

Applications of Deliberate Practice in Health Professions Education: A Systematic Review

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Abstract

The development of clinical and professional competence in higher education remains a challenge, particularly within skills-based programmes. Deliberate practice (DP), a theory of expert performance grounded in structured repetition, feedback, and goal-directed learning, has been increasingly applied in health professions education (HPE), yet its broader educational implications remain underexplored. This paper reports findings from a systematic review examining how DP has been applied within HPE and the factors influencing its implementation. Guided by PRISMA principles, peer-reviewed and grey literature published between 2011 and 2021 were analysed. The review identified DP as a flexible pedagogical framework supporting skills acquisition, learner motivation, and performance improvement when embedded within curriculum design. Key enablers and constraints influencing implementation are discussed. The findings offer transferable insights for higher education educators seeking to strengthen skills development through structured, evidence-informed teaching approaches.

Keywords: *Deliberate practice; skills acquisition; curriculum design; health professions education; higher education.*

1. Introduction

Higher education institutions are increasingly tasked with producing graduates who demonstrate not only disciplinary knowledge but also high levels of practical competence and professional readiness. This challenge is particularly pronounced in skills-based programmes, where students are required to integrate theoretical understanding with complex psychomotor and decision-making skills. Traditional instructional approaches, however, often rely on opportunistic practice and unstructured feedback, which may limit the development of expert performance. Deliberate practice (DP), originally conceptualised within expertise research

(Ericsson et al., 1993), proposes that high-level performance is achieved through structured, repetitive practice, explicit performance goals, and targeted feedback. Within HPE, DP has gained attention as a potential framework for improving clinical skills training. Despite this growing interest, there remains limited synthesis of how DP has been operationalised in educational contexts and what lessons may be transferable to higher education more broadly.

This paper presents findings from a systematic review conducted as part of a larger doctoral study aimed at redesigning a clinical block course. The review sought to examine how DP has been applied in HPE and to identify factors that support or hinder its educational use. By situating these findings within a higher education discourse, this paper contributes evidence-informed insights relevant to curriculum designers and educators across disciplines.

2. Methodology

2.1. Review Design

A systematic review methodology was adopted to synthesise existing literature on the use of DP within HPE. The review was guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework to ensure transparency and methodological rigour.

2.2. Search strategy and eligibility criteria

A search strategy was formulated employing the Population, Concept, and Context (PCC) question development framework (Table 1). The decision to use PCC versus Population, Intervention, Comparison, Outcomes and Study design (PICOS) was informed by the exploratory nature of educational research and the heterogeneity of study designs within HPE. The use of PCC was justified as it allowed for broader inclusion of diverse methodologies and educational contexts, aligning with the study's aim of understanding how DP is applied rather than evaluating intervention effectiveness. An electronic search was conducted across multiple databases, including EBSCOhost, ProQuest, ScienceDirect, Wiley Online Library, Sabinet, and ERIC. The following terms used included: "deliberate practice" AND "medical education" OR "health education" and their Boolean combinations.

Table 1. Search Strategy Formulated by the Population, Concept, and Context Criteria (Peters et al., 2020)

Criteria	Determinants
Population	Healthcare professionals, including students and teachers
Concept	Deliberate practice
Context	Medicine and allied health professions education

Peer-reviewed articles and grey literature published between January 2011 and December 2021 were considered. The review period was selected to capture the decade during which DP evolved from a theoretical model of expertise into an applied educational framework in HPE. More direct empirical applications emerged from around 2011 alongside growth in simulation-based learning, competency-based curricula, and structured feedback models across undergraduate, postgraduate and workplace-based training. Ending in 2021 provided a contemporary ten-year evidence base for meaningful synthesis of trends, applications, and implementation challenges. Studies were included if they reported on the use of DP as a teaching, learning, or assessment strategy within HPE. Quantitative, qualitative, and mixed-methods studies were eligible for inclusion. Studies were excluded if DP was discussed only theoretically without educational application, if the context was outside health or medical education, if DP was used purely as an intervention, or if the full text was unavailable. The methodological quality was assessed based on the sampling methods used, the measurement tools, data sources, ethics, response rate, data sources, and the accurate application of the principles or characteristics of DP. The appraisal tools used in this review were adapted from the Johanna Briggs Institute (JBI)(Lockwood et al., 2015), the Critical Appraisal Skills Programme (CASP)(CASP, 2018), and Roman and Frantz (Roman & Frantz, 2013). Table 2 is an example of an appraisal tool used in this review and adapted from the validated CASP tool for mixed-method studies.

Table 2: Mixed-Method Appraisal Tool (Adapted from the CASP tool)

Reviewer (Name):		
Study Title:		
Authors, Year:		
Mixed-Method Appraisal Tool		
Question	Score	
	Yes - 1	No - 0
1. Is the sampling process clearly stated?		
2. Did the research design appropriately address the research question?		
3. Was the research setting justified?		
4. Was drop out response reported?		
5. Was the inclusion and exclusion criterion clearly stated?		
6. Are the methods of data collection adequately explained?		
7. Are the findings interpreted in the context of other studies and theory?		
8. Is adequate evidence provided to support the analysis?		
9. Has reliability and validity or trustworthiness been described?		
10. Are the PIs' own positions, assumptions and bias outlined?		
11. Are the findings of this study generalisable to the study population?		
12. Has ethical issues been taken into consideration?		

2.3. Data extraction and synthesis

The review was conducted between February 2022 and March 2023. Titles and abstracts were screened independently by two reviewers, followed by full-text screening. Data extracted included educational context, study design, application of DP principles, reported outcomes, and perceived benefits or challenges. Disagreements were resolved by consensus discussions with a third reviewer. A narrative synthesis approach was used to identify recurring patterns and themes related to the educational use of DP.

3. Findings

The search initially yielded 6324 hits. Following the removal of duplicates (n=4 558), 1766 title records were screened. Ultimately, 13 studies were included in the final sample for this review. Ninety-two percent (92%) of the eligible studies (n=14) met the appraisal criteria, with studies scoring satisfactory (n=8) and good (n=5) being included. Ninety-two percent of included studies were rated as satisfactory or good in methodological quality. The studies were published between 2011 and 2021 and comprised cohort (n=5), mixed-methods (n=3), quantitative (n=4),

and qualitative (n=1) designs. Figure 1 details the process involved in reaching the final number of included studies.

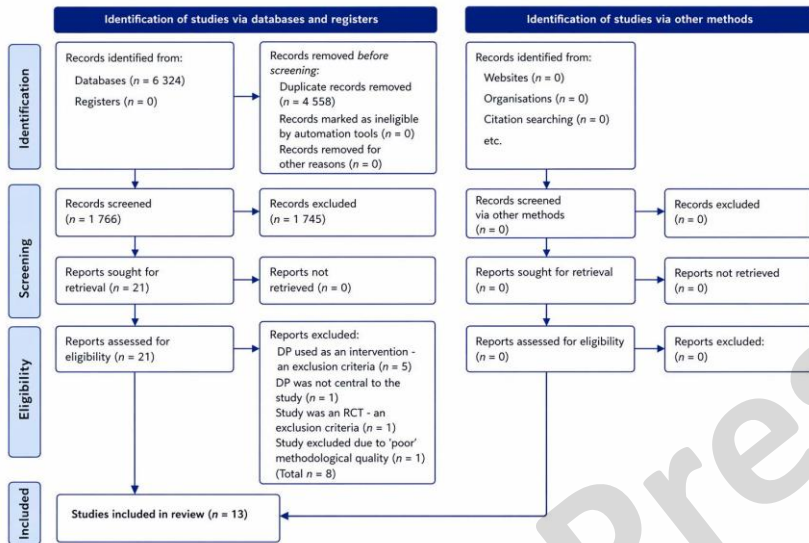


Figure 1. Flowchart of the process followed during this systematic review

Most studies originated from the USA (Bathish et al., 2018; Dai et al., 2016; DeBourgh & Prion, 2017; Durning et al., 2013; Gauthier et al., 2015; Haubrick, 2017; Malik et al., 2013; Owen et al., 2017; Weaver & Jones, 2021), with others conducted in Canada (Gauthier et al., 2015; Waechter et al., 2019), the Netherlands (Duvivier et al., 2011; van de Wiel et al., 2011), and Thailand (Pongsachareonnont et al., 2021). Across the 13 studies, data were obtained from 2 072 participants, including undergraduate and postgraduate students, educators, and qualified health professionals. Sample sizes varied considerably and represented both academic training and workplace-based intervention contexts. The healthcare professions included in the study were nursing (n=4), otolaryngology (ear-nose-and-throat [ENT]) (n=1), ophthalmology (n=1), internal medicine (n=2), general medicine (n=2), endocrinology (n=1), dermatology (n=1), and dietetics (n=1). Among the 13 studies, three samples consisted of qualified professionals (Bathish et al., 2018; Durning et al., 2013; Haubrick, 2017), five samples comprised undergraduate students (DeBourgh & Prion, 2017; Duvivier et al., 2011; Owen et al., 2017; Waechter et al., 2019) five samples involved postgraduate students (Durning et al., 2013; Gauthier et al., 2015; Malik et al., 2013; Pongsachareonnont et al., 2021; van de Wiel et al., 2011), and two samples consisted of educators (Dai et al., 2016; Haubrick, 2017). Notably, the educator samples included programme directors and preceptors. Furthermore, some studies included multiple samples with varying profiles, such as students and educators. Demographic reporting was inconsistent, particularly for age and sex.

Study foci varied widely, including curriculum evaluation, instructional methods, clinical procedure analysis, and the development of DP-based evaluation frameworks. Deliberate practice was applied primarily as an instructional strategy within simulation-based medical education, but also as a framework for curriculum evaluation, benchmarking, and procedural assessment. The key features of DP, namely task deconstruction, repeated practice, feedback, and assessment, were applied inconsistently across studies. Feedback emerged as the most prominent element, with some studies demonstrating the feasibility of automated and standardised feedback systems. Few studies explicitly incorporated learner motivation, one of the core tenets of DP. Only four studies reported stakeholder perceptions of DP. Students and educators generally viewed DP positively, describing it as valuable, enjoyable, and beneficial for confidence and critical thinking. Immediate and individualised feedback was highlighted as particularly important. Due to the exclusion of intervention studies, this review could not determine the direct impact of DP on clinical skill development. Instead, the findings demonstrate that DP is used flexibly as an instructional method, evaluative framework, and analytical tool within HPE.

4. Discussion

The findings of this review suggest that DP offers a robust, theory-informed framework for enhancing skills development in higher education, particularly within programmes requiring competence-based outcomes. This supports the foundational work of Ericsson and colleagues, who proposed that expert performance develops through structured, effortful practice guided by feedback and progressive refinement (Ericsson et al., 1993). The predominance of studies from the United States, with additional contributions from Canada, the Netherlands, and Thailand, indicates that the application of DP has gained international traction, although evidence remains concentrated in high-income settings. This geographical distribution mirrors broader global trends in HPE research, where simulation-based and competency-driven pedagogies are more frequently reported in well-resourced systems. Across the included studies, DP was applied not only as an instructional strategy, particularly within simulation-based medical education, but also as a framework for curriculum evaluation, benchmarking, and procedural assessment. This finding is consistent with wider international literature demonstrating that DP has evolved beyond a narrow training method into a broader educational model capable of informing curriculum design, assessment systems, and faculty development (Donoghue et al., 2021). Previous work in simulation-based medical education has similarly reported that repeated practice combined with feedback is associated with improved learner performance and procedural competence (Ng et al., 2021). While the review focused on HPE, the key features and principles of DP, are transferable to a wide range of higher education contexts. The included studies were, however, heterogeneous in terms of design, participant groups, disciplines, and modes of implementation, which limited direct comparability and precluded meta-analysis.

Nevertheless, recurring positive findings across diverse settings provide moderate confidence in the educational value of DP, particularly for the development of procedural, cognitive, and performance-based competencies (Goffe, 2024). Importantly, the review highlights that DP is most effective when embedded at the curriculum level rather than applied as an isolated instructional technique. This aligns with contemporary higher education discourse advocating for constructive alignment and intentional learning design. However, successful implementation requires careful consideration of contextual realities, including staff workload and institutional resources.

5. Implications for Higher Education Practice

This review offers several implications for higher education educators and curriculum designers:

- DP can support systematic skills development when embedded within curriculum structures.
- Formative, feedback-driven assessment is central to effective DP implementation.
- Curriculum redesign processes should account for contextual constraints to ensure feasibility and sustainability.

By adopting DP-informed approaches, higher education institutions may strengthen graduate competence and better align teaching strategies with professional practice demands.

6. Conclusion

Deliberate practice represents a promising pedagogical framework for skills-based education in higher education. The systematic review demonstrates its potential to enhance learning outcomes when applied through structured curriculum design. While challenges remain, particularly in resource-constrained environments, DP offers a transferable and evidence-informed approach for advancing teaching and learning in higher education contexts.

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