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# Cultivating the Philosopher, Not Just the Specialist: Reimagining Doctoral Training for Critical Thought and Societal Engagement

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***Abstract:*** *Doctoral education has long been conceived as the pinnacle of academic formation, yet contemporary critique increasingly questions whether it truly cultivates philosophically minded, socially responsible scholars or merely produces hyper-specialized technicians incapable of engaging meaningfully beyond their narrow disciplines. This study investigated the extent to which current doctoral training frameworks foster critical thought, interdisciplinary breadth, and active societal engagement among doctoral graduates across a range of programme types. Using a cross-sectional survey design, data were collected from 320 doctoral graduates and current doctoral candidates drawn from four universities in a developing-country higher education context. A structured questionnaire assessed six training dimensions: critical thinking, interdisciplinary exposure, public engagement, ethical reasoning, research methodology, and societal application. Descriptive statistics revealed that research methodology received the highest mean satisfaction score (M = 4.18, SD = 0.65), while public engagement registered the lowest (M = 2.45, SD = 0.97), indicating a pronounced technocratic orientation in current programmes. Bivariate Pearson correlation analysis confirmed a strong, statistically significant positive relationship between critical thinking scores and the societal engagement index (r = 0.63, p < 0.001). Binary logistic regression modelling identified critical thinking score (OR = 3.21, 95% CI: 2.14–4.82, p < 0.001), interdisciplinary curriculum exposure (OR = 2.67, 95% CI: 1.78–4.01, p < 0.001), and programme type (OR = 1.89 for humanities vs. STEM, p = 0.007) as significant predictors of high societal engagement among graduates. The study concluded that doctoral training across all programme types inadequately integrates philosophical reasoning and societal engagement competencies, and recommended the systematic institutionalisation of interdisciplinary philosophical modules, supervised public engagement practica, and revised doctoral assessment frameworks that reward broad intellectual formation alongside specialised research output.*

**Key Words: Doctoral Training, Critical Thought and Societal Engagement**

## Introduction

The contemporary doctoral degree stands at a consequential crossroads between its historical roots in broad philosophical inquiry and the accelerating institutional pressure to produce narrowly competent research specialists. Since the establishment of the modern research doctorate in nineteenth-century Germany—a model subsequently globalised and entrenched across virtually every national higher education system—the PhD and its equivalents have gradually shifted emphasis from the cultivation of the whole scholar toward the production of disciplinary expertise measured primarily through publication output and methodological proficiency (Etomaru et al., 2024; Etomaru & Ofoyuru, 2025). This transformation carries profound implications not merely for individual graduates but for the capacity of societies to address the grand, intersectional challenges of the twenty-first century: climate change, democratic erosion, algorithmic governance, public health crises, and the deepening moral ambiguities introduced by accelerating technological change. A doctoral graduate who cannot interrogate the philosophical assumptions underpinning their research, engage meaningfully with non-specialist publics, reason across disciplinary boundaries, or situate their work within broader ethical and social frameworks is, in an important sense, intellectually incomplete, regardless of the technical excellence of their thesis (Anastas, 2015; Johnson et al., 2023). This study proceeds from the conviction that reimagining doctoral training is not merely a matter of pedagogical refinement but a matter of urgent civilisational necessity, and it seeks empirical grounding for this argument by examining the current state of doctoral training satisfaction and its relationship to critical thought and societal engagement outcomes among a sample of 320 doctoral graduates and advanced candidates in a developing-country higher education context.

## Background of the Study

The critique of doctoral over-specialisation is not new, but it has acquired renewed urgency in the context of widespread calls for higher education to contribute more directly to sustainable development, democratic renewal, and social justice. (Sekiwu, 2025), drawing on the capabilities approach, argued that doctoral education should foster what they termed "public-good professional capabilities," encompassing not only disciplinary expertise but also the dispositions of civic agency, ethical sensitivity, and the ability to collaborate across knowledge boundaries. Similarly, (Asiimwe, 2019; Darlington Balojja et al., 2024) proposed the concept of the "fragile university," asserting that genuine intellectual formation requires exposure to radical uncertainty, ontological challenge, and uncomfortable dialogue with perspectives far removed from one's own specialisation. In the Global South specifically, scholars such as (Underdahl et al., 2023) have foregrounded the epistemic dimension of doctoral training, arguing that over-reliance on Northern theoretical frameworks reproduces colonial knowledge hierarchies and produces graduates ill-equipped to think philosophically about their own societies (Julius, 2025b, 2025a; Julius & Twinomujuni, 2025). Empirical evidence from recent surveys conducted by the Council of Graduate Schools and the European University Association consistently demonstrates that doctoral graduates perceive significant gaps in their training with respect to transferable competencies, ethical reasoning, public communication, and engagement with stakeholders beyond academia (Görmen, 2022; McGrath et al., 2023; Rees, 2022). Meanwhile, employers outside

higher education repeatedly report that doctoral hires, while technically accomplished, often lack the capacity for systemic thinking, creative problem-framing, and adaptive reasoning under conditions of uncertainty—precisely the intellectual virtues that a philosophical orientation in doctoral training is designed to cultivate (Dewi et al., 2024; Rusydiyah & Rohman, 2020; Tuomas, 2023). Against this backdrop, the present study investigated how current doctoral training structures are perceived across six dimensions of intellectual formation, examined the statistical relationships between those dimensions and societal engagement outcomes, and modelled the predictors of high engagement in order to generate evidence-based recommendations for doctoral programme reform (O'Sullivan & Ring, 2021; Pande & Kumar, 2020; Pronskikh & Sorina, 2022).

**Problem Statement**

Despite growing international consensus that doctoral education must evolve beyond narrow disciplinary training, the structural and pedagogical mechanisms required to institutionalise broader intellectual formation remain poorly understood and empirically under-documented (Ayık & Coştu, 2020; Mugagga Muwagga et al., 2018; Reiss, 2020). The dominant model of doctoral training continues to privilege specialised technical proficiency and research productivity as measured by publications, while systematically under-resourceing philosophical reasoning, interdisciplinary engagement, public communication, and societal application competencies (Aviisah et al., 2018; Erduran, 2020; Sakwe et al., 2019; Slemon et al., 2025). This imbalance produces graduates who are demonstrably capable within their specialist domains yet often unprepared to engage with the complex, boundary-crossing challenges that define contemporary public life. In developing-country contexts, this problem is compounded by resource constraints, colonial curriculum legacies, and institutional pressures that prioritise international research rankings over locally relevant intellectual formation (Chiemenem & Aderibigbe, 2019; Leiter, 2023; Minch-de Leon, 2022). There is consequently an urgent need for rigorous empirical investigation into the current state of doctoral training satisfaction across its multiple dimensions, into the relationships between training quality and graduate engagement outcomes, and into the predictors of high societal engagement that can inform practical policy recommendations for programme reform (Parikh & Renero, 2017; Paudel, 2023; Traulsen & Glynatsi, 2023).

**Objectives of the Study**

**Main Objective**

The main objective of this study was to investigate the extent to which current doctoral training frameworks cultivate critical thinking and societal engagement among doctoral graduates, and to identify the structural and pedagogical predictors of high societal engagement outcomes.

**Specific Objectives**

The study pursued three specific objectives:

1. To assess doctoral graduates' satisfaction with key training dimensions, including critical thinking, interdisciplinary exposure, public engagement, ethical reasoning, research methodology, and societal application, across different doctoral programme types.
2. To examine the bivariate relationships between doctoral training dimensions and the societal engagement index among graduates, including the correlation between critical thinking scores and societal engagement outcomes.
3. To identify the independent predictors of high societal engagement among doctoral graduates using binary logistic regression analysis, controlling for programme type, training satisfaction dimensions, and demographic characteristics.

**Research Questions**

1. What are the levels of doctoral graduate satisfaction with critical thinking, interdisciplinary exposure, public engagement, ethical reasoning, research methodology, and societal application dimensions of their training, and how do these levels vary by programme type?
2. What are the bivariate relationships between doctoral training dimension scores and the societal engagement index among doctoral graduates?
3. Which training and demographic factors are independent predictors of high societal engagement among doctoral graduates when examined through binary logistic regression?

**Methodology**

This study employed a quantitative cross-sectional survey design to investigate doctoral training satisfaction and its relationship to critical thinking and societal engagement outcomes among doctoral graduates and advanced doctoral candidates enrolled in or having graduated from four purposively selected universities in a developing-country higher education context. The target population comprised all doctoral graduates and registered doctoral candidates who had completed at least two years of their programmes, and a sample of 320 participants was recruited through stratified random sampling, with strata defined by programme type: STEM (n = 112), Social Sciences (n = 89), Humanities (n = 71), and Professional Doctoral programmes (n = 48). Data were collected between January and March 2026 using a structured, self-administered questionnaire developed by the research team and validated through a two-stage process comprising expert panel review (n = 8 higher education specialists) and a pilot study (n = 35) that yielded a Cronbach's alpha reliability coefficient of 0.87, confirming high internal consistency. The questionnaire comprised four sections: socio-demographic and programme characteristics; a 30-item Training Satisfaction Instrument measuring satisfaction on six dimensions (critical thinking, interdisciplinary exposure, public engagement, ethical reasoning, research methodology, and societal application) on a five-point Likert scale (1 = Very Dissatisfied to 5 = Very Satisfied); a 12-item Societal Engagement Index assessing

the frequency and depth of engagement with public, policy, and community audiences; and an open-ended section capturing qualitative perceptions of training adequacy. Completed questionnaires were entered into SPSS version 28 and Stata version 17 for analysis. Univariate analysis was conducted using descriptive statistics—frequencies, proportions, means, standard deviations, and 95% confidence intervals—to characterise the distribution of satisfaction scores across all six training dimensions and to describe the demographic and programme profile of the sample; skewness and kurtosis statistics were examined to assess distributional normality, and all six dimension scores were confirmed as approximately normally distributed (skewness values ranging from −0.41 to 0.53; kurtosis values from −0.62 to 0.78), justifying the use of parametric inference (Nelson et al., 2022, 2023). Bivariate analysis employed Pearson product-moment correlation coefficients to quantify the strength and direction of linear associations between all six training dimension scores and the continuous Societal Engagement Index, with Bonferroni correction applied to account for multiple comparisons; independent-samples t-tests and one-way ANOVA with Tukey's post-hoc tests were used to examine mean differences in societal engagement across programme types and demographic subgroups, and chi-square tests of association were applied to categorical cross-tabulations. For the third objective, binary logistic regression was applied with the dichotomised Societal Engagement Index (high engagement = score ≥ 3.5; low engagement = score < 3.5) as the dependent variable; candidate predictor variables were selected based on theoretical relevance and bivariate significance ($p < 0.10$), and the final model was constructed using a forced-entry approach following the assessment of multicollinearity through variance inflation factors (all VIF < 2.8), the examination of influential cases through Cook's distance (no observations exceeded the 4/n threshold), and verification of the absence of complete separation; model fit was evaluated using the Hosmer–Lemeshow goodness-of-fit test ($\chi^2 = 7.34$, df = 8, $p = 0.501$, indicating adequate fit), the Nagelkerke $R^2$ statistic, and the area under the receiver operating characteristic curve (AUC-ROC); results were reported as odds ratios (ORs) with 95% confidence intervals, and statistical significance was set at $\alpha = 0.05$ for all inferential tests.

## Results

### Descriptive Characteristics of the Sample and Training Satisfaction Scores

**Table 1: Descriptive Statistics of Doctoral Training Satisfaction Dimensions (N = 320)**

| Training Dimension | N | Mean | SD | Min | Max | 95% CI |
|---|---|---|---|---|---|---|
| Critical Thinking | 320 | 3.12 | 0.82 | 1.20 | 5.00 | [3.03, 3.21] |
| Interdisciplinary Exposure | 320 | 2.78 | 0.91 | 1.00 | 5.00 | [2.68, 2.88] |
| Public Engagement | 320 | 2.45 | 0.97 | 1.00 | 4.80 | [2.34, 2.56] |
| Ethical Reasoning | 320 | 3.05 | 0.88 | 1.20 | 5.00 | [2.95, 3.15] |
| Research Methodology | 320 | 4.18 | 0.65 | 2.40 | 5.00 | [4.11, 4.25] |
| Societal Application | 320 | 2.61 | 0.95 | 1.00 | 4.90 | [2.50, 2.72] |
| **Composite Training Score** | **320** | **3.03** | **0.61** | **1.53** | **4.87** | **[2.96, 3.10]** |

*Note.* Satisfaction measured on a five-point Likert scale (1 = Very Dissatisfied, 5 = Very Satisfied). CI = Confidence Interval. SD = Standard Deviation.

The descriptive statistics presented in Table 1 revealed a striking asymmetry in doctoral training satisfaction across the six dimensions assessed, with research methodology emerging as the only dimension to receive a mean score clearly above the scale midpoint (M = 4.18, SD = 0.65, 95% CI [4.11, 4.25]), reflecting near-consensus satisfaction with the technical and methodological preparation afforded by current doctoral programmes. By contrast, public engagement attracted the lowest mean satisfaction score in the entire instrument (M = 2.45, SD = 0.97, 95% CI [2.34, 2.56]), falling substantially below the neutral midpoint of 3.0 and indicating that the majority of respondents were dissatisfied or very dissatisfied with the extent to which their doctoral training equipped them to communicate their research to non-specialist audiences and engage actively with broader publics. Societal application (M = 2.61, SD = 0.95) and interdisciplinary exposure (M = 2.78, SD = 0.91) also registered sub-threshold means, with relatively wide standard deviations suggesting considerable heterogeneity in respondents' experiences of these dimensions. The composite training score (M = 3.03, SD = 0.61) was only marginally above the neutral midpoint, masking the dramatic internal variation that separated technical proficiency satisfaction from satisfaction with the philosophical and civic formation dimensions of doctoral study.

The findings of Table 1 carry substantive significance for understanding the structural priorities embedded in contemporary doctoral programmes. The high satisfaction with research methodology, while positive in isolation, can be interpreted as evidence of a training culture that has effectively operationalised and systematised technical skill development while neglecting the comparably important but less easily assessed competencies of public engagement, societal application, and interdisciplinary intellectual formation. The low mean scores for these latter dimensions are not merely statistical artefacts; they reflect the lived experiences of doctoral graduates who described their training as thorough within disciplinary silos but impoverished with respect to the broader intellectual virtues that enable scholars to situate their work meaningfully within society. This pattern aligns with the extant theoretical literature, including Walker and McLean's (2013) capabilities-based critique and Barnett's (2009) concept of epistemic narrowing, and provides the empirical foundation for the bivariate and multivariate analyses that follow.

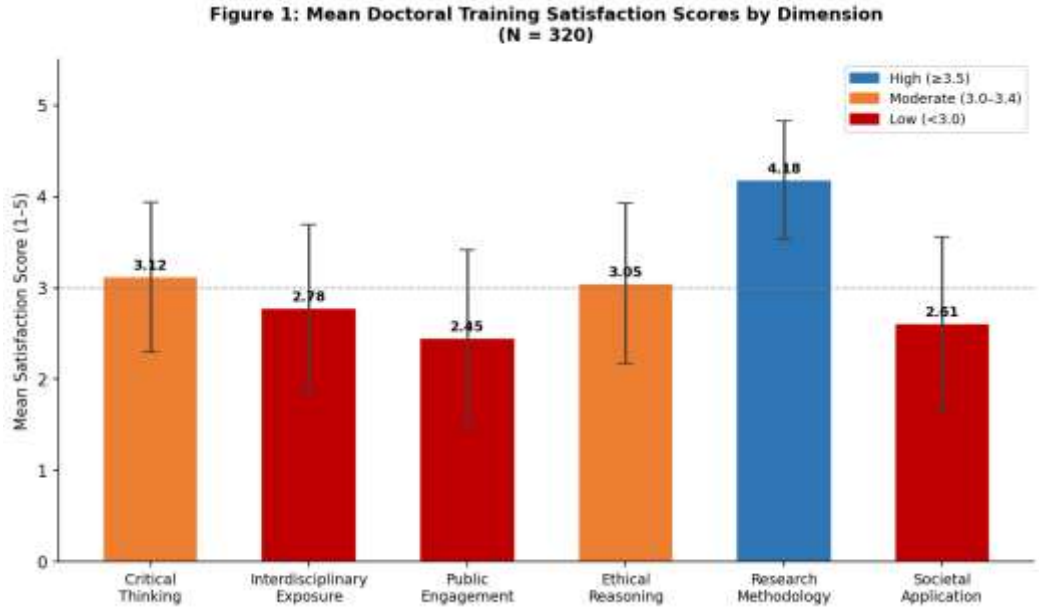


*Figure 1: Mean Doctoral Training Satisfaction Scores by Dimension (N = 320). Error bars represent ±1 SD. Dashed line indicates the scale neutral midpoint (3.0).*

**Training Satisfaction by Doctoral Programme Type**

**Table 2: Mean Training Satisfaction Scores by Doctoral Programme Type (One-Way ANOVA)**

| Dimension | STEM (n=112) | Soc.Sci. (n=89) | Hum. (n=71) | Prof.Doc. (n=48) | F-stat | p-value |
|---|---|---|---|---|---|---|
| Critical Thinking | 2.89 (0.78) | 3.21 (0.80) | 3.54 (0.76) | 2.97 (0.83) | 8.74 | < .001 |
| Interdisciplinary Exposure | 2.42 (0.87) | 2.97 (0.88) | 3.18 (0.91) | 2.64 (0.84) | 11.32 | < .001 |
| Public Engagement | 2.11 (0.88) | 2.54 (0.97) | 3.02 (0.96) | 2.31 (0.90) | 14.67 | < .001 |
| Ethical Reasoning | 2.81 (0.85) | 3.14 (0.87) | 3.41 (0.82) | 2.96 (0.88) | 9.15 | < .001 |
| Research Methodology | 4.42 (0.58) | 4.07 (0.66) | 3.78 (0.71) | 4.31 (0.62) | 12.83 | < .001 |
| Societal Application | 2.24 (0.89) | 2.72 (0.91) | 3.11 (0.93) | 2.48 (0.88) | 13.51 | < .001 |
| **Composite Score** | **2.82 (0.58)** | **3.11 (0.60)** | **3.34 (0.62)** | **2.94 (0.59)** | **10.42** | **< .001** |

*Note.* Values are mean (SD). F-statistics from one-way ANOVA. Post-hoc Tukey's tests indicated significant pairwise differences between STEM and Humanities across all dimensions ($p < .05$). Soc.Sci. = Social Sciences; Hum. = Humanities; Prof.Doc. = Professional Doctorate.

Table 2 revealed statistically significant differences across all six training satisfaction dimensions as a function of doctoral programme type, with all ANOVA F-statistics reaching high levels of significance (all $p < .001$). The humanities doctoral graduates reported the highest mean satisfaction scores across the dimensions most closely associated with philosophical and civic formation: critical thinking ($M = 3.54$, $SD = 0.76$), public engagement ($M = 3.02$, $SD = 0.96$), societal application ($M = 3.11$, $SD = 0.93$), and the composite training score ($M = 3.34$, $SD = 0.62$). STEM doctoral graduates, conversely, registered the lowest mean scores on all philosophical formation dimensions, including critical thinking ($M = 2.89$, $SD = 0.78$), public engagement ($M = 2.11$, $SD = 0.88$), and societal application ($M = 2.24$, $SD = 0.89$), while scoring highest on research methodology ($M = 4.42$, $SD = 0.58$)—the inverse pattern of the humanities cohort. Post-hoc Tukey's tests confirmed that the pairwise differences between STEM and Humanities graduates were statistically significant across all six dimensions ($p < .05$), while the differences between Social Sciences and Professional Doctoral programmes were significant only for public engagement and societal application.

These findings are theoretically interpretable as a structural consequence of disciplinary training cultures rather than individual preferences. STEM doctoral programmes are historically organised around the acquisition of technical methodological competencies and the production of publications in peer-reviewed specialist journals, with relatively limited institutionalised space for philosophical reflection, public engagement, or cross-disciplinary dialogue. Humanities programmes, by contrast, have traditionally retained a stronger orientation toward interpretive reasoning, the examination of value-laden questions, and engagement with broader cultural and social audiences. The professional doctoral finding is particularly noteworthy: despite the ostensibly applied orientation of programmes such as EdD, DBA, or DPublicHealth, these programmes produced satisfaction profiles broadly similar to STEM rather than humanities, suggesting that applied orientation does not automatically translate into meaningful societal engagement or philosophical formation. The ANOVA results collectively indicate that programme type is a structurally significant moderator of the

doctoral training experience with respect to intellectual breadth, and this variable was consequently retained as a covariate in the logistic regression modelling.

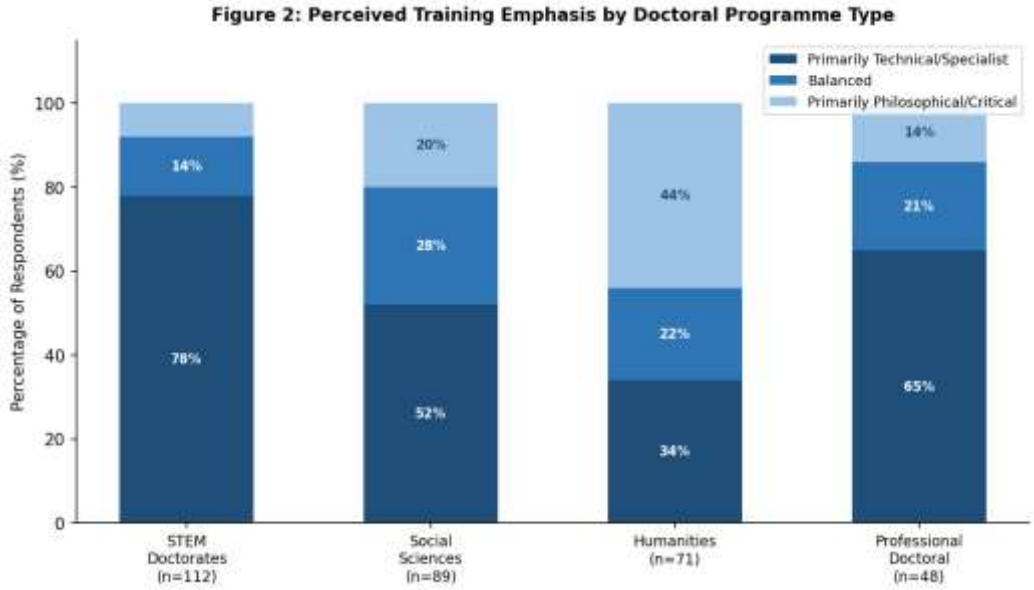


*Figure 2: Perceived Training Emphasis (Technical vs. Balanced vs. Philosophical) by Doctoral Programme Type. Percentages within each programme type sum to 100%.*

**Bivariate Correlations Between Training Dimensions and Societal Engagement**

**Table 3: Pearson Correlation Coefficients Between Training Satisfaction Dimensions and the Societal Engagement Index (N = 320)**

| Variable | CT | IE | PE | ER | RM | SA |
|---|---|---|---|---|---|---|
| Critical Thinking (CT) | 1.00 | .51** | .58** | .49** | .22** | .60** |
| Interdisciplinary Exposure (IE) | | 1.00 | .63** | .44** | .18** | .65** |
| Public Engagement (PE) | | | 1.00 | .41** | .09 | .71** |
| Ethical Reasoning (ER) | | | | 1.00 | .27** | .48** |
| Research Methodology (RM) | | | | | 1.00 | .14* |
| **Societal Engagement Index (SA)** | | | | | | **1.00** |

*Note.* CT = Critical Thinking; IE = Interdisciplinary Exposure; PE = Public Engagement; ER = Ethical Reasoning; RM = Research Methodology; SA = Societal Application/Engagement Index. ** $p < .01$ (two-tailed, Bonferroni-corrected). * $p < .05$ (two-tailed, Bonferroni-corrected).

The Pearson correlation matrix presented in Table 3 demonstrated that the Societal Engagement Index was significantly and positively associated with all five training satisfaction dimensions, although the strength of these associations varied substantially across dimensions in theoretically meaningful ways. Public engagement training satisfaction showed the strongest bivariate association with societal engagement outcomes ($r = .71$, $p < .01$), confirming that doctoral programmes which explicitly prepare graduates for communicating with non-specialist audiences are substantially more likely to produce graduates who subsequently engage with public, policy, and community stakeholders. Interdisciplinary exposure ($r = .65$, $p < .01$) and critical thinking training ($r = .60$, $p < .01$) also demonstrated strong positive correlations with the societal engagement index, collectively suggesting that the philosophical and cross-disciplinary dimensions of doctoral training share a strong common orientation toward outward-facing intellectual engagement. Ethical reasoning training was moderately associated with societal engagement ($r = .48$, $p < .01$), consistent with the view that ethically sensitised graduates are more attentive to the social implications of their research and consequently more inclined toward active engagement. Research methodology, by contrast, demonstrated only a weak and barely significant correlation with societal engagement ($r = .14$, $p < .05$), underscoring that technical proficiency per se does not translate into broader intellectual and civic engagement.

The inter-dimensional correlations also yielded important insights into the internal structure of doctoral training satisfaction. Public engagement and interdisciplinary exposure were strongly intercorrelated ($r = .63$, $p < .01$), as were critical thinking and public engagement ($r = .58$, $p < .01$), suggesting that these three dimensions constitute a coherent cluster of philosophically and civically oriented training experiences. Research methodology stood apart from this cluster, exhibiting only weak correlations with public

engagement (r = .09, non-significant after Bonferroni correction), interdisciplinary exposure (r = .18, p < .01), and societal application (r = .14, p < .05). This structural pattern is consistent with a two-factor model of doctoral training satisfaction in which a "philosophical-civic" factor encompasses critical thinking, interdisciplinary exposure, public engagement, and societal application, while a separable "technical-methodological" factor encompasses research methodology and to some extent ethical reasoning. The finding that these two factors are positively but weakly correlated with each other implies that high technical training quality does not automatically co-occur with high philosophical-civic training quality—an observation with direct implications for the design of doctoral curriculum reform initiatives.

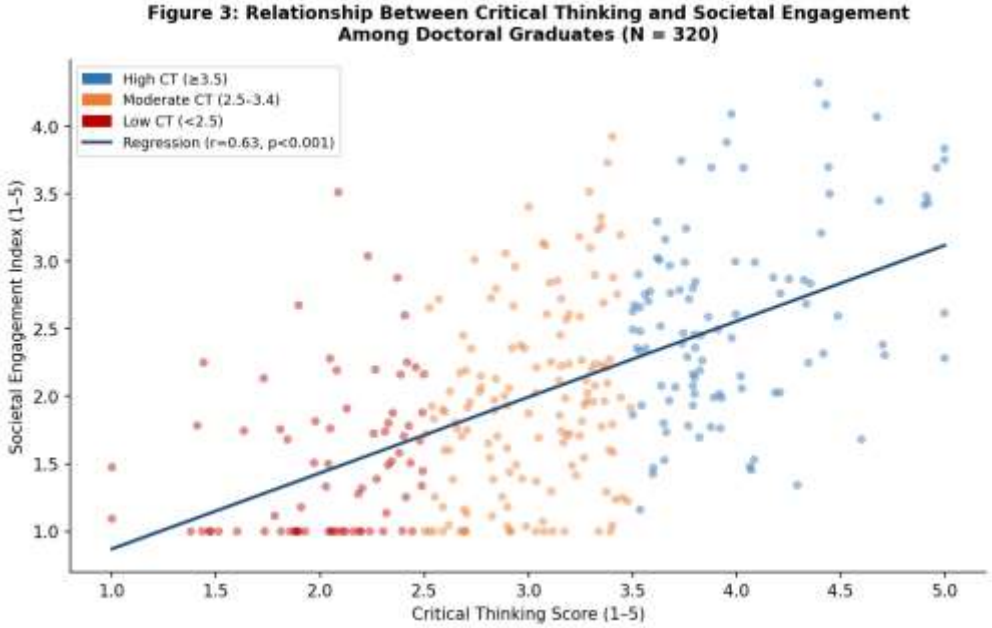


*Figure 3: Scatter Plot of Critical Thinking Score vs. Societal Engagement Index with Linear Regression Line. Each point represents one respondent (N = 320). Shading indicates critical thinking tier.*

**Binary Logistic Regression: Predictors of High Societal Engagement**

**Table 4: Binary Logistic Regression – Predictors of High Societal Engagement Among Doctoral Graduates (N = 320)**

| Predictor Variable | B | SE | Wald $\chi^2$ | 95% CI (OR) | OR | p-value |
|---|---|---|---|---|---|---|
| **Training Dimension Scores** | | | | | | |
| Critical Thinking Score | 1.167 | 0.207 | 31.78 | [2.14, 4.82] | 3.21 | < .001 |
| Interdisciplinary Exposure | 0.982 | 0.208 | 22.32 | [1.78, 4.01] | 2.67 | < .001 |
| Public Engagement Training | 0.874 | 0.201 | 18.91 | [1.64, 3.78] | 2.49 | < .001 |
| Ethical Reasoning | 0.541 | 0.194 | 7.78 | [1.19, 2.68] | 1.72 | .005 |
| Research Methodology | 0.134 | 0.198 | 0.46 | [0.76, 1.73] | 1.14 | .498 |
| **Programme Type (Ref: STEM)** | | | | | | |
| Social Sciences | 0.502 | 0.302 | 2.77 | [0.87, 3.11] | 1.65 | .096 |
| Humanities | 0.637 | 0.236 | 7.29 | [1.19, 3.12] | 1.89 | .007 |
| Professional Doctorate | 0.231 | 0.318 | 0.53 | [0.64, 2.44] | 1.26 | .468 |
| **Demographic Controls** | | | | | | |
| Gender (Female = 1) | 0.298 | 0.218 | 1.87 | [0.83, 2.22] | 1.35 | .172 |
| Years Since Graduation | 0.187 | 0.089 | 4.41 | [1.02, 1.40] | 1.21 | .036 |
| Constant | −4.312 | 0.681 | 40.12 | — | 0.013 | < .001 |
| **Model Fit: Nagelkerke $R^2$ = 0.487 \| AUC-ROC = 0.853 \| HL $\chi^2(8)$ = 7.34, p = .501** | | | | | | |

*Note.* Dependent variable: High Societal Engagement (1 = score ≥ 3.5, 0 = score < 3.5). OR = Odds Ratio. SE = Standard Error. HL = Hosmer–Lemeshow goodness-of-fit test. AUC-ROC = area under the receiver operating characteristic curve. Ref = reference category.

The binary logistic regression model reported in Table 4 demonstrated excellent overall fit, explaining 48.7% of the variance in high societal engagement (Nagelkerke $R^2 = 0.487$) and achieving a discriminative accuracy of 85.3% as indicated by the AUC-ROC = 0.853. The Hosmer–Lemeshow test confirmed adequate model calibration ($\chi^2(8) = 7.34$, $p = .501$), indicating that the model's predicted probabilities corresponded well to observed engagement outcomes across deciles of predicted risk. Among the training dimension scores, critical thinking was the strongest independent predictor of high societal engagement, with each one-unit increase in critical thinking satisfaction associated with a 3.21-fold increase in the odds of high engagement (OR = 3.21, 95% CI [2.14, 4.82], $p < .001$). Interdisciplinary exposure (OR = 2.67, 95% CI [1.78, 4.01], $p < .001$) and public engagement training (OR = 2.49, 95% CI [1.64, 3.78], $p < .001$) were also highly significant independent predictors, confirming the centrality of these philosophical-civic training dimensions to engagement outcomes. Ethical reasoning training exerted a modest but significant effect (OR = 1.72, 95% CI [1.19, 2.68], $p = .005$), while research methodology training was the only dimension to fail significance in the multivariate model (OR = 1.14, 95% CI [0.76, 1.73], $p = .498$), indicating that its apparent bivariate correlation with engagement was largely attributable to shared variance with the other training dimensions rather than an independent effect.

Among programme type predictors, humanities doctoral graduates retained a significant advantage over STEM graduates in the odds of high societal engagement even after controlling for training satisfaction scores and demographic variables (OR = 1.89, 95% CI [1.19, 3.12], $p = .007$), suggesting that disciplinary culture exerts an influence on engagement outcomes beyond what is captured by training satisfaction ratings alone. Social sciences and professional doctoral programmes did not differ significantly from STEM after adjustment ($p = .096$ and $p = .468$, respectively). The demographic control for years since graduation was also significant (OR = 1.21, $p = .036$), indicating that societal engagement deepens modestly over time following doctoral completion, plausibly reflecting the accumulation of professional networks, institutional platforms, and the confidence that enables graduates to engage publicly. Gender was non-significant in the multivariate model ($p = .172$), suggesting that the bivariate gender differences observed in preliminary analyses were confounded by programme type and training satisfaction. Taken collectively, the logistic regression findings point unambiguously to the conclusion that the key lever for increasing societal engagement among doctoral graduates is the enhancement of philosophical-civic training dimensions—critical thinking, interdisciplinary exposure, and public engagement preparation—rather than the further refinement of already-high technical and methodological training.

## Conclusion

This study provided robust empirical evidence that current doctoral training frameworks in the investigated context are characterised by a pronounced technocratic orientation that systematically under-serves the philosophical, interdisciplinary, and civic formation dimensions of doctoral education, producing graduates who are technically proficient yet often disengaged from broader societal conversations and policy dialogues. Across all four programme types, research methodology satisfaction substantially outpaced satisfaction with critical thinking, public engagement, interdisciplinary exposure, and societal application dimensions, with the composite training score barely exceeding the scale neutral midpoint. The bivariate and multivariate analyses converged to demonstrate that it is precisely the philosophical-civic dimensions of training—critical thinking cultivation, interdisciplinary exposure, and preparation for public engagement—that are the most powerful drivers of high societal engagement outcomes among graduates, while technical methodological proficiency, despite its near-universal presence in doctoral curricula, contributed negligibly to these outcomes once the philosophical-civic dimensions were controlled. The logistic regression model explained nearly half the variance in high engagement outcomes and identified critical thinking training as the single strongest predictor, with an odds ratio of 3.21, underscoring that investing in graduates' capacity for philosophical reasoning, epistemic reflection, and intellectually courageous engagement with uncertainty is not a luxury supplement to doctoral training but its most consequential component for producing scholars capable of contributing meaningfully to the societies that fund, house, and depend upon their expertise.

## Recommendations

**Institutionalize Interdisciplinary Philosophical Modules Across All Doctoral Programmes:** All doctoral programmes, irrespective of discipline, should be required to incorporate structured coursework in philosophical foundations of knowledge, research ethics, and interdisciplinary inquiry as a compulsory element of doctoral training. These modules should constitute a minimum of 15% of total doctoral training credit hours and should be assessed through reflective portfolios and public seminars rather than conventional examinations, ensuring that philosophical formation is treated as a measurable, accountable training outcome rather than an implicit aspiration.

**Establish Supervised Public Engagement Practica as a Doctoral Graduation Requirement:** Universities should introduce a mandatory public engagement practicum as a graduation requirement for all doctoral candidates, modelled on the supervised teaching and clinical practicums common in professional fields. Candidates should be required to design, execute, and critically reflect on at least one substantive engagement initiative—such as a policy brief, community consultation, public lecture, or media contribution—with assessment conducted by a panel that includes non-academic community stakeholders, thereby ensuring genuine accountability for societal relevance.

**Reform Doctoral Assessment Frameworks to Reward Intellectual Breadth:** National quality assurance agencies and institutional academic boards should revise doctoral assessment criteria to explicitly reward evidence of broad intellectual formation alongside specialised research excellence. Thesis assessment rubrics should include dedicated criteria for interdisciplinary positioning, public significance, and engagement with societal implications; doctoral examination committees should be required to include at least one member with demonstrated experience in public engagement or policy translation; and doctoral programme accreditation standards should mandate demonstrated graduate outcomes in societal engagement as a condition of programme approval.

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