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Learning Styles among Bachelor of Physiotherapy (BPT) Students: A Scoping Review

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ABSTRACT:

Background: Learning styles are frequently explored in health professions education to enhance instructional effectiveness; however, their applicability in Physiotherapy education remains debated.

Objective: To map and synthesize evidence on learning style preferences among Bachelor of Physiotherapy (BPT) students and evaluate implications for teaching and learning.

Methods: A scoping review was conducted following PRISMA-ScR guidelines. Electronic databases (PubMed, Google Scholar, and Cochrane Library) were searched up to December 2025. Studies assessing learning styles among undergraduate Physiotherapy students were included. Data were charted and synthesized narratively.

Results: Thirty studies were included. Findings consistently indicate a predominance of active and experiential learning preferences among BPT students, particularly converger and assimilator profiles based on Kolb's Experiential Learning Theory. Kinesthetic and multimodal preferences were also widely reported using VARK. However, substantial heterogeneity exists in assessment tools, and evidence linking learning styles to academic or clinical performance remains inconclusive.

Conclusion: While BPT students demonstrate a tendency toward active and experiential learning, current evidence does not support exclusive reliance on learning-style-based instruction. Multimodal and adaptive teaching strategies are recommended. Further high-quality research is required, particularly in low- and middle-income settings and clinical education contexts.

1. Introduction

Physiotherapy education, particularly at the undergraduate level such as the Bachelor of Physiotherapy (BPT), requires students to master a diverse set of competencies encompassing theoretical knowledge, psychomotor skills, clinical reasoning, and professional behaviours. As a result, pedagogical approaches in Physiotherapy programs have increasingly shifted from predominantly lecture-based methods to more student-centered and experiential learning strategies to support deeper understanding and skill acquisition[1],[2].

Several theories within educational psychology propose that learners exhibit characteristic preferences for processing information, commonly referred to as *learning styles*[3]. These preferences reflect how learners perceive, interact with, and respond to different instructional environments and materials[4]. The concept of learning styles has been extensively discussed within health sciences education since the 1970s, with multiple models proposed to describe how individuals prefer to learn[5].

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One of the most commonly referenced frameworks is Kolb's Experiential Learning Theory (ELT), which posits a cyclical learning process involving concrete experience, reflective observation, abstract conceptualization, and active experimentation[6]. Based on this model, learners can be classified as convergers, assimilators, divergers, or accommodators**,** each representing distinct ways of engaging with learning tasks[7].

Another influential framework is the VARK model, which categorizes learners according to sensory modalities Visual, Aural, Read/Write, and Kinesthetic suggesting that individuals have preferred channels for receiving and processing information[8]. Although the evidence for tailoring instruction solely based on VARK categories is debated, the model remains widely used for understanding learner preferences within educational settings[9].

Understanding learning styles is considered valuable in higher education because it may assist educators in designing and delivering curriculum content that engages students more effectively, enhances motivation, and supports retention of knowledge and skills[10],[11]. In health professions education, where learning integrates cognitive, psychomotor, and affective domains, alignment of pedagogical approaches with diverse learner preferences is suggested to facilitate engagement and adaptiveness to varied learning demands[12],[13].

Within the Physiotherapy discipline specifically, empirical evidence indicates that learners often exhibit active and experiential learning preferences, frequently gravitating towards kinesthetic modes that align with hands-on clinical training[14],[15]. A systematic scoping review of Physiotherapy learners noted that *converger* and *assimilator* styles reflecting practical application and organized conceptual understanding were commonly reported among undergraduate and postgraduate Physiotherapy students[16]. However, the literature also highlights methodological variation in how learning styles are measured and the absence of a consistent predictive relationship between identified learning preferences and academic or clinical performance outcomes[17],[18].

Despite its theoretical appeal, the concept of learning styles is subject to ongoing debate. Critics argue that definitions and measurement instruments lack robust psychometric validation, and that adapting instruction to match individual learning styles has *not* been shown conclusively to enhance learning outcomes[19],[20]. Nonetheless, awareness of learner preferences continues to inform educational planning, particularly where instructional variety and multimodal engagement are prioritized to accommodate the complex learning requirements of health professional students[11],[12].

Given the unique demands of Physiotherapy education encompassing both classroom and clinical environments a comprehensive understanding of learning style patterns among BPT students can provide insights for curriculum development, instructional design, and student support mechanisms. This review therefore aims to synthesize existing evidence on the learning styles of BPT students, examine the theoretical underpinnings of prominent models, and discuss educational implications for Physiotherapy programs.

2. Methodology

Study Design

This review was conducted as a scoping review to systematically identify, map, and synthesize existing evidence on the learning styles of Bachelor of Physiotherapy (BPT) students. A scoping review was selected due to the exploratory nature of the research question, the anticipated heterogeneity of study designs, and the aim to examine the breadth of literature rather than conduct a meta-analysis. The review process followed the methodological framework outlined by Arksey and O'Malley and was guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) guidelines.

Information Sources and Search Strategy

A comprehensive search was conducted across multiple electronic databases, including PubMed, Google Scholar, and Cochrane Library, to identify peer-reviewed articles published up to December 2025. The search strategy combined keywords and Medical Subject Headings (MeSH) related to Physiotherapy education and learning styles, using Boolean operators. Example search terms included: "learning styles" OR "learning preferences" AND "Physiotherapy students" OR "BPT students" AND "Kolb" OR "VARK". Reference lists of included studies were hand-searched to identify additional relevant articles.

Eligibility Criteria

Studies were included if they evaluated learning styles of undergraduate Physiotherapy (BPT) students, regardless of study design, including cross-sectional, descriptive, observational, or experimental studies. Only studies published in English with full-text availability were considered for inclusion. Studies were excluded if they did not specifically report on Physiotherapy students, if they were review articles, editorials, or commentaries

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without primary data, or if they focused on postgraduate or other health profession students without providing BPT-specific data.

Study Selection

All records identified through database searches were exported to a reference management software, and duplicates were removed. Two independent reviewers screened titles and abstracts for relevance. Full-text articles of potentially eligible studies were retrieved and assessed for inclusion based on the pre-defined eligibility criteria. Disagreements between reviewers were resolved through discussion, and a third reviewer was consulted if consensus could not be reached.

Data Charting and Synthesis

A structured data extraction form was developed to capture key information from each study, including: author, year, country, sample size, participant demographics, learning style assessment tool used (e.g., Kolb, VARK), predominant learning style identified, and main findings. Data were synthesized narratively, focusing on the distribution of learning style preferences among BPT students, methodological approaches used, and potential implications for educational practice. Quantitative aggregation (meta-analysis) was not performed due to variability in study designs, assessment tools, and reporting formats.

Protocol and Reporting Considerations

The review protocol was developed a priori and guided by scoping review methodology frameworks. Reporting adhered to the PRISMA-ScR checklist to ensure transparency and replicability. A PRISMA flow diagram was constructed to illustrate the study selection process, including numbers of records identified, screened, included, and excluded, with reasons for exclusion clearly documented.

Grey Literature

To minimize publication bias and enhance comprehensiveness, grey literature sources were also considered. These included theses, conference proceedings, Institutional reports, and policy documents related to Physiotherapy education and learning styles. Searches were conducted via Google Scholar and Institutional repositories. Studies identified in grey literature were subjected to the same eligibility and data extraction procedures as peer-reviewed articles.

3. Results

Study Selection

The literature search identified a total of 540 records across electronic databases and additional sources. After removal of duplicates, 480 records were screened based on titles and abstracts, of which 390 were excluded due to irrelevance to Physiotherapy education or learning styles. Ninety full-text articles were assessed for eligibility. Of these, 60 studies were excluded for reasons including lack of BPT-specific data, inadequate methodological reporting, or absence of relevant outcomes. Finally, seven studies met the inclusion criteria and were included in the review. The study selection process is illustrated in the PRISMA 2020 flow diagram.

Characteristics of Included Studies

The seven included studies represented diverse geographical regions, including Australia, the United States, India, Ghana, South Africa, Turkey, and Ireland. All studies employed observational designs, with the majority being cross-sectional in nature. Sample sizes ranged from 80 to 184 participants.

In terms of assessment tools, Kolb's Experiential Learning Theory and the VARK model were most commonly used, while one study utilized a combination of both approaches. The included studies focused primarily on undergraduate Physiotherapy students, although some also included broader allied health student populations.

Learning Style Preferences Based on Kolb's Model

Studies utilizing Kolb's Experiential Learning Theory consistently reported a predominance of active and experiential learning styles. Milanese et al. identified the converger learning style as the most dominant among Physiotherapy students, indicating a preference for practical application of knowledge and problem-solving. Similarly, Ilcin et al. reported assimilator as the most common style, reflecting a tendency toward organized conceptual understanding.

Afrifa et al. further supported these findings by demonstrating a general inclination toward active learning styles among clinical Physiotherapy students. These results collectively suggest that Physiotherapy students tend to favor learning approaches that integrate theory with practical application, aligning with the clinical and skill-based nature of the profession.

Learning Style Preferences Based on VARK Model

Studies employing the VARK model highlighted a strong preference for kinesthetic and multimodal learning styles. Desai and Shah reported kinesthetic learning as the dominant preference among Indian BPT students, emphasizing the importance of hands-on and experiential learning.

In contrast, Brown et al. (2008) and Brown et al. (2009) found that students frequently exhibited multimodal preferences, indicating flexibility in learning approaches and the ability to adapt to multiple instructional methods. These findings suggest that Physiotherapy students

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benefit from diverse teaching modalities rather than reliance on a single instructional approach.

Heterogeneity in Learning Preferences

One study utilizing mixed assessment methods reported heterogeneous learning preferences, with no single dominant style emerging across the cohort. This variability highlights the complexity of learning behaviors among Physiotherapy students and suggests that individual differences, educational context, and stage of training may influence learning preferences.

Summary of Evidence

Overall, the findings across included studies indicate that Physiotherapy students predominantly exhibit active, experiential, and kinesthetic learning preferences. Kolb-based studies emphasize converger and assimilator styles, while VARK-based studies highlight kinesthetic and multimodal tendencies. Despite these trends, considerable heterogeneity exists in both the measurement tools used and the reported outcomes.

4. Discussion

This scoping review synthesised evidence on learning style preferences among Bachelor of Physiotherapy (BPT) students and identified four key PRISMA-aligned themes: (1) predominance of Kolb-based active learning styles, (2) kinesthetic and multimodal preferences from VARK-based studies, (3) heterogeneity across learner cohorts, and (4) methodological limitations within the evidence base. While the findings provide a structured understanding of learner preferences, their interpretation must be grounded in a critical appraisal of both theoretical foundations and empirical limitations.

Predominance of Kolb-Based Active Learning Styles

The results indicate that Physiotherapy students frequently demonstrate converger and assimilator learning styles, reflecting a preference for integrating conceptual knowledge with practical application. This aligns with early conceptualisations of learning styles as relatively stable learner characteristics influencing engagement with instructional environments[1,3]. Kolb's Experiential Learning Theory further supports this interpretation by positioning learning as a cyclical process involving experience, reflection, and application[4].

Empirical studies included in this review reinforce this pattern, particularly within clinical education contexts where problem-solving and application are central[7,16]. However, this apparent consistency must be interpreted cautiously. The theoretical assumption that learners can be categorised into fixed styles has been challenged, with evidence suggesting that learning is context-dependent and adaptable rather than static[5]. Furthermore, the reliance on cross-sectional designs limits the ability to determine whether these preferences are stable traits or influenced by curricular exposure. Thus, while Kolb-based findings appear aligned with professional training demands, they should be viewed as indicative trends rather than definitive classifications**.**

Kinesthetic and Multimodal Preferences (VARK-Based Findings)

The review also demonstrates a strong inclination toward kinesthetic and multimodal learning preferences, particularly in studies using the VARK framework. Early work by Fleming and Mills introduced VARK as a tool to encourage reflection on learning preferences[2], with subsequent applications in health professions education highlighting its practical appeal[9]. In Physiotherapy education, kinesthetic learning is especially relevant given the emphasis on hands-on skills, manual therapy, and clinical practice[12,14].

However, the educational utility of VARK remains contested. Validation studies have reported limited construct validity and weak empirical support for modality-based instruction[10]. Moreover, systematic critiques have found no robust evidence supporting the "meshing hypothesis," which suggests that matching teaching methods to learning styles improves outcomes[5,19]. While multimodal preferences observed in studies such as Brown et al.[8,11] suggest adaptability among learners, they simultaneously undermine the premise of rigid categorisation. Therefore, VARK findings should be interpreted as descriptive rather than prescriptive, informing instructional diversity rather than dictating teaching strategies.

Heterogeneity in Learning Preferences

A consistent observation across the included studies is the presence of heterogeneity in learning preferences, with some cohorts demonstrating dominant styles while others show mixed distributions. This variability reflects the influence of contextual, cultural, and educational factors on learning behaviors[13,18]. Studies conducted across diverse geographical regions, including Ghana and South Africa, further highlight how local educational practices and clinical exposure shape learner engagement[14,15].

From a methodological perspective, this heterogeneity raises concerns regarding comparability and generalisability. Differences in assessment tools (Kolb vs. VARK vs. mixed models), sample characteristics, and study settings introduce variability that may not reflect true differences in learning preferences but rather

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inconsistencies in measurement approaches. Additionally, the small number of included studies limits the robustness of conclusions. Consequently, the observed heterogeneity should be interpreted as both a reflection of genuine diversity and a manifestation of methodological inconsistency within the literature**.**

Methodological Limitations and Evidence Gaps

The critical appraisal of included studies reveals several limitations that constrain the strength of evidence. All studies utilised observational, predominantly cross-sectional designs, which preclude causal inference and limit the exploration of temporal changes in learning preferences. The reliance on self-reported instruments introduces potential biases, including recall bias and social desirability bias, further affecting data reliability.

Importantly, there is a lack of consistent evidence linking learning styles to academic or clinical performance outcomes. While some studies suggest associations, findings remain inconclusive and inconsistent[16],[17]. This limitation is particularly significant given that the practical relevance of learning styles lies in their ability to inform effective educational strategies.

Moreover, broader critiques of learning style theories question their theoretical and empirical validity. Comprehensive reviews have concluded that there is insufficient evidence to support the application of learning styles in evidence-based education[5],[19]. These critiques challenge the continued emphasis on categorising learners and highlight the need to shift focus toward evidence-informed teaching practices**.**

Implications for Physiotherapy Education

When aligned with the results of this review, the findings suggest that Physiotherapy education should prioritise flexible, multimodal, and experiential teaching approaches rather than rigid adherence to learning style frameworks. The predominance of active and kinesthetic preferences supports the use of simulation-based learning, case-based discussions, and clinical exposure. However, the presence of multimodal preferences and heterogeneity indicates that instructional variety is more beneficial than individualised style matching[11],[12].

Educational strategies should therefore be guided by principles of cognitive science and pedagogy rather than learning style categorisation. Techniques such as active learning, feedback integration, and spaced practice may offer greater educational impact. In the context of Physiotherapy, where integration of knowledge and skills is essential, a holistic and adaptive approach to teaching is likely to be more effective.

Conclusion

This scoping review indicates that BPT students predominantly prefer active, experiential, and kinaesthetic learning approaches, aligning with the practical demands of physiotherapy education. However, substantial heterogeneity and methodological limitations, along with ongoing concerns regarding the validity of learning style theories, limit the strength and applicability of these findings.

Learning styles should therefore be viewed as descriptive rather than prescriptive, with limited evidence supporting their role in improving educational outcomes. Instead, physiotherapy education should prioritize flexible, multimodal, and evidence-based teaching strategies that promote active engagement and skill integration.

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Table 1: Characteristics of Included Studies

Author (Year)	Country	Sample Size	Study Design	Tool Used	Main Findings
Milanese et al. (2013)	Australia	120	Cross-sectional	Kolb	Converger dominant
Brown et al. (2008)	USA	95	Cross-sectional	VARK	Multimodal preference
Desai & Shah (2021)	India	150	Cross-sectional	VARK	Kinesthetic dominant
Afrifa et al. (2022)	Ghana	80	Observational	Kolb	Active learning styles
Olivier et al. (2021)	South Africa	110	Cross-sectional	Mixed	Mixed preferences
Ilcin et al. (2018)	Turkey	184	Cross-sectional	Kolb	Assimilator common
Brown et al. (2009)	Ireland	130	Cross-sectional	Kolb/VARK	Multimodal

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PRISMA Flow Diagram

Figure 1- Prisma Flow Diagram