Success in High-Need Schools Journal

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Journal Issue Theme: "Finding Success for Every Student"

This issue of the online Success in High-Need Schools Journal contains articles and columns analyzing student achievement and program development reflecting the two-year transition from No Child Left Behind (NCLB) to the 2015 Every Student Succeeds Act (ESSA), a bipartisan Obama era measure in which Congress reauthorized the 1965 federal Elementary and Secondary Education Act (ESEA). ESSA loosened the rigorous federal school accountability requirements of NCLB to allow states and schools more flexibility in developing standards and methods for student achievement. ESSA retains protections for economically disadvantaged students, students with disabilities, and English language learners and continues transparency and accountability provisions of ESEA. ESSA also requires states to help ensure that all students have excellent teachers and safe and supportive learning environments to prepare them for success in college, careers, and life.

During the spring of 2017, states submitted to the federal Department of Education their plans for implementation of ESSA. The state plan that the Illinois State Board of Education (ISBE) submitted in April 2017, declares a goal of 90% of ninth grade students will be on track to graduate with their cohort, that 90% of students will graduate from high school prepared for college and career, and that by 2025, at least 60% of Illinoisans will hold a "high quality degree or postsecondary credential." Moreover, the plan commits to development of three years of baseline data against which to measure student progress in such areas as academic achievement, graduation rates, and English learner proficiency. This issue of Success in High-Need Schools Journal will reflect approaches in Illinois for implementation of ESSA and findings in assessing the challenges in achieving the goals of state plans.

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Publisher's Column: Finding Success for Every Student

By: Dr. Jan Fitzsimmons

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This issue of Success in High-Need Schools features work from the institute "Finding Success for Every Student." In an era of reform and exciting research findings about teaching and learning, this issue provides an opportunity to explore some best practices for effective teachers and teacher leaders, especially those in high-need schools, who work diligently to find success for every student! As we embark on implementing ESSA, the Every Students Succeeds Act, in all fifty states, join us to examine policies, philosophical queries, lessons learned, promising practices and research that contribute to meeting the multiplicity of demands for excellent teaching and teacher leadership to increase student achievement and to build world-class learning communities across the state and around the country…and especially for each student!

First contemplate the ideology of the federal policy, ESSA, that will set the tone for education for the next fifteen years with Dr. Tony Smith, the 28th Illinois State Superintendent of Education. While NCLB and Race to the Top, earlier renditions of the Elementary and Secondary Education Act, established rigorous accountability agendas that seemed to punish schools and districts, Smith says that ESSA provides an opportunity to "develop an accountability system that highlights and supports." Smith explains that in Illinois the plan is to "recognize student's individual starting points and help them grow." In this column Smith explains just how Illinois will ground, launch and support this plan.

Frank Harwath then advances the "Student Success" discussion to focus on the importance of learning and STEM. "How do we know what we know?" queries Harwath in his article, Metrics: The Cornerstone of Science. Harwath suggests the necessity of "accurate information, the ability to store and retrieve information and a process to organize, compare and test hypotheses." Read this article and ruminate on how teachers might approach learning in STEM as they grow in understanding the logic of the scientific method and the importance of metrics!

In Targeting Adolescent Male Reading Motivation Preparation for College Success, Jana McNally pushes us to reconsider gender inequities and the pursuit of success for each student. McNally asks, "How can we prepare and motivate our male readers to prepare for college success?" After reading this article, muse over such compelling literacy-motivating factors as "the power of choice, positive images of masculinity, hands-on activities such as drama, and classroom libraries!"

Jaclyn Murawska, explores "issues of equity, empowerment and access to high-quality mathematics teaching and learning" as she shares KenKen Puzzles for Developing Number Sense and Positive Mathematics Identity in Elementary School. In this engaging article, Marwaska calls on teachers to engage in "productive struggle" and "procedural fluency" to find success for students in mathematics. If you haven't tried before, try engaging in KenKen as you read this article and illuminate the possibility of engaging elementary students in fun-filled struggle and challenge that leads to problem solving success in mathematics.

Finally, Annette Johnson, Supporting Teachers Through Social and Emotional Learning, proposes that while there are many factors that influence success for every student, there are also critical issues that affect teachers. If ignored, Johnson argues, those issues impact student learning to a greater degree! Johnson claims that social emotional learning for teachers is urgent as 40-50% of teachers leave the classroom during their first five years due to stress and an inability to address that stress in a healthy way. If teachers are the most important factor in what children learn and how successful students are in the classroom, finding ways to address teacher social and emotional health is of paramount importance.

Finding Success for Every Student is a complex endeavor, but a worthwhile journey. One "we must take together" argues Smith! And while we are not there yet, the articles in this issue of the journal suggest possibilities and plans for transforming our educational system and communities "for the better!"

Every Student Succeeds

By: Dr. Tony Smith

I believe we are on the right path to provide safe, rigorous, and well-rounded learning environments for all students. The shifts happening in Illinois' public education policy are fostering the conditions for our schools to thrive by sending more state funding to the most under-resourced students and by developing an accountability system that highlights and supports instead of punishes.

We have seen Illinois students' and educators' tremendous capacity for growth on the 2017 Illinois Report Card. Students achieved gains in many indicators from the 2015-16 school year to the 2016-17 school year, including English language arts achievement on the PARCC assessment; the four-, five-, and six-year graduation rates; college enrollment rates; Advanced Placement participation and success; the community college remediation rate; ninth-grade students on track to graduate; and eighth-grade students passing Algebra I. Our educators and educational leaders have done a fantastic job diving into the data to uncover what is working and to identify new strategies and partnerships to support the whole child.

Our job as educators is to recognize our students' individual starting points and help them grow. As leaders, we make policy decisions that can provide or expand supports that children need. We now have an opportunity to take this work even deeper with the implementation of the Illinois Every Student Succeeds Act (ESSA) Plan.

The Illinois ESSA Plan is grounded in the idea that the way that we support schools and students needs to take local context into account to ensure all students have the support they need to thrive. Thousands of educators and educational leaders provided feedback over more than 16 months indicating that you wanted multiple measures of assessment and a greater focus on growth-based measurements in addition to attainment outcomes. We heard you.

ESSA establishes common, high expectations for all students; assesses school performance based on multiple indicators of student success; and recognizes the interconnectedness of students' cognitive growth, social/emotional development, and physical well-being. We will use data and local context to drive appreciative inquiry and inform more holistic supports.

This plan is the basis for us to launch a differentiated system of support called IL-EMPOWER. This will build the capacity of our education system to improve student outcomes through educator-led and state-supported school improvement. The system is grounded in ISBE's core

values, a focus on the whole child, and ways to provide the greatest support for the students with the greatest need. A pilot program with several dozen districts over the 2017-18 school year will yield information to help shape the structure of IL-EMPOWER to ensure it strengthens and engages the whole school and whole community. Beginning in the 2018-19 school year, IL-EMPOWER will be required for the lowest-performing 5 percent of schools and for high schools with a 67 percent or lower graduation rate.

Our agency is choosing to champion progress while identifying the deep gaps that persist in our state. We are recognizing Illinois educators as leaders for a healthier and more economically secure future. Illinois is making progress generally *and* specifically we must do much more to help the children and families in greatest need. We can simultaneously understand this context *and* recognize growth. Acknowledging that we are doing some things well does not mean we do not see the inequity around us. We recognize that we have to improve our practices and acknowledge the urgency to shepherd more students into successful adulthoods.

We have to do this work together. Creating a healthy public education system that can serve as the backbone for a thriving state requires more than any one of us can do alone. We need to accelerate the growth we are seeing by making connections between schools with different strengths and challenges. We must engage in dialogue; continue to build trusting relationships with one another; and activate all public, private, and philanthropic resources available in order to change those practices that have left too many behind. As educators and leaders, we can achieve a transformed future in Illinois – a state of whole, healthy children nested in whole communities wherein all people are socially and economically secure.

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Metrics: The Cornerstone of Science

By: Frank Harwath

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How Do We Know What We Know?

Perhaps, the question should be; how do we as human beings learn something for the first time? We can conceive of several different avenues for learning such as: personal experience, verbal explanations, and analogies to name a few. However, humans have often found themselves in places where the knowledge of a particular circumstance has not already been acquired and communicated by someone else. Therefore, learning in this instance is a personal journey involving observation and comparison rather than being the product of instruction. New discoveries in science fall into this category.

Addressing this question is not intended as a philosophical discussion of epistemology. Rather, it is an acknowledgment of the processes involved in acquiring knowledge, and the role that metrics play in those processes.

There are some clues from historical artifacts that suggest the role of intuition in the process of discovery in the development of scientific insight. We can also make some inferences based on contemporary learning models. We can use these to produce a scientifically oriented learning model, at least conceptually, that leads to a better understanding of how we learn and how best to pass that knowledge on to others.

At the present time, it is thought that modern humans evolved from a distinct branch of primates approximately 200,000 years ago [1]. To the best of our knowledge, there are no significant differences between people born today and their ancestors from that time, i.e., the abilities to perceive and learn, retain memory, and synthesize new concepts are essentially the same [2]. What would distinguish an individual from 200 millennia ago and someone alive today is experiential and to a large degree based on what a modern day human is taught. So, assuming this is true, what could that model look like and why?

Necessary Elements for Understanding

Broadly speaking, understanding relies on the availability of accurate information, the ability to store and retrieve information, and a process to organize, compare, and test hypotheses. The structures and methods used to acquire information are quite varied, and they affect the amount and quality of the information. One has only to gaze at the night sky on a clear evening

to realize how the unaided eye, while being able to resolve countless stars, still lacks the resolution to detect the moons of Jupiter. This suggests that there is a wealth of detail that is not accessible without some instrument to enhance the facilities with which we were born.

The Limits of Perception

Traditional senses include sight, sound, taste, smell, and touch. The sense of sight contains the ability to resolve colors, shapes, sizes, and the perception of movement. The sense of sound embraces pitch, timbre, rhythm, relative volume, and percussion. Taste is comprised of sweet, salty, bitter, sour, and umami. The human sense of smell might be able to distinguish nearly 1 trillion different odors [3]. Touch can reveal temperature, hot or cold, surface condition or roughness, and the hardness or pliability of an object. There are also several nontraditional senses such as kinesthetic, time, and familiarity, to name a few.

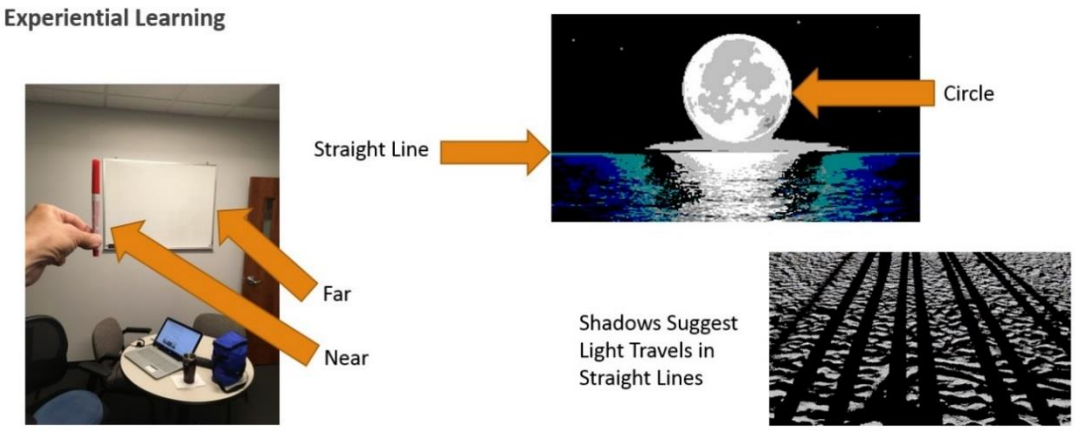
In the absence of instruction, modern humans from 200,000 BCE, employed their senses to understand their world and develop strategies to ensure their survival. Using just these senses, they would be able to recognize and distinguish subtle differences in their environment that they were able to exploit. Even without detailed knowledge or measurement equipment, they would have been able to make the distinctions such as big, small; fast, slow; many, few. Depending solely on use of their hands they could manipulate many objects and decide whether such objects were relatively heavy or light, or if a tree limb was strong or weak depending on their experience. They would be able to predict whether moving objects were likely to collide and they could perceive impacts either visually or audibly.

With these limited faculties, early modern humans were able to learn a great deal. It is arguable that the very base level of knowledge is the ability to recognize an object. Not only is this advantageous when trying to decide whether or not something is edible or poisonous, but it also can lead to the grouping of similar objects or associating objects based upon a common characteristic. It seems that human knowledge is largely, if not solely, based upon experience. In other words, we can only understand new situations that have similar characteristics to other situations of which we have firsthand knowledge. This appears to be a human limitation. A wholly original idea or concept, unrelated to situation, idea, or concepts that have been experienced, are outside the range of human behavior.

Experiential Learning

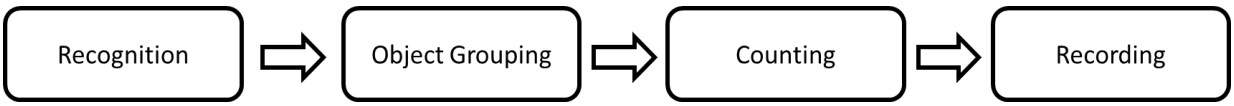
It might be beneficial to consider the evolution of knowledge based on experiential learning. Our innate abilities allow us, within limits, to observe and experience many facets of our existence. Perhaps even more fundamental than counting is the ability to recognize similar geometries. This is supported by the numerous archeological artifacts such as textiles, pottery, and cave paintings which feature geometric designs [4]. Object recognition and grouping can be established in many ways, but one of the most common is grouping by shape. In the modern world, we might think that early humans lacked access to ideal geometric examples. However, it doesn't take long to find many such instances during a short walk in a park or on the beach. Geometric shapes, such as circles, are evident in the sky in the form of the sun and the moon.

Stars are occurrences of points. Many plants, especially grasses, grow in nearly perfect straight lines. The horizon, as seen when standing by a large body of water, also produces an amazing specimen of a straight line. Crystals in nature form cubes (pyrites), hexagons (quartz), even pentagonal dodecahedrons (Ho-Mg-Zn quasicrystal). Indeed, the geometric forms found in nature could have helped form the basis of an understanding of geometry itself.



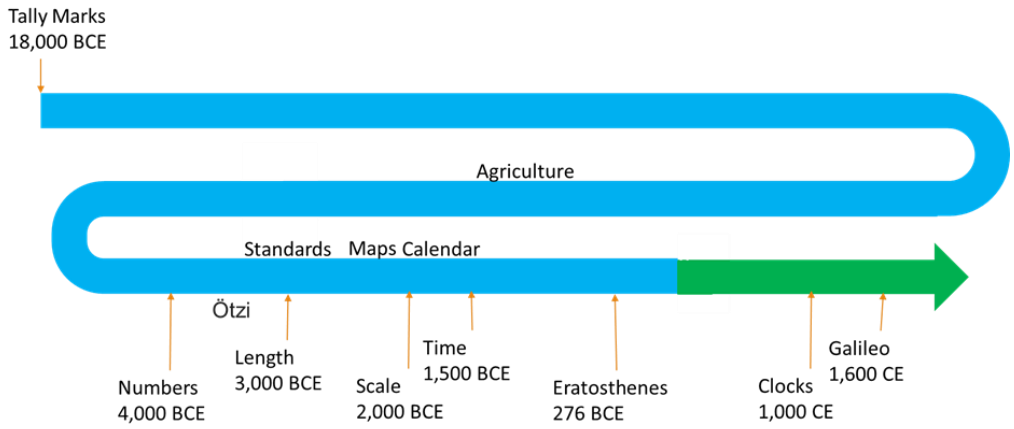
Grouping Leads to Counting

As the foregoing process describes, early human beings recognized objects based on common characteristics deduced solely by means of their innate senses and their ability to group objects based on shared characteristics. By necessity, establishing a group logically precedes assessing the number within the group. Nomadic bands that subsisted on hunting and gathering may not have felt a need to assess a specific number within groups. There is evidence that early languages did not have number systems [5]. In fact, there are languages in use today where there is a concept of one, few, or many, but no specific ability to count or number [6]. The exact date when counting and an associated numerical system came into existence is unknown. However, we do have archaeological evidence in the form of the Ishango bone [7] which dates to 18,000 BCE. This artifact has a series of tally marks carved in three columns running the length of the bone. The regularity and organization of the marks indicate they are not merely the byproduct of some random process, but were intentionally carved into the bone to serve as a numerical recording system. Therefore, if we incorporate counting and recording, our process looks like this:



This process appears to have been sufficient for several millennia, for we don't see evidence of more complex behaviors between 18,000 BCE and 4000 BCE [8]. From the archeological record, it appears that this time period saw the development of agriculture and the establishment of the first permanent settlements. During the bulk of this period humans still lived primarily in small scattered groups. It's likely that there wasn't any pressing need for more complex

methods of counting and measuring. The following timeline lends some perspective to developments associated with measurement and numbering systems.



Trading and Agriculture Lead to Measuring

Over time, the increasing influence of cities with their higher population densities, social stratification, and increased wealth [8] provided the incentive to produce improved methods of accounting for personal wealth. Uniquely shaped clay tokens representing specific quantities of animals or goods were in use around 4,000 BCE in the Zagros region of Iran [9]. Tokens were replaced with symbols about 500 years later. Abstract numbers, with no relationship between the symbol and the article counted, appear to have been invented in about 3100 BCE [10]. This accelerating pace of change seems staggering compared to the preceding 10,000 years. Trade seems to be the prime mover with regard to the advent of tokens, and they were likely critical with regard to the practice of agriculture in general [11].

While there is no specific evidence suggesting a date or location, land surveying and the calculation of area likely occurred during this period. Regular flooding of the Nile forced the annual practice of defining the boundaries of individual farms by *harpedonaptai.* Also known as rope stretchers, these ancient surveyors used ropes knotted at equal intervals to measure distances and establish boundaries before the planting season began. A scene depicting this exercise is incorporated into the Major Scorpian Macehead [12]. The term rope stretching referred to the fact that the rope needed to be pulled taut in order to keep it from sagging [13]. By the early dynastic period in Egypt, complex record keeping and Hieroglyphic script had been invented, suggesting a link between activities that are deemed of sufficient importance, like maintaining the size and integrity of one's farm, and the need to record that information in a way that others could understand and acknowledge. In a sense, humans appear to have been following the same pattern as they did with regard to counting, i.e. when a need arose to count more items than could easily be accommodated with just two hands, a tally system was implemented. This extended over time with increasing sophistication resulting in abstract numbering systems.

Measuring area was also a critical need. Understanding how much grain was needed to successfully seed a field was important from the standpoint that insufficient seed stock could result in a poor yield and famine. Excess grain storage might result in poor overall health for the farmer due to an overly restricted food intake during the year. The Rhind papyrus, from about 1550 BCE [14], is a record of mathematical tables and instructions for solving problems. It begins with fractional expressions, addresses geometry, and in particular mensuration. By this time, the Egyptians were adept at calculating the areas of many different shapes and had approximated Pi with an error of less than 1%.

There is some debate whether the Egyptians were aware of the Pythagorean rule, but they did know how to establish right triangles using the 3-4-5 triangle method. By 2700 BCE, the great pyramid of Giza was built with nearly perfectly square sides which would not have been possible without careful measurement [15].

Tool Making

One might not immediately associate the act of measuring and tool making. However, the same drive to solve problems employing aids that extend human capabilities at birth is a hallmark of the human species. The use of rope to measure linear distances has been mentioned. It was also used to define circular geometries for sacred spaces, such as Stonehenge [16], as well as for measuring their circumference. The plummet or plumb bob, is another ancient tool used to measure inclines and to ensure level surfaces [17]. It is still in general use today. It consists of a string with a suspended weight. The string can be tied to a frame establishing surfaces at precise angles. The balance scale, invented around 2000 BCE consisted of a rod with a rope tied in the center [18]. The balance could, with great sensitivity, determine whether the masses on each end were equal. Each of these examples of measuring tools is relatively simple, and yet they have the capacity to determine weights, areas, lengths, and circumferences with a degree of accuracy far greater than is possible without tools. Also, the use of tools reduces measurement bias.

It's worth noting the ingenuity associated with these developments. They likely came as a result of careful observation, recording, and experimentation. It’s the nature of technology that one development rests on the foundation of the prior one. Imagine what it would be like to have no pre-existing knowledge base, no formal mathematics, yet to devise methods and tools that worked so well using only materials readily found in nature.

Measuring Requires Standards

The environment where the sophistication of measurement techniques and associated mathematics grew significantly included a number of influences. The dominance of urban centers, more powerful governments, and the concurrent needs to control commerce and taxation [19] occurred in the millennia between 4000 and 3000 BCE. When working with trade items that did not exist in discrete units, it became necessary at first to agree on the basis of comparison. However, human behavior suggests that if two individuals are motivated to make some sort of trade where an item could not be discreetly counted, the parties involved would

negotiate a standard that they mutually agreed upon for the transaction. The way that the standard was employed would also be mutually agreed upon in advance.

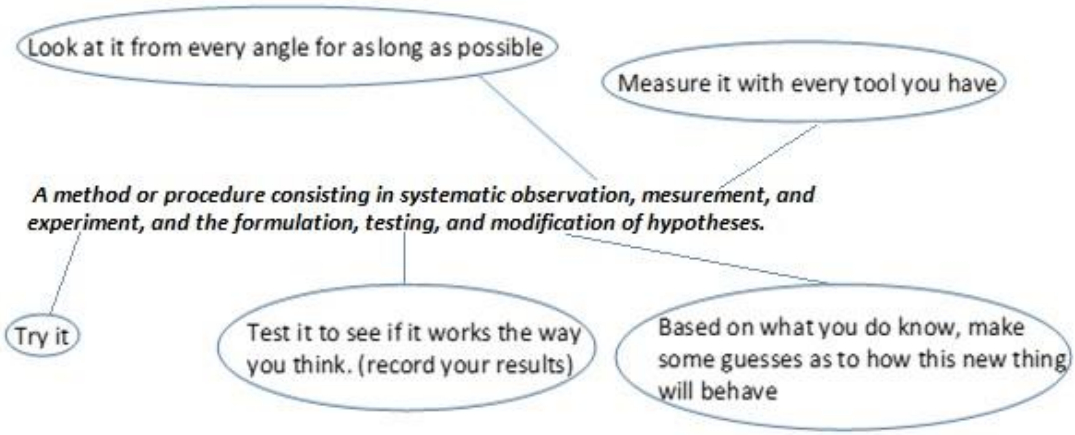
This behavior could be the result of a human desire for fairness necessary for consummation of trade. In a transaction, whether bartering or using some medium of exchange, all parties desire that the agreement from their point of view be transacted transparently and equitably. Prior to the use of standards, the ability to count individual units existed. Therefore, if an agreement was made to exchange a certain number of one item for another number of a different item, the items in question could each be counted in turn; thus verifying the amounts. When it came to measuring things that don't come in discrete units, like land area, it became more complicated. This was because one individual's length standard might differ from another's. For example, if two individuals counted the number of paces that it took to walk along the edge of a field they likely would get a different number. This complicated the process of buying and selling property. It also affected the taxes paid on property.

Eventually, governments instituted official standards and published the methodology required to employ those measurements. We find this in early cultures in Mesopotamia and Egypt [20]. During this period the earliest recorded standards of measurement were produced. The government in Egypt created standards, samples of which exist to this day. These were used to ensure uniformity when it came to measuring lengths. They also standardized methods to calculate area. This combination of standards of measure and calculation went a long way to promote fair measurements and results viewed as equitable.

Planning and Projecting

What seems to immediately follow, is an ability to project into the future. The expectation that future events would be consistent with past events might be an assumption consistent with human experience. With the advent of keeping records, this could be verified beyond an individual's lifetime. These assumptions evolved into models that could be tested. The establishment of standards for measurements and calculations allowed people to make certain projections and determine whether their models were accurate. Using the prior example of the required quantity of seed necessary for the best yield, a farmer could plant adjacent areas with different amounts of seed. After harvest, a comparison could be made to determine which provided the highest yield. This ability to create models, make projections (hypotheses), and measure results are all skills needed for scientific inquiry.

The Oxford dictionary definition of The Scientific Method is, "a method or procedure consisting in systematic observation, measurement, and experiment, and the formulation, testing, and modification of hypotheses." In essence, that's what has been described. It's not surprising, just logical. Breaking it down we have an example of human behavior that intuitively followed the Scientific Method.



We may also assume that if the hypotheses were not supported by the data, there would be modifications to the model and repetition of the process.

Another way to look at it is that the scientific method is a logical process that was employed, at times, by people throughout history. The documentation of the scientific method merely extended its utility to a wider audience and aligned the expectations of practitioners. The scientific method is not practicable without metrics and mathematics, since there would be no way to evaluate results without them. It's also arguable, that metrics and the practice of the scientific method preceded the development of mathematics, and that mathematics was a response to the need to explain or evaluate important measurements.

In the end, the question of "How do we know what we know?" is resolved by the logical implementation of the scientific method which relies on unbiased measurement. Metrics is the cornerstone of science.

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Targeting Adolescent Male Reading Motivation as Preparation for College Success

By: Jana McNally

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Abstract
Implementation of Common Core State Standards was intended to improve student college readiness. However, there continues to be a larger number of females entering college than males. In addition, females are outperforming males in both reading achievement and reading motivation. Thus, the challenge remains: how can we prepare and motivate our male readers to prepare for college success? This article shares research on strategies that motivate boys to read and provides specific classroom recommendations to target male reading motivation.

Introduction

In the fall of 2016, over 20 million students enrolled in colleges and universities across our nation (National Center for Education Statistics). This achievement reflected the goal of the Common Core Standards designed to increase student readiness for success in college. Yet, in preparing middle and secondary level students for the journey to college, schools are missing an opportunity to prepare adequately a significant portion of our student population. The population of students attending college in fall 2016 reveals only 8.8 million males compared to 11.7 million females (National Center for Education Statistics). Thus, the question arises: what is preventing boys from acting on the same opportunities for college readiness as their female counterparts?

In viewing data on gender discrepancies, females outperform males in both reading achievement and motivation to read. Since 1992, female students have scored higher than male students in reading achievement at both grades 4 and 8. This gender gap remains consistent in grade 12 with females outperforming males by 10 points (National Center for Education Statistics, 2016). In 2007, Pitcher et al. explored students' self-concepts as readers and the values associated with reading of adolescents in Grades 6-12. Their results demonstrated that girls scored significantly higher on self-concept as readers and the value of reading. Further, boys' value of reading decreased over time, while girls' value of reading increased. If males are lagging behind females in both reading motivation and achievement, it is not surprising that fewer males than females are attending college, which is historically dominated by reading assignments, lengthy textbooks, and the frequent writing of papers.

Engagement with reading is highly correlated with reading comprehension achievement (Guthrie, et al., 2001). Therefore, if schools can develop strategies to motivate and engage male readers, it would seem possible to narrow male and female achievement gaps and increase the number of males attending college. Fortunately, there are many practical strategies that middle and secondary teachers can implement to target the males in their classrooms in order to increase their reading motivation and desire to continue their literacy journey beyond high school.

Research on Strategies to Motivate Boys to Read

Smith and Wilhelm's powerful study, *Reading Don't Fix No Chevys* (2002), explored the literacy lives, both in and out of school, of a diverse group of 49 adolescent boys. Their study found that participants' decisions about what they chose to do in and out of school stemmed from five different characteristics. First, a sense of competence and control is an essential motivator for boys. As a result, boys enjoy reading genres that add to their personal interests and areas of expertise. Second, boys need to feel competent and rewarded by what they are reading immediately, or they will lose all motivation to continue reading. Next, boys are motivated to read books that contain appropriate challenges. If a particular book seems too complex and they cannot understand what is happening, they will develop a negative attitude about it and shut down. The fourth characteristic that leads to motivation to read is having clear goals and feedback.

Boys need to see a clear link between what they are reading and the real world. They also are motivated by a focus on the immediate. Rather than read a work that may help them become college-ready "someday," they prefer books that relate to their lives "right now." Finally, boys are motivated for social reasons. Thus, if a book is recommended by a peer, or if they can read the same book as a friend and talk about it, they are much more motivated to read it. Wilhelm and Smith (2014) found that allowing males to freely choose their own texts to read from among engaging and relevant books and providing an inquiry-based structure to learning—activating their prior knowledge and posing problem solving questions seen as relevant and important, are significant practices that teachers can implement to create a context that supports boys' motivation.

Baker (2002) explored strategies for overcoming reading resistance in middle school. Baker is also troubled by the widening gap in college readiness between students who read and those who do not. Based on the research previously cited which shows girls reading more than boys, her research is especially relevant for strategies to help boys become more engaged in reading. One strategy Baker promotes is reader choice. She believes it is essential for students to be able to choose their reading material so that they may pursue their passions. To aid this strategy, she recommends that teachers have a diverse selection of reading materials in their classroom. Most importantly, boys will need books that speak to their interest as readers.

Baker (2002) also emphasizes the importance of time. Teachers must give their students time to read and discuss their books. Finally, she stresses that the classroom atmosphere is essential for improving student engagement with books. Teachers must create a classroom community

that promotes respect for students of all cultures and allows students the opportunity to make personal connections with what they read. In a female-dominated profession, it is particularly important for teachers to ensure that their classrooms include texts with which males can connect and engage. Baker's strategies promote reading engagement for both boys and girls. However, to truly promote boys' engagement, the teacher must emphasize reaching boys through the implementation of these strategies.

Like Baker (2002), Jenkins (2009) also explored strategies to promote school reading success. Jenkins' article sought to provide teachers with recommendations to increase the achievement of male readers. Jenkins' first recommendation was to create a team to work together to ensure the success of the male reader. He believed it was critical for parents, teachers, tutors, and other school staff to work together for the success of the child. This ensures that the help the students receive is not disjointed. According to Jenkins, the support team members should discuss the child's reading successes or failures at least once a month.

Jenkins also feels it essential for teachers to build on the past success of the child. Unfortunately, teachers do not always effectively communicate with one another. If a struggling reader finds success with one teacher, that teacher must pass along their strategies to the next teacher to ensure continued success. Jenkins also recommended that teachers take care to connect reading to a particular student's world of experience and concern. This is especially critical for male students since the books chosen by female reading teachers will often connect more with their female students. Teachers must emphasize identifying and selecting reading materials with which boys can connect and thus be able to analyze using critical thinking in relation to their own lives. Like Baker (2002), Jenkins also suggested that students be able to choose their reading material in order to give boys a sense of ownership over their literacy learning.

Finally, Jenkins recommended that teachers of all subject areas provide their students with a variety of texts on a single topic. This will ensure that boys have access to magazine articles, song lyrics, photographs, blogs, and other texts to reinforce what they are learning. The variety of texts used will expose boys to the in-depth comprehension required to understand their topic of study. It is critical to remember that these strategies are not just helpful for boys, but will help all students become more engaged in reading.

Ivey and Johnston's (2013) study focused on engagement for both males and females with young adult literature and provides important insights into current challenges in engaging students in classrooms. In their study, 71 eighth-grade students were given a choice to read from 150-200 high interest young adult narrative texts. Students were given time every day to read from their selected text without any assignments, tests, quizzes, or projects attached to the book. Students reported high engagement with these texts, including reading in other classes, reading outside of school, and actually considering reading as an enjoyable hobby. One student noted,

> Before this year, we kind of had to read books they assigned to us, so I'd pretend to

> read it, and I just wouldn't care about books at all. But now they give us a choice if we want to read it, where we get to pick the book that we read. I actually read it instead of pretending to read it. (p.261)

Ivey and Johnston's research provides important insight into the power of choice and high interest texts in motivating adolescent readers.

Boltz (2007) expresses deep concerns over most school-age boys scoring lower than girls at every level on standardized tests of reading comprehension. Based on her own research, she believes that one reason boys read less is because the texts they receive in school do not connect with their interests. Like other researchers, Boltz stresses the importance of providing choices in reading, giving students time to read, and having a wide variety of reading material, including nonfiction, available in different forms. In addition, she also notes the importance of observing role models who read and valuing reading. This is an essential piece in promoting boys' reading engagement. Boys must see their male teachers, principals, fathers, brothers, and other male role models valuing reading. Reading must be depicted as "masculine" so that boys can proudly read and schools can begin to create a male culture that values reading.

One way to view reading as "masculine" is to introduce boys to positive images of masculinity through archetypes of manhood. Brozo (2002) provides examples of young adult literature that contains these archetypes, such as a healer, king, warrior, or trickster, to help boys understand what it means to be a man. Using such stories in the classroom will connect this literature to boys' lives and interests, further motivating them to read.

Popular children's book author Jon Scieszka has devoted much of his professional career to finding ways to help boys become readers. In his article "Guys and Reading" (2003), he writes, "Researching the problems boys have with reading, I've come to the conclusion that much of the cause of boys' reluctance to read can be reduced to a single, crucial element – motivation" (p. 18). He opines that, to motivate boys, we need positive male reading role models, must value non-fiction, magazines, newspapers, comics, and other forms of text, and we must identify books that boys like to read using their own peer recommendations.

In 2005, Taylor summarized current research on the issues that boys face with literacy and offered several strategies to help bridge this literacy gap. Taylor believed that it was essential for teachers to expand their teaching styles. Teachers must start including hands-on activities such as drama, or challenges that improve the confidence of male readers. Taylor also offered several innovative strategies such as inviting males to provide book talks, or creating a "Guy's Rack" collection of boys' favorite reads. Further, Taylor urged educators to be sensitive to the individual learning pace of each boy. In addition to the strategies of other researchers reviewed in this article, Taylor discussed the importance of broadening a school's definition of literacy. Rather than only viewing fictional novels as literacy, schools must start recognizing texts such as magazines, science books, multimedia-enhanced texts, and blogs, which boys tend to prefer over novels. Gee (2003) even makes a case for the positive use of video games as a new literacy that teaches problem solving and innovation.

Weih (2008) uses his own struggle with reading engagement in school, as well as his son's struggle to engage with school texts, to explore ways to promote male engagement with classroom texts. He cites Sullivan's 2004 article, "Why Johnny Won't Read," which argues that because the profession is female-dominated, most teachers do not respect boys' reading preferences. Sullivan contends that female teachers value "female literature," while dismissing boys' preferences for "yucky stuff and real things" as lacking in literary quality (p. 37). Weih argues, "boys need to have their reading interests validated in school, if we expect to see improvement in boys' reading scores on tests" (p.20). Based on his concern, Weih organized a book club for middle school boys to learn about their reading, including their interests, preferences, purposes, recommendations, and discourse about text. Based on his work with the boys' book club, Weih discovered several implications to improve middle school boys' reading experiences including using male role models, choosing books with characteristics that appeal to boys, and allowing boys to actively research and discuss topics related to the book on their own, instead of assigning tasks. Weih argues that "assignments related to the book could suppress the joy from the reading and sharing experience" (p.25).

Like Weih, Welldon (2005) also created a boys' book club at her school to help close the gender gap in reading. She found that creating reading competitions, using male role models, and selecting books that engage boys were key to the program's success. She specifically notes that texts do not have to be of high literary quality, but instead should appeal to reluctant readers and target boys' interests. In "Boys Are People Too: Boys and Reading, Truth and Misconceptions," Horton (2005) summarized current research on boys and reading conducted in Australia. Of the numerous studies reported, one key piece of research cited was Alloway et al (2002) which found that boys have a strong interest in electronic forms of literacy. This form of text is essential for all students to become literate in the 21st century.

Wilhelm and Smith (2014) argue that boys must embrace reading, not just for the sake of improving their reading ability, but also to "experience the manifold pleasures and the potential for growth that reading offers" (p. 273). They further assert that experiencing the pleasure and power of reading is essential for creating the lifelong reader who is a "civically engaged democratic citizen" (p.273). Helping boys find pleasure in reading is about more than improving their test scores. It can also help their social and emotional learning. One of the boys Wilhelm and Smith interviewed declared, "I learn about myself through books when I imagine myself in the different situations...it's learning about what you could be" (p.275).

Recommendations

Much of the research on improving adolescent male reading motivation includes best practice strategies that will help all learners, not just males, to be successful. However, classroom teachers must begin implementing these strategies with their male students specifically in mind. First, teachers should be aware of the texts in their classrooms and be sure their classroom library includes a variety of genres and forms of text. For example, classroom libraries can contain magazines, newspapers, comic books, graphic novels, how-to manuals, or fantasy novels. There can even be a specific "Guys Shelf" with books targeting the boys in the class. During reading lessons, students can read text through multimedia formats such as

reading articles online, using apps to download picture books, or listening to podcasts.

Next, students should have choice in determining what books they are reading on a daily basis. Choice can come in the form of a daily self-selected text, choosing which novel (out of a select few) they want to read for literature circles, or taking a whole class vote on which text to use for the next read aloud. In addition, students need to be given time to read. For example, carving out a small block of time at the beginning of class each day where students can read from their self-selected text in a quiet, reading-friendly environment can be an effective practice.

It is critical for students to see male reading role models in their school. Female teachers can invite male staff members to perform "read alouds" or to give a book talks about their favorite books. Fathers, uncles, cousins, grandfathers, or male community members can be invited as mystery readers into the classroom. Classroom walls can contain photos of male celebrities reading, such as the viral photo of Lebron James reading *Divergent* (Roth, 2011) during the 2015 NBA playoffs. A "boys only" book club, led by a male staff member, can also be used as a way for boys to see each other as peer male reading role models.

Finally, educators must implement hands-on activities that keep their students challenged, engaged, and active. For example, when teaching Problem and Solution, teachers might allow students to brainstorm things that bother them (problems) in their every day life. Then, offer them the challenge of creating a blueprint for an object that could solve these problems (solutions). Or, put students in role-playing scenarios based on a character from a book. For example, if a character in a book cannot communicate, give students a group task to complete (i.e. lining up in order based on birthday) without speaking. Include bins of legos in classrooms so that students can recreate a setting and then share how the setting impacts the storyline. Allow exercise balls instead of chairs to increase movement and focus.

As educators, it is critical that we implement strategies to motivate our male readers. We want all students to feel inspired to continue their literacy journey beyond middle and high school. By implementing the recommendations born out of research in this field, classroom teachers are sure to find male students who are more motivated, engaged, and interested in continuing their education.

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KenKen Puzzles for Developing Number Sense And Positive Mathematics Identify in Elementary School

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Introduction

In recent years, renewed attention has been given to issues of equity, empowerment, and access to high-quality mathematics teaching and learning. For example, in September 2016, the National Council of Teachers of Mathematics (NCTM) endorsed the joint position statement issued by the National Council of Supervisors of Mathematics (NCSM) and TODOS Mathematics for All: *Mathematics Education Through the Lens of Social Justice: Acknowledgment, Actions, and Accountability* (2016). In this position statement, NCSM and TODOS argue that social justice mathematics is the priority to "promote positive mathematics learning and achievement" (NCSM & TODOS, 2016, p. 1). In particular, Aguirre, Mayfield-Ingram, and Martin (2013) recommend the following action for curriculum and instruction: "Cultivate and sustain a positive mathematics identity and affect in students as doers of mathematics" (p. 5).

Given that in the recently approved plan to the U.S. Department of Education under the Every Student Succeeds Act (ESSA), Illinois has committed to "using the opportunities provided through ESSA to reduce barriers to learning in order to achieve fair access to high-quality educational opportunities for each and every child" (ISBE, 2017, p. 8), mathematics educators have a responsibility to ask: how can we ensure that every child finds success and begins to develop a positive mathematics identity in the elementary mathematics classroom?

NCTM's (2014) *Principles to Actions* calls for teachers to *support productive struggle in learning mathematics* and to *build procedural fluency from conceptual understanding.* Experiences that afford students the opportunity to productively struggle, while simultaneously building procedural fluency, can help students gain confidence in mathematics. And research has shown that even one positive experience with productive struggle can increase students' positive attitudes toward problem solving (Murawska, 2018).

Conversely, if young children continually perceive that their math tasks are too difficult, negative dispositions and math anxiety can emerge. In fact, Maloney and Beilock (2012) found that math anxiety can appear as early as first grade. Fortunately, the researchers also found that providing opportunities for young children to engage in positive mathematical activities that improve mathematics skills may help prevent the development of math anxiety.

Therefore, it is incumbent on elementary school teachers to seek positive ways of improving math skills and number sense. Now, improving mathematics skills does not imply memorization of basic facts. Boaler (2016) has long argued that timed tests for math fact memorization do not promote flexibility, number sense, and positive mathematical mindsets, and have proven to be traumatic for many children, oftentimes contributing to math anxiety. Instead, developing children's number sense can be accomplished through challenging math puzzles (Boaler, 2008). One such puzzle is called KenKen. KenKen puzzles help elementary school students develop number sense, operation sense, flexibility, and reasoning (Gomez & Novak, 2014). By weaving KenKen into the K-5 mathematics curriculum, teachers can cultivate students' positive mathematics identity and lay the foundations for success.

KenKen Rules

What is KenKen? KenKen is a puzzle similar to Sudoku, but with mathematical operators. KenKen, Japanese word for "square wisdom" or "cleverness squared," was invented in 2003 by Tetsuya Miyamoto, a Japanese mathematics instructor, as a means to help his students improve their math and logic skills (KenKen, 2017). Two of the rules are the same as Sudoku (the digits cannot be repeated in any row, and the digits cannot be repeated in any column). But the difference is that in any *cage* (set of squares outlined in bold), the digits must combine to create the target number using the specified mathematical operation (+, −, ×, ÷). Not only is KenKen an effective means to increase students' number sense, procedural fluency, and perseverance, the puzzle serves as a wonderful, though somewhat addictive, pastime for adults.

The best way to learn KenKen is to just try one. Figure 1 contains two 3×3 KenKen puzzles, and Figure 2 contains one 4×4 puzzle, courtesy of www.kenkenpuzzles.com, the free KenKen website. Remember never to guess. If you're not sure, put your choices, called *candidates*, into a square.

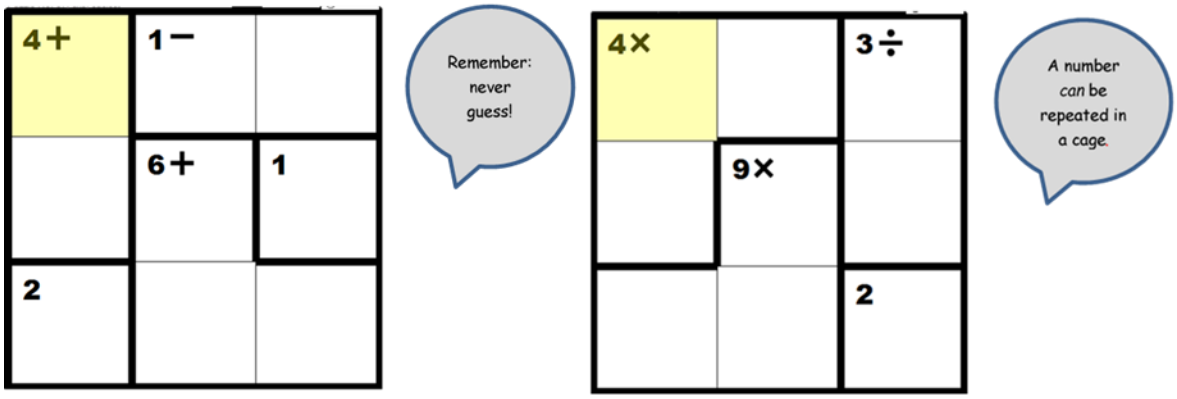

Figure 1. Two 3×3 KenKen puzzles (KenKen, 2018).

In the 4×4 puzzle in Figure 2, the *doubles strategy* allows the player to narrow down the choices for a given row or column. For example, looking at the first column, a 2 will go in the bottom left square. In the **7+** cage, the player can put candidates 3 and 4 in those squares until it is certain where each of those digits should be placed. Even though the order of digits 3 and 4 is not known, both digits will be used. Hence, the first column has now used a 2, 3, and 4. This forces the top square in the first column to be a 1. Solutions for all three KenKen puzzles can be found in the Appendix.

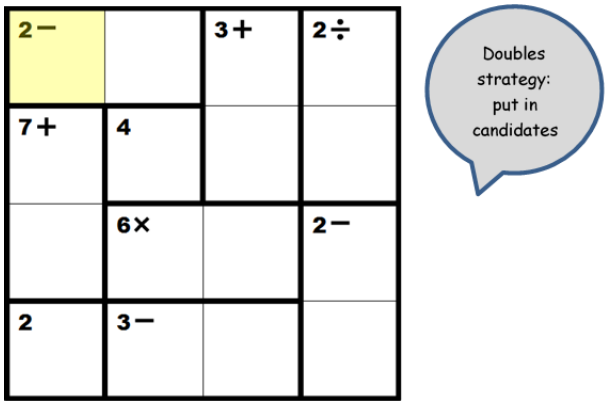

Figure 2. One 4×4 KenKen puzzle (KenKen, 2018).

Common Core Alignment

So why is KenKen good for the mathematics classroom in terms of the Common Core State Standards for Mathematics? KenKen definitely develops key number sense attributes, such as understanding of numbers and relationships, procedural fluency with math facts, flexibility, decomposing, and mental math skills. In particular, KenKen builds skills specifically required for Common Core mathematics (CCSSI, 2010):

Basic math facts and operations

2.OA.2 Fluently add and subtract within 20 using mental strategies.

3.0A.7 Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division

Number theory topics: divisibility, factors, primes

4.OA.4 Find all factor pairs for a whole number in the range 1–100… Determine whether a given whole number in the range 1–100 is prime or composite.

Combinatorics

K.OA.3 Decompose numbers less than or equal to 10 into pairs in more than one way

Also note that KenKen puzzles can be useful in high school and college mathematics classrooms for developing perseverance and advance mathematical reasoning such as parity, symmetry, logic, combinatorics, and algebraic thinking (Reiter, Thornton, & Vennebush, 2013).

In addition, KenKen explicitly promotes at least three of the eight Common Core *Standards for Mathematical Practice* (CCSSI, 2010):

SMP 1	Make sense of problems and persevere in solving them
SMP 2	Reason abstractly and quantitatively
SMP 3	Construct viable arguments and critique the reasoning of others

Ideas for Implementation

When would you have time to do KenKen puzzles in class? Following are a few ideas: warm-up, end of class activity for skills practice, a focus for team problem solving, just-in-case box of problems, math club, school-wide competition, or extra credit. In teacher education courses, KenKen can be used in the mathematics content course as a factors and divisibility activity or in a methods course as an example of an effective game to promote number sense and productive struggle. Thus I have found KenKen puzzles to be successful K-16 classrooms.

Where can you find KenKen puzzles? You can (a) go to the free KenKen site and play anytime (www.kenkenpuzzles.com), (b) find new puzzles every day on NCTM's Illuminations website (http://illuminations.nctm.org/Activity.aspx?id=4184), (c) find a KenKen for Younger Learners full lesson plan at NCTM (http://illuminations.nctm.org/Lesson.aspx?id=6889) (d) sign up for the FREE teacher packet which is emailed to you weekly during the school year, highly recommended, (e) purchase a KenKen paperback puzzle book through Barnes and Noble, Amazon, etc. or (f) yes, there's an app for that for any smartphone.

In sum, mathematics teachers concur that KenKen is an engaging activity that encourages positive attitudes, especially helpful in building confidence in a student who defines herself as "not a math person." This type of puzzle can easily become a part of the elementary school curriculum to develop number sense, flexibility, perseverance, and contribute to a student's attainment of a positive mathematics identity.

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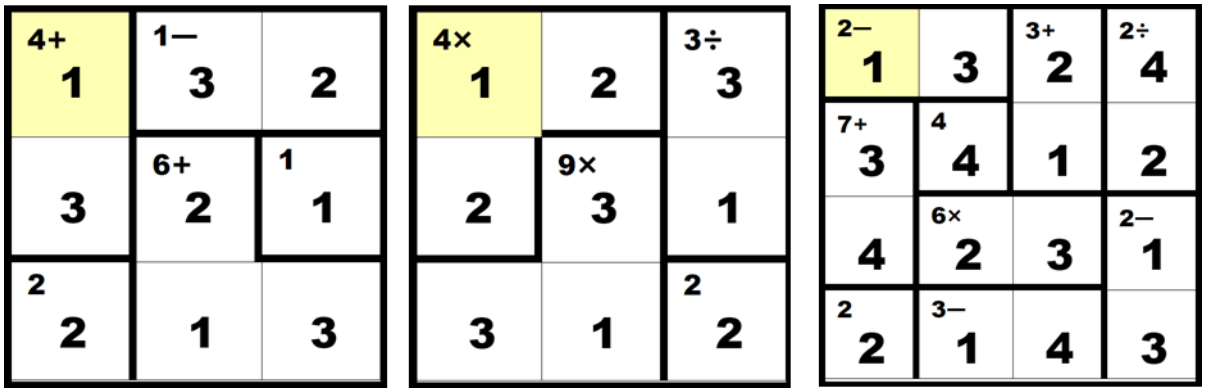
Appendix

Solutions to three KenKen puzzles.



Supporting Teachers Through Social and Emotional Learning

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Abstract

A myriad of factors affect the experiences of youth in schools that may influence healthy development and academic success. Some challenges for students include learning difficulties and mental health concerns, which also play a significant role in academic success, development of positive relationships and future success in relationships and careers. Multiple domains including home, school, and community impact youth development. Adult relationships with parents, family, and teachers are critical assets for youth and are necessary for their Social and Emotional Learning (SEL) skill development. Although the development of SEL is necessary for youth, it is equally important for adults. This discussion will address the importance of teachers strengthening their own social and emotional competence so that they can better support their students.

Background

SEL is the process of acquiring the skills to recognize and manage emotions, develop caring and concern for others, establish positive relationships, make responsible decisions, and handle challenging decisions effectively (CASEL, 2005). Durlak, et al (2011), conducted a meta-analysis of 213 school-based, universal social and emotional learning (SEL) programs involving 270,034 kindergarten through high school students and found that students who received SEL instruction demonstrated significantly improved social and emotional skills, attitudes, behavior, and enhanced academic performance (11 percentile-point gain in achievement). Comparably, Jennings and Greenberg (2009), found that positive relations with teachers are an important element of student mental health and that teacher support is associated with both an increase in youth well-being and a decrease in social and emotional stressors for youth. Research has also confirmed that teacher relationships and positive connections with youth can be a protective factor for youth (Jennings & Greenberg).

Educators enter into education with dreams of changing the odds for disadvantaged children, inspiring a love for learning, or developing critical thinkers. Unfortunately, research shows that 40-50 percent of teachers will leave the classroom within their first five years due to stress or the lack of support (Markow, 2006). Stress influences the way teachers interact with their students. When adults are stressed their interaction with youth become less warm, harsher and sometimes conflictual. Second, teachers who have limited ability to regulate their emotions may have difficulty coping with stress and modeling stress management for students. Third,

neuroscience research shows that stress also disrupts cognitive regulation processes, including attention, memory, and problem solving (Jennings & Greenberg, 2009).

Supporting Teachers

Teaching is an emotional practice, and teachers need support in strengthening their social and emotional skills in order to manage the stress that comes with educating youth. This has multiple values for the profession. Teachers' sense efficacy in their work and it promotes teacher retention. Social and emotional competencies are not skills that are explicitly taught in teacher education curriculum. Nonetheless, social and emotional competency (SEC) is associated with well-being, increased enjoyment in teaching, and feeling more efficacious. Characteristics of socially and emotionally competent teachers include having high self-awareness, social awareness, knowing how to manage their emotions and behaviors and exhibiting good decision-making skills. It is important for teachers to manage their behavior even when emotionally aroused by challenging situations and regulating their emotions in healthy ways that facilitate positive classroom outcomes without compromising their health. They firmly and effectively set limits while demonstrating respect. They also are comfortable with a level of ambiguity and uncertainty that comes from letting students figure things out for themselves.

Self-awareness is cultivated by developing the ability to identify how you feel, not only the surface feelings or those that are obvious but also the ones that are hidden. The ability to reflect on your own feelings and recognize your strengths and challenges is critical in this area. It is also important to understand how your behavior may affect others and particularly the youth in your classroom. Social/interpersonal skills include understanding social cues (such as body language and tone of voice) correctly accessing the intent of the other's behavior (Jennings & Greenberg, 2009). For example, it is important to assess the student's behavior and its meaning before responding to that behavior.

Socially and emotionally competent teachers exhibit prosocial values and make responsible decisions based on an assessment of factors including how their decisions may affect themselves and others. It is important to respect the perspectives of others even if it differs from your own viewpoint. Most critically, is the ability to use reflection as a way to assess areas for development and create an action plan to make changes.

The lack of explicit preservice or in-service training aimed at teachers' SEL development is a major challenge for schools. It is important that educational leaders recognize that teachers come to school with many of the same life stressors that other adults face. Yet, they are expected to create a warm nurturing environment, be emotionally responsive to students, and maintain collaborative relationships with adults and parents who are a part of the school community.

Schools leaders are encouraged to develop opportunities for teachers to cultivate their SEL competences. Support for SEL must be embedded in the life and culture of the school for

everyone, including teachers, staff, students, and administrators. In order to support teachers school leaders must intentional and build in-service training, professional learning communities and coaching as a part of the staff development. Dedicated time should be made available for teachers to expand and enhance their SEL skills. The following are some recommendations:

- Providing opportunities for SEL development through teacher in-services, professional development and professional learning communities (PLC). Consider developing reading circles to review books such as Emotional Intelligence 2.0. It is a resource that is ideally suited for the PLC. It presents a step-by-step program for increasing one's SEL competencies. Providing a safe environment where discussion of the skills introduced along with reflection and insight can provide a meaningful strategy for teachers to expand their skills in this area. It has a pretest/posttest where the person can evaluate their own SEL competences and areas that need further development.
  Teachers should:
- Build emotional awareness. Understand how your emotions affect colleagues and students. Find ways to stay calm when angry, avoid embarrassing the students.
- Have clear expectations and classroom norms including appropriate consequences that are clearly articulated to students. Give students "voice" and "choice" and respect their suggestions. Ask probing questions that help students solve problems on their own.
- Be aware of cultural differences and respect those differences.
- Incorporate **reflection** into your daily practice. You may consider partnering with a colleague for ongoing reflection. Reflect on what happened during your day. What went well and what areas need further development. What role you can play in making a change?
- Recognize the need for self-care and address ways to reduce your own personal stress.

Research shows that teacher support is important for student success. The social and emotional competences of teachers is critical to developing and maintaining a supportive teacher-student relationship and will better enable teachers to manage the social and emotional challenges within the context of their classroom and school. It is important that school leaders are intentional in providing support for teachers to expand these skill. The end results is that youth, teacher and school wins!

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