Energizing Preschoolers & Pre-Service Educators: Reflections on Wind Day

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Introduction

In June 2019, the co-researchers attended the Energizing Pre-Service Teacher Education Programs and In-Service Educators Conference in Wisconsin Dells, WI. An output of that conference was the development of a collective research study funded by the Wisconsin K-12 Energy Education Program (KEEP) and Wisconsin Society of Science Teachers (WISST). The intention of the larger study designed at the 2019 conference was to explore how environmental education is being implemented in Wisconsin’s Institutions of Higher Education, as well as effective ways energy education can be implemented with K-12 learners in Wisconsin’s schools. Thus, this study is a part of a larger action research project being conducted by K-12 educators and university professors throughout Wisconsin to explore effective and impactful environmental education strategies. Posed with the central research question at the summer 2019 workshop, the project’s participants were inspired by wind energy lessons developed by Wisconsin’s K-12 Energy Education Program (pp. 47-49 and pp. 117-119).

However, as both co-researchers serve within the field of early childhood education, there was strong motivation to consider how an energy education experience might be developmentally appropriate for preschoolers. Specifically, this study is important because it provided a group of pre-service educators with an authentic opportunity to reflect upon their own content knowledge related to energy education, as well as to apply that content knowledge to planning, implementing, and assessing energy education activities for young children. These are key NTASC standard areas of growth for pre-service educators. This study explored effective and impactful environmental education learning opportunities for both preschoolers as well as future educators.

Purpose Statement

The purpose of this qualitative research study was to explore the characteristics of a learning experience that helped both preschoolers and pre-service educators learn about wind energy and effectively, and efficiently; Furthermore, the proposed study intended to explore pre-service educators’ perceptions of planning and implementing a wind and energy learning experience for preschoolers; with specific emphases on the most effective characteristics of that learning experience for the learners involved.

Research Questions

Central Research Question: What characteristics of a learning experience help students learn about energy efficiently, effectively, and long term?

SRQ1: How do preschool students perceive wind energy?

SRQ2: How do pre-service educators perceive planning and implementing energy education for young children?

SRQ3: How should the characteristics of the learning experience help students learn about energy efficiently, effectively, and long term?

Methodology

Two groups of participants participated in the Wind Day action research project during the spring and summer of 2020. Ten pre-service educators enrolled in a science and environment education methods course served as participants, research assistants, and preschool educators. Twelve preschoolers participated in the Wind Day event in June 2020. Initial data was gathered from the pre-service educators in the form of a Pre-Reflection Tool; and from the preschoolers using the Pre-Interview Drawing. Each pre-service educator completed the Pre-Interview Drawing with 1-2 preschoolers during a visit to the host preschool in February 2020. In the following weeks, the pre-service educators generated lesson plans and materials for “Wind Day.” The pre-service educators were responsible for planning one of the five mini-lessons. This was a collaborative learning experience as the candidates refined their mini-lesson, formative assessment tools, and received feedback as a part of the methods course. At this point, COVID-19 policies complicated the research methodology. Wind Day was scheduled for the end of April 2020, and the pre-service educators would have been responsible to collaboratively facilitate the entire sequence of Wind Day. Next, the pre-service educators were to complete the Post-Reflection Tool; and the preschoolers’ Post-Interview Drawings would have been gathered for analysis. Instead, the pre-service educators recorded a virtual version of Wind Day, and submitted a final analysis of the project using the Post-Reflection Tool. The actual Wind Day event was recorded and strategies that were created were shared with the preschoolers. During June 2020, the co-researchers and pre-service educators analyzed the data and generated findings that compared both preschoolers’ and pre-service educators’ initial and resultant knowledge. Conclusions were drawn about the experience in relation to the central research question.

Results

The findings from the action research illuminated areas of growth and new insight related to the central research question for all of the learners that participated, including the co-researchers. Based on the findings of this study characteristics of energy education experiences that are effective, efficient, and long term include activities that are multimodal and multisensory. This is especially important since wind is invisible and abstract for young children. Developmentally appropriate exploration and play for preschoolers at stations is an impactful lesson structure in which the teacher can facilitate, disrupt, observe, and model the content with a small group of learners. At stations, children can experience opportunities to use simple tools and play with the concepts; in this case, caps, puppets, bubbles, wind direction, and wind chimes. Furthermore, authentic and hands-on experiences that intentionally consider and build on the children’s prior schema were effective. In the case of Wind Day, content knowledge was integrated and co-constructed from five co-researchers, tasked with the project and collaborating with and problem solving and critical thinking required to participate in a STEM activity using sail cars. Finally, for long-term activities should be transferable; repeated at home or another day to increase the preschoolers’ depth of knowledge.

Discussion

The central research question was further illuminated by considering growth of both content knowledge and pedagogical understandings of the participants. The preschoolers’ growth included an increased ability to define wind and the impact of wind, despite its invisibility. Initial data demonstrated a fearful misconception of strong wind. After Wind Day, the preschoolers recognized that wind can be unpredictable, but rather than expressing that the children found ways to explore and play with various types of strengths of wind. The children used pinwheels as simple tools to measure the wind, and they compared the wind and how this generated a beginning recognition of how wind is an energy source that is useful. However, final data analysis demonstrated that the preschoolers were still lacking design principles for implementing wind energy lessons. For example, the preschoolers demonstrated improved pedagogical insight in several InTASC (2011) Model Core Teaching Standard areas. The pre-service educators demonstrated improved pedagogical insight in several InTASC (2011) Model Core Teaching Standard areas. The pre-service educators demonstrated improved pedagogical insight in several InTASC (2011) Model Core Teaching Standard areas. The pre-service educators demonstrated improved pedagogical insight in several InTASC (2011) Model Core Teaching Standard areas.