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Chapter

Becoming an Expert *on Purpose*: How Deliberate Practice Informs Teacher Effectiveness

David G. Grant

Abstract

The call for teacher improvement has long been advocated in educational circles. Hargreaves & Fullan asserted it takes 8 years to reach the highest level. The important direct relationship of teacher effectiveness to student achievement was summarized by John Hattie. Many pathways to developing teacher effectiveness have been explored. A unique body of literature exploring expertise and its acquisition led to the articulation of deliberate practice theory with application in the domains of chess, music, medical training, and professional domains. Although a robust set of reviews have synthesized knowledge of deliberate practice in other domains, a comparable review could not be found in the field of education. Therefore, this chapter synthesizes the literature applying deliberate practice theory to the cultivation of teacher effectiveness.

Keywords: teacher effectiveness, instructional expertise, deliberate practice, pedagogy, instructional coaching

1. Introduction

The importance of effective teachers cannot be underestimated. Indeed, stakeholders such as students, parents, and principals wholeheartedly agree on this need. Current literature confirms that the highest levels of effectiveness for teachers come after 8 years and begin to diminish after 23 [1]. Nevertheless, there are some teachers within the profession who “...will still not settle for *relatively effective teaching*. They will deliberately and frequently engage in activities to improve their teaching” [2]. We seek to foster continuous self-improvement of teachers’ instructional expertise.

Instructional expertise refers to the effective use of pedagogical content knowledge [3] and related skills by teachers resulting in visible learning outcomes for students [4]. A unique body of research has explored elite expertise and its *acquisition* leading to the articulation of deliberate practice theory [5, 6] and subsequent application in multiple domains including chess, music, medical training, and professional domains [7]. Literature reviews have synthesized findings in medical training, music, and psychology [6, 8, 9]; however, no systematic literature review could be found applying deliberate practice theory in the domain of K-12 teaching.

Therefore, this chapter synthesizes current research applying deliberate practice theory to the development of K-12 teacher instructional expertise. The article

describes historical antecedents in the general study of expertise and then explains deliberate practice theory, concluding with three questions pursued in this chapter. Section two describes application of this theory to educational research. Section three describes methodology. Section four synthesizes findings for the characteristics of deliberate practice, constraints to the process, and outcomes found in the literature. Section five discusses the implications for research, policy, and practice. The final section concludes the chapter.

1.1 Historical antecedents in the study of expertise

Early modern assumptions of expertise were altered in 1869 by Sir Francis Galton. Prior to his study of expertise, it was assumed that eminence in any domain was fully explained by natural ability. Galton's tripartite theory retained a belief in innate talent but added to this the dimension of zeal and the power to do laborious work. In Galton's words, "If a man is gifted with vast intellectual ability, eagerness to work, and power of working, I cannot comprehend how such a man should be repressed" [10].

Alternative scientific accounts of expertise development have been proposed. Study of research scientists found the average age of first publication was 25.2 with greatest work published at age 35.4, a period of 10.2 years [11]. The study of chess grand masters led to a similar specific period of practice to achieve eminence, i.e., ten years practice or more to become a chess grand master [12]. Bereiter and Scardamalia [13] posited expertise as a process, rather than a state of being, something experts do over and over thereby becoming and remaining experts; they look for and take on increasing challenges in their domain. In this context, a theory of deliberate practice was published in 1993 synthesizing nearly a century of research on expertise and reporting data from two new empirical studies in support of this theory [14].

1.2 Deliberate practice theory and educational literature

Deliberate practice is a unique type of practice that is purposeful, systematic, requires focused attention and is conducted with the specific goal of improving performance. Two studies of musicians found that practicing alone with a focus on self-improvement was the activity rated most relevant by elite musicians as contrasted with performances and playing for fun [14]. Indeed, it is possible to analyze the vital factors that mediate eminent performance in other domains [15]. Eminent scientists have high rates of publication; they deliberately develop and refine ideas through thinking and writing. Manuscripts go through many revisions and the peer review process offers feedback. Elite runners deliberately develop muscle using interval training and less time in long moderate runs that offer the "runners high." In the domain of chess, deliberate practice consists in the hours spent studying published games of chess grandmasters seeking to predict the next move of a master; this type of practice was contrasted with playing games in tournaments or for fun [16]. Another example focused on improving student achievement by applying deliberate practice to students. The critical factor for such practice was structuring students' study activities, so that students obtain specific, timely, and reliable feedback regarding their progress [17]. Moreover, Dunn & Shriner [2] found strong support for using the deliberate practice framework to understand the development of expertise in the ill-structured domain of teaching. In sum, deliberate practice theory has over three decades of research in multiple domains with extensive empirical support for applying deliberate practice to improve teacher instructional expertise [18].

Educational research on the development of expertise confirms deliberate practice theory's prediction that it will take much longer than a typical one-year teacher education program to develop expert ability. Shulman's theory [3], pedagogical content knowledge, has greatly influenced generally accepted notions of what instructional expertise ought to be described as for teachers. To be an expert, a teacher must acquire expert knowledge of their content, expert knowledge of pedagogies relevant to their content area, and the expert judgment to apply such knowledge with the student population they are teaching. Indeed, a long-term synthesis of meta-analyses in educational research found effect sizes for a wide range of practices; however, the big idea emerging was that effective teaching is visible to students and student learning outcomes are visible to teachers [4]. Therefore, we include outcomes in the working definition of instructional expertise. Instructional expertise refers to the effective use of pedagogical content knowledge and related skills by teachers resulting in visible learning outcomes for students. Consistent with deliberate practice theory [14], we expect instructional expertise to be the outcome of prolonged intentional efforts by teachers to improve.

Many studies since 1999 sought to apply deliberate practice theory in K-12 teaching. Whereas chess masters study published games, deliberate practice for teachers occurs in an ill-structured domain where many different teacher quality goals are relevant. As such, deliberate practice for teachers is a self-improving approach to goal setting, instructional practice, feedback seeking, evaluation and decision making related to new goals. Often there is a shift from task design by a coach to self-improving goal setting, from directed practice alone to self-improving instructional practice with students, from receiving feedback from a coach to seeking self-improving feedback from multiple sources, and evaluation as reflection for self-improvement.

Four characteristics are essential to deliberate practice. A practice task with a well-defined goal is designed by a coach for self-improvement. The next dimension, feedback, is crucial to positive impact. Feedback needs to be immediate and informative in response to the practice thus enabling the learner to use the information for self-improvement. Third, reflection on both feedback and practice informs future deliberate practice. This cycle of self-improvement is repeated with intensity over time leading to incremental improvements.

Three constraints may limit deliberate practice. This type of practice requires significant motivation and effort as it is not inherently enjoyable, provides little external reward, and is difficult. The continuous cycle of growth requires full concentration, evaluation, and applying new strategies to improve performance. As well, motivation and effort must be supported by a third constraint, environmental factors. Deliberate practice is supported or hindered by availability of resources such as time, tools, and financial costs related to coaches, experts, and training (**Figure 1**).

The following research questions guided this systematic review the literature applying deliberate practice to teacher instructional expertise:

1. How have the characteristics of deliberate practice been applied to improve instructional expertise in K-12 teaching (e.g., task design/goal, informative feedback, reflection, and repetition)?
2. How have the constraints of environmental factors and individual motivation impacted deliberate practice in the K-12 teaching context?
3. To what extent does the expected outcome of deliberate practice (i.e., instructional expertise) occur in studies of K-12 teachers?

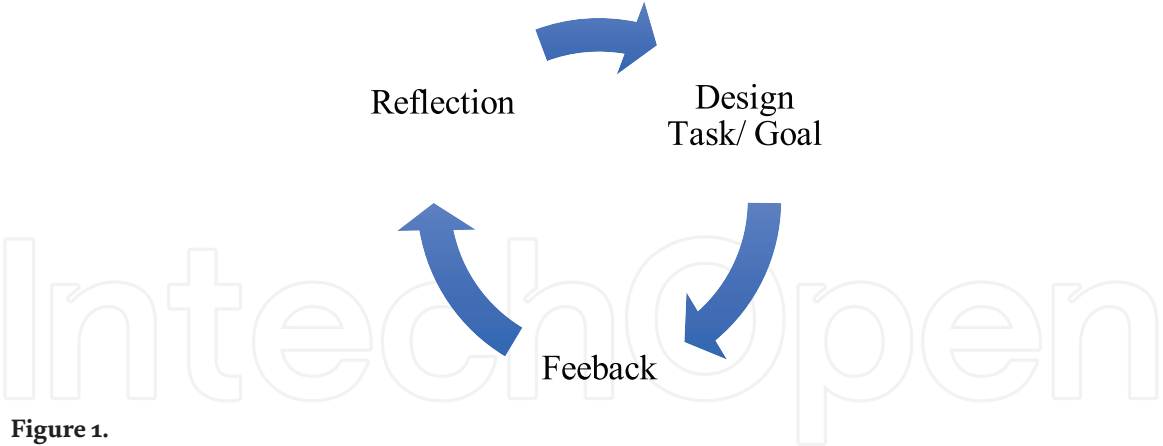


Figure 1.
Deliberate practice intensively repeated.

2. Methodology

The purpose of this study was to synthesize research findings of deliberate practice for K-12 teachers. Search terms were derived from a review of the literature on deliberate practice theory. Final criteria included (1) peer reviewed studies utilizing deliberate practice with K-12 teachers, (2) studies in which deliberate practice was the interpretive lens, (3) and studies that made a unique contribution to deliberate practice knowledge in the ill-structured domain of K-12 teacher expertise. These criteria excluded non-peer reviewed works, editorials, essays. This filter also excluded studies and literature reviews of DP in other domains (medical, music, sociology, human resources, higher education, students, etc.). The primary search term was deliberate practice which combined with secondary terms (goals, feedback, motivation, education, and instruction). The following databases were searched: ERIC, Academic Search Premier, PsycARTICLES, PsycINFO, Social Sciences Full Text (H.W. Wilson), and Google Scholar.

Initial search of peer reviewed studies with deliberate practice in the abstract produced 644 citations. “Deliberate practice” and “education” produced 325 citations. Combination searches were conducted with “deliberate practice” and “motivation,” “goals,” “instruction,” and “feedback,” producing 79 citations. New citations were added to the list and duplicates were eliminated.

All titles were reviewed to ensure relation to deliberate practice and K-12 teachers. Articles by Ericsson and literature reviews not directly focused on K-12 teachers were removed. Articles were eliminated that were editorial, essay, or specific studies in other domains. Literature reviews of DP in other domains were removed. This process resulted in 46 citations. Abstract analysis was employed to determine if deliberate practice was the theoretical framework for design and interpretation. Articles advocating deliberate practice strategies for teachers that were not empirical studies were removed. There were seven studies remaining that met all criteria. Google Scholar was used to identify and review studies citing these seven, a forward-looking check for articles meeting criteria. Two additional articles were found meeting all criteria. All articles were read through for confirmation. The final sample included nine studies published from 1999 to 2019.

Each study was read a second time for systematic analysis. Factors of deliberate practice were used to code relevant details of each study. Findings for each factor were comparatively analyzed for similarities, differences, and insights informing the research questions for this study. An overview of studies is provided below, followed by result of analyses presented in an integration of findings.

2.1 Overview of studies 1999: 2019

Nine studies since 1999 studied instructional expertise for teachers through the lens of deliberate practice including a third from Europe, North America, and Asia, respectively. Quantitative, qualitative, and mixed method designs were employed. Studies as a group confirm the empirical usefulness of deliberate practice.

Dunn and Shriner [2] found planning and evaluation to be core deliberate practices. In contrast, although Hashim and Ahmad [19] confirmed the importance of preparing and evaluation, their study of expert educators reported two activities not associated with deliberate practice including number of hours in daily teaching and extracurricular activities. As well, König, J., Blömeke, S., & Kaiser, G. [19] cited teaching time alone as deliberate practice. Although teaching time is prerequisite to instructional practice, deliberate practice theory predicts teaching time alone is an insufficient explanation for eminent ability. Other researchers noted that since all teachers engage in most or all of these activities, a factor unique to self-improving teachers must explain the difference; this difference was termed teacher approach [2]. Adding support, Bronkhorst et al. [20] identified 63 activities meeting designated criteria for deliberate practice but found no significant difference between these activities relative to other activities. However, differences were found for the outcomes of these activities. Thus, the study supports Dunn & Shriner [2] in suggesting approach, rather than mere participation in the activity, distinguished teacher activities as deliberate practice. Bronkhorst et al. [21] found stronger descriptions of teacher deliberate practice reporting one group of experts who described deliberate practice as the enactment of teaching (i.e., put into practice one's intentions) while other experts described deliberate practice as regulation, (i.e., reflection on one's own learning process & seek self-improvement). Another study focused on instructional practice using micro lessons [22]. Finally, public lesson study highlighted teacher lesson planning with specific goals, rehearsal of instructional practice, feedback (from students, peers, and experts), and active evaluation with decision making [23–25]. Thus, public lesson study provided the most complete explication of deliberate practice.

3. Research question #1 characteristics of deliberate practice

3.1 Task design- self-improving goals of teachers

The task/goals of planning and evaluation to improve student outcomes were common in two studies of in-service teachers [2, 24]. A more recent study did not name specific tasks but implied teacher goals to motivate students and manage disruptive behaviors [19]. Studies of DP through Chinese lesson study [23–25] identified explicit teacher goals including 1. mathematics task design, 2. planning to teach a difficult math concept, and 3. using mathematically, pedagogically appropriate language. Notice that teacher goals included designing a task for students (student goal), how to practice (instructional practice, teacher goal), and use of language (enactment of content knowledge, teacher goal). Studies of expert teacher educators found two goals driving practice: improved student performance and increased teacher knowledge. Bronkhorst et al. [21] notes themes from the design principles that link with deliberate practice goals. The design of teaching is like the planning noted in studies of in-service teachers. Expert educators note three broad goals they have for student teachers- meaning oriented learning, enactment of effective teaching, and regulation of

reflection. It is reasonable to infer student teachers will have specific goals for lessons that influence the range of deliberate practices they engage in. Hashim & Ahmad [26] reported expert learning goals such as studying in London and long-term performance goals (e.g., promotion to trainer, mentor, and “excellent lecturer”). Note that performance goals do not fit the definition of deliberate practice but may motivate teachers to engage in a range of activities. Anderson et al. [22] did not provide explicit goals for self-improvement, yet the characteristics of task design were implied in descriptions of lesson planning. Based on the responses of pre-service teachers, I note three implicit goals: 1. to engage the interest of students, 2. effectively present the lesson, and 3. influence student understanding of content. Bronkhorst et al. [20] used three characteristics of deliberate practice as criteria for identifying student teachers’ learning activities as deliberate practice. Student teachers identified 249 activities as “purposefully designed.” Evidence was lacking to indicate these were designed by an expert for teacher self-improvement as in Chinese public lessons. Non-deliberate practice goals included performances such as final public lesson and promotion goals.

3.2 Feedback

Three studies of in-service teachers implied students are a source of feedback to teachers who give attention to the cues. For König et al. [19] feedback can be viewed as cues coming from student displays of motivation or disruptive behavior while Dunn & Shriner [2] find student *learning* outcomes (e.g., teachers test, projects, district assessments) are a source of feedback. However, a key difference in the public lesson study was the salience of informative and critical feedback by “knowledgeable others,” focused on three highly specific goals [23–25]. The types of feedback cited in public study included providing rationale, strategies, correction, questions, validation of practice, description, and suggestions for change. Both Dunn & Shriner [2] and Chinese lesson study [23–25] highlighted dialog with peers but public lessons offered greater structure for peer feedback and included expert feedback. Such feedback was informative of strategies and provide corrective input on practices negatively impacting student learning. The Malaysian study had very sparse examples of such feedback [26]. On the other hand, the Netherlands study identified expert articulation of student teachers’ theories as unique and important feedback [21]. As well, teacher educators’ facilitation of student teacher self-evaluation raised awareness- another important source of feedback. Both studies included student teacher supervisors implying feedback is central to developing instructional expertise; however, the information, strategy, or corrective nature of such feedback was missing. This limited an important connection with the deliberate practice model. In contrast, student responses during the lesson as well as after the lesson were important feedback cues. This type of indirect feedback is similar to findings by Dunn & Shriner [2] and König et al. [19]. Preservice teachers received feedback from context (time was up before they were ready), student reactions (interested, enjoying the lesson), and student outputs (more correct answers) [22]. Student teaching supervisors provided feedback of “already been noticed.” The study also included feedback from peers [20].

3.3 Reflection-revision, evaluation and decision making

Reflection was evident or implied in most studies and, at times, synonymous with evaluation of teaching. However, reflection was not addressed in the German study [19]. Again, public lessons stood out as distinguished from general teacher

reflection [2, 24, 25] in that all members of teacher research groups (TRG) participated in the reflection including reflection on teacher performance during the lesson. The reflection characteristic was a salient theme among expert educators [21, 26], which led to revisions of task design, mathematical representations, task sequence, time sequence, and activity design.

Reflection can be inferred from Anderson et al. [22] based on student teacher comments regarding micro-teaching concerns, e.g., initial concerns with pacing. Bronkhorst et al. [20] did not collect data on active reflection of student teachers. Studies provided data supporting *types* of reflection including evaluation of student feedback, dialog on expert feedback, self-evaluation, and exploring revision or improvement possibilities with peers, experts, or supervisors.

3.4 Intense repetition

Repetition of the planning-evaluation cycle was common to four studies [2, 23–25] and can be inferred from the teaching time variable that predicts interpretive ability of teachers [19]. Public lessons were unique in the focus on rehearsal and repetition. Two studies included three cycles of Chinese lesson study [24, 25]. Rehearsing the lesson with various groups of students with critical feedback was more effortful for teachers and receiving critical feedback was not inherently enjoyable [23]. Repetition was implied in the described practices of expert educators (i.e., design- reflect- evaluate) [21, 26]. Although repetition was a criterion and reported activities included a plan to repeat, it is unclear whether repetition was linked with incremental self-improvement goals. In contrast, Anderson et al. [22] included an initial micro lesson with three repetitions making its impact more visible.

4. Research question #2 constraints of deliberate practice

4.1 Environmental constraints

Findings were context-specific and indicate that teachers who are provided job-embedded opportunities for planning and evaluation have greater opportunity to deliberately improve instructional expertise [2, 23–25]. Environmental factors impact how much teaching time teachers have. Thus, König et al. [19] suggest that leaders secure the maximum teaching time. This makes sense for students implicitly, but study data found that teaching time predicted 10% of expertise in interpreting classroom situations depicted in video vignettes. Chinese lesson study [23, 24] was supported by environmental infrastructure and a long tradition of public lessons in China. All aspects of deliberate practices were job embedded, included in the evaluation system, culturally supported, and for at least one teacher participation was directed. Even when this process was implemented in the United States, there was support from university professors, experienced educators, and time to engage in repeated teaching, reflection, and revision [25]. Such environmental factors deserve careful review prior to implementing in different cultural contexts.

4.2 Motivational constraints

Motivation was expressed as *mindfulness* and *effort* during planning and evaluation activities; these were found to be the essential difference for teachers optimizing

growth in instructional expertise [2]. Although effort and motivation to participate were assumed as part of the cultural context of public lessons, the response to feedback contrasted sharply. For example, teacher one resisted feedback leading to confusion among students in the public lesson while teacher two accepted, applied, and even sought out new strategy feedback leading to noteworthy improvement in the public lesson. Note that teacher two persisted through five rehearsal cycles (compared to one cycle for teacher one), another indication of strong motivation. The study provided thick description of feedback and suggests that response to feedback and feedback seeking may be a proxy for teacher motivation for self-improvement [23]. Two additional studies of Chinese lesson study were conducted allowing volunteers [24, 25]. In each study motivation appeared to be strong, a confirmation that this approach is more efficacious with educators who have a mental model of self-improvement.

Differences in teacher response may link with Dunn & Shriner's [2] finding that some teachers are more mindful in planning/evaluation than others indicating that variance in self-motivation creates variance in acquisition of expertise. König et al. [19] found that task demand/challenge by students (i.e., motivating students & managing disruptive behavior) predicted teacher profile with an explanatory power of 20.7%. Analysis generated a paradoxical finding that higher skilled teachers report higher motivational and behavioral challenges from students. Their findings raise the possibility that such problems motivate teachers to experiment with new strategies thus leading to higher levels of expertise [19].

4.3 Linking environmental and motivational factors

Insights from expert teacher studies offer additional insights. Bronkhorst et al. [21] links individual motivation and environmental factors. The environment described includes active modeling of expert educators for their student teachers, active facilitation for the deliberate practices, alignment of student teacher conceptions with expert educators' conceptions, and a combination of self-evaluation with expert educator evaluation. Thus, an environment with support and aligned accountability fosters conditions for self-improvement of student teachers. Hashim [26] noted essential self-motivation and environmental supports. The environment they worked in included administrative support which led to unique opportunities to further develop knowledge and skills. Experts noted that such support was costly financially and limited to teachers demonstrating self-motivational individual values. Expert educators reported individual values of self-direction, a committed attitude, a firm work ethic and persistence. Experts note they were also socially motivated by peers. Moreover, these supportive learning experiences paved the way to leadership opportunities as trainers, mentors, and eventually to promotion as "excellent lecturer" by the ministry of education. Note the interaction effect of individual motivational factors with environmental factors leading to recognized expertise.

Environmental factors influenced student teachers in both studies of preservice teachers. Small group size (5–7 fourth grade students), varied classrooms, a limit of 35 minutes, and university instruction in social studies pedagogical content knowledge combined to influence repeated lessons [22]. Environmental cues such as "already been noticed" were cited as influential feedback [20]. As well, both studies found student teachers were motivated to self-improve *to improve student outcomes*. Anderson et al. [22] notes dimensions of teacher performance (i.e., pacing, gaining student interest) were important to motivation. These findings are consistent with studies of Chinese lesson study [24, 25]. In contrast, Bronkhorst et al. [20]

incorporated “motivated in some way” as a fourth criteria in identifying 308 student teacher activities while only 63 met all criteria as deliberate practice. In sum, preservice and early career teachers may be considered as novices who are influenced by their environmental context and motivated by factors that differ from expert teachers. However, the motivation for self-improvement seems to transcend differences in experience, skill, content area, and culture. More research on the motivation for self-improvement is warranted.

5. Research question #3 outcomes of deliberate practice

Educational studies of deliberate practice build on prior studies of elite performance. Prior studies used retrospective interviews and experience logs to investigate elite and good performers. Analysis of type of practice, frequency of practice, total daily/weekly practice, and total accumulated practice were conducted. Therefore, it was essential that the study of expert performance begin with *true experts*. Researchers could then empirically investigate whether differences in expertise were best explained by innate characteristics, type of practice, amount of practice, or some combination of these factors.

Experts in the domains of chess (i.e., chess grandmasters) and music (i.e., international philharmonic orchestra members) demonstrate elite expertise with clear outcomes. We make the causal assumption that A (deliberate practice) causes B (gain in ability). Studies of instructional expertise reported impact on teachers’ instructional practices and on student outcomes. Deliberate practice for teaching (A) improves instructional practice (B), which in turn influences student achievement (C). However, other factors *could* influence student achievement. Thus, while deliberate practice has a direct effect on instructional practice, it has an *indirect* effect on student achievement. Studies reported both types of outcomes, albeit without using statistical methods (i.e., path analysis) which could measure such effects. Such research is recommended.

5.1 Three positive outcomes

Deliberate practice produced moderate direct qualitative results on a range of teacher instructional practices. Dunn & Shriver [2] found that experts change strategy when students are not learning, learn more from deliberate practice activities due to their *approach*, and make changes based on informal evaluation of student behavior [2]. König et al. [19] predicted the outcome of teaching time to be increased skill in interpreting classroom situations; a form of instructional expertise. As these skills were measured using video vignettes of actual classroom situations, we infer this outcome relates to teacher reflection-in-action [27], consistent with Dunn & Shriver [2]. More specific teacher improvement outcomes occurred in public lessons including improved instructional expertise in task design, teaching difficult math concepts, and using mathematically appropriate language. These outcomes occurred the primary level [24], upper elementary level [24], and high school level [25].

Contrasting outcomes occurred in one study of teacher performance because one teacher resisted feedback leading to confusion for students while another teacher accepted and used strategy-oriented feedback leading to “remarkable improvement in her attempt to teach the difficult idea to the first graders” [23]. Thus, outcomes of deliberate practice resulted in improved teacher performance which impacted positive student learning outcomes.

Response to feedback appears to mediate the effects of deliberate practice with expert feedback. Pre-service teachers using deliberate practice improved efficiency of instruction and increased pedagogical content knowledge for social studies [22]. Expert teacher educators reported that student teachers increase their efforts for self-improvement, instructional effectiveness, and experience greater success when they engage in deliberate practice [21].

Student outcomes varied significantly, and studies provided mainly qualitative support for the influence of deliberate practice on student achievement. Anderson et al. [22] found students produced more correct answers because pre-service teachers used deliberate practice. Expert educators reported that deliberate practice for student teachers resulted in improved student outcomes [21] but specific data demonstrating this connection was absent from the study. One clear example of student achievement outcome was improved student learning on a government geography exam resulting from expert use of a new strategy [26]. Evidence to date suggest that a clearly defined outcome for students is likely to be impacted through deliberate practice, but such outcomes are micro in nature. It may be possible to improve outcomes that are tangential or of secondary importance. More research is needed to investigate the indirect effects of deliberate practice on student achievement outcomes, including quantitative measures which can be allow inferences to a larger population.

The evidence from the study of deliberate practice with K-12 teachers demonstrate its potential to produce improvements for self-selected skills deliberately practiced by teachers. However, the decision of *which* skills are practiced and improved may alter significantly whether student achievement is improved.

6. Discussion

Each unique characteristic (task design, feedback, reflection, sustained repetition) and constraint (environmental resources and individual motivation) of deliberate practice theory is empirically supported in research literature and all characteristics were demonstrated in the Chinese public lesson. Challenging goals (task design) increase the effectiveness and need for feedback [28]. When goals are too easy, feedback is not needed. However, when goals are designed with sufficient challenge, feedback is essential to success. This process was illustrated well by the Chinese public lesson process. Feedback by a knowledgeable other, related to these goals, influences reflection, revision, and outcomes. Indeed, meta-analyses demonstrate that the effect size for feedback with students was 0.72 [4, 29]. Given the support for each factor of the deliberate practice model, I suggest that deliberate practice provides a useful heuristic for continuous-improvement of instructional expertise by K-12 teachers. Future research will be needed to confirm and quantify such value in developing teacher quality.

Several limitations emerged in this systematic review spanning 1999–2019. First, studies in this review used number of years (i.e., 10, 24) and recommendations of others (peers, ministry of education) as a key indicator of expert status. These measures are not trustworthy predictors of student achievement and, therefore, of elite performance. Second, sample sizes of most studies were very small, and none were randomly selected. The sample selection limits generalizability of findings. In addition, only two studies explored deliberate practice with in-service teachers at the secondary level and there were no studies of secondary teachers with the minimum experience of ten years suggested by deliberate practice. Finally, this study

consistently found teacher *approach or self-motivation* to be the difference between teachers engaging in deliberate practice compared with those who do not, or who resist the process. However, no scale was developed to measure the construct of self-improvement motivation.

Therefore, several research recommendations may help in the process. First, I recommend investigating the indirect effects of deliberate practice on student achievement outcomes. Second, research is needed to explore the deliberate practices of *self-improving secondary tenured teachers*. Specifically, researchers need to explore teacher practices for those who *do not need to improve* yet aggressively seek self-improvement. Third, future research needs to develop and test a scale that can measure the construct of *teacher self-improvement motivation*. Research can then study factors that predict the construct in K-12 teaching as well as outcomes that can be predicted by the construct.

Policy makers may aid this journey in a few strategic ways. First, recent research on integrated leadership identified practices that foster “community learning,” one of two functions predicting teachers with high effectiveness and high morale [30]. Evidence from 20 years of research on deliberate practice for teachers provides complementary evidence for how we cultivate teacher instructional expertise. Therefore, policy makers should fund and support policies and regulations that institutionalize job-embedded professional learning communities. In addition, policies for teacher professional development need to consider additional small-scale implementation of Chinese lesson study as a means of deliberate practice.

Professional practice begins in our schools of education and continues into our schools and districts. Therefore, teacher training programs need to embed deliberate practice as a means to develop and sustain improvement in teaching instructional expertise. Principal training programs need to guide principals in how to support community learning as the primary work of teachers and staff in a school. Finally, instructional coaches, mentors, and specialists need to apply the principles of deliberate practice as they seek to support ongoing improvement of teachers in schools.

7. Conclusion

This chapter presented a challenge, an invitation to teachers into a long-term journey toward the highest levels of expertise. In a profession in which large numbers leave the profession or promote within five years, we are not experiencing the highest levels of performance for all teachers. Concurrently, the pressure on teachers for results has invited resistance. It remains for leaders, teachers, policy makers, and researchers to collaborate on improving the conditions in which all of us work while simultaneously taking the next step to motivate teachers within our respective contexts.

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