Title: STEM College for Kids

By: Dr. Kelli Odden & Dr. Carol Enger

Introduction:

Laughter, conversation, tinkering, and clatter were sounds heard throughout the halls of Mayville State University June 20-23. What created all of this noise? STEM College for Kids was in full swing. For the last three summers, Mayville State University's BSED Early Childhood Education program and STEM education program have collaborated to introduce students entering into kindergarten through third grade to the STEM engineering process. Throughout the four day STEM College for Kids event, 38 students spent four hours together each day to solve various problems presented to them by Mayville State University's pre-service teachers. Students were introduced to a problem that needed to be solved using the engineering design process.

A Perfect Collaboration:

Annually, Mayville State University's BSED Early Childhood program holds its summer "block classes" for six weeks throughout the months of June and July. Students participate in Social Studies Strategies in ECE, Language and Literacy in ECE, Elementary Science, and Kindergarten Methods courses each day for six weeks. Part of their practicum experience for all four courses is the STEM College for Kids. This hands-on experience allows the pre-service teachers to practice using strategies taught to them throughout their coursework with children.

The pre-service teachers are put into teams of 2 or 3. Time is spent on team building and sharing one another's teaching styles. Dr. Carol Enger and Dr. Kelli Odden have both found team building to be a critical component of the success for STEM College for Kids. "Pre-service teachers are required to get to know their peers on a professional level and learn the give and

take of teaching as a team" stated Dr. Carol Enger. This summer there were eleven pre-service teachers divided into five different teaching teams that took part in this professional experience.

Once the team building components were conducted Mayville State's STEM Coordinator Dr. Sarah Sletten also took the time to educate the pre-service teachers on the STEM engineering process and what it can look like in action. This year Dr. Sletten presented the pre-service teachers with the following problem, a child's swing broke, and it needs to be fixed. The parameters Dr. Sletten gave for this project were that the swing had to be safe, sustainable, and be able to swing back and forth easily. There was an immediate hum in the room with questions being asked of one another, ideas presented, and actions being taken to solve the problem. The pre-service teachers learned quickly that this process requires a hands-on approach, where mistakes are a way to further exploration, and the importance of playing is at the fore front. Yulia Momberg, a senior at Mayville State University stated, "The engineering process is similar to the many philosophies of play that we have been studying throughout our education at Mayville State University".

Curriculum:

The Early Childhood team in collaboration with Mayville State University's STEM Coordinator ordered Hands-on Standards STEM kits through Hand 2 Mind. It is important to note that these kits were a starting point for each teaching team, giving them a focus and a problem to solve. The kits were a foundation allowing the pre-service teacher's to research and explore the topics given to them; challenging them to decide how to further their teaching on the area of study.

The topics studied this year:

Pam’s Camping Adventure: Pam is a raccoon planning a camping trip and needs help with her tent. Geometry and graphing skills are used to problem solve as children learn about properties of material and their suitability for an intended purpose.

Pam and Ava's Mapping Adventure: Pam the raccoon is on the ground while Ava the owl is in the air. How do Pam and Ava's positions change what they see? Children take a look from both points of view to help Pam and Ava plan a new bike path.

Ron’s Habitat Adventure: Ron the Armadillo wants to help an injured, displaced wild turtle survive. Children work with Ron to design, make, and test a patch that will help the turtle heal when it is returned to the pond habitat.

Sunny Sandbox Exploration: In this STEM module, Sophie's brother Sam loves to play in the sandbox. But the sun makes the sand too hot! Children explore the warming effects of the sun as they help Sophie design and build a covering to block sunlight.

Sidewalk Safety Exploration: In this STEM module, Deon's little sister Jada is learning to ride a bike. Deon doesn't want Jada to get hurt going too fast. Children learn about and use slope and speed to design safe ways for Jada to slow down.

Little Footprint Exploration: In this STEM module, children help Ethan and Yana plan a delivery route for Farmer Lee that saves gas and creates less pollution. Students plan, build, test, and optimize a delivery route that reduces resource use.

Squeaky Clean Magnets Challenge: In this module, Pete's Pet Shop is looking for a way to quickly clean fish tanks without disturbing the fish. Students explore the power of magnets.

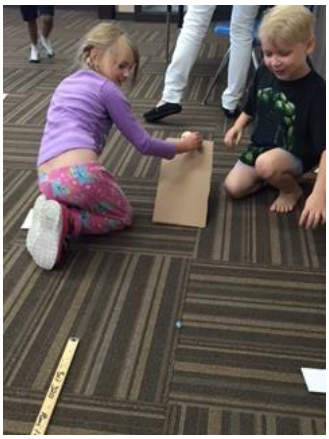
Then they plan, build, test, and optimize a design solution for cleaning the pet store's fish tanks.

Farmer Grady's Challenge: In this module, Farmer Grady wants to protect her crops from being damaged by severe weather. Students learn about weather conditions and materials that can withstand severe weather. Then, they plan, build, test, and optimize design solutions to protect crops.

STEM College for Kids:

Students came from as far as Arizona and as close as down the block to attend the day camp. The events started at 9:00 each morning and ended at 12:00 in time to go home for lunch. Students were busy solving problems using hands-on approaches that allowed for repeated tries and various outcomes. The pictures below is an example of some of the determination shown when looking for just the right pitch for a bicycle to travel safely down a hill.





The students exclaimed there excitement about all the problem's proposed each day. Many students chose to miss other opportunities taking place throughout the community so they could come back and not "miss out". One little boy exclaimed, "I can swim any day, today I am an engineer".

Reflections:

Our team of pre-service teachers and professors identified the following reflections about this STEM College for Kids experience:

- The Hands-On Standards for STEM kits are an amazing start to the planning process and it forced further exploration and thinking about the topics.
- STEM College for Kids is set up in a format that allows pre-service teachers to practice planning lessons that are hands-on learning in a play format. The students were allowed to explore, test out, discuss, try and try again.
- Pre-service teachers and professors both agreed that preparation goes a long way. This summer we had a specific time slot set aside each day for the teaching teams to work together, plan, research, and create effective learning environments.
- Along with the preparation of the curriculum the classroom environment was carefully planned and transformed to support the STEM experience.

The STEM College For Kids practicum event for Mayville State University's pre-service teachers and the children of the surrounding communities proved to be a positive and effective learning experience.

Mayville State University's Pre-Service Teachers pictured from left to right:

Cheyenne Olson, Allison Roth, Amanda Miranowski, Megan Sherven, Jennifer Cook, Yulia Momberg, Stephany Wold, Elizabeth Schatz, Kelsey Kramer, Marley Papenfuss, and Tasha Baldwin

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Dr. Carol Enger, Professor, Mayville State University. Dr. Enger teaches courses in Early Childhood Education and is active in many state and national organizations promoting quality programs for children and families.