

Professional Development Paper

By

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Submitted to

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The title of my professional development is “Learn Science and Engineering through projects with Lego WeDO 2.0”. The topic was learning science and engineering through projects. My session took place at my place of employment, which is Dixon Elementary School in Dixon, Montana. The attendees were nine of my coworkers who are educators of grades PreSchool through 8th grade and our Principal. Four educators who attended were; Crista Anderson (Principal) canderson@dixonschool.org, Jeff Buck (7th/8th grade teacher) jbuck@dixonschool.org, Kyler Rutz (5th grade teacher) krutz@dixonschool.org, and Mariah Delaney (Preschool teacher) mdelaney@dixonschool.org.

The Next Generation Science Standard that my professional development session addressed are; NGSS performance expectation **3-PS2-1**: Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.

The Common Core State Standards addressed for English Language Arts are;

CCSS.ELA-Literacy.W.3.7: Conduct short research projects that build knowledge about a topic. **CCSS.ELA-Literacy.W.3.8**: Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories. **CCSS.ELA-Literacy.SL.3.1.a**: Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.

CCSS.ELA-Literacy.SL.3.1.d: Explain your own ideas and comprehension in light of the discussion.

The goal of my Professional development session was to expose my coworkers to NASA integrated assets by promoting innovative and informative educational materials that engage students' interest in science, technology, and engineering. Because the LEGO Education WeDo 2.0 curriculum pack is built on Next Generation Science Standards and facilitates a clear, easy to follow journey through engineering, earth, physical, life and space sciences, I hope to inspire my coworkers to implement more NGSS instructional content into their current curriculums.

My Post-Survey Questions were: 1. Do you understand how the Lego Education WeDo 2.0 Core Set strengthens students' understanding of the eight science and engineering practices, including developing and using models, planning and carrying out investigations, analyzing and interpreting data, using mathematics and computational thinking, constructing explanations and designing solutions, engaging in argument from evidence, and obtaining, evaluating and communicating information? a. Yes b. No c. Unsure

2. Will you use the LEGO Education WeDo 2.0 curriculum in your classroom?

a. Yes b. No c. Unsure

3. Are you interested in using any other engineering curriculum in your classroom?

a. Yes b. No c. Unsure

4. What do you foresee as the biggest obstacle implementing engineering design into your current curriculum?

5. Would you like to implement more STEM based lessons/projects during our school's Visions time? a. Never b. At least once/month c. At least once/trimester d. At least once/year

My professional development session took place in my school on a regularly scheduled Pupil-Instruction Related day in the school's computer lab on March 2, 2020. The session was 1 hour long and attendance was required for all of the educators on the staff.

I presented a powerpoint of a 3rd through 5th grade focused lesson plan. The learning goal that my materials address is the topic of force and motion that was explored and explained in detail by Sir Isaac Newton. Students will explore what forces are and how they make objects move and create and program a robot to investigate the effects of balanced and unbalanced forces on the motion of an object. Then, document and present findings about forces. After I presented my powerpoint my coworkers got into 3 separate groups and shared an IPAD and a WeDo 2.0 kit and began to build "Pulling Pete". Two groups finished their robot quickly and modified him by exchanging the tire size and experimenting by pulling more weight.

My professional development integrates NASA assets by promoting innovative and informative educational materials that engage students' interest in science, technology, programming and engineering. As well as develop motor and cognitive skills through robot building.

Due to the COVID-19 pandemic I have not been able to complete any follow up activities. However, when school does resume I plan to use our weekly staff meetings to check in with my colleagues to see if they have used the Lego WeDo Curriculum or any other engineering design activities in their classrooms. If so, I will ask them "how did it go"? "Will you implement another or a first one soon"? "Did you find that it enhanced or supplemented their curriculum well"? "Do you want to use their lesson during our Visions time"? Since we all work in the same building, they can also contact me whenever they have a question about the process and/or implementation. I also offered my support during my P.D. session for future planning and/or resources.

My post-Survey Questions were; 1) Do you understand how the Lego Education WeDo 2.0 Core Set strengthens students' understanding of the eight science and engineering practices, including developing and using models, planning and carrying out investigations, analyzing and interpreting data, using mathematics and computational thinking, constructing explanations and designing solutions, engaging in argument from evidence, and obtaining, evaluating and communicating information?

a. Yes b. No c. Unsure

2) Will you use the LEGO Education WeDo 2.0 curriculum in your classroom?

a. Yes b. No c. Unsure

- 3) Are you interested in using any other engineering curriculum in your classroom?
a. Yes b. No c. Unsure
- 4) What do you foresee as the biggest obstacle implementing engineering design into your current curriculum?
5) Would you like to implement more STEM based lessons/projects during our school's Visions time?
a. Never b. At least once/month c. At least once/trimester d. At least once/year

The survey results are; four out of eight participants said they will use the LEGO WeDo 2.0 curriculum in their classroom. Two out of eight participants said they are unsure if they will use the Lego WeDo 2.0 curriculum in their classroom. One participant said they will not use the Lego WeDo 2.0 curriculum in their classroom (she is the school counselor).

When asked "Do you understand how the Lego Education WeDo 2.0 Core Set strengthens students' understanding of the eight science and engineering practices, including developing and using models, planning and carrying out investigations, analyzing and interpreting data, using mathematics and computational thinking, constructing explanations and designing solutions, engaging in argument from evidence, and obtaining, evaluating and communicating information" ? Eight out of eight participants answered yes.

I feel that my professional development was successful because each group accomplished the assembly and coding of their robot. Most of the participants were not aware that our school owns several Lego WeDo 2.0 kits or the in depth curriculum that they contain. Also, seven out of eight educators said that they are interested in using additional engineering curriculum in their classroom. We discussed how we could use a Vision's class (which is a designated time set aside every Friday from 1:30-2:15 for our entire student body and teachers to randomly mix up and combine into four separate groups to participate in a lesson of various sorts) once a month to participate in a Lego WeDo 2.0 lesson.

When asked "Would you like to implement more STEM based lessons/projects during our school's Visions time" ? five out of eight educators answered "at least once a month". Three out of eight educators answered "at least once a trimester".

My P.D. project related to the reading from the Luft, Dubios, Kaufman & Plank (2016) article "Science teachers are professional learners and leaders. As learners, they want to participate in workshops about district curriculum, institutes that support the development of new content knowledge, or professional learning communities that examine instructional practices". (Luft, Dubios, Kaufman, & Plank, 2016, p.1). As I mentioned, only one of my coworkers had experience with the Lego WeDo 2.0 kits (or with any type of coding) so my PD gave them an

opportunity to learn and participate in something new. I think teachers can get complacent in their teaching and don't take the risks of venturing into learning something new. If we want the very best for our students we need to keep up with new technology. My project also relates to the DiSimone (2011) article because it contains 4 of the 5 core features that DiSimone says that effective professional development needs to include, which is; "Content focus: Professional development activities should focus on subject matter content and how students learn that content. Active learning: Teachers should have opportunities to get involved, such as observing and receiving feedback, analyzing student work, or making presentations, as opposed to passively sitting through lectures. Coherence: What teachers learn in any professional development activity should be consistent with other professional development, with their knowledge and beliefs, and with school, district, and state reforms and policies. Duration: Professional development activities should be spread over a semester and should include 20 hours or more of contact time. Collective participation: Groups of teachers from the same grade, subject, or school should participate in professional development activities together to build an interactive learning community" (DiSimone, 2011 p.69). The features that my P.D. included is Content Focus, because my content focused solely on subject matter content and how to give students a hands on approach to understanding phenomenon. It included active learning because I conducted my P.D. at my workplace and received feedback and also provided an actual learning experience for the participants. My P.D. featured coherence by exposing my coworkers to a lesson that contains NGSS and Common core standards. Lastly, my P.D. featured collective participation. There was only one absent teacher during my session because she was out sick. Otherwise, all of the teachers in my school participated together in learning something that was new to them and something that was meaningful that they could actually do in their classroom.

My professional development helps teachers understand content by providing a lesson plan on investigating the effects of balanced and unbalanced forces on the movement of an object. My session helps teachers implement STEM into the classroom by providing directions to create a pull robot and conduct an investigation about pull forces. Afterwards, students have the possibility to explore new designs for a pull machine, build their own model, and do the same tests they did with their original pull-robot and compare the findings of the two investigations. Lego WeDo 2.0 also incorporates coding skills, computational thinking and engineering principals.

References

Desimone, L. M. (2011). A Primer on Effective Professional Development. *Phi Delta Kappan*, 92(6), 68–71.

Luft, J. A., Dubois, S. L., Kaufmann, J., & Plank, L. (2016). Science Teacher Leadership: Learning from a Three-year Leadership Program. *Science Educator*, 25(1), 1-9.

