Integrating a Science of Learning and Development Framework Into a Teacher Education Program

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Abstract: Many teachers are inadequately prepared to meet the academic, social, and emotional needs of their learners. Findings from the Science of Learning and Development can offer direction for the teacher education field in preparing novice teachers. We are designing the curriculum for a competency-based teacher education program that will integrate a Science of Learning and Development framework. This has implications for other schools of education.

The science of learning and development and teacher education

As research has proliferated across the various disciplines (cognitive, computational, sociocultural, and anthropological) within the learning sciences, it has revealed a need for a synthesis of the disparate bodies of research for practitioners. The Science of Learning and Development (SoLD) Initiative, launched in 2016, synthesized research from the learning sciences in order to lay out key principles of learning and development as well as practice implications (Cantor, Osher, Berg, Steyer & Rose, 2018; Osher, Cantor, Berg, Steyer & Rose, 2018) and presented a framework, called the Science of Learning and Development Principles of Practice, for developing learning environments that promote comprehensive development (Darling-Hammond et al., 2019). This framework is organized around four interrelated areas - *productive instructional strategies*, *social and emotional development*, *system of supports*, and *supportive environment*. With principles for both school- and classroom-level learning environments, the framework has significant implications for teachers, as key participants in and designers of classroom-level interventions (Fishman, Davis, & Chan, 2014).

Darling-Hammond and Bransford (2005) describe teaching as a complex, knowledge-intensive profession, which requires knowledge of learners and their development in social contexts, knowledge of subject matter and curriculum goals, and knowledge of teaching. However, teacher preparation in the United States is frequently inadequate, with too many teachers insufficiently prepared to meet the academic, social, and emotional needs of the diverse learners whom they find in their classrooms. New SoLD findings can offer greater direction for the teacher education field, informing both the knowledge base for novice teachers and the way learning experiences are structured (Darling-Hammond & Oakes, 2019). All pre-service teachers should learn about the varied ways in which students learn and develop, and the interrelationship between environments, instruction, and development (Darling-Hammond et al., 2019), in order to make good decisions in the classroom. Knowledge of the SoLD positions teachers as both designers and informed consumers of educational tools and curricula, with the ability to assess the principles behind any new strategies or ideas they encounter. Moreover, pre-service teachers must practice enacting the kinds of strategies that promote the whole child approach to learning, as practice is necessary in developing competency (Ball & Forzani, 2009).

Designing the curriculum for a teacher education program

This work is situated within a competency-based teacher education program for which one of the core competencies is "Grounding Practice in the Science of Learning and Development." To make progress towards this competency, teacher candidates within the program must demonstrate their ability to evaluate various evidence-based practices for instruction, building community and relationships, and social and emotional development in order to identify those best suited to their specific goals and contexts. Teacher candidates must also be able to inform their design of learning experiences, relationships and classroom community, and their general practice with an understanding of the principles of the SoLD.

The goal of this work is to inform the design of the graduate program curriculum in order to support teacher candidates in meeting the above learning objectives. We are investigating the following questions: (1) What findings from the SoLD are most important for a novice teacher to know? and (2) How can the principles of practice from the SoLD be integrated into the curriculum for a competency-based teacher education program?

In order to answer the first question, we are conducting a review of reviews on the SoLD and its implications for teacher education. Specifically, we are looking for findings that have a strong evidence base and have been found across multiple studies as well as findings that are easily transferable and applicable to teacher practice and are within the realm of control for a teacher.

For the second question, we are guiding the curriculum redesign of the program so that it reinforces the principles of practice from the SoLD by providing teacher candidates with opportunities to learn about, practice, and design with these principles. We have started with the revision of three pieces of curriculum - Facilitating Collaborative Learning, Designing Lessons, and Designing Assessments - and have integrated key resources that present teacher candidates with the principles of practice from the SoLD that are most relevant to each of those curriculum pieces. As of now, teacher candidates are engaging with resources that present principles from *social and emotional development* as they learn about and practice Facilitating Collaborative Learning and are engaging with resources that present principles from *productive instructional strategies* as they learn about and practice Designing Lessons and Designing Assessments. Furthermore, the summative assessment for each of these curriculum pieces asks teacher candidates to reflect back and justify how they used their knowledge of principles of practice from the SoLD in their demonstration of competence.

The goal for the fully revised version of the curriculum is to have the principles of practice from the Science of Learning and Development be reinforced more regularly in each of the pieces of the curriculum and to ensure that every piece of curriculum is grounded in specific principles from the SoLD (Figure 1).

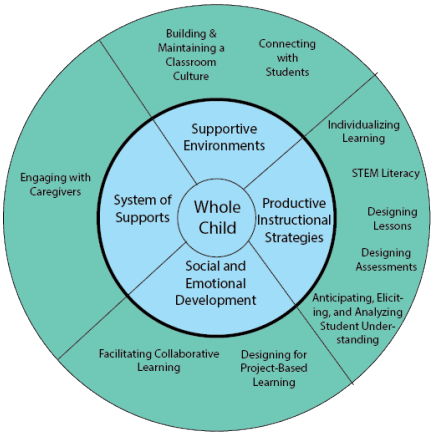

Figure 1. The SoLD Principles of Practice surrounded by pieces of the curriculum they map to.

Discussion

By positioning the Science of Learning and Development as a core competency within the program and integrating it in the curriculum, we hope to graduate educators who are well-equipped to support their students' learning and development through the whole child approach. With this work, we are redesigning the curriculum so it enforces principles of practice from the SoLD and provides teacher candidates with the opportunity to learn about and practice these principles. We are also redesigning the curriculum so that the way teacher candidates learn about and practice the SoLD also embody the principles from the SoLD. In this way, we are "modelling the model" in our redesign for both our teacher candidates and for other schools of teacher education. As such, we also hope to provide a model for how other schools of education think about and design for the SoLD in their own curriculum.

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