Curriculum Exchange: Transforming Teaching through Implementing Inquiry

Dr. Aaron C. Clark, North Carolina State University

Dr. Aaron C. Clark is a Professor of Technology, Design, and Engineering Education within the College of Education and is the Director of Graduate Programs and Associate Department Chair for the Department of Science, Technology, Engineering and Mathematics Education (STEM). He received his B.S. and M.S. in Technology and earned his doctoral degree in Technology Education. Dr. Clark has worked in both industry and education, including administration at the community college and university levels. His teaching specialties are in visual theory and literacy, 3-D modeling, technical animation, and STEM-based pedagogy. Research areas include graphics education, game art and design, and scientific/technical visualization. Dr. Clark's current research focus is on creating a national model for professional development for teachers in engineering, design and technical education that is interactive and leads towards national board certification. He has been and continues to be a Principle Investigator on a variety of funded research grants related to visualization and education and has dedicated his studies in areas related to STEM curricula integration. He currently consults to a variety of businesses, educational agencies and organizations.

Dr. Jeremy V Ernst, Virginia Tech

Jeremy V. Ernst is an associate professor in the School of Education at Virginia Tech. He currently teaches graduate courses in STEM education foundations and contemporary issues in Integrative STEM Education. He is also a Fellow of the Institute for Creativity Arts and Technology at Virginia Tech. Jeremy specializes in research focused on dynamic intervention means for STEM education students categorized as at-risk of dropping out of school. He also has curriculum research and development experiences in technology, engineering, and design education.

Dr. Vincent William DeLuca, North Carolina State University

V. William DeLuca, Ed.D. Dr. DeLuca taught middle school, high school, undergraduate and graduate level technology education in his 30 year career as a teacher and researcher. He has extensive research and curriculum development experience in STEM disciplines. His research includes the study of thinking processes, teaching methods, and activities that improve technological problem-solving performance and creativity. He has expertise in developing technology and engineering education curriculum that integrates science, technology, engineering and mathematics (STEM) concepts. Dr. Deluca is Co-PI on NSF project Transforming Teaching through Implementing Inquiry (DRL 1118942). This project focuses on developing research-proven professional development resources that integrate teacher learning with assessment practice. The end product will constitute a professional development and research-proven cyber infrastructure for technology, engineering and design educators.

Ms. Sharon Wensel Bowers, Virginia Polytechnic Institute and State University

Sharon Bowers is a doctoral student and graduate research assistant in Integrative STEM Education at Virginia Polytechnic Institute and State University.

She is also a Senior STEM educational specialist for the Center for Integrative STEM Education (CISE) at the National Institute of Aerospace (NIA). Sharon recently retired from Virginia Beach City Public schools after more than 30 years as a science educator. Her work with children earned her several honors, including recognition as a Secondary Science Presidential Award Winner for Virginia.

Sharon is developing and teaching five graduate courses for McDaniel College that will lead to a certificate in elementary STEM education and is a STEM androgogy consultant for Stevenson University.

Through her work with NIA, Sharon has developed resources that model best practice in the use of instructional technology to support 21st Century teaching and learning. Through partnerships with NASA

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and local school divisions, NIA has developed NIA Universe, a multi-user interactive, synchronous virtual world that brings together students, teachers, and experts for collaborative work. Sharon oversees the development and use of this emerging technology to support collaborative, inquiry-based instruction. She is the program manager for the NASA Goddard OPTIMUS PRIME Spinoff InWorld Challenge, a challenge that uses NIA Universe as a platform for collaborative design.

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Transforming Teaching through Implementing Inquiry

How does T2I2 transform teacher practice?

T2I2 offers teachers ***flexible*** and ***practical*** professional experiences that can immediately be applied directly into classroom instruction.

Teachers may choose the ***content*** and ***strategies*** based upon need.

It's professional learning to ***fit a teacher's time and needs*** while developing a national network for teachers.

How does T2I2 impact student learning?

Students learning in a T2I2- shaped classroom experience:

- ***Student-centered*** and ***generated*** learning experiences;
- ***Effective*** use of ***instructional technology;*** and
- ***Authentically integrated science, technology, engineering and math*** content and practice.

EbD curriculum is modified and used as a prototype.

Start with an EbD unit.

T2I2 STEM content specialists and teacher educators collaborate to develop a fully integrated STEM unit for student implementation..

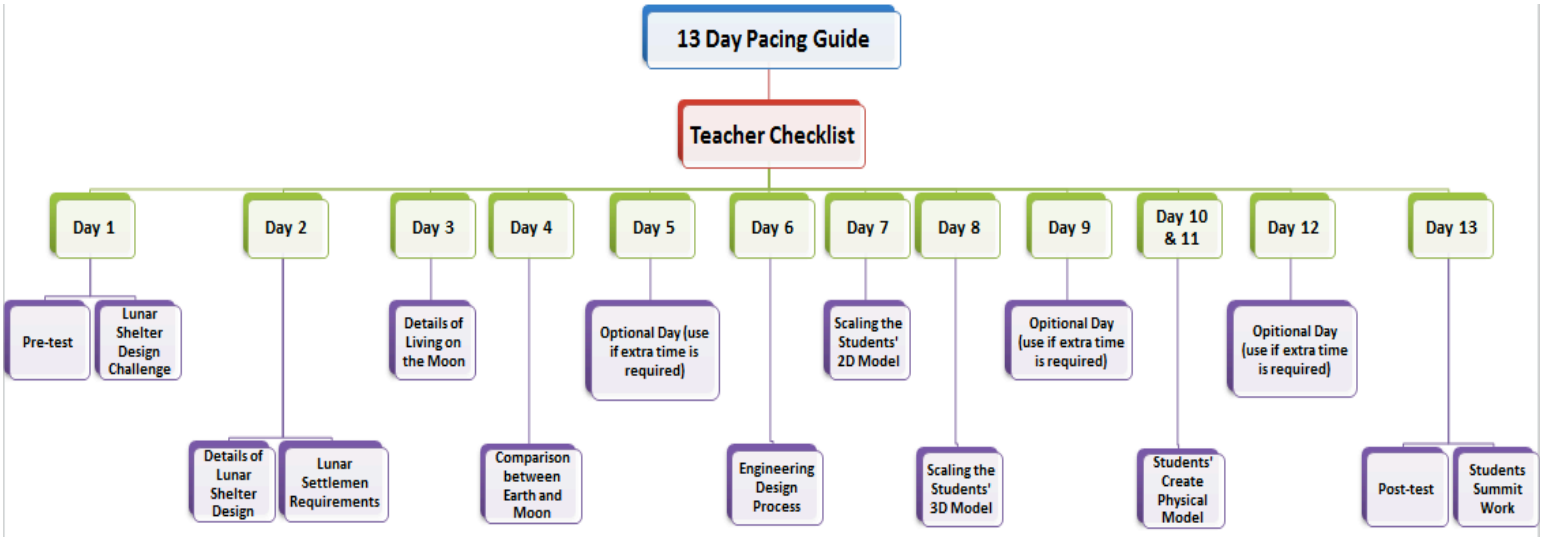
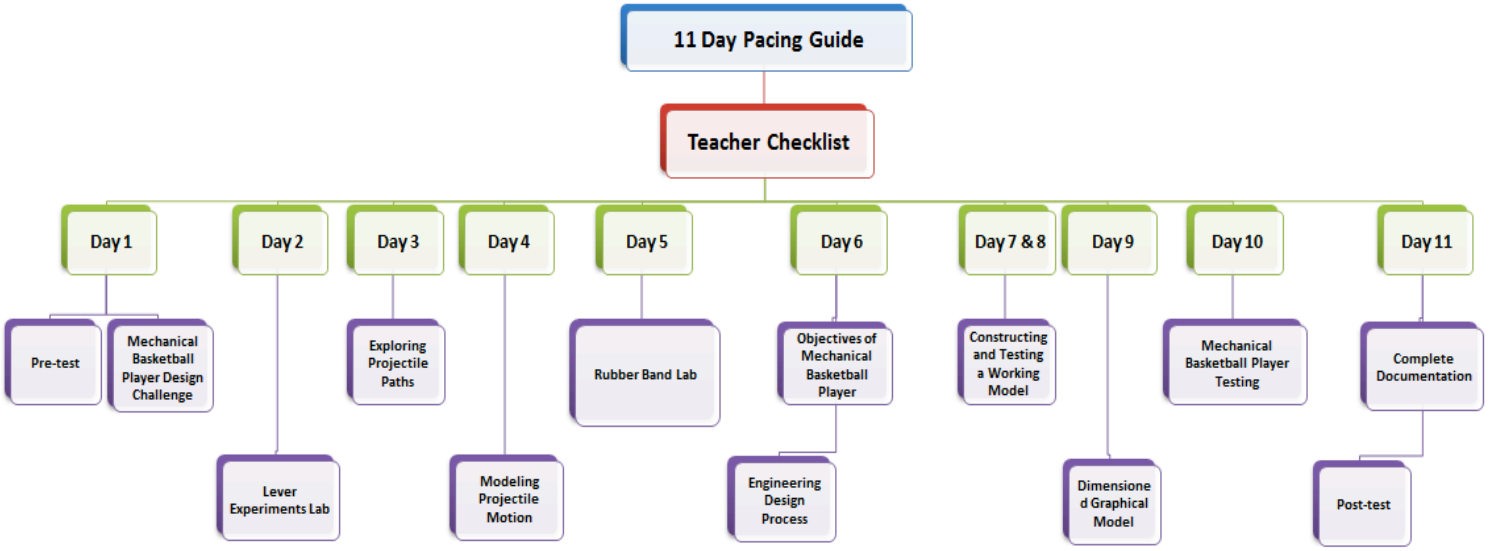
- Lunar Shelter Design Challenge (MS)
- Mechanical Basketball Player (HS)

Unit is piloted and field tested by T2I2 teacher leaders to incorporate improvements into the unit design and sequencing based upon student outcomes and teacher implementation experiences.

The final curriculum will be available through Stem Center for Teaching and Learning.

- Pacing Guides
- Checklists
- Pre and Posttests
- Unit Content

Lunar Shelter Design Challenge
Middle School Unit of Instruction



Mechanical Basketball Player Challenge
High School Unit of Instruction