



A Science, Technology, Engineering, and Mathematics (STEM) Lesson Plan for Teaching Water Quality Concepts in China



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Introduction:

The future of environmental problem-solving is education. The U. S. is investing in advancing Science, Technology, Engineering, and Mathematics (STEM) education to better prepare students to face these coming environmental challenges and the drawbacks of a nation falling behind developmentally. China similarly faces impending devastation from environmental degradation including water scarcity, declining water quality, and regional climate change. Like the U.S., China needs to expand STEM education to better prepare for future challenges related to environmental sustainability as well as political, societal, and economical sustainability. The natural progression of society places this responsibility in the hands of future generations. Some key concepts in environmental and oceanographic science are already taught in schools in the U.S. and China, but incorporation of these concepts into current and existing hands-on STEM lesson plans will generate early interest in youth STEM learning through creative methodology and practical application.

Experimental Design/Methods:

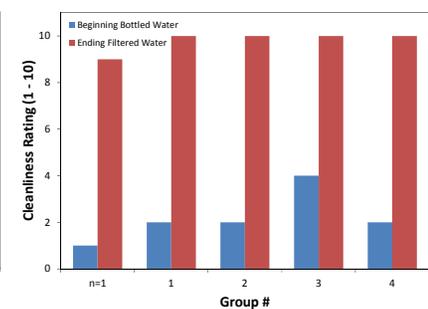
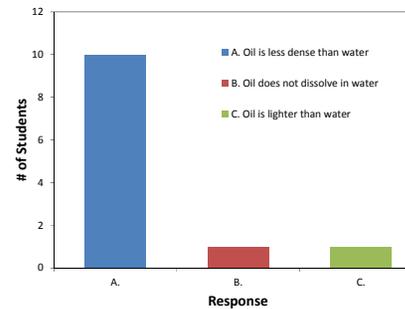
A STEM lesson plan incorporating fundamental oceanographic principles was created and tested for U.S. grade 5-6 students. The lesson plan was then translated into Chinese for use in STEM K-12 efforts in China.

Humans and Water Quality	
U. S. Naval Academy STEM Curriculum MIDN 1/C Claire Fletcher	
Part One: Humans and Water Quality	
Objectives:	<ul style="list-style-type: none"> • Identify the 50% of water that is fresh water. • Explain the water cycle. • Describe the importance of water to life. • Explain the importance of water to the environment. • Explain the importance of water to the economy. • Explain the importance of water to the environment. • Explain the importance of water to the environment.
Materials:	<ul style="list-style-type: none"> • Paper cups (20 per group) • Paper plates (20 per group) • Tap water (20 per group) • Oil (20 per group) • Food coloring (20 per group) • Paper towels (20 per group) • Paper plates (20 per group) • Paper cups (20 per group) • Paper plates (20 per group) • Paper cups (20 per group) • Paper plates (20 per group)
Procedure:	<ol style="list-style-type: none"> 1. Fill each cup with 1/2 cup of water. 2. Add 1/2 cup of oil to each cup. 3. Add a few drops of food coloring to each cup. 4. Stir the mixture with a spoon. 5. Observe the mixture. 6. Discuss the results.
Assessment:	<ul style="list-style-type: none"> • Ask students to describe the water cycle. • Ask students to explain the importance of water to life. • Ask students to explain the importance of water to the environment. • Ask students to explain the importance of water to the economy. • Ask students to explain the importance of water to the environment. • Ask students to explain the importance of water to the environment.



人命和水質	
U. S. Naval Academy STEM Curriculum MIDN 1/C Claire Fletcher (英文)	
第一部分：人命和水質	
目标：	<ul style="list-style-type: none"> • 识别出50%的淡水。 • 解释水循环。 • 描述水对生命的重要性。 • 描述水对环境的重要性。 • 描述水对经济的重要性。 • 描述水对环境的重要性。 • 描述水对环境的重要性。
材料：	<ul style="list-style-type: none"> • 纸杯 (20个/组) • 纸盘 (20个/组) • 自来水 (20个/组) • 油 (20个/组) • 食用色素 (20个/组) • 纸巾 (20个/组) • 纸盘 (20个/组) • 纸杯 (20个/组) • 纸盘 (20个/组) • 纸杯 (20个/组) • 纸盘 (20个/组)
程序：	<ol style="list-style-type: none"> 1. 在每个杯子里倒1/2杯水。 2. 在每个杯子里倒1/2杯油。 3. 在每个杯子里滴几滴食用色素。 4. 用勺子搅拌混合物。 5. 观察混合物。 6. 讨论结果。
评估：	<ul style="list-style-type: none"> • 问学生描述水循环。 • 问学生解释水对生命的重要性。 • 问学生解释水对环境的重要性。 • 问学生解释水对经济的重要性。 • 问学生解释水对环境的重要性。 • 问学生解释水对环境的重要性。

Results:



Conclusion/Relevance:

- Results provide a baseline STEM lesson plan for future research on youth education to confront future environmental challenges.
- Follow-on studies should be conducted in China's classrooms and should include more focus on breaking socio-cultural barriers.
- STEM education is essential to the future of political, economical, societal, and environmental sustainability.