

## Standards Analysis Assignment

I am most interested in the preschool age group of 3-5 year olds. There are very few states in the USA where a designated preschool program is available in the public school system. West Virginia is an exception. They have also developed pre-K standards that have been in effect as of 2019. They are not simply standards for older children that are being applied to this age group, but ones that have been developed for them that are age appropriate. Consequently, I have chosen them to explore, as well as the Common Core Math Standards and ITEEA Standards

Question 1- Which standards relate to problem solving or engineering design?

A) West Virginia Pre-K Standards

I have chosen to include executive function development, social and interpersonal skill goals which I believe assist in cooperative and collaborative engineering problem solving and design.

Initiative and Curiosity:

AL.PK.3- Demonstrates flexibility, imagination and inventiveness in approaching tasks and activities

AL.PK.5- Inquire and investigate

Persistence and Attentiveness:

AL.PK.6- Persist in completing tasks, activities, projects and experiences

AL.PK.8- Engage in project or activity over an extended period of time

AL.PK.9- Continuously create, develop and implement plans

AL.PK.10- Seek solutions to questions, tasks, or problems through trial and error

## Cooperation:

AL.PK.11- Initiate and engage in learning experiences and play with peers

AL.PK.12- Relate and share knowledge with peers

## Mathematics

Kirkley's concept of "declarative knowledge" is beginning to be developed at this age and it will help formulate the foundation of problem solving and design.

## Counting and Cardinality:

M.pk.4- Understand the relationship between numbers and quantities

## Operations and Algebraic Thinking:

M.PK.8- Recognize addition as putting objects together and subtraction as taking objects apart

M.PK.11- Duplicate, create, and extend simple patterns using concrete objects

## Measurement and Data:

M.PK.14- With prompting and support, identify measurable attributes such as length and weight

## Geometry:

M.PK.18- Correctly name basic shapes regardless of their orientations or overall size

M.Pk.20- Analyze and compare two and three dimensional shapes and objects in different sizes. Describe their similarities, differences and other attributes

M.PK.21- Create and build shapes from components

## Science

## Science as Inquiry:

SC.PK.1- Ask questions that can be answered through active investigation

SCPK.3-investigate cause and effect relationships

SC.PK.4- Make predictions and brainstorm solutions

SC.PK.10- Explore and describe changes in materials and relationships ( e.g. cause/effect)

There are no technological standards established for this age group in the West Virginia Standards

#### B) Common Core Math Standards

CCSS.MATH.CONTENT.K.CC.B.4- Understand the relationship between numbers and quantities

CCSS.MATH.K.CC.C.6- Identify whether the number of objects in one group is greater than, less than or equal to the number of objects in another group

CCSS.MATH.CONTENT.K.OAA.2- Solve addition and subtraction word problems and add and subtract within 10

CCSS.MATH.CONTENT.K.OAA.3- Decompose numbers less than 10 into pairs in more than one way

#### Measurement and Data:

CCSS.MATH.CONTENT.K.MD.A.1- Describe measurable attributes of objects, such as length and weight

CCSS.MATH.CONTENT.MD.A.2- Directly compare two objects with a measurable attribute in common ,to see which object has more/less of the attribute

#### Geometry:

CCSS.MATH.CONTENT.K.G.A.2- Correctly name shapes regardless of their orientation or overall size

CCSS.MATH.CONTENT.K.G.A.3- Identify shapes as two-dimensional or three -dimensional

CCSS.MATH.CONTENT.K.G.B.4- Analyze and compare two and three-dimensional shapes, in different sizes and orientations

CCSS.MATH.CONTENT.K.G.B.5-Model shapes in the world by building shapes from components (e.g.sticks, clay,etc)

### C) ITEEA Standards for Technological and Engineering Literacy

There are no standards specifically for kindergarten. They are grouped together with grades one and two.

Standard 1: Nature and Characteristics of Technology and Engineering:

STEL-1A- Compare the natural world and human -made world (ie. trees, plants, animals, etc. vs. pencils, computers, telephones, etc.)

STEL-1B- Explain the tools and techniques that people use to help them do things

STEL-1C- Demonstrate that creating can be done by anyone

STEL-1D- Discuss the role of scientists, engineers, technologists and others who work in technology

Standard 2: Core concepts of Technology and Engineering:

STEL-2A- Illustrate how systems have parts or components that work together to accomplish a goal

STEL-2C- Explain that materials are selected for use because they possess desirable properties and characteristics

STEL-2D- Develop a plan in order to complete a task

STEL-2E- Collaborate effectively as a member of a team

Standard 3: Integration of Knowledge, Technologies, and Practices:

STEL-3A- Apply concepts and skills from technology and engineering activities that reinforce concepts and skills across multiple content areas ( e.g. using building blocks to reinforce counting skills)

STEL-3B- Draw connections between technology and human experiences

Standard 5: influence of Society on Technological Development:

STEL-5A- Explain the needs and wants of individuals and societies

Standard 7: Design in Technology and Engineering Education:

STEL-7A- Apply design concepts, principles and processes through play and exploration

STEL-7B- Demonstrate that designs have requirements

STEL-7C- Explain that design is a response to wants and needs

STEL-7D- Discuss that all designs have different characteristics that can be described

STEL-7E- Illustrate that there are different solutions to a design and that none are perfect

STEL-7F- Differentiate essential skills of the technology and engineering design process (e.g. thinking, building, testing)

STEL-7G- Apply skills necessary for making in design ( tinkering and play)

Standard 8: Applying, Maintaining and Assessing Technological Products and Systems:

STEL-8A- Analyze how things work

STEL-8C- Describe qualities of everyday products

Questions 2 and 3- How are these standards similar/different from each other?

I believe that the West Virginia and Common Core Standards have similar goals in what is to be accomplished with this age group. They focus on the development of foundational skills with a twist. For example, simply memorizing addition and subtraction facts is not enough. They both attempt to emphasize more understanding of how numbers work, how shapes work, etc. and how they can be manipulated and utilized.

The fact that the West Virginia standards also include desired interpersonal skill development is worth noting. Initiative, curiosity and cooperative skills are all necessary for future success in problem solving and engineering design.

The ITEEA Standards are a little different. They group the standards on a continuum. They group grades together, (e.g. k-2), giving children more time to develop the skills and perfect them.

Although there are basic skills included in the standards, the emphasis appears to be to integrate these skills and take it to the next level, i.e. demonstrating, applying, explaining and analyzing what is being done.

Question 4- What are your thoughts on engineering design problem solving as a unifying concept/skill?

I do believe that the engineering design problem solving process is not only a unifying concept, but also, one that integrates the science and mathematical skills. It formulates a "blueprint" of how to formulate solutions, how to critically think, analyze, test, and refine to find the best answer to the problem. The result of this process can be the creation of new technology.

## References

- 1) Common Core Math Standards  
<http://www.corestandards.org/Math>
- 2) ITEEA Standards for Technological and Engineering Literacy  
<http://.iteea.org/File.aspx?id=168776>
- 3) West Virginia Pre-K Standards  
<http://wvde.us/wp-content/uploads/2019/05/PKStandardsBookletUPDATE-Final-May-2019.pdf>

