



# **FoodMASTER: REACH TO TEACH!**

*Partnering Dietitians with Science  
Education Communities*

# Disclosure



FoodMASTER is supported by the National Institute of General Medical Sciences (NIGMS)

[www.foodmaster.org](http://www.foodmaster.org)

# Objectives for This Talk

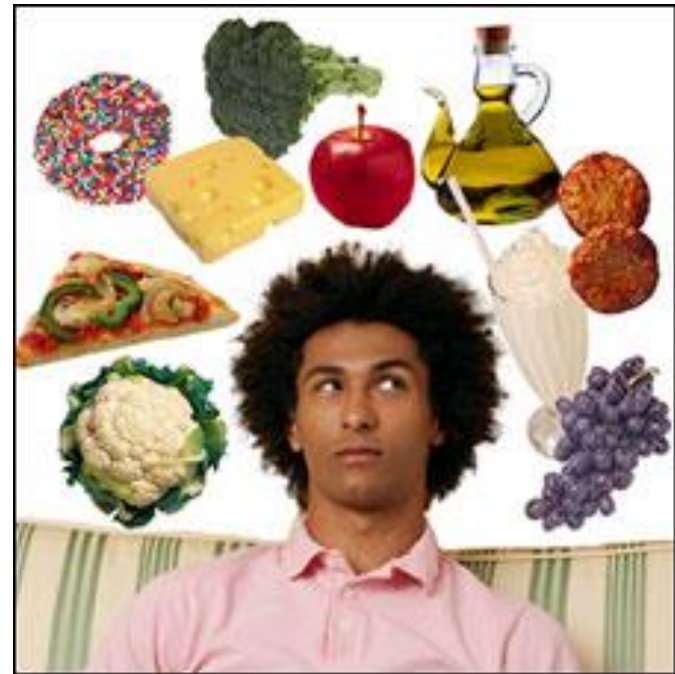
- Participants will be able to
  - Identify and promote food concepts for teaching science to children and teens
    - CDR 6040 Education Theories and Techniques for Children and Adolescents
  - Promote strong teacher influence to increase the pipeline of students entering STEM professions, especially minorities and women
    - CDR 6080 Training, Coaching and Mentoring
  - Describe 3 key benefits of the FoodMASTER curriculum related to science education
    - CDR 9020 Evaluation and Application of Research

Background

# **PART ONE**

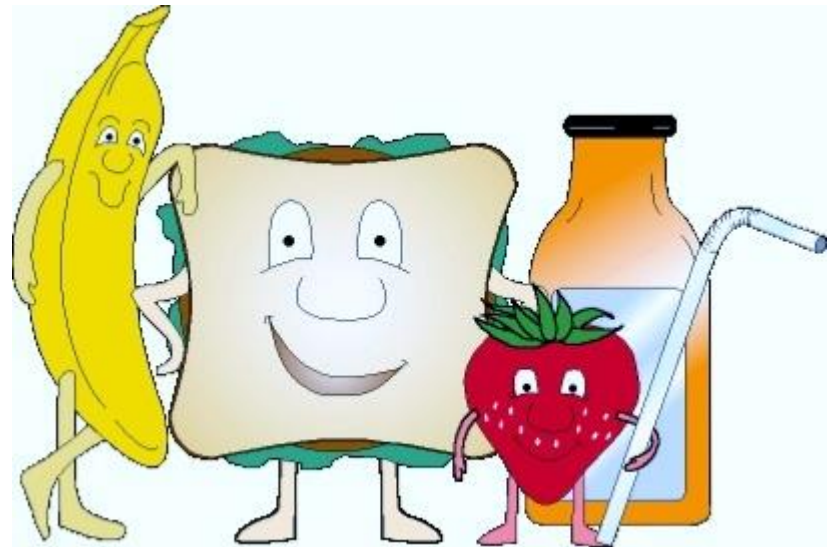
# What is the Fundamental Problem???

- Despite efforts of the federal and state governments, businesses, and health education communities to improve food and nutrition science understanding...



# Reality Check

- Children only receive an estimated 3 hours of food and nutrition science education in schools each year



# So What??

- The majority of the population obtain their food and nutrition science information from the mass media
- Lack of this knowledge continues to plague our citizens and exacerbate chronic disease!



# What Else???

- Communities that are most impacted by this knowledge deficit face challenges in:
  - Preparing their children for science and health careers
  - Attracting health professionals to their communities
- Also
  - Maintaining healthcare system capacity to address health disparities, causing even larger gaps in outcomes and costs



# Our Solution = FoodMASTER

- Partnering dietitians with science education communities!!



# What is the FoodMASTER Initiative?

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The **F**ood, **M**ath **A**nd **S**cience Teaching  
Enhancement **R**esource Initiative:

a compilation of programs aimed at  
improving the public understanding of  
Food and Nutrition Sciences

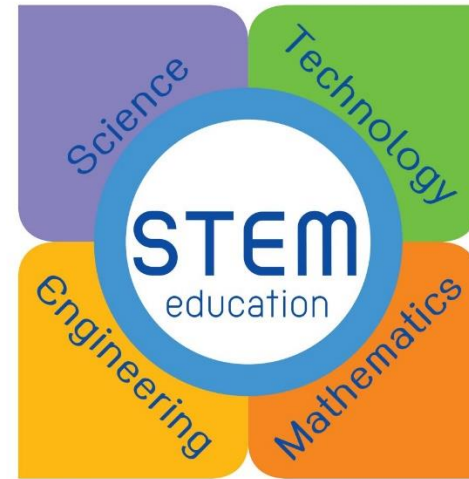
# Raise a Hand

- How many of you have heard of STEM or STEAM EDUCATION??



# What is **STEM** Education?

- A movement in American Education to help teachers and their students understand how the academic disciplines of **Science, Technology, Engineering and Mathematics** impact their world and prepare them for the workforce of tomorrow.
- **STEAM** includes **ART** as well



# STEM/STEAM EDUCATION

- Formal = K-12
- Informal = after-school, science museums, youth clubs
- Trends = Early STEAM, targeting underserved populations
- How does it advance public understanding of science and math?
  - Science and Mathematics are vital to our future
  - Science is everywhere; it shapes our everyday experiences...including plants and food!

# Careers for Our Children

- STEM is their future—the technological age in which they live, their best career options, and their key to wise decisions.
  - The US Department of Labor listed the **ten most wanted employees**; eight require STEM degrees!
  - According to the U. S. Department of Commerce, STEM occupations are growing.
    - Health care workers will average **20% more** in life time earnings than peers with similar degrees in non-health care.

# CHALLENGES FOR DIETITIANS

- Not enough professional dietitians to reach all outlets for food and science information
- Competition from non-reputable sources
- K-12 school environments focus heavily on subject content for standardized testing, leaving little time for nutrition education

# OPPORTUNITIES FOR DIETITIANS

- Dietitians have always been champions for promoting public understanding of food and nutrition science!!
  - The dietetics profession has a history of being a gateway for women in science.
  - Dietitians are heavily involved with school and health-care operations
  - New opportunities exist for influencing food and businesses as consumers demand healthier choices

# DESIRED OUTCOMES

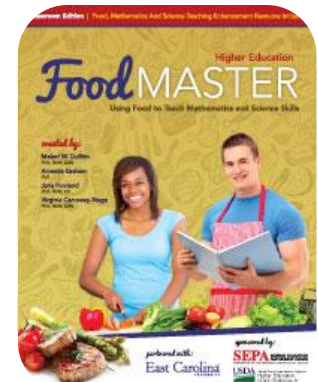
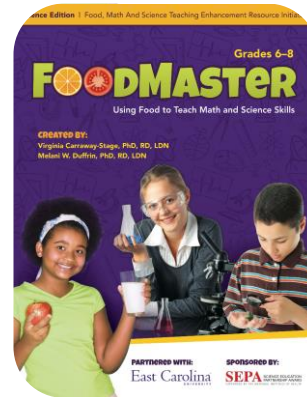
- Increased confidence for approaching **partnerships** with science educators
  - Meet educators “where they are”
  - Increase teacher knowledge and efficacy
- Increase **student exposure** to science content
- Enhance **family outreach** through children

# FoodMASTER



## FoodMASTER Curricular Resources

- FoodMASTER Intermediate Teacher & Student Editions
- Food on the Farm
- FoodMASTER Middle Grades Science
- FoodMASTER Higher Education



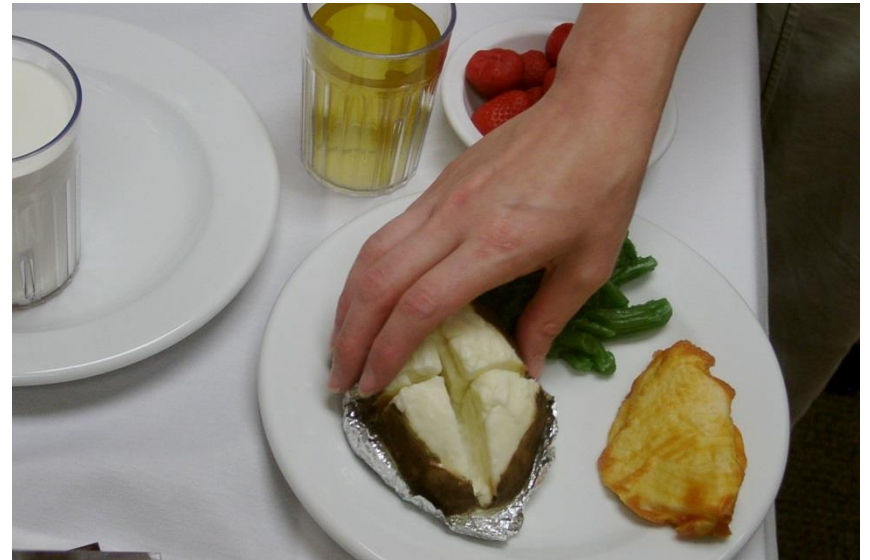
# “Trojan Horse” of Nutrition Education

- FoodMASTER provides access to formal and informal education learning environments by focusing on mathematics and science academic achievement.



# Why Use Food?

- Students have preexisting contextual experiences
- Conducive to hands-on activities
- Concepts in biology, chemistry, environmental sciences, math, nutrition, health



# BEST OF ALL...

Engagement and  
Motivation!

- **Food engages multiple senses:**
  - VISUAL, TASTE, SMELL, TOUCH...
  - EVEN SOUND!



# Kids Have Fun

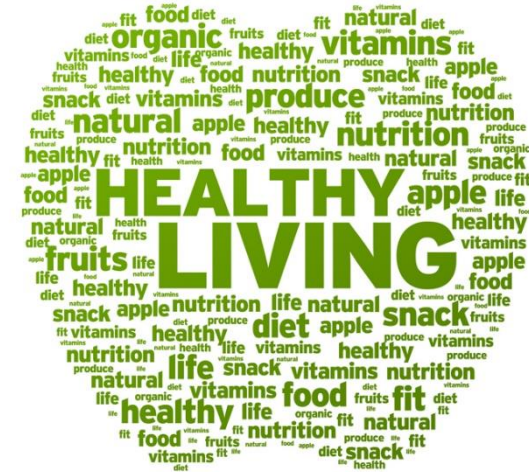
- FoodMASTER Fridays
- “It’s like hiding your vegetables in the spaghetti sauce”

**Banana Experiment**  
*Which Will Ripen First?*



# Math + Science Skills = Healthy Living

- Academic success in math and science is a foundational component for success in **life**
  - Food and Nutrition Science knowledge and skills lead to **healthy living**.



# Big Impact!

Educating children in  
formal and informal  
learning environments

- *Impacts families*
- *Impacts communities*
- *Impacts future generations!!*



# TAKE A MINUTE FOR AN ACTIVITY



# Group Activity

- Partner with your neighbor or table mates
- Think of a food
  - Identify possible science projects



# Share Your Ideas



Examples

FoodMASTER Curriculum

# **PART TWO**

# Sample Curriculum

- Measurement
- Food Safety
- Management
- Meats
- Eggs
- Fats & Oils
- Grains
- Vegetables
- Fruits
- Milk & Cheese



# Methods

## Development

- Pilot Testing
- 2009-2010 FoodMASTER Implemented in 4th Grade Classrooms
  - North Carolina (9 classrooms)
  - Ohio (9 classrooms)
- Pre- and Post-test Exam:
  - Nutrition Knowledge: 28 Questions
  - Multidisciplinary Science Knowledge: 13 Questions
  - Mathematics Knowledge: 20 Questions



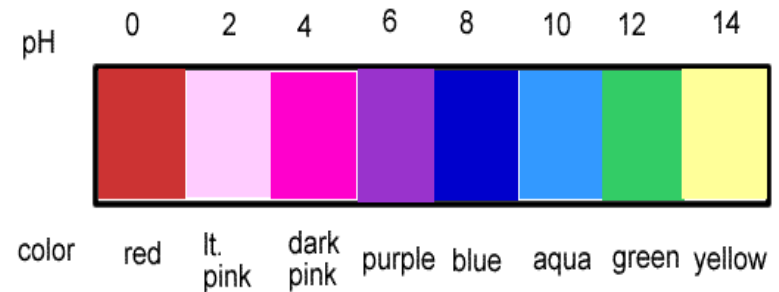
# Sample Activity

## Activity A: Browning



## Activity B: Color Changes in Acids and Bases

Red Cabbage Color changes with pH



# What Do Teachers Care About?

- Ease of preparation and implementation
- Confidence in their ability to teach content
- Formal environments:
  - Student engagement
  - Student learning
  - Student achievement (standardized testing)

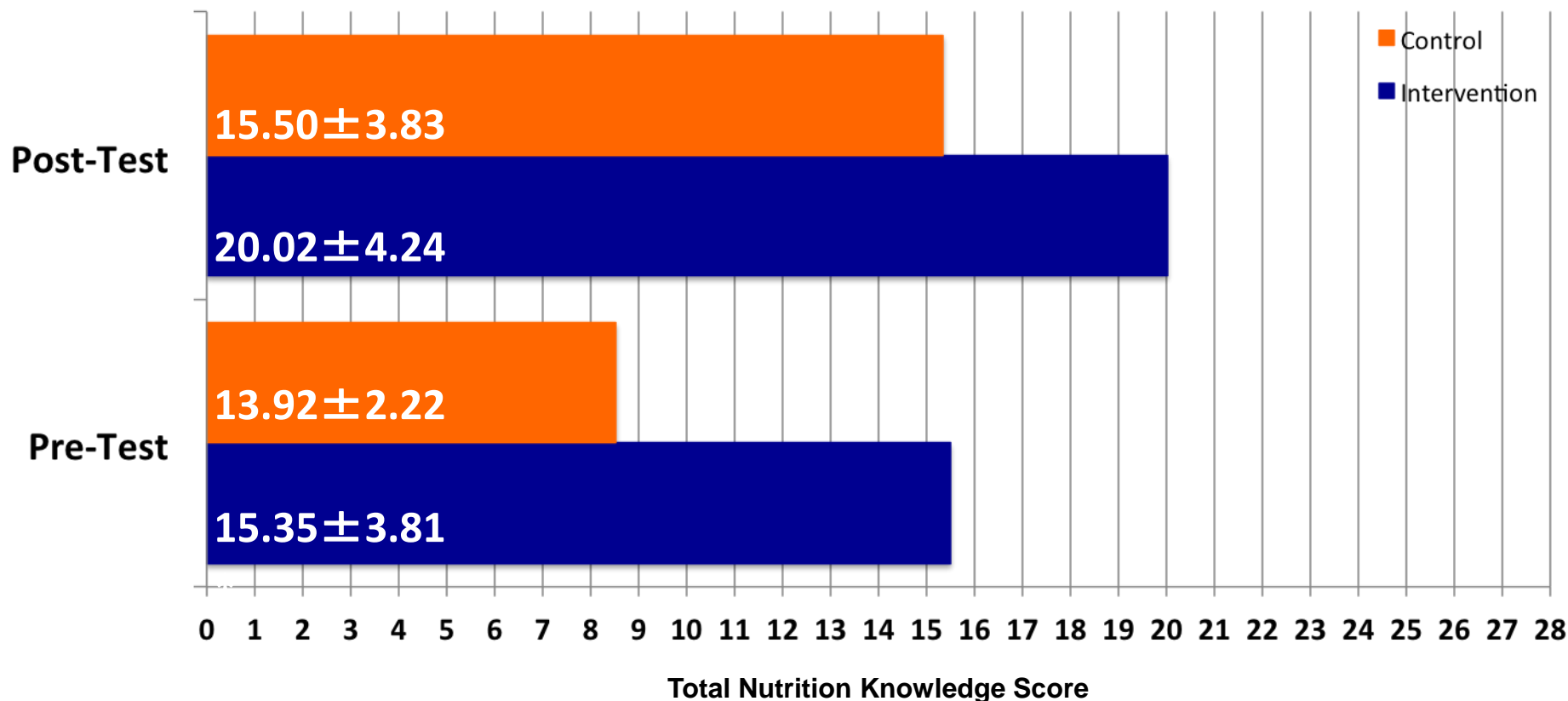
# Teacher Video



DATA

# **PART THREE**

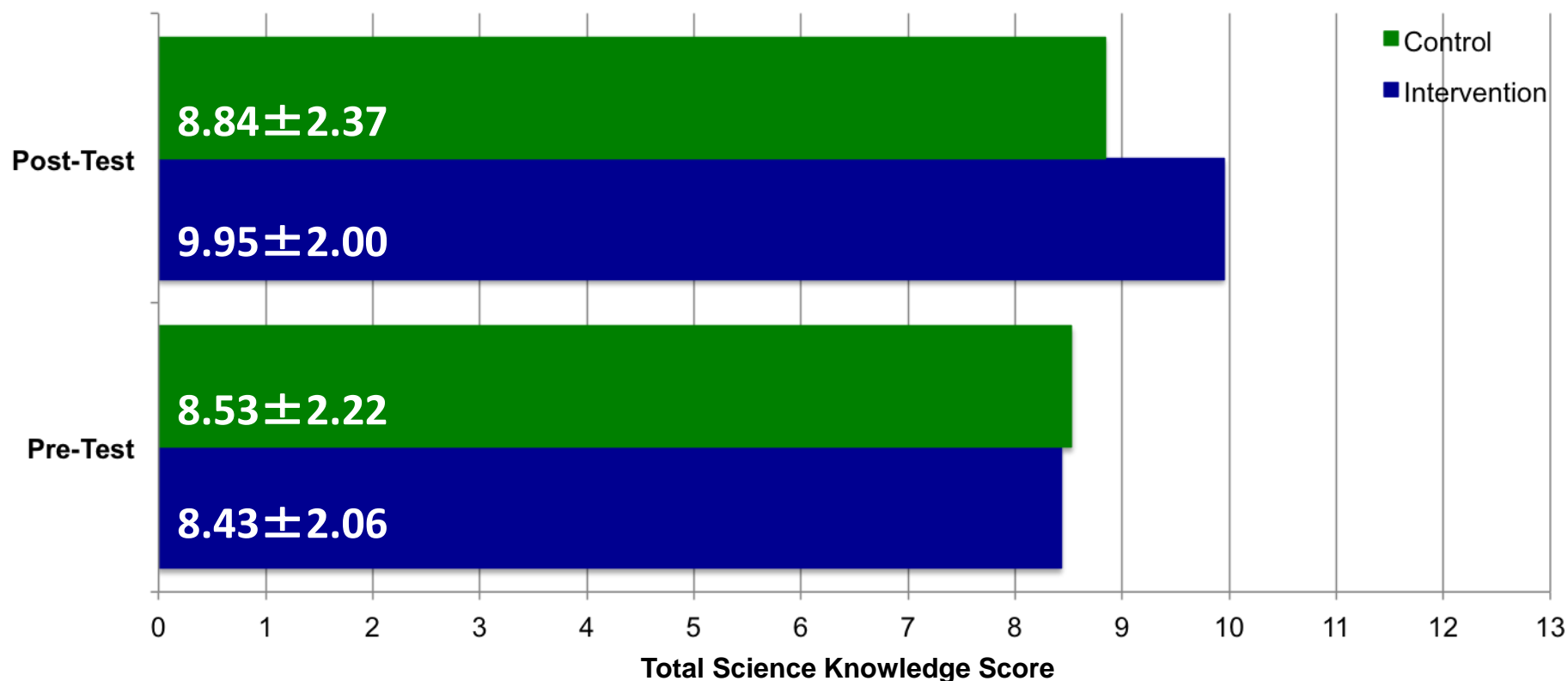
# Nutrition Knowledge Results



**Figure 1. Control versus Intervention Nutrition Knowledge Scores (28 questions)**

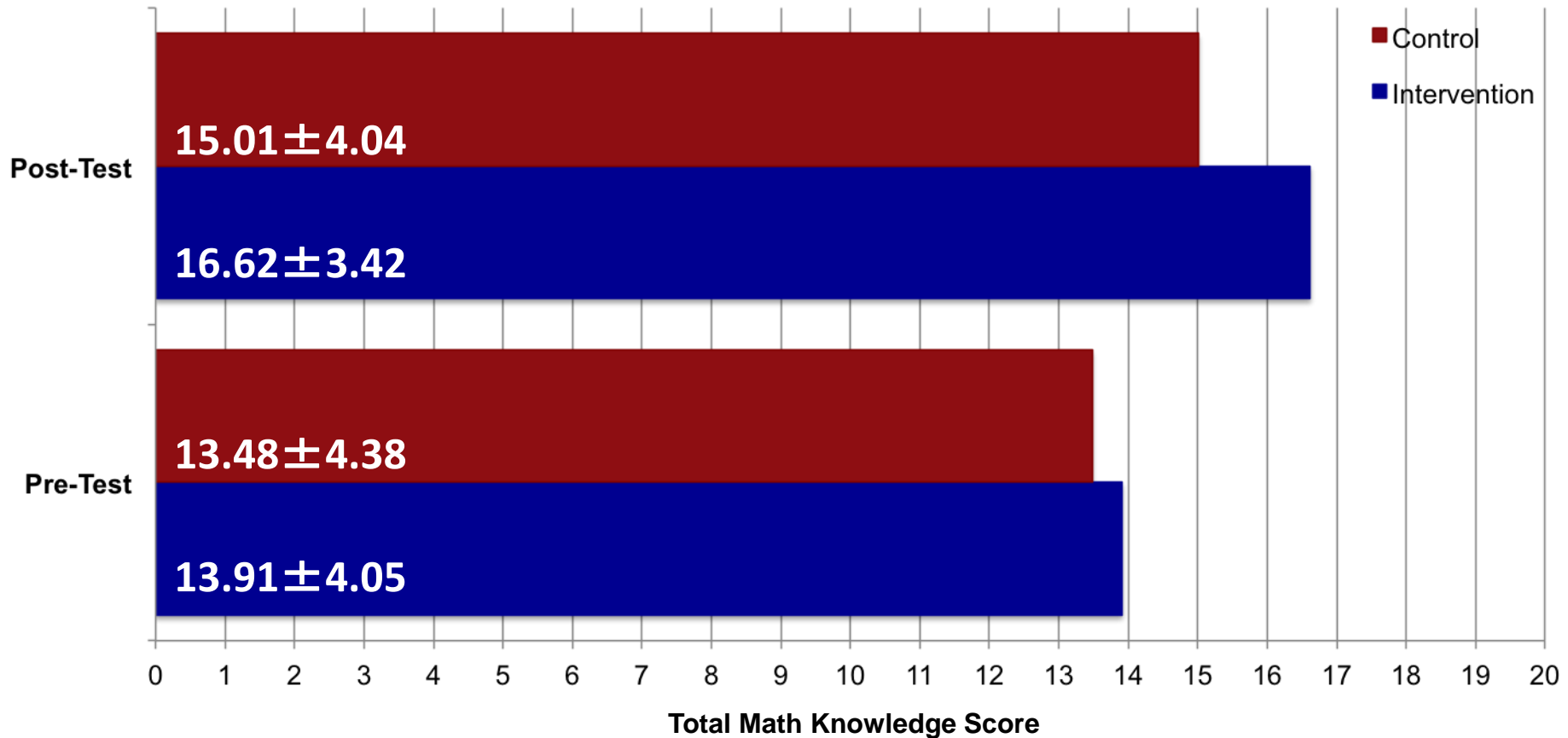
\*Post-test score after adjusting for baseline scores

# Multidisciplinary Science Knowledge Results



**Figure 2. Control versus Intervention Mean Science Knowledge Scores (13 questions)**

# Math Knowledge Results



**Figure 3. Control versus Intervention Mean Math Knowledge Scores (20 questions)**

# FoodMASTER Outcomes

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## FoodMASTER Intermediate (FMI)

- The School Health Education Evaluation reported that 10-15 hours of education are needed to observe significant changes in program-specific knowledge.
  - FMI students were exposed to an average of 18 hours of food-based education over the academic year compared to the 3.4 hour national average.
  - A significant difference in general science, mathematics, and nutrition knowledge (research developed exams) was detected between the intervention group and control group.
- FMI teachers displayed gains in self-efficacy toward teaching nutrition that were significantly greater than changes observed in the matched comparison group.
- For professionals interested in ensuring intermediate school - age children receive food and nutrition education, integration with science and mathematics may be ideal domains, and vice versa without detracting from efforts to ensure students perform well on achievement on standardized tests.



# FoodMASTER Outcomes

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## FoodMASTER Middle Grades Science

- A significant difference was detected in science and nutrition knowledge between the intervention group and control group. Researcher-developed tools were created using the AAAS Project 2061 Science Assessment and the Health Assessment Project item banks.
- Teachers felt FMM was a valuable experience for middle school students and were willing to repeat over half the chapters.
- Motives for teacher willingness to repeat activities: student enjoyment, standard alignment, ease of instructions, professional development training experience, and the provision of additional resources.

Teacher comment on EOG improvement - *"..overall, our kids did really well on the EOGs, so I know that this had a really good impact..."*

# Discussion

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- Students exposed to an integrative food-based curriculum will achieve gains on nutrition, science, and mathematics questions.
- These questions are important foundational information for many science disciplines.
- This allows teachers to stay within the scope of what they are teaching about science without having to compete with other subjects for instructional time.

# Implications

- FM supports the potential for food and nutrition science subject matter to garner more K-12 classroom instruction time when materials are aligned with national and state standards.
- This method enables students to demonstrate knowledge acquisition through standardized testing.



# Research & Publications

- Carraway-Stage, V., Diaz, S., Hovland, J.A., Kolasa, K., Duffrin, M.W. (2015) Exploring the Associations Among Nutrition, Science, and Mathematics Domains of Knowledge for an Integrative, Food-based Curriculum. *Journal of Nutrition Education and Behavior*. Under Review.
- Roseno, A., Carraway-Stage, V., Diaz, D., & Duffrin, M. (2015). Validation of Attitudes toward Science Instrument Constructs. *International Journal of Science Education*. Under review
- Hodges, C., Roseno, A., Hovland, J., Diaz, S., Duffrin, M., & Carraway-Stage, V. (2015) Food-based Science Curriculum Improves 4th Grade Educators' Self-Efficacy for Teaching Nutrition. *American Journal of Health Education*. Under review
- Carraway-Stage, V., Hovland, J., Ochab, C., Diaz, S., & Duffrin, M.W. (2014). Food-based Science Curriculum Yields Gains in Nutrition Knowledge. *Journal of School Health*, 85, 231-240.
- Roseno, A., Carrarway-Stage, V., Hoerdmann, C., Diaz, S., Geist, E., Duffrin, M.W. (2014). Applying mathematical concepts with hands-on, food-based science curriculum. *School of Science & Mathematics*, 115(1), 14-21.
- Hovland, J.A., Carraway-Stage, V., Cela, A., Collins, C., Diaz, S., Collins, A., Duffrin, M. (2013) Food-based Science Curriculum Increases 4<sup>th</sup> Graders Multidisciplinary Science Knowledge . *Journal of Food Science Education*.
- McLeod, S., Carraway-Stage, V., Hovland J.A., & Duffrin, M.W. (2012). Measuring me: Using nutrition education curriculum activities to teach elementary students mathematics. *Journal of Nutrition Education and Behavior*, 44, 189-191
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- Duffrin, M.W., Cuson, D., Phillips, S.K., and Graham, A.S. (2005). Developing Food Products and Enthusiastic Learners. *Journal of Nutrition Education and Behavior*, 37(1) 41-42.
- Duffrin, M.W., Cuson, D., and Phillips, S.K. (2005). Using foods to boost math and science skills. *Journal of Family and Consumer Sciences*, 97(1) 64-65.
- Phillips, S.K., Duffrin, M.W. and Geist, E.A. (2004). Be a food scientist. *Science and Children*, 41(4), 24-29.

YOU CAN BECOME A FOODMASTER CHAMPION!

# **PART FOUR**

# Next Steps



# DISSEMINATE!

- *Reach to Teach*
- *Teacher Professional Development*

# RDNs can S.A.V.E. the World!

**Seek** opportunities

**Advocate** for nutrition  
policy and change

**Voice** expert opinions

**Explore** hot topics

Courtesy of South Carolina Academy of  
Nutrition and Dietetics, 2016



# Formal Education

## State Boards of Education

- Letters of support
- Departments of Public Instruction
  - Alabama
  - Georgia (Donna Martin)
  - Mississippi
  - North Carolina (Lyn Harvey)
  - South Carolina

## Departments of Science Education

- Partnerships
- Regional RDN Champions
  - “Reach to Teach” program
  - 3-5 teachers per year
- Numeracy assessment, science scores

# Informal Education

## Children and Teens

- Compare rural and urban sites
- Boys and Girls' Clubs –
  - Day camps
  - Week-long camps
- After-School programs
- 4-H programs, Scouts
- Museums

## Teacher Professional Development

- Regional National STEM Teachers Association meetings
  - Booths, Exhibits
- Department of Public Instruction
  - 4 or 6-Hour workshops
  - Starter kits
  - Collaborate with Cooperative Extension agencies

# Affiliate Training

**New Hampshire (Manchester)**

**North Carolina (Durham)**



# International Engagement

## Greece



## Portugal



# What Can YOU Do?

**Check Out the Resources!**



**Become a CHAMPION!**



# Tell Teachers about the Website



What can we help you find? [go](#)

Home

Grades 3-5

Grades 6-8

Higher Ed

Community Ed

Contact Us



*"My students absolutely loved FoodMASTER! It was a very motivating learning tool..."*

— Jan Slattery  
Plains Elementary  
Plains, OH



[Like](#) 5 [Tweet](#) 1 [Share](#)

Kids and adults alike interact with food everyday. Without even realizing it, we are exposed to dozens of mathematic and scientific concepts almost every time we prepare food! That makes food an exceptional tool for teaching math and science to virtually all ages.



The FoodMASTER Initiative is a compilation of hands-on and virtual programs that use food to teach math and science skills. Subjects covered include biology, chemistry, microbiology, nutrition, and health, as well as math concepts such as numbers and operations, algebra, geometry, measurement, and problem solving.

**SEPA** SCIENCE EDUCATION  
PARTNERSHIP AWARD  
SUPPORTED BY THE NATIONAL INSTITUTES OF HEALTH

© 2012 FoodMASTER (Food, Math and Science Teaching Enhancement Resource)  
Web Design & Development by Cara Cairns Design

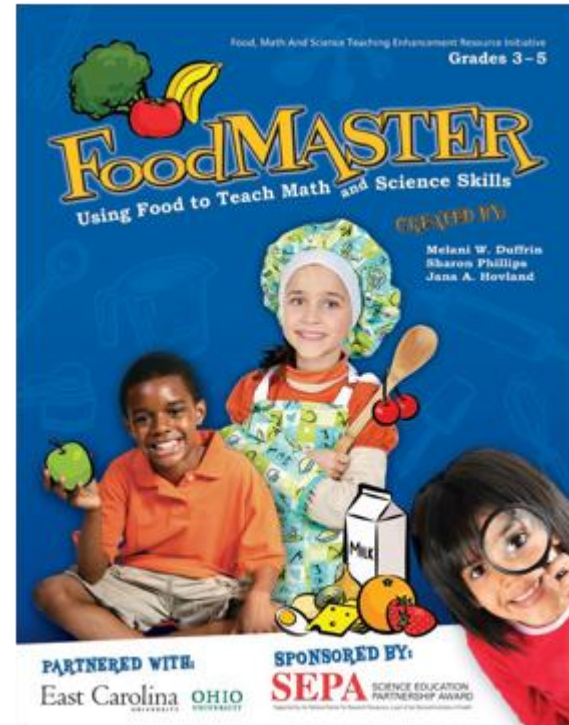


# SHARE THE FREE CURRICULAR RESOURCES

## Modules

- Intermediate Teacher & Student Editions (Grades 3-5)
- Food on the Farm (Grades 3-5 Mathematics Supplement)
- Middle Grades Science (Grades 6-8)
- Higher Education

## Posters



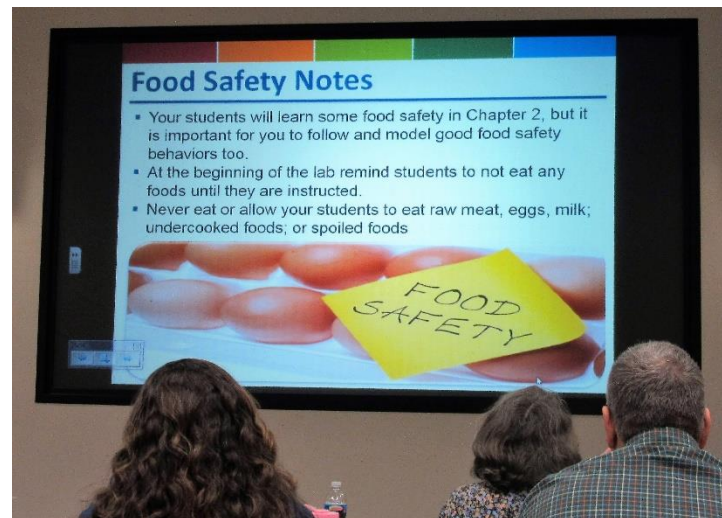
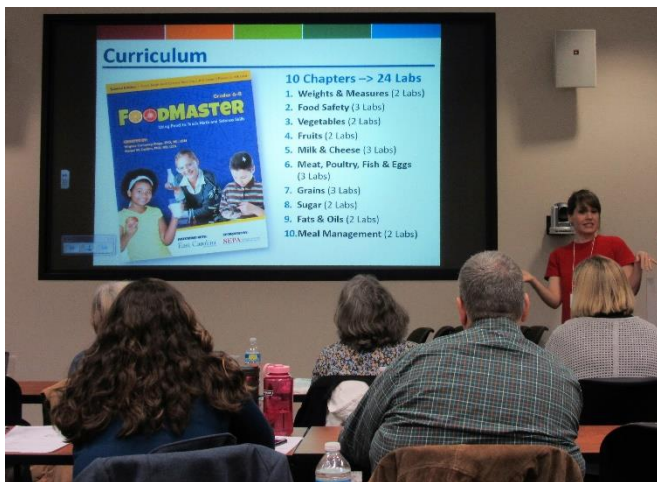
# Offer to Speak or Do Activities

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- Schools
  - Classrooms
  - Science Fairs
  - After School Programs
- Start FoodMASTER Fridays



# OFFER TEACHER TRAINING



# Help Your Community

- Identify and apply for STEM grants
- Build partnerships with like-minded organizations
- Be entrepreneurial
  - Offer teacher professional development in school districts
  - Offer food science or cooking programs
  - **What other ideas???**

# STAY CONNECTED!

Let FoodMASTER know what you are doing and how we can help with:

- Teacher Professional development
  - Adult Learner
  - Document results
- Classroom activities
- Grant program advice



# Our Take-Home Messages





“Tell me and I forget. Teach me and I remember.



*Involve me and I learn.*”

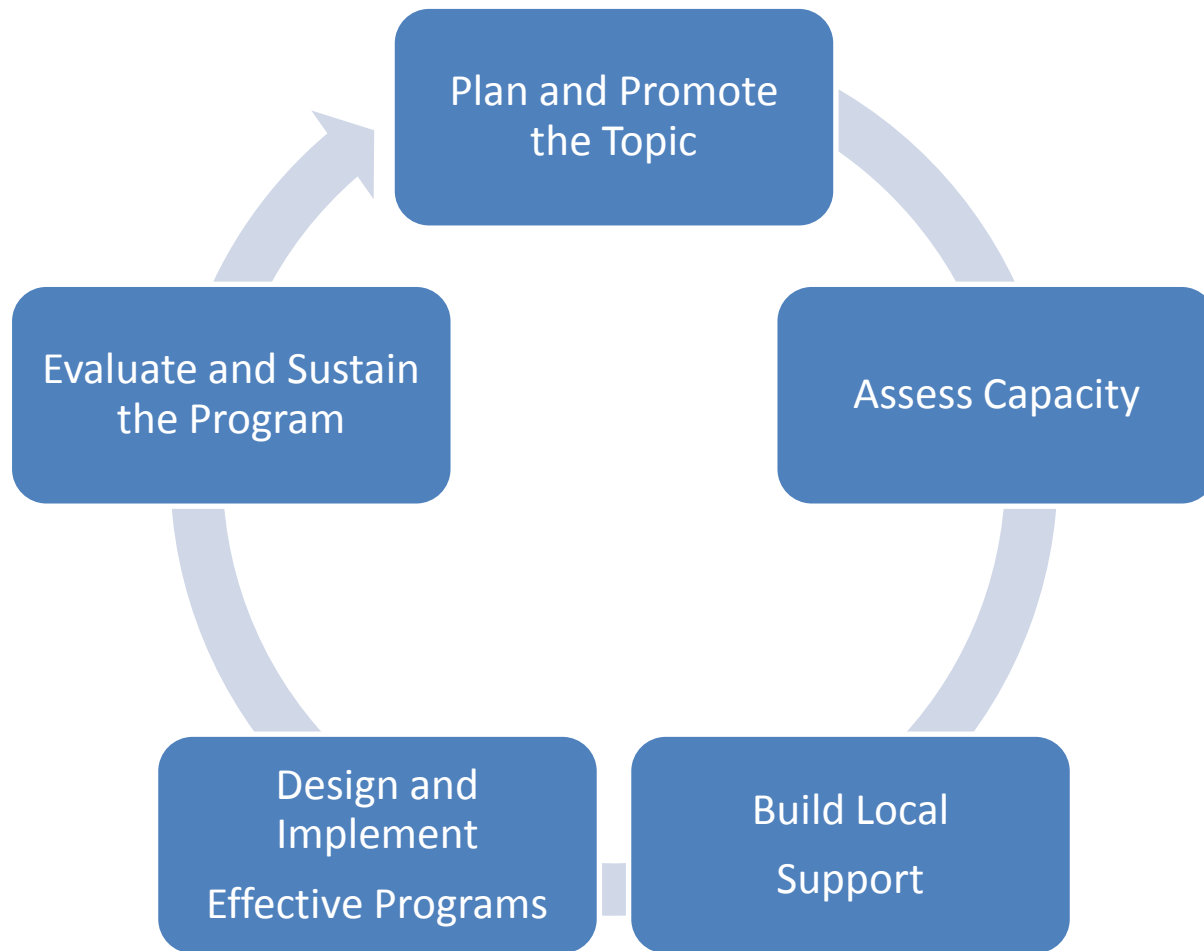


- Benjamin Franklin

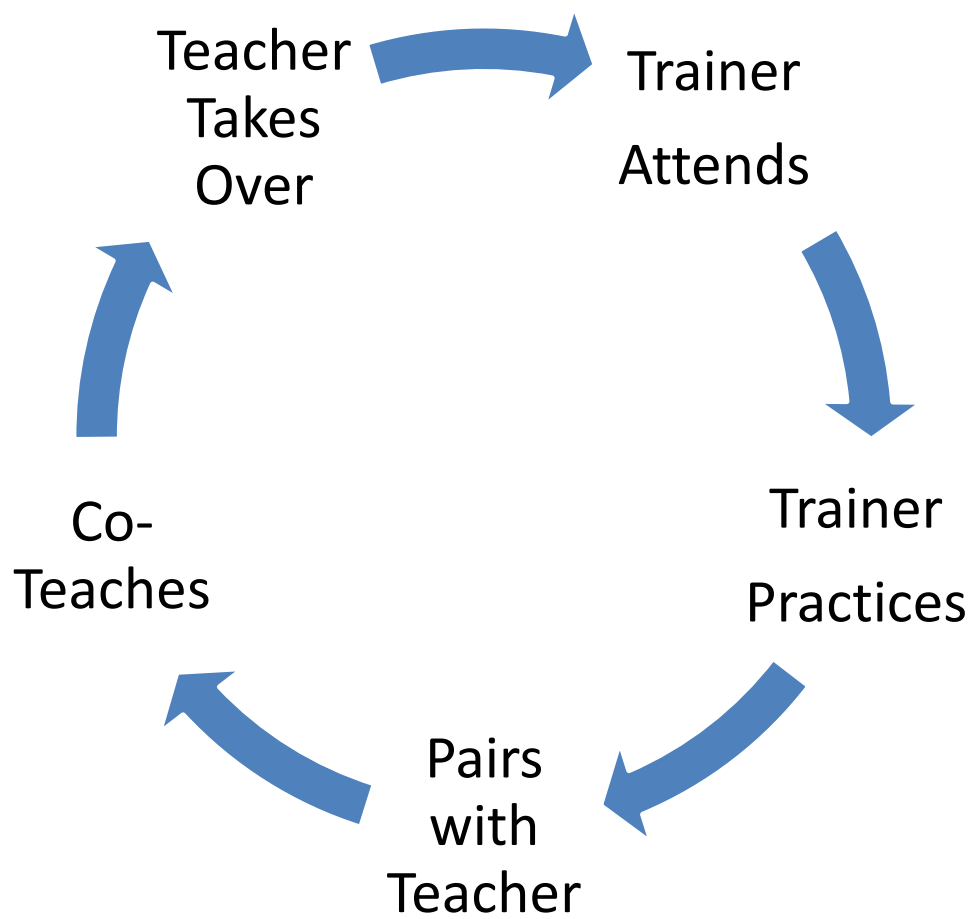
Setting Up Teacher Professional Development

# **PART FIVE**

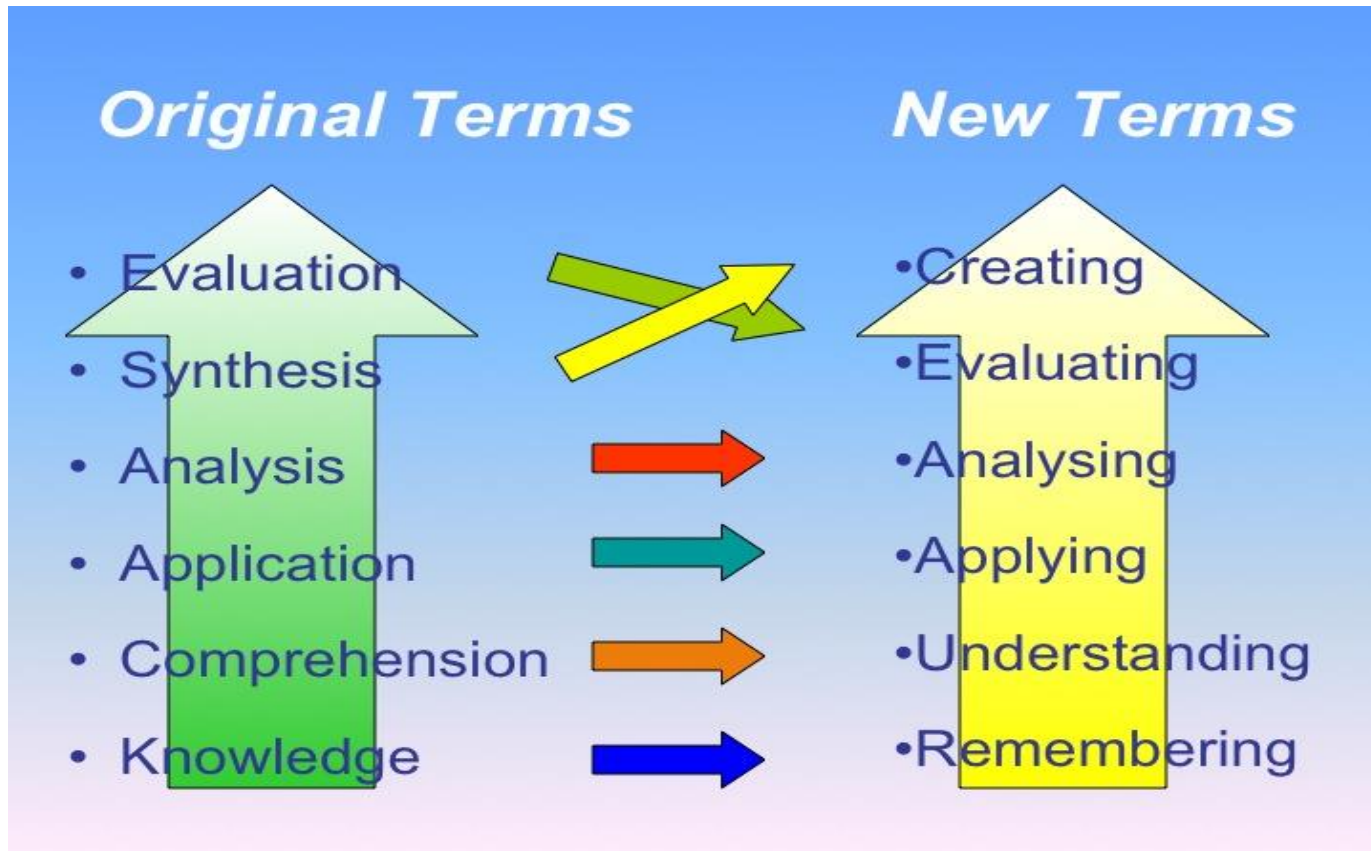
# Train the Trainer: Professional Development Model



# Reach to Teach -- *Teacher Army!*



# Bloom's Taxonomy



- Raise your hand if you took formal classes on how to TEACH adults



# Pedagogy vs Andragogy

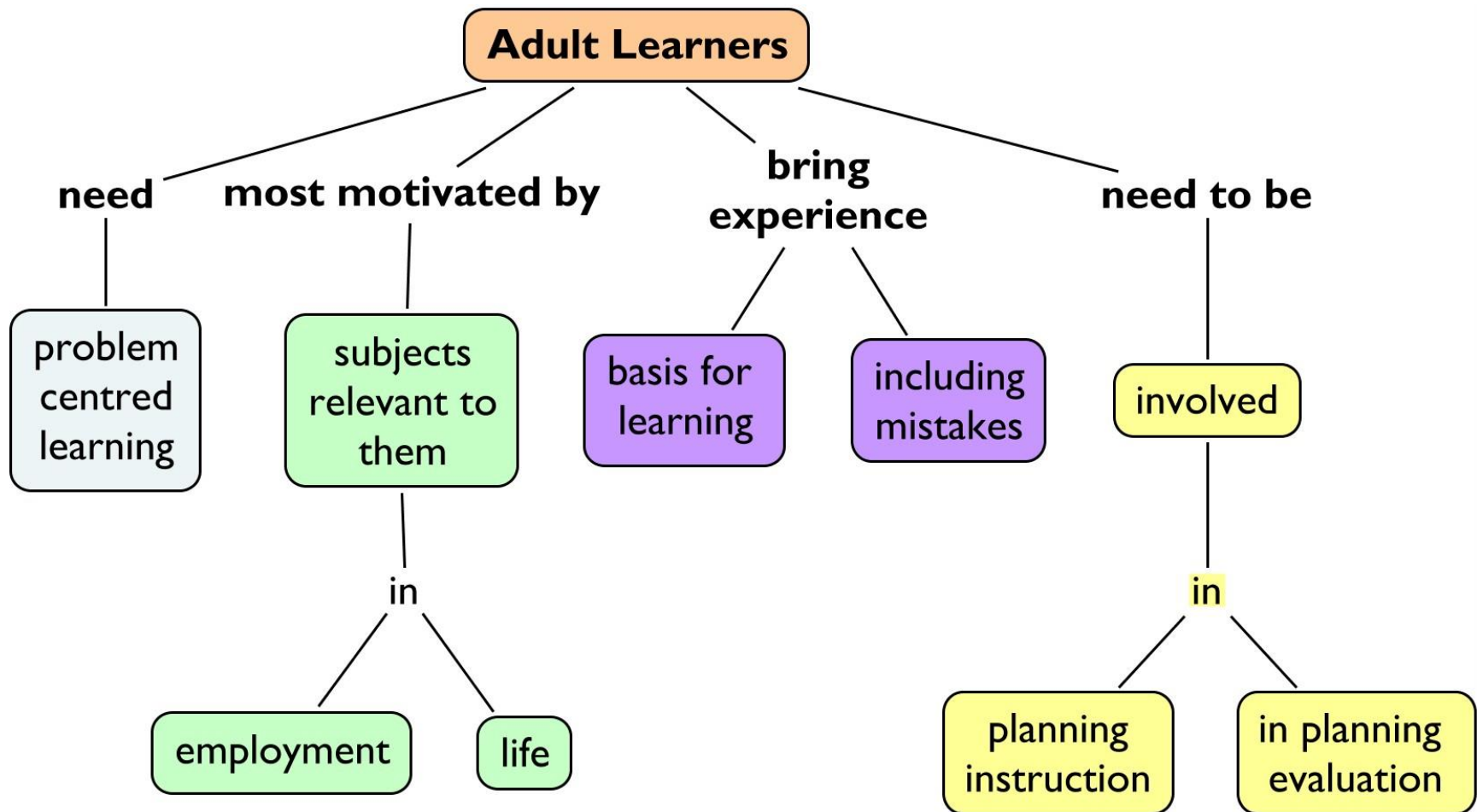
- **Pedagogy**

- Formal climate and structure
- Orientation: future, someday
- Teacher dominant and student dependent
- Motivation by external rewards or punishment

- **Andragogy**

- Informal climate
- Orientation: the present/now
- Reciprocity in transactions
- Learner is independent
- Learning is problem-centered

# So--Who is The Adult Learner?

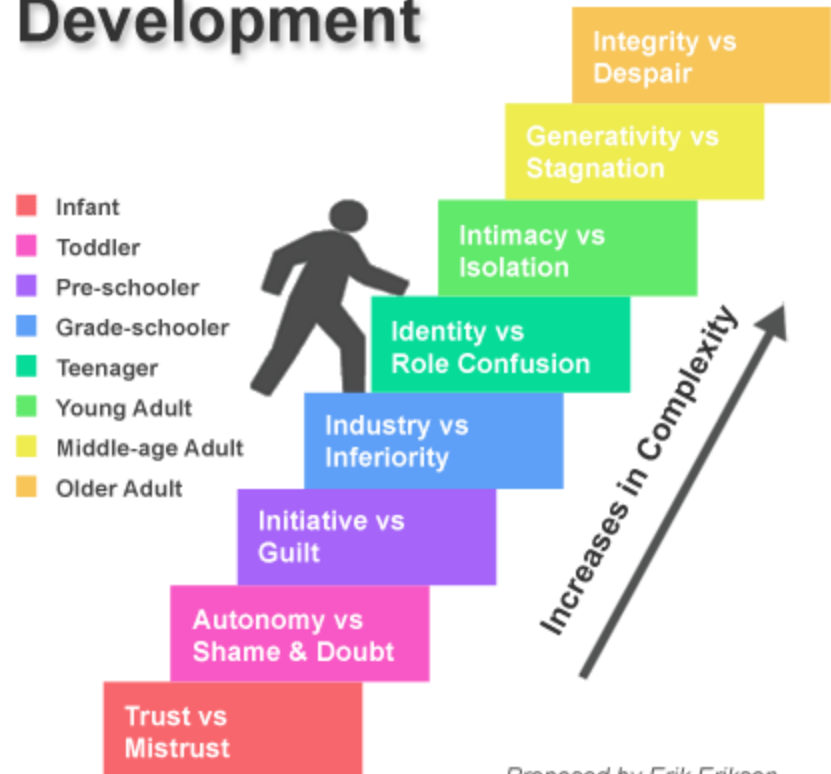


# Erikson's Stages of Development

- Early Adulthood 18 – 30
- Middle Adulthood 31 – 65
- Late Adulthood 65+



## Stages of Psychosocial Development



Proposed by Erik Erikson



FOCUS IS ON

*The*  
***LEARNER!!***

# Skills Needed



# Thank You!

- “The best part of learning is sharing what you know.”  
— Vaughn K. Lauer