Model for Teaching Science Curriculum

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Purpose: Expose pre-service teachers to the teaching of a science curriculum, with grade progression, using a simplified, concise model that is accessible for all learners and spans the science content areas of span life science/LS, physical science/PS, earth & space science/ESS, and engineering, technology, along with a distinct environmental education perspective. Project Learning Tree's "Explore Your Environment" will serve as this model for exposing pre-service teachers to the use of science curriculum in the classroom.

Science is a way of knowing about the natural world and universe in which we live. Science knowledge is ideally discovered through observation and inquiry about one's environment, making place-based environmental education a natural approach for the learning of science concepts and skills. Pre-service teachers perceive that they will be faced with the daunting task of teaching a vast array of science concepts and skills when entering PK-9 classrooms. NGSS serves to guide this with three-dimensional learning encompassing practices (SEPs), content (DCIs), and concepts (CCCs). However, the curriculum available to teachers in various school districts ranges from non-existent to highly scripted. In an effort to prepare pre-service teachers to teach in the classrooms of schools with this variation in curriculum availability, it is being proposed to use the Project Learning Tree "Explore Your Environment K-8 Activity Guide" (PLT) as the source for modeling teaching curriculum in a science methods course to demonstrate the following curriculum features:

Curriculum Feature	Criteria	Model Support
Place-Based Learning	Focus on learners' local spaces with which they are most familiar; emphasis on outdoors	National Geographic Multiple Perspectives PLT - trees likely available in all outdoor environments
Environmental Education	Connects to environmental literacy and sustainability	PLT – by nature of its content, the Wisconsin standards for Environmental Literacy and Sustainability are exemplified
Connectivity	Local perspective with extension to regional, global	The Connectivity Project PLT – local/regional/global perspective on trees (Appendix G)

Inquiry-Based	Learners investigate answers to (their) questions	PLT – Planning an Investigation (Appendix L) I Notice..., I Wonder..., It Reminds Me Of..., I Think Maybe…
Questioning	Learners develop their own questions based on their observations	Making Observations Questioning Strategies How to Teach Nature Journaling
Nature of Science (NOS)	NOS tenants are emphasized	Nature and Practices of Science
Science Content	Activities span life science/LS, physical science/PS, earth & space science/ESS, and engineering, technology, and application of science/ETS	PLT - Although the emphasis is on life science/LS, there are distinct components of physical science/PS, earth & space science/ESS, and engineering, technology, and application of science/ETS in the supplied activities to allow for exposure to all science content areas; Index identifies content topics
Curriculum Integration	Other content areas (math, ELA, social studies – also art, health, PE, faith) and/or STEM concepts are integrated with the lesson's science content	PLT - STEM/STEAM/STREAMS based activities allow for interdisciplinary teaching; additional activity resources further extend this opportunity; allows for science and social studies integration into ELA and math (Appendix E STEM Skills and Index for subject integration)
Argumentation	CER (claim, evidence, reasoning) framework utilized for argumentation	PLT – Appendix K
Learning Cycle	Lesson are consistent with the 5E learning cycle (Engage, Explore, Explain, Elaborate, Evaluate)	PLT - Activities easily follow the 5E learning cycle
Storyline	A storyline is used to connect lesson(s)	PLT – demonstrates the use of a storyline by the nature of its tree/forestry focus; samples units have storyline (Appendix H)

Lesson Planning Components	Contains key lesson plan components (standards, objectives, prior knowledge, vocab, assessment, procedure, differentiation)	PLT – lesson plan format matches that of IHE's template (page 89)
Standards Driven	Lessons are designed using NGSS SEP/DCI/CCC three-dimensional framework	PLT – lessons are aligned with the NGSS; in addition, Wisconsin standards for Environmental Literacy and Sustainability are also exemplified (Appendix A)
Assessment	Learning objectives are assessed in a variety of ways	PLT – incorporates a variety of assessment strategies; Appendix M
Vocabulary	Focus on using academic language, specifically vocabulary, for reading, writing, speaking, listening	PLT – Glossary for vocabulary (Appendix I)
Differentiation	Lessons include a variety of multimodal activities to enable learning for all	PLT - activities provide exposure to a variety of strategies (Appendix F; Index identifies differentiation strategies)
Flexibility	Allows for the use of outside supplemental materials such as other curriculums, read-alouds, videos, slide presentations, etc.	PLT - allows flexibility for use of other resources and provides information for some of these additional resources
Unit Planning	Groups of connected lessons comprise a unit of study	PLT - activities with theme focus (trees/forestry) allows for creative unit creation; sample units are also provided (Appendix H)
Scaffolded across Grades	Science concepts and skills and built upon from one grade level to the next	PLT - bridges concepts from PK - 8 with trees/forestry; activities organized by grade bands

Resource

Project Learning Tree 2021, *Explore Your Environment: K-8 Activity Guide.*