

Problem Based Learning (PBL) in Medical Education: Perspectives from Modern and Ayurvedic Psychology.

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ABSTRACT

In clinical education, problem-based learning (PBL) is becoming more widely acknowledged as a cognitive reform that aligns teaching methods with current neuroscience on higher-order cognitive processes and brain function. PBL activates brain areas related to reasoning, memory integration, and adaptive decision-making by having students work through actual clinical challenges in small, self-directed groupings. With the help of this model, medical students can translate theoretical ideas into clinically relevant comprehension, developing their ability to analyze patient narratives, interpret symptoms, and apply information in real-world medical settings. PBL changes the role of the educator from that of a knowledge provider to that of a facilitator who directs inquiry, fosters metacognitive development, and provides focused feedback that enhances clinical judgment. It also necessitates a setting rich in resources and variety of teaching-learning instruments. This article's integration of PBL with the Indian mind and consciousness is one of its distinctive features. The inquiry-oriented structure of PBL is naturally complemented by Indian cognitive traditions, which emphasize holistic attention, introspective awareness, and intuitive understanding. By encouraging more in-depth reflection, ethical awareness, and integrative thinking, this synthesis positions PBL as a teaching strategy that both satisfies the requirements of contemporary medical education and connects with India's philosophical tradition. This article's objective is to examine contemporary PBL in clinical and medical education in relation to the Indian mind and awareness..

Keywords: Neuroscience, Cognitive function, Mind, Consciousness, Problem-Based Learning.

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INTRODUCTION

Through teaching pupils to think critically, reason, and ask questions, ancient Greek philosophers like Socrates and Plato established the groundwork for inquiry-based learning. Francis Bacon carried on this tradition's development by emphasizing inductive reasoning and methodical observation, which influenced contemporary scientific thought. Problem-oriented learning was further developed in the twentieth century by prominent educational psychologists [1]. John Dewey emphasized experience-based learning and the value of "learning by doing" through his pragmatic and functionalist viewpoint. Abraham Flexner supported integrated, practice-oriented medical education, while Carl Rogers,

a representative of humanistic psychology, supported self-directed learning. Karl Popper added the realization that problem-driven research and hypothesis testing are how knowledge advances [2,3].

The formal adoption of Problem-Based Learning (PBL) in medical education began with McMaster University in 1969 and Maastricht University in 1974, both stressing small-group, self-directed learning founded in real clinical problems. Simultaneous advances in educational learning theories showed how the brain's adaptive functioning changes with age and experience. These theories acknowledged how children arrange and classify information and how behaviourist perspectives

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from Watson and B.F. Skinner emphasized learning as reactions to stimuli in organized contexts. They were indirectly impacted by neuroscience [1,4].

The Indian mind and consciousness tradition offers a distinctive framework for understanding learning, cognition, and intellectual growth [5,6,7]. Rooted in diverse Indian knowledge systems—including *Ayurveda*, *Mantra Yoga*, *Hatha Yoga*, *Patanjali's Ashtanga Yoga*, and *the Shaiva, Natha, and Siddha schools of Tantra-Yoga*—this tradition places strong emphasis on mindfulness, regulated nostril breathing, and the disciplined practices of *mudra*, *bandha*, and other *yogic* techniques. Unlike purely analytical Western models, the Indian perspective views knowledge as an integrated and experiential process shaped by reflection, inner awareness, and mindful observation. Foundational concepts such as *viveka* (discernment), *dhyana* (focused attention), and *sahaj bodh* (intuitive insight) illustrate how learners harmonize cognitive, emotional, and experiential dimensions to cultivate deeper understanding. This holistic orientation provides a meaningful basis for connecting problem-based learning with culturally rooted modes of inquiry that value self-reflection, ethical sensitivity, and experiential engagement, thereby enriching modern clinical education [8].

The current study looks at Problem-Based Learning (PBL) as a cognitive reform in clinical education, emphasizing how its tenets fit with Indian traditions of mind and consciousness [2,9,10]. This study investigates how the PBL's small-group, self-directed, problem-oriented format improves clinical reasoning by immersing students in authentic medical situations while also connecting with India's contemplative and integrated approaches to knowledge. This work is significant because it attempts to connect contemporary educational neuroscience with culturally grounded cognitive practices, providing a framework that may improve medical students' reflective thinking, ethical sensitivity, experiential understanding, and deeper cognitive engagement. This study demonstrates a significant avenue for improving clinical training in the Indian context by fusing ideas from Indian philosophical systems—such as mindfulness, disciplined awareness, and intuitive understanding—with modern PBL techniques. The objective of this article is to analyse and interpret the modern PBL model in clinical and medical education through its potential integration with the Indian mind and consciousness.

MATERIALS AND METHODS

This review adopted a descriptive-analytical method to explore Problem-Based Learning (PBL) as a cognitive reform in higher education, focusing on Indian perspectives on mind and consciousness. Literature from 2000–2024 was gathered through Google Scholar, Scopus, and Web of Science using targeted keywords related to PBL, cognitive development, Indian psychology, and consciousness studies. Peer-reviewed articles, policy documents, and conceptual papers were screened for relevance and theoretical contribution. The selected sources were examined descriptively and analysed thematically to identify recurring cognitive, cultural, and pedagogical patterns shaping the role of PBL in contemporary higher education.

THEORETICAL REVIEW

Problem Based Learning Integration with the Modern Psychology

Problem-Based Learning (PBL) is an instructional approach that shifts the focus from traditional lecture-based teaching to student-driven learning. Instead of passively absorbing information, students engage with real-world problems that require critical thinking, collaboration, and independent research [11]. Problem-Based Learning (PBL) is a teaching method in which complex real-world problems are used as the vehicle to promote student learning of concepts and principles as opposed to direct presentation of facts and concepts. In addition to course content, PBL can promote the development of critical thinking skills, problem-solving abilities, and communication skills. It can also provide opportunities for working in groups, finding and evaluating research materials, and life-long learning [12]. PBL is mostly used to teach small groups of students; it develops and combines the knowledge acquisition style with development of specific skills and attitudes. PBL helps students to understand the relevance of underlying scientific knowledge and principles of clinical practices by exploring first-hand experience. PBL theory is termed as an information processing approach to learning. It is different from traditional teaching approaches in many aspects. It encourages students to use self-directed learning skills which are generally not found in traditional teaching-learning processes and provides opportunities to analyse a given clinical scenario, identify and rank the most important learning objectives related to it. It helps students to gather additional information necessary to effectively address those objectives [13].

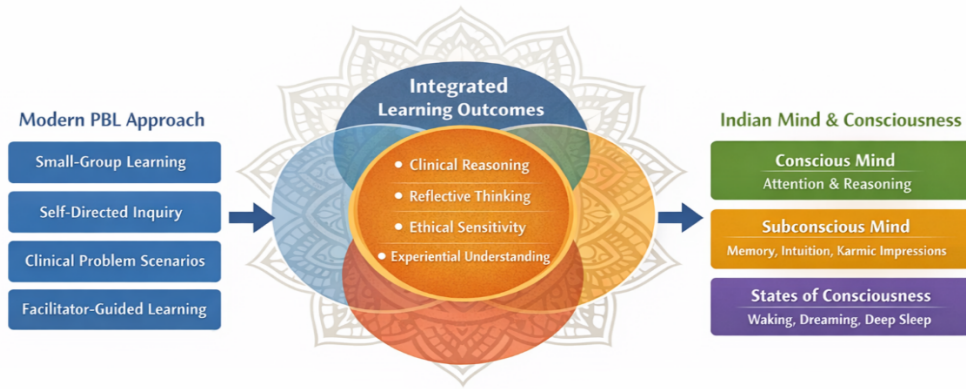


Figure 1: Integrative framework of PBL demonstrates how contemporary PBL elements interact with layers of the Indian mind and consciousness to provide experiential awareness, ethical sensitivity, clinical reasoning, and reflective thinking.

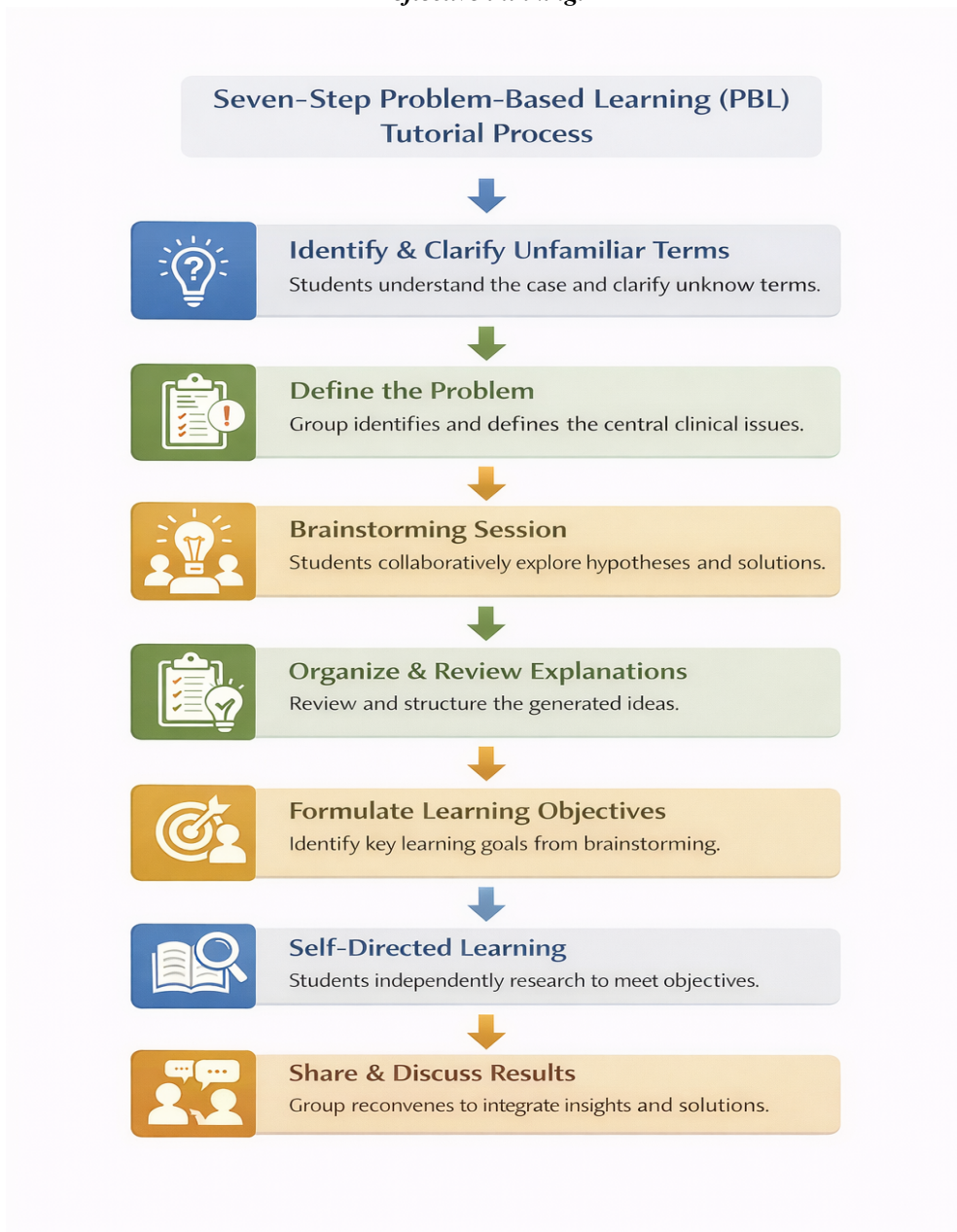


Figure 2: The seven-step Problem-Based Learning (PBL) method in clinical education demonstrates student-centered, cooperative, and self-directed learning.

Key features of Problem Based Learning (PBL)

- **Active Learning:** PBL encourages independent, self-directed learning where students take responsibility for their education. In PBL students take charge of their learning, teacher or instructor only guide them time by time. Students do their project or work based on their previous knowledge and current understanding [14].
- **Group Collaboration:** Students work in small groups to develop skills in teamwork, communication, and problem-solving. When students get aware with the problem, they start working on the concern problem together. A small group of student starts searching for new and innovative ways or solutions to their proposed problem by helping each other, considering each other suggestions and feedback. Students improve their communication skill by doing practical cases, critical thinking power and problem solving skills of students get enhances by practicing the real and practical hands on experience on the present cases [15].
- **Integration of Knowledge:** Clinical scenarios help students understand how scientific principles apply to real-world medical practice. When a non-experience student takes PBL session and then go for practical case, He or She will not find they unaware of the situation provided to them. PBL help students to take theory in practical scenario and apply the concept and understanding into their practical [16].
- **Structured Process:** The seven-jump" model outlines a step-by-step method for PBL tutorials. Students follow the seven step process of PBL to get better tutorial understanding. Staring from situational awareness to identifying key problems then working together to solve the cases , Student make their ways for learning being active and curious .student follow step by step process to get authentic, applicable and practical knowledge of the presented case to them [17].
- **Curriculum Design:** PBL requires adjustments in staffing, assessment methods, and learning resources to be effective. Example in medical curriculum courses, the syllabus and curriculum are now included more of practical method of teaching comparing to traditional lecture based teaching. Curriculum has been set as per fix time and a fix chapter in which student will be taught in their practical teaching method requiring more resources and teaching learning tools [18].
- **Assessment & Evaluation:** Traditional assessments may not fully capture PBL's benefits, but students tend to retain knowledge better. Direct measurement cannot be done in PBL method but the outcome of this method can be seen in the application level of the students.

How fearlessly the student faces all the new cases and problem can be seen in the practical scenario [19].

- **Student-Centered:** Learners take responsibility for their education by exploring problems and seeking solutions [20].
- **Problem-Driven:** Learning begins with a complex, open-ended problem rather than predefined content [21].
- **Self-Directed Inquiry:** Instead of receiving direct answers, students research and develop their own solutions [22].
- **Facilitator Role:** Instructors act as guides rather than lecturers, helping students navigate their learning process. Teachers only give direction to their students by providing valuable feedback on their projects. [9].

Process of Problem Based Learning (PBL)

The Problem-Based Learning (PBL) tutorial process involves a structured, student-centered approach to learning in seven steps:

- **Identify and clarify unfamiliar terms:** Group of student generally gets aware of the case or clinical scenario that works as a trigger point for learning. After getting introduced to the clinical case, students get to know the basic term, concepts or information they do not know and understand before. The main aim of this step is to collaboratively identify these unknown terms. By group work or group sharing, student tries to solve these unidentified and unknown term by using their previous knowledge or context clues [14,17].
- **Define the problem:** After the case is understood, group start working together to define and clear the central problem. Having a different opinion, students may differ in their interpretation of the case scenario. After discussion with logical reasoning and negotiation technique, student reaches to clear and relevant clinical issues from complex information [16,21].
- **Brainstorming session:** This step involve collaborative discussion of student to explore possible explanation for the problem identified. Students use their previous knowledge to make hypotheses, theories and technique that can clear the situation. It is an open ended process which create active participation, critical thinking and encourages creativity among students. Then the students try to identify their learning gap which letter help them to create their learning environment and setting learning goals [9,15].
- **Organize and review explanation:** Students review problems and idea that were created during brainstorming session and started using their thought process in a tentative solutions.

Students move from unstructured discussion to a more suitable and structured understanding of the problem [17,19].

- **Formulating learning objectives:** after discussion and debate students reach to organized discussion and a tentative solution. Students create specific learning objectives that need to solve the problem. These learning objectives are independent and clearly defined. It is focused and related to problem. The learning objectives are achievable with time-boundation. It is more comprehensive to explain important concepts. Teacher makes sure that the learning objectives are related to curriculum [14,18].
- **Self-directed learning:** students take responsibility of their own learning by self-directed learning. Students gather information by different means of sources to find and meet their learning objectives which were earlier set by the group. This promotes individuality and responsibility for their one's learning [20,22].
- **Share and discuss study results:** students meet and share their insight and knowledge. They compare their learning resources and clear their doubts and integrate their learning to create a better understanding of the case [4,21].

Problem Based Learning Integration with the Indian Mind and Consciousness

Integrating Problem-Based Learning (PBL) with the Indian mind and consciousness tradition provides a holistic and culturally grounded perspective for strengthening cognitive development in clinical education. Indian philosophy views the individual mind

as a multi-layered system linking neurobiological brain processes with deeper dimensions of subtle consciousness [7,10,23]. The conscious mind reflects moment-to-moment awareness shaped by neurochemical activity, while transitional states—dreaming and deep sleep—restore *pranic* energy and emotional equilibrium. Beyond these layers lies the subconscious mind, regarded as the core of psychological identity and the repository of karmic impressions from present and past experiences. The surface, deep and dark layers influence behavioural patterns, emotional states, stress responses, and psychosomatic manifestations. This framework suggests that learning is not limited to rational cognition alone but is shaped by deeper, often silent, mental processes [24,25].

PBL aligns naturally with this multidimensional model because it engages learners at both conscious and subconscious levels [9,10,26]. Through analysing clinical scenarios, questioning assumptions, collaborating in small groups, and integrating theoretical knowledge with real-life practice, students activate conscious reasoning while also drawing upon intuitive insights, reflective awareness, and experiential memory stored in the subconscious. When PBL is complemented with Indian practices such as mindful breathing, focused attention (*dhyana*), and disciplined self-regulation, it may enhance neurochemical balance—supporting dopamine, serotonin, and melatonin activity—and thereby strengthen emotional resilience, attention stability, and decision-making. This integrated approach offers a promising avenue for future medical education: a learning model that is cognitively rigorous, culturally resonant, and therapeutically aligned with the holistic functioning of the Indian mind and consciousness [8,27].

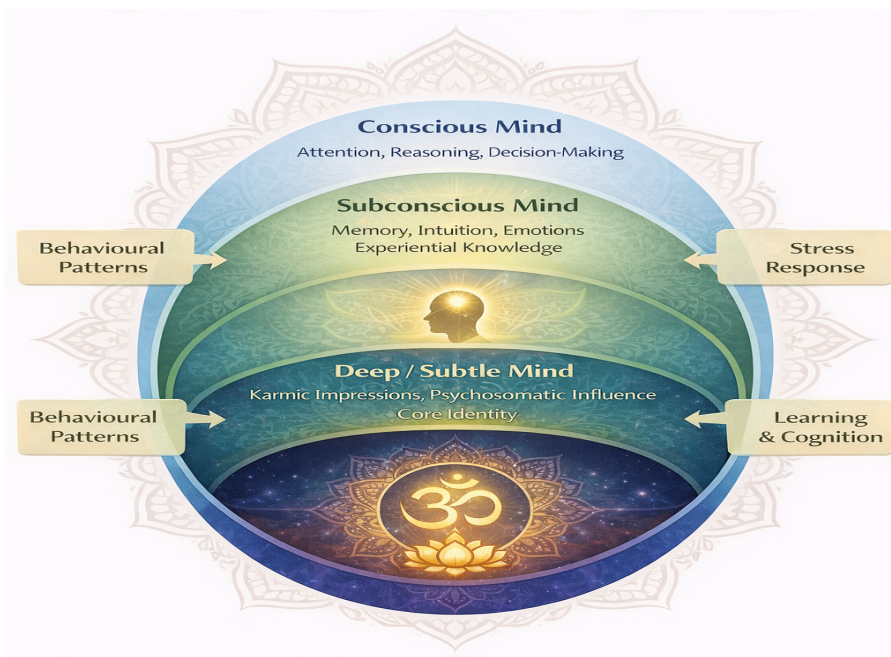


Figure 3: A multi-layered model of the Indian mind, consciousness, and Ayurveda that illustrates how the conscious, subconscious, and deep/subtle layers affect learning, behaviour, emotions, and stress response.

DISCUSSION

Problem-Based Learning as a Learner-Centered Pedagogical Reform

Problem-Based Learning (PBL) has emerged as a significant learner-centered pedagogical approach that promotes critical reasoning, self-directed inquiry, and clinical competence in medical education. A growing body of systematic reviews and meta-analyses suggests that PBL positively influences multiple learning outcomes compared with traditional lecture-based methods. Evidence indicates that while gains in factual knowledge may be similar across instructional models, Problem-Based Learning (PBL) is consistently associated with enhanced clinical competence, greater learner engagement, and higher student satisfaction, reflecting deeper cognitive processing rather than surface-level memorization [28,29].

Cognitive and Educational Foundations of PBL

The educational value of PBL is strongly supported by constructivist learning theory, which emphasizes that knowledge is actively constructed through engagement with meaningful problems rather than passively received. Research has demonstrated that PBL facilitates the development of higher-order cognitive skills such as analysis, synthesis, evaluation, and application—capacities essential for effective clinical reasoning [30]. By requiring learners to integrate prior knowledge with new information while solving authentic clinical problems, PBL promotes the formation of robust cognitive schemas and long-term knowledge retention.

PBL and Clinical Competence Development

In the context of clinical education, Problem-Based Learning (PBL) serves as a powerful approach for preparing students to navigate the complexities of real-world medical practice. Meta-analytical evidence suggests that PBL strengthens clinical reasoning, problem-solving ability, communication skills, and self-directed learning across medical and nursing education contexts [31]. Integrated instructional approaches combining PBL with case-based learning have further demonstrated improvements in theoretical understanding and practical competence, underscoring the adaptability of PBL to diverse curricular designs [32].

Contextual and Institutional Factors Influencing PBL Effectiveness

Despite its pedagogical strengths, the effectiveness of PBL depends significantly on contextual and structural factors within educational institutions. Successful implementation requires trained facilitators, adequate learning resources, alignment with curriculum objectives, and assessment strategies that capture higher-order learning outcomes. Variations in faculty expertise, institutional support, and assessment design have been identified as key challenges influencing PBL outcomes, emphasizing that pedagogical quality is as critical as instructional philosophy [29].

Integration of PBL with Indian Perspectives on Mind and Consciousness

When examined through the lens of Indian traditions of mind and consciousness, Problem-Based Learning (PBL) demonstrates strong conceptual alignment [33]. Indian psychological and philosophical systems emphasize holistic cognition, reflective awareness, ethical sensitivity, and experiential knowledge [33,34]. These principles resonate closely with PBL's emphasis on inquiry, collaboration, self-reflection, and contextual understanding [29]. While contemporary neuroscience explains learning through neural networks and information process [35], Indian cognitive traditions underscore the integration of conscious reasoning with deeper reflective and intuitive processes, thereby offering a complementary framework for understanding learning.

Implications for Holistic Medical Education

Integrating Indian contemplative concepts—such as disciplined attention, mindful reflection, and intuitive discernment—into PBL may enhance emotional regulation, attentional stability, and ethical sensitivity among medical learners [36,37]. Although empirical research on this integrative approach remains limited, the conceptual synergy between PBL and Indian cognitive frameworks indicates a promising direction for the development of culturally grounded and cognitively holistic models of medical education [33].

Summary and Future Directions

In summary, existing evidence supports Problem-Based Learning (PBL) as an effective instructional approach that enhances clinical competence, critical thinking, and learner engagement in medical education [29,31]. Its alignment with principles of active learning and contextual problem-solving resonates with both contemporary educational theory and traditional Indian perspectives on cognition and awareness [33,35]. Future research should prioritize empirical evaluation of culturally integrated PBL models and examine their influence on reflective thinking, ethical decision-making, and long-term professional competence across diverse educational contexts.

CONCLUSION

Studying Problem-Based Learning (PBL) as a transformational cognitive reform in clinical education and investigating its potential for meaningful integration with Indian mind and consciousness traditions are the main goals of this study. In order to improve clinical reasoning and professional competence, the goal is to examine how India's holistic cognitive approaches—such as mindfulness, reflective awareness, and intuitive understanding—align with PBL's inquiry-driven, self-directed, and experiential learning framework. Future directions for this work include creating PBL frameworks that are culturally sensitive, incorporating Indian psychology and yoga techniques that improve cognitive flexibility and attention, and creating medical curricula that strike a balance between scientific instruction and hands-on reflection. More research is needed to evaluate learning outcomes in various clinical settings, investigate empirically how Indian consciousness-based practices

affect neurocognitive processes in PBL, and determine how these integrated models affect medical students' long-term decision-making, empathy, and patient-centred care.

Limitations

This review is conceptual in nature and does not include empirical or experimental data, which may limit the generalizability of its interpretations. The proposed integration of problem-based learning with Indian perspectives on mind and consciousness is primarily theoretical and requires empirical validation in clinical educational settings. In addition, variations in study design and contextual differences across the reviewed literature may influence the transferability of the findings.

Author Contributions

Ms. Sangeeta Singh conducted the literature search and contributed to data collection and the initial drafting of the manuscript. Mrs. Kanchan Chauhan contributed to the conceptualization of the study and assisted in manuscript preparation. Dr. Manoj Kr Singh Chauhan contributed to the study design, supervision, and critical revision of the manuscript. Prof. Chandra Shekhar Pandey provided expert guidance, validated the scientific content, and critically reviewed the manuscript. All authors reviewed and approved the final manuscript and agree to be accountable for all aspects of the work.

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DECLARATION

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Ethical Approval: This study did not involve human participants or animals; therefore, ethical approval was not required.

Use of Artificial Intelligence: A language model-based tool was used solely for language refinement and editorial assistance. No artificial intelligence tools were used for data generation, analysis, or interpretation.

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