

## Becoming a 3 Dimensional Teacher of Science: Conceptual Change

The journey into becoming a three dimensional teacher as described by the Framework for K-12 Science Education (2012) embraces the dimensions of science and engineering practices, crosscutting concepts and disciplinary core ideas. The Framework argues that the dimensions are interwoven and should not be separated when planning and carrying out science lessons and challenges teachers of science to accept this vision for science education. Although the titles of the individual components of the three dimensions seem simple at first glance, as educators dig into each area, the depth and complexity of the dimensions quickly becomes obvious and often overwhelming. The Framework authors face the challenge of the dimensions head-on in the first chapter, *A New Conceptual Framework*, acknowledging that conceptual change, first for teacher and then for students, is paramount.

Conceptual change is defined as learning that changes an existing conception. It is a process that results in a paradigm shift, revolutionizing one's prior thinking. Conceptual change takes time...time to determine one's current beliefs, to be open to new ideas, to accommodate new thinking into one's current understanding and time to put the new learning into practice. Often we expect learning to be instantaneous, but that is usually not the case.

The following self assessment is intended to provide an understanding of where you are on the Becoming a 3 Dimensional Teacher of Science continuum. It is based on the work of Llewellyn (2007) and others.

Please rate where you see yourself in the following stages.

**Building Awareness:** In this stage you are reflecting on your professional goals, trying to determine the teacher you want to be. You are becoming aware of the concept of a 3 Dimensional Teacher.

**Exposing Beliefs:** In this stage, you reflect on your strengths and weaknesses, recognizing there is distance between where you are and where you want to be. You can identify and articulate the 3 dimensions, but have not implemented them with any forethought or regularity in your teaching.

**Confronting Beliefs:** Here you are implementing a proven professional development plan to assist you reaching your desired stage regarding the 3 dimensions. This includes a formalized plan to attend workshops, conduct personal reading, explore online resources, engage with other teachers in PLCs, participate in twitter chats, attend conferences, etc. You are challenging yourself by implementing some of the 3 dimensions and reflecting on the effectiveness of the lessons and make appropriate changes to ensure rigorous application of the 3 dimensions.

**Reinterpreting Beliefs:** You are gaining new strategies and improving your instruction with ongoing reflection. You are comfortable with peer support and willingly share ideas

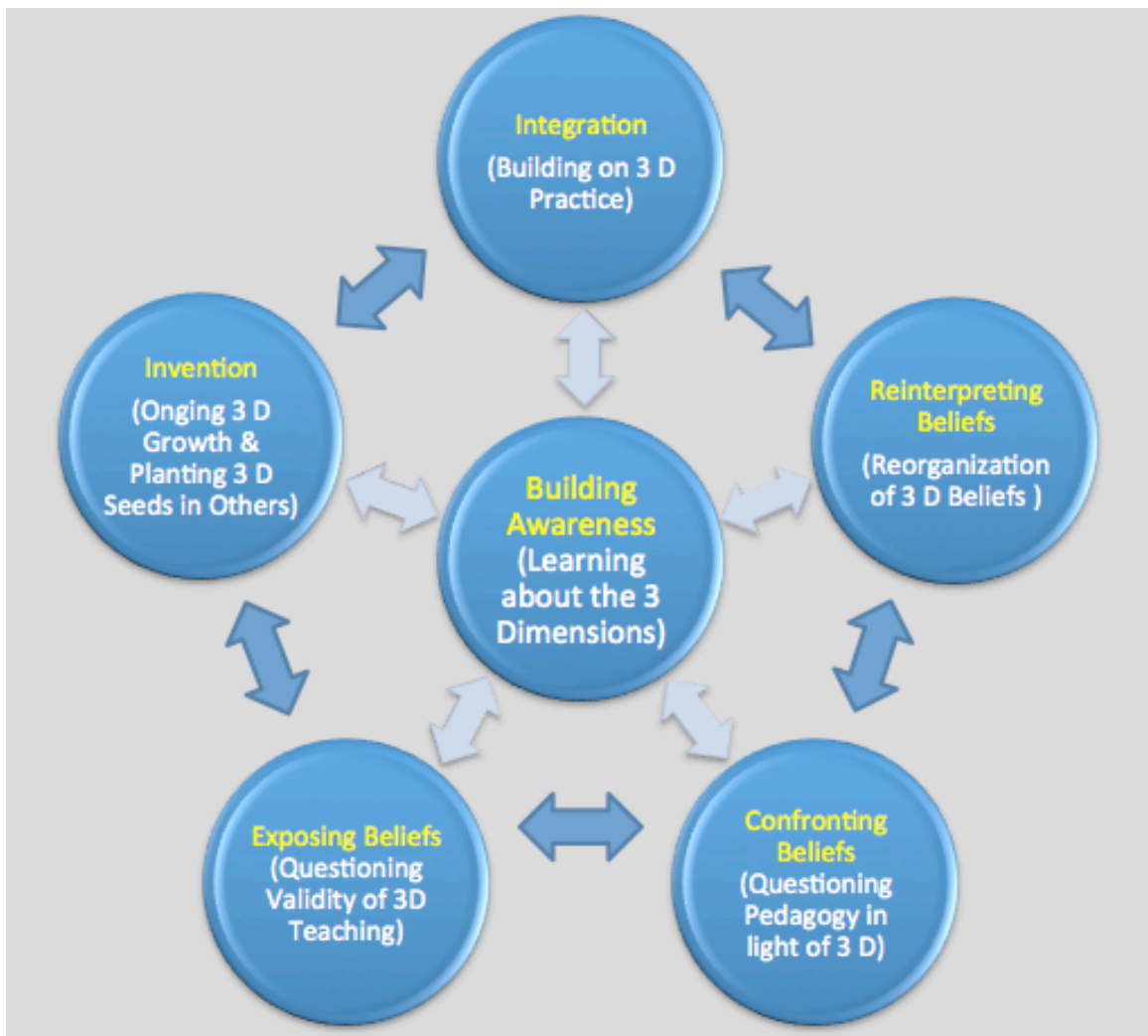
and ask for help in areas of weakness. More and more of your instruction is 3 dimensional in nature. You are consciously turning learning over to your students and are becoming a guide on the side and a co-learner rather than the sole dispenser of knowledge.

**Integration:** You are attempting to fully implement 3 dimensional teaching in your classroom. Your mindset for all instruction accounts for science & engineering practices, crosscutting concepts and disciplinary core ideas and you view them as interwoven. You have a repertoire of teaching strategies that includes seamless access to all dimensions. You have a support system of colleagues with whom you can continue your professional growth.

**Invention:** In this stage you are involved in on-going, deep professional development around the 3 dimensions. You are inventing new ways of expanding your practice and you are purposefully planting the seeds for others through conversation, presentations, creation of materials and more.

In what stage do you see yourself today? Identify and name the stage:

Please explain your stage choice:



## References Cited

National Research Council. *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas*. Washington, DC: The National Academies Press, 2012.

<http://esc.tricountyesc.org/cos/science/resources/resources-becoming-an-inquiry-teacher>  
Becoming an Inquiry Teacher (*Llewellyn, 2007, pp 1-3*)