

**INVESTIGATING DIMENSIONS OF HOLISTIC EDUCATION: A
NEUROCOGNITIVE STUDY OF VALUES, EMPATHY, AND
MINDFULNESS**

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**NATIONAL RESOURCE CENTRE FOR VALUE EDUCATION IN ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY DELHI**

JULY 2025

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INVESTIGATING DIMENSIONS OF HOLISTIC EDUCATION: A
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by

Mannu Brahma

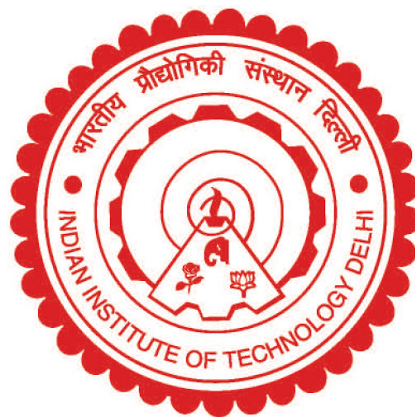
National Resource Center for Value Education in Engineering

Submitted

in fulfillment of the requirements for the degree of

Doctor of Philosophy

to the



INDIAN INSTITUTE OF TECHNOLOGY DELHI

JULY 2025

CERTIFICATE

This is to certify that the thesis titled “**Investigating Dimensions of Holistic Education: A Neurocognitive Study of Values, Empathy, and Mindfulness**”, being submitted by **Mr. Mannu Brahma** to the Indian Institute of Technology Delhi for the award of the degree of **Doctor of Philosophy**, is a bona fide record of the research work done by him under my supervision.

The research work in this thesis has not been submitted in part or whole to any other university or institute for the award of any degree or diploma.

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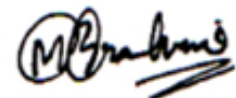
Indian Institute of Technology Delhi

ACKNOWLEDGEMENTS

Embarking through the doctoral expedition was quite a challenging, enlightening, and humbling experience. Without the help, wishes, and direction of many individuals and systems, this journey would not have been feasible. I would especially like to express my gratitude towards my family for their constant support on this voyage. I sincerely thank my doctoral committee members, Prof. Rahul Garg, Prof. Varsha Singh, and Prof. Kamlesh Singh, for their invaluable academic support. Likewise, I also owe a great deal of thanks to Prof. Greeshma Sharma for her priceless suggestions and recommendations regarding my research. Besides, I sincerely appreciate the efforts of non-teaching, administrative, and caretaking staff at IIT Delhi for offering first-rate lab facilities and infrastructure that let the present research be conducted. My thanks also go to the gymkhana facilities for providing me warmth and comfort during the enduring periods of stress and pressure.

I want to express my heartfelt gratitude to all the volunteers in my studies. Special thanks to Ms. Sadaf Haleem Khan, Mr. Yash Chakarvarty, Mr. Dushyant Soni, Mr. Abhishek Rajpurohit, and Mr. Abhijeet Kujur among colleagues. Additionally, I thank our lab interns, Ms. Riya Jain, Ms. Gautami Suresh, Ms. Alma Ali, Ms. Shreya Sarkar, and Ms. Sutapa Goswami, for their honest support and cooperative research efforts. Last but not least, there aren't enough words to express my gratitude for the experimental gadgets and academic resources I relied upon in my studies. Above all, I owe a great deal to Prof. Jyoti Kumar, my PhD supervisor; his relentless care, attention, knowledge, and support enhanced not only my research performance but also my perspective on existence itself. Despite the successful completion of the project, I do think I could have learned more and done greater justice to everyone around me and the known-unknown facets of life in general, albeit long to go for what I seek as a student of science.

Date: 23-07-2025



Mr. Mannu Brahma

ABSTRACT

In contemporary education, there is a growing emphasis on holistic learning approaches. The holistic education goals of integrating intellectual, emotional, physical, social, aesthetic, and spiritual dimensions of learning are the universal needs of education today. The vision is consistent with the current educational policies, including the National Education Policy (NEP-2020) and the United Nations Sustainable Development Goal 4.7. Informed thus by the national and international policy-making aimed towards holistic education, a need to identify the dimensions of holistic education and examine their interrelationships within the Indian context was recognized. Holistic education dimensions, viz. empathy, mindfulness, compassion, and critical inquiry, were identified and substantiated based on a systematic literature review. The thesis aimed to study the mutual relationships amongst identified holistic education dimensions, utilizing a healthy novice meditator adult students sample.

Nine studies subsequently examined the interrelationships among trait/state mindfulness, trait empathy, trait/state arithmetic proficiency (proxying critical inquiry), and compassionate values traits. All the social-behavioral self-report questionnaires administered were subjected to sample- and literature-based reliability-validity evaluation, ensuring the robustness of the findings. Millisecond-precise chronometric cognitive measures and a neurobehavioral examination utilizing a breath-focus meditation intervention were employed to study the state aspects of arithmetic proficiency and novice mindfulness, respectively. Principal findings included the explication of Batson's 'Empathy-Altruism Hypothesis', implicating the role of both affective- and cognitive-empathy traits in fostering altruistic compassionate trait values. Further, the thesis rejected amongst Indian novice meditators the 'Mindful-Altruism Hypothesis' in favor of a 'Mindful-Autonomy Paradox'. Besides, an 'Empathic Affectfulness' effect was observed, indicating the positive and negative association of perspective-taking and personal-distress, respectively, with novice mindfulness traits. Also, novice state mindfulness demonstrated antagonistic neurobehavioral associations with empathetic traits. The thesis concluded with a mindfulness-empathy-compassion integrated trait framework, highlighting the association of mindfulness traits with compassionate altruistic values mediated-moderated via empathic traits. Therefore, emphasizing mindfulness-boosting pedagogical interventions to foster empathy, compassion, and mindfulness. Overall, the findings offer to serve as an empirical aid for Indian educators towards the integration of examined holistic education dimensions onto the ubiquitous classroom practices.

सार

समकालीन शिक्षा में, समग्र शिक्षण परिप्रेक्ष्य पर अधिक जोर दिया जा रहा है। सीखने के बौद्धिक, भावनात्मक, शारीरिक, सामाजिक, सौंदर्यात्मक, और आध्यात्मिक आयामों को एकीकृत करने के समग्र शिक्षा लक्ष्य आज शिक्षा की सार्वभौमिक आवश्यकताएं हैं। यह दृष्टिकोण राष्ट्रीय शिक्षा नीति (एनईपी-2020) और संयुक्त राष्ट्र सतत विकास लक्ष्य 4.7 सहित वर्तमान शैक्षिक नीतियों के भी अनुरूप है। इस प्रकार समग्र शिक्षा के उद्देश्य से राष्ट्रीय और अंतर्राष्ट्रीय नीति-निर्माण द्वारा सूचित, समग्र शिक्षा के आयामों की पहचान करने और भारतीय संदर्भ में उनके अंतर्संबंधों की जांच करने की आवश्यकता को अभिज्ञात किया गया। तत्पश्चात, समग्र शिक्षा के आयामों, अर्थात् समानुभूति, सचेतनता, करुणा, और आलोचनात्मक जांच की पहचान की गई, और व्यवस्थित साहित्य समीक्षा के आधार पर उन्हें प्रमाणित किया गया। कुलमिलाकर, इस शोध प्रबंध का उद्देश्य एक स्वस्थ नौसिखिया ध्यानकर्ता वयस्क छात्रों के जनसंख्या नमूना का उपयोग करते हुए पहचाने गए समग्र शिक्षा आयामों के बीच आपसी संबंधों का अध्ययन करना था।

तदंतर, नौ अध्ययनों द्वारा इस शोध प्रबंध में शीलगुणात्मक/अवस्थात्मक सचेतनता, शीलगुणात्मक समानुभूति, शीलगुणात्मक/अवस्थात्मक अंकगणितीय कुशलता (आलोचनात्मक जांच प्रतिनिधियात्मक), और करुणात्मक मूल्यों के लक्षणों के बीच आयामों की जांच की गई। विशेषतः, उपयोगित सभी सामाजिक-व्यवहारिक स्व-रिपोर्ट प्रश्नावलियों को नमूना- और साहित्य-आधारित विश्वसनीयता-वैधता मूल्यांकन के अधीन किया गया, जिससे निष्कर्षों की मजबूती सुनिश्चित हुई। इसके अतिरिक्त, मिलीसेकंड-सटीक कालानुक्रमिक संज्ञानात्मक उपाय और एक श्वास-केंद्रित ध्यान हस्तक्षेप का उपयोग करते हुए एक व्यवहारिक-तंत्रिका परीक्षा को, क्रमशः अंकगणितीय कुशलता और नौसिखिया सचेतनता के अवस्थात्मक पहलुओं का अध्ययन करने के लिए नियोजित किया गया था।

प्रमुख निष्कर्षों में बैटसन की 'समानुभूति-परहितवाद प्रकल्पना' की प्रमाणिकता शामिल थी, जो परहितवादी करुणात्मक मूल्यों को बढ़ावा देने में भावात्मक- और संज्ञानात्मक-समानुभूति दोनों लक्षणों की भूमिका को निहित करती है। इसके अलावा, शोध प्रबंध ने भारतीय नौसिखिया ध्यानकर्ताओं के बीच 'सचेतन-स्वायत्तता विरोधाभास' के पक्ष में 'सचेतन-परहितवाद प्रकल्पना' को प्रयोगसिद्ध अस्वीकृत किया। तदंतर, एक 'समानुभूत-भावलीनता प्रभाव' देखा गया, जिसमें नौसिखिया सचेतन लक्षणों के साथ, क्रमशः परिप्रेक्ष्य लेने और व्यक्तिगत-तनाव के सकारात्मक और नकारात्मक संबंध का संकेत देता है। इसके अलावा, नौसिखिया अवस्थात्मक सचेतनता ने समानुभूतिपूर्ण लक्षणों के साथ विरोधी व्यवहार-तांत्रिक संगठन का प्रदर्शन किया। एक 'शीलगुणात्मक सचेतनता-समानुभूति-करुणा एकीकृत ढांचे' के साथ शोध प्रबंध का समापन हुआ, जिसमें समानुभूतिपूर्ण लक्षणों के माध्यम से मध्यस्थता-संग्रमता किए गए परहितवादी करुणात्मक मूल्यों के साथ सचेतनता लक्षणों के जुड़ाव पर प्रकाश डाला गया। वस्तुतः, समानुभूति, करुणा, और सचेतनता को बढ़ावा देने के लिए सचेतनता बढ़ाने वाले शैक्षणिक हस्तक्षेपों पर जोर देना अनिवार्य है। कुल मिलाकर, प्रस्तुतित शोध-निष्कर्ष भारतीय शिक्षकों के लिए सर्वव्यापी कक्षा प्रथाओं में जांचे गए समग्र शिक्षा आयामों के एकीकरण की दिशा में एक संख्यात्मक अनुभवजन्य सहायता के रूप में काम करते हैं।

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LIST OF ABBREVIATIONS AND TERMINOLOGIES

NEP	National Education Policy. The education policy developed by the Government of India.
SDG	Sustainable Development Goals. A set of goals put forth by the United Nations for a better and sustainable future.
UNESCO-MGIEP	United Nations Educational, Scientific, and Cultural Organization (UNESCO)'s Mahatma Gandhi Institute of Education for Peace and Sustainable Development.
AICTE	All India Council for Technical Education. A statutory body and a national-level council in India responsible for technical education, under the Department of Higher Education, Ministry of Education.
ISEE	International Science and Evidence-based Assessment. An initiative by UNESCO-MGIEP to reform educational practices through evidence-based research.
SEL	Socio-emotional Learning. The educational method through which individuals learn and apply a set of social, emotional, and related skills.
OECD	Organization for Economic Co-operation and Development.
CASEL	Collaborative for Academic, Social, and Emotional Learning.
MELQO	Measuring Early Learning Quality and Outcomes.
MODEL	Measure of Development and Early Learning.
NESET	Network of Experts on the Social Dimension of Education and Training.
SEAD	Social, Emotional, Academic Development. A framework based on SEL.
S-ART	Self-Awareness, -Regulation, & -Transcendence.
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analysis.
LIBRE/EMC²	A curriculum framework that fosters whole-brain learning, the key components of it being Empathy, Mindfulness, Compassion, and Critical Inquiry.
SLR	Systematic Literature Review.
IIT	Indian Institute of Technology. A group of autonomous public technical and research universities in India.
ICMR	Indian Council of Medical Research.
WEIRD	White, Educated, Industrialized, Rich, Democratic.
STEM	Science, Technology, Engineering, and Mathematics. Refers to a broad educational and professional discipline encompassing these four interconnected fields.
EEG	Electroencephalography. A test that records postsynaptic potentials in the brain.
ERP	Event-Related Potential. A measured brain response that is directly linked to a specific sensory, cognitive, or motor event.

EFA	Exploratory Factor Analysis. A statistical technique used to uncover latent factors that are difficult to observe or measure directly.
PCA	Principal Component Analysis. A statistical technique used for dimensionality reduction in data analysis.
KMO	Kaiser-Meyer-Olkin Measure of Sampling Adequacy. A statistic used to assess the suitability of data for factor analysis.
CFA	Confirmatory Factor Analysis. A statistical method used to confirm the structure and relationships between observed and latent variables in a hypothesized model.
ESEM	Exploratory Structural Equation Modelling. A statistical technique that combines exploratory factor analysis (EFA) and confirmatory factor analysis (CFA).
CFI	Confirmatory Fit Index. A statistical measure that evaluates the fit of a proposed model to the observed data.
TLI	Tucker-Lewis Index. A goodness-of-fit measure that evaluates model fit by comparing the chi-square value of the proposed model to that of a null model.
RMSEA	Root Mean Square Error of Approximation. A goodness-of-fit statistic that measures how well a model approximates the data.
CI	Confidence Interval. A range derived from sample data that likely contains the true population parameter with a given probability.
AIC	Akaike Information Criterion. A statistic that evaluates model fit by balancing goodness-of-fit with complexity.
BIC	Bayesian Information Criterion. A measure that evaluates model fit by balancing goodness-of-fit with a stronger penalty for model complexity.
df	Degrees of Freedom. The number of independent values or quantities that can vary in an analysis without violating constraints.
IRI	Interpersonal Reactivity Index. A self-report questionnaire used to measure empathy.
PT	Perspective Taking. A scale of the IRI that evaluates the capacity to understand others' psychological perspectives in daily life.
EC	Empathetic Concern. A scale of the IRI that assesses concern expressed for others' well-being.
PD	Personal Distress. A scale of the IRI that measures discomfort experienced in response to others' distress.
FS	Fantasy. A scale of the IRI that measures one's emotional involvement in fictional works.
AE	Affective Empathy. A variable that is a combination of PD and EC demonstrating empathetic concern for others' emotions and well-being.
CE	Cognitive Empathy. A variable that combines FS and PT, entailing emotional understanding and cognitive empathy skills.

OE	Other-oriented Empathy. A variable that is a combination of PT and EC, prioritizing empathy for others' emotions and perspectives.
SE	Self-oriented Empathy. A variable that is a combination of FS and PD indicating a self-centered reaction to others' distress rather than empathetic concern.
TE	Trait Empathy. A variable within the study that the IRI measures.
PVQ-RR	Revised Portrait Value Questionnaire. An instrument used to measure the sub-dimensions of values based on Schwartz's Theory of Basic Values.
STRA	Self Transcendence. A higher-order value quadrant that reflects altruism and empathy.
SENH	Self Enhancement. A higher-order value quadrant that focuses on ambition and authority.
OP2C	Openness to Change. A higher-order value quadrant that highlights independence and creativity.
CONS	Conservation. A higher-order value quadrant that is driven by a desire for order and predictability.
SDI	Self Direction. One of the basic ten values that reflects a desire for independence and autonomy.
STI	Stimulation. One of the basic ten values and a narrowly defined value that values excitement and novel life experiences.
HED	Hedonism. One of the basic ten values and a narrowly defined value that prioritizes seeking pleasure and enjoyment in life.
ACH	Achievement. One of the basic ten values and a narrowly defined value that emphasizes the desire for mastery and competence.
POW	Power. One of the basic ten values that entails having authority over others and possessing wealth.
SEC	Security. One of the basic ten values that embraces safety and stability.
CONF	Conformity. One of the basic ten values that values adherence to norms.
TRA	Tradition. One of the basic ten values and a narrowly defined value that highlights maintaining customs and traditional practices.
BEN	Benevolence. One of the basic ten values that reflects concern for others' welfare.
UNI	Universalism. One of the basic ten values that emphasizes justice and equality for all people.
SDT	Self-Direction Thought. A narrowly defined value that values forming independent thoughts and opinions.
SDA	Self-Direction Action. A narrowly defined value that emphasizes making autonomous decisions.
POD	Power Dominance. A narrowly defined value that entails having influence over the actions of others.
POR	Power Resources. A narrowly defined value that highlights the possession of wealth.
FAC	Face. A narrowly defined value that entails protecting one's public image.
SEP	Security Personal. A narrowly defined value that emphasizes personal safety.
SES	Security Societal. A narrowly defined value that focuses on the stability of society.

CIR	Conformity Rules. A narrowly defined value that prioritizes adherence to rules and laws.
CIP	Conformity Interpersonal. A narrowly defined value that values avoiding conflict.
HUM	Humility. A narrowly defined value that entails modesty.
UNN	Universalism Nature. A narrowly defined value that values environmental protection.
UNC	Universalism Concern. A narrowly defined value that prioritizes social justice and equality.
UNT	Universalism Tolerance. A narrowly defined value that values acceptance of diversity.
BEC	Benevolence Care. A narrowly defined value that entails caring for loved ones.
BED	Benevolence Dependability. A narrowly defined value that values being trustworthy and reliable.
FFMQ	Five Facet Mindfulness Questionnaire. A self-report tool used to assess mindfulness in individuals across five dimensions.
OBS	Observing. One of the dimensions of FFMQ that indicates a heightened awareness of present-moment experience.
DES	Describing. One of the dimensions of FFMQ that focuses on the ability to articulate one's thoughts and actions.
AA	Acting with Awareness. One of the dimensions of FFMQ that reflects a strong presence and focus on the self.
NJ	Non-Judgment of Inner Experience. One of the dimensions of FFMQ that measures one's reactivity towards internal experiences.
NR	Non-Reactivity to Inner Experience. One of the dimensions of FFMQ that assesses one's responses to inner states.
TMIND	Trait Mindfulness. A variable within the study measured by FFMQ and is understood as a combination of the facets of FFMQ.
BFI	Big Factors Inventory. A self-report questionnaire that assesses personality along five factors.
EX	Extraversion. One of the factors of BFI that includes being energetic and lively.
AG	Agreeableness. One of the factors of BFI that involves being helpful and considerate.
CT	Conscientiousness. One of the factors of BFI that involves being responsible and meticulous.
N'	Reverse Neuroticism. One of the factors of BFI that has been reversed to represent emotional stability.
OC	Openness to Experience. One of the factors of BFI that refers to being creative and unconventional.
ARSQ	Amsterdam Resting-State Questionnaire. A self-report questionnaire used to assess an individual's resting-state experience.
DOM	Discontinuity of Mind. One of the experiences assessed by ARSQ that is marked by busy thoughts and restlessness.
TOM	Theory of Mind. One of the experiences assessed by ARSQ that includes thinking about others.
SLF	Self Dimension. One of the experiences assessed by ARSQ that involves introspection.
PLN	Planning. One of the experiences assessed by ARSQ that includes thoughts pertaining to task completion and contemplation.
SLP	Sleepiness. One of the experiences assessed by ARSQ that is characterized by feelings of tiredness and sleepiness.

CMF	Comfort Dimension. One of the experiences assessed by ARSQ that comprises feelings of comfort, relaxation, and happiness.
SOA	Somatic Awareness. One of the experiences assessed by ARSQ that entails thoughts about health and consciousness of the body.
SMIND	State Mindfulness. A variable within our study measured by ARSQ and is understood as the presence of CMF and SOA in the absence of other experiences.
EA	Empathetic Affectfulness. The capacity to recognize and comprehend others' emotions in a situation while maintaining emotional balance, is facilitated by mindfulness and denoted by PT-PD.
GEN X STEM	Gender-STEM Interaction. The effect of the interaction between gender and STEM-based academic choices.
CWL	Cognitive Workload. The mental effort required to perform a task, reflecting how much cognitive resource is needed to manage and process information.
RS	Resting State. The first stage of Breath-Awareness meditation intervention, involves resting close-eyed to relax and unwind.
BC	Breath Counting. The second stage of Breath-Awareness meditation intervention, which involves counting breath cycles to initiate Breath Focus.
BF	Breath Focus. The third stage of Breath-Awareness meditation intervention, which involves focusing solely on breathing without counting the cycles.
BCF	Breath Counting Feedback. Likert scale-based self-report of their breath counts, breath confidence, distract count, and breath feeling post-BC. Devised by the author.
OCC	Occipital Region. Part of the brain responsible for processing visual information.
PFC	Prefrontal Cortex. Region of the brain associated with higher-order cognitive functions such as decision-making, planning, and social behavior.
DMN	Default Mode Network. A network of brain regions active during resting-states and associated with ruminative thinking.