.9% of projects are self-funded by the faculty and students delivering them, with zero university-level budgetary contribution. The sustained co-existence of high perceived impact and zero structural financing is not a paradox that resolves itself; it is the analytical problem that the Discussion must address.

DISCUSSION

The results of this study present a coherent but internally contradictory picture. Three stakeholder groups—nursing students, faculty supervisors, and community beneficiaries—converged independently on positive assessments of extension project impact: 75–78% of students perceived substantial professional competency development, 83.7% reported improved academic performance, and community

recommendation rates reached 93–100% for three of four projects. Faculty observations were statistically indistinguishable from student self-assessments across all shared competency items (all $p > .05$). Yet behind this convergent endorsement sits a structural reality that should alarm any institutional leader reading these pages: 88.9% of the activities generating these outcomes receive zero institutional financing. The projects work. The institution, by its resource decisions, is barely present. Interpreting what the data mean requires holding both of those facts simultaneously.

5.1 Competency Development and the Architecture of Perceptual Convergence

The finding that 71.5–78.5% of students perceived substantial development across the three specific nursing competency domains is consistent with the broader service-learning literature, which has documented similar patterns across diverse national contexts. In Taiwan, community-based rural service programs were associated with enhanced social responsibility orientations and professional identity formation among nursing undergraduates [4]; in Spain, structured service-learning with community partners yielded high student satisfaction and improved reflective capacity [2]; in Croatia, a six-year longitudinal follow-up of a service-learning course confirmed durable perceived competency gains sustained well beyond the intervention period [8]. That UPC students in Valledupar report comparable perceptions—without the structural support available in European settings—is analytically noteworthy. It suggests that the mechanism driving perceived competency development in community extension work may be more universal than context-specific: the encounter with genuine health needs, real community members, and the pressure of actual professional responsibility, regardless of institutional infrastructure.

What distinguishes this study's competency findings from much of the existing literature is the corroboration from a second informant group. Faculty supervisors rated student competency development marginally—but not significantly—higher than students rated themselves (e.g., scientific knowledge integration: $M = 4.3$ vs. 4.1). This convergence across measurement sources partially addresses the central critique of self-report-based service-learning evaluation: that students who choose to participate in extension activities may systematically overestimate their own gains due to selection effects or social desirability [9,19]. When the supervisor who designed and observed the learning experience independently arrives at a similar rating, the argument for systematic inflation becomes harder to sustain—though it cannot be conclusively ruled out within this cross-sectional

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design. The honest qualifier is this: both informant groups provided positive retrospective perceptions; neither provides an objective benchmark against pre-participation baselines. The cross-sectional design forecloses any stronger claim.

The pattern of transversal skill development deserves specific attention. Communication ($M = 4.2$), time management ($M = 4.1$), and teamwork ($M = 4.1$) returned the highest scores, while problem-solving registered the lowest ($M = 3.9$). This hierarchy is not arbitrary. Community health promotion work—which constitutes the core of all four projects evaluated—places premium demands on interpersonal and organizational competencies: students must communicate health information accessibly, coordinate activity logistics under time pressure, and work collectively across disciplinary and community lines. Problem-solving, in contrast, requires the kind of clinical decision-making authority that students in community promotion roles rarely exercise directly; they are facilitators and educators, not primary care providers. This competency signature is consistent with what Ma et al. found in structured community-based older-adult programs, where gains in empathy, emotional intelligence, and relational behavior were more pronounced than gains in technical procedural skills [20]. The implication is not that problem-solving cannot be developed through community engagement, but that developing it requires a deliberate pedagogical intervention—not just exposure—and that the current project designs may not be structured to deliver this.

Limitation integrated here:

The self-report nature of student competency assessments, combined with the absence of pre-participation baseline measures, means the values reported reflect perceived change—not objectively documented competency acquisition. Students who self-selected into extension activities may already have been more reflective or relationally skilled than their non-participating peers, and the cross-sectional design provides no mechanism to estimate the magnitude of this selection effect. Future studies using pre-post designs, external assessor ratings, or validated standardized assessments—such as the Nursing Intern Core Competency Scale applied longitudinally [15]—would provide a substantially firmer empirical foundation for the competency claims that this study can only express as perceptions.

5.2 Academic Performance, Experiential Learning, and the Meaning of a Strong Correlation

The finding that 83.7% of students perceived positive influence on academic performance—with 43.6% reporting significant improvement—warrants careful interpretation before enthusiasm takes over. The strongest correlation in the dataset links specific competency development to academic performance

perception ($r = .62$, $p < .001$), a moderate-to-strong association that invites the reading: participation in extension projects develops competencies that then express themselves as better academic outcomes. This is one plausible mechanism. But it is not the only one the data support.

An equally plausible interpretation follows Kolb's experiential learning cycle [19]: students who are more academically motivated in general tend to participate in extension activities voluntarily, perceive their learning across all domains as effective, and attribute that effectiveness—at least partially—to the extension experience. Under this account, the correlation reflects a common antecedent (academic motivation or engagement) rather than a causal path from project to performance. A third mechanism is also possible: the concrete experience of applying classroom theory in community contexts may help students reorganize and consolidate prior learning, producing retrospective perceptions of improved understanding that register as 'improved academic performance' even when transcript grades have not changed. Švirg et al.'s six-year longitudinal study found that service-learning participants reported sustained perceived academic benefits well beyond the intervention year [8], consistent with a genuine consolidation effect. The cross-sectional design of the present study does not allow discrimination among these mechanisms.

The practical implication is the same regardless of mechanism. When 83.7% of students from a probabilistic random sample of a nursing program perceive their academic performance as improved following extension participation—and when faculty independently perceive student competency development at comparable levels—program administrators face a defensible evidential basis for retaining and expanding these activities. The evidence may not be causal, but it is multi-informant, generalizable to the program population, and consistent with the international literature. What it does not yet provide is the longitudinal data needed to determine whether perceived academic performance translates into objective improvements in certification examinations, clinical evaluations, or post-graduation practice quality. Generating that evidence is a concrete priority for future research.

5.3 Values Formation: The Relational Ceiling and the Social Justice Floor

The values findings open a more uncomfortable conversation. Empathy (18.6%), respect (18.0%), and responsibility (16.9%) together account for 53.5% of all student value endorsements—a compelling result that aligns with decades of service-learning research demonstrating that direct community contact consistently strengthens relational and ethical

awareness [1,3,20]. Students who spend time with stratum-1 community members managing chronic disease risk, navigating road injury, or confronting adolescent sexual health challenges are encountering the social texture of vulnerability in ways that classroom instruction cannot fully replicate. That empathy and respect emerge as the dominant value gains is precisely what Kolb's experiential learning framework would predict: concrete experience with human difference produces reflective observation of one's own relational responses.

Yet social justice was identified by only 2 students (1.2%). The gap between the top three values—all interpersonal, all relational—and the structural value at the bottom is not a measurement artifact. It reflects something real about how these projects are pedagogically designed. Kerkove and Culross described this pattern precisely in their integrative review of transformative learning and structural competency: community engagement reliably develops empathy toward individuals while leaving intact the structural frameworks—inequality, power, access—that produced those individuals' vulnerability in the first place [21]. Students learn to feel for the community member; they do not reliably learn to analyze the systemic conditions that made that community member's health situation what it is. Abiri et al. documented the same gap in the context of social determinants of health education: exposure alone does not produce structural competency; structured critical reflection, explicit SDOH curricula, and faculty facilitation of systemic analysis are required [7].

The practical implication for UPC's nursing program is direct. The projects as currently designed appear to develop the affective and interpersonal dimensions of professional formation effectively. The analytical and political dimensions—the capacity to identify structural determinants of health, advocate for systemic change, and situate individual patient experience within sociopolitical context—are not receiving adequate developmental attention. This is not a failure of student character; it is a curricular design gap. Addressing it would require embedding structured debriefing sessions, reflective journal protocols, and explicit social determinants of health frameworks into project activities [22,23], rather than relying on the encounter itself to generate critical consciousness. The fact that this program serves communities in stratum 1–2 of a department with documented health disparities makes the gap not just academically relevant but ethically consequential.

5.4 Community Reception and the Diagnostic Value of Project Heterogeneity

The community data present two analytically separable stories that should not be collapsed into a single verdict. For three projects—Muévete América,

Seguridad Vial, and Salud Sexual y Reproductiva—community reception is unambiguously positive: team performance global means of 4.49–4.59/5, recommendation rates of 93.8–100%, and behavior change intention rates of 91.1–96.6%. These figures are not inflated by a lenient scale: they emerge from a demographically heterogeneous census population spanning adults managing chronic disease risk, young people navigating road safety, and adolescents confronting sexual health decisions. The diversity of populations rating the same program consistently highly strengthens confidence that the observed pattern reflects genuine quality rather than social desirability or scale collapse.

Arte Enfermería presents a systematically different profile: global performance mean of 3.57, recommendation rate of 88.9%, behavior change intention rate of 88.9%—all significantly lower than the remaining three projects, with the chi-square analysis confirming that these between-project differences in behavior change intention are unlikely to reflect sampling variation alone ($\chi^2(3) = 8.42$, $p = .038$, Cramér's $V = .19$). Several explanatory mechanisms are plausible and cannot be ranked with the available data. Arte Enfermería is the youngest project in the portfolio (4–7 semesters vs. 14–36 for its peers); it serves a university-educated community with higher baseline knowledge and potentially more demanding evaluative standards; and it operates in the most conceptually ambitious domain—environmental health and sustainability through artistic expression—where the connection between activity and measurable behavior change may be less direct. The ANOVA finding that Seguridad Vial produced significantly higher community knowledge acquisition than SSR (mean difference = 0.34, $p = .04$, $\eta^2 = .04$) reinforces the conclusion that project-level implementation quality varies in ways that matter for community outcomes, even within a portfolio overseen by the same institutional program.

This heterogeneity is analytically valuable precisely because it prevents the interpretation that extension projects, as a category, produce uniform outcomes. Hodge, Cooper, and Richardson found that community engagement in nursing programs produced highly variable student experiences depending on placement quality and supervisor support [6]; the UPC data suggest that community-side outcomes are similarly variable, and that the source of variation is attributable to project-level factors rather than to the population served. The practical implication is that Arte Enfermería requires targeted review—of its activity structure, its pedagogical scaffolding, and its assessment mechanisms—rather than the uniform institutional response that aggregate satisfaction data would suggest is unnecessary.

5.5 The Structural Paradox: High Impact, Zero Financing, and the Limits of Dedication

The most consequential finding in this dataset has nothing to do with Likert scales. It is a binary fact: 88.9% of the extension projects that are producing these documented perceptions of educational and community impact receive no institutional funding whatsoever. Faculty members and students are financing the activities themselves. One project—Gestión en Salud—has secured external sponsorship from a government entity, representing the sole exception to a pattern of near-total institutional financial abandonment.

This finding requires contextualization to be fully understood. The literature on theory-practice integration in nursing education consistently identifies resource constraints and faculty workload as primary barriers to the effective implementation of community extension activities [19,24]. What is documented at UPC is not simply a resource constraint; it is the complete absence of institutional investment in activities that the institution's own regulatory documents—including CNA Factor 5 and the program's Educational Project—designate as core mission functions. The gap between the institutional rhetoric of social projection as a 'substantive function' and the institutional reality of zero budget allocation constitutes what the original draft's data correctly identified as an 'organizational anomaly' [25]. It is one thing for an institution to underfund extension activities; it is another to formally mandate them while providing no resources for their execution.

The international literature does not offer many precedents as extreme as this. Social accountability frameworks in higher education medical and nursing programs identify institutional commitment—demonstrated through budgetary allocation, curricular integration, and faculty recognition—as the primary predictor of long-term extension program quality and sustainability [26]. Faculty development programs that support extension implementation are consistently identified as enablers, while resource constraints and heavy workloads are identified as barriers [24]. The UPC data suggest that when these barriers are present at their most extreme—zero institutional resources—the activities survive only through the personal dedication of faculty who absorb costs that the institution should bear. This is not a model that scales, replicates, or survives personnel transitions. When the committed faculty member retires, transfers, or burns out, the project likely ends with them—regardless of how valued it is by students and communities.

The low faculty response rate (22%, $n = 9$ of 41) cannot be dismissed as a minor methodological inconvenience in this context. Nine faculty members participated; thirty-two did not. It is possible—perhaps

likely—that the nine who responded are among the most committed and engaged members of the faculty, biasing the sample toward a more positive account of faculty participation and alignment. The twenty-two percent of faculty responsible for the active portfolio of extension projects are demonstrably delivering high-perceived-impact work. But the seventy-eight percent who did not respond may represent a substantial body of faculty who are either not engaged in extension activities at all, or whose engagement is so peripheral that they did not consider themselves relevant participants. The financing finding and the participation finding together point toward the same structural reality: extension at UPC is carried by a small, self-funded, under-recognized minority of the faculty body. That the outcomes are as positive as they are is not an argument for maintaining this structure—it is a tribute to the people operating within it despite it.

5.6 Toward a Policy Response: What the Data Compel

Three policy directions follow directly from these findings, and they are presented in order of urgency. First, UPC must formalize institutional financial commitment to extension projects. The specific form this takes—dedicated line items in the program budget, competitive internal grants, faculty recognition credits, or cost-sharing agreements with community health institutions—is a matter for institutional negotiation. What is not negotiable, if the program intends to sustain accreditation-level quality and fulfill its stated social mission, is the continuation of a zero-investment model. Cress and Stokamer describe the formalization of institutional resource allocation as the single most determinative factor in whether service-learning transitions from a set of enthusiastic individual activities into a durable programmatic commitment [27]. The data from this study provide the empirical foundation for that institutional conversation.

Second, the values formation component of extension projects requires deliberate curricular redesign. The finding that social justice was endorsed by 1.2% of students while empathy was endorsed by 18.6% describes an educational outcome, not a student deficit. It describes a curriculum that develops affective responsiveness without developing structural analysis. Embedding reflective debriefing sessions, explicit social determinants of health frameworks, and structured critical dialogue into project activities—drawing on the SALT leadership model [28] and justice-oriented pedagogical approaches [22]—would address this gap without requiring major structural changes to the projects themselves.

Third, Arte Enfermería requires a structured review before it is scaled or continued in its current form. As

the only project with systematically lower community ratings across all evaluated dimensions, it represents either a design problem, a maturation problem, or a population mismatch. A focused evaluation—incorporating qualitative data from community participants, student activity logs, and faculty supervisor assessments—would distinguish among these explanations and generate specific recommendations. The other three projects provide a within-portfolio benchmark against which Arte Enfermería can be evaluated, making this a tractable diagnostic task rather than a speculative redesign exercise.

A final observation bears stating clearly before the Conclusion. This study is the first multi-stakeholder cross-sectional evaluation of nursing extension projects in a Colombian regional public university to be conducted with a probabilistic student sample, a full community census, and validated instruments. Its findings are specific to UPC and the department of Cesar. They cannot be generalized to other Colombian nursing programs, to other Latin American institutional contexts, or to university extension programs in different disciplinary fields. What can be generalized is the method: the three-estate stakeholder design, the multi-dimensional competency framework, and the integration of descriptive, psychometric, and inferential analyses provide a replicable evaluation architecture that other programs in similar regulatory and resource environments could adopt to generate the accreditation evidence that CNA Factor 5 currently demands but few programs actually produce.

CONCLUSION

This study produced the first empirical, multi-stakeholder assessment of the academic impact of social extension projects in the nursing program at the Universidad Popular del Cesar—a program that has operated these activities for nearly two decades without the systematic evidence that its own accreditation obligations and institutional mission require. Drawing on a probabilistic random sample of 172 students, a purposive faculty sample of 9, and a full census of 232 community beneficiaries across four concurrent projects, the study documented that perceived professional competency development, academic performance improvement, and community satisfaction are high and cross-informant-consistent; that project outcomes are meaningfully heterogeneous rather than uniform, with Arte Enfermería systematically underperforming its portfolio peers in ways that demand targeted institutional review; and that the program's extension function is sustained entirely through the personal financial dedication of a small cohort of faculty and students, with zero institutional budget allocation—a structural fragility

that places the entire achievement at perpetual risk of collapse. The co-existence of genuine educational and community value with near-total institutional financial abandonment is not a paradox that persistence alone can resolve. Formalizing institutional investment, redesigning the values formation component to address the documented social justice gap, and establishing longitudinal evaluation mechanisms are the concrete actions that would transform these findings from evidence of what is being achieved despite institutional structures into evidence of what could be achieved because of them.

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