

# THE LOST FUNCTION

*A Math Adventure Game*

## **Pi and the The Lost Function Episode 1 - Pre-Algebra/Algebra**

# Introduction

- AT&LT's mission is to develop innovative, effective, and affordable teaching tools for the civilian education market
  - Reuse M&S and training system technologies harvested from 20 years of military training system development by BMH Associates, Inc.
    - Serious gaming
    - Automated performance monitoring and assessment
    - Automated intervention (remediation)
  - More effectively engage low-performing students who do not respond to traditional teaching techniques
    - Decrease number of students who do not pass standardized math tests
    - Increase number of students who can continue to pursue a STEM degree
  - Allow individual students to more efficiently prepare for end-of-course exams and state standardized math exams
  - Affordable - \$5 per student per year on school-owned computers

# Introduction

- First product – Pre-algebra educational game
  - Released September 2012
  - 2,200 student accounts at 5 schools in Virginia Beach and Fairfax
  - VA school systems currently evaluating the Pre-algebra game
    - Surry, Chesapeake, Henrico, Chesterfield, Roanoke, Hampton
  - 1,800 student accounts created for schools in NC, TX, and CT
- \$500,000 DoD R&D contract awarded in December 2011
  - Modularize and enhance the Intelligent Tutoring Agent feature of our Pre-algebra math game
  - DoD Education Activity (DoDEA) piloted use of the game this summer at Ramstein AFB, Germany

# Increased Student Engagement

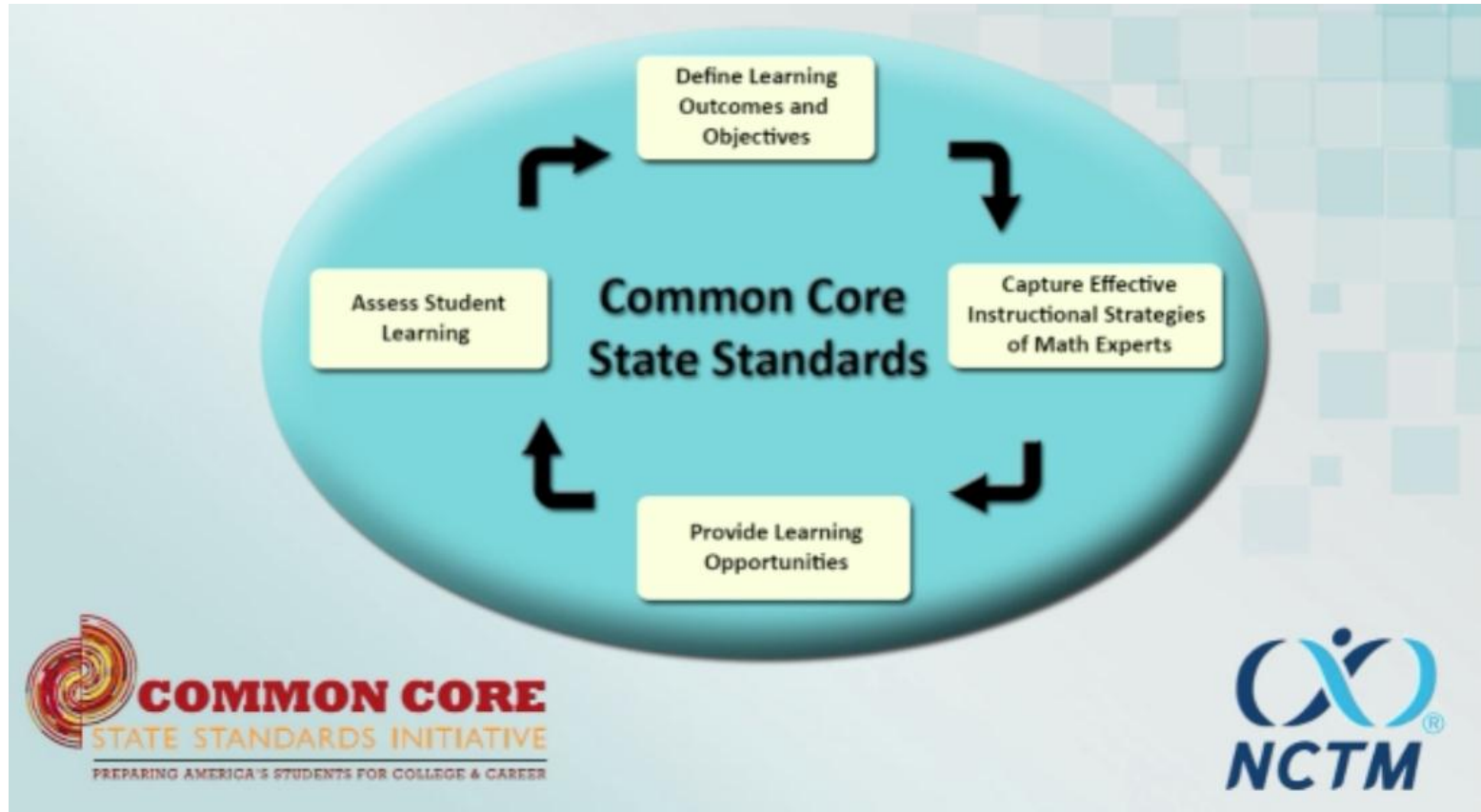
## 3D Video Game



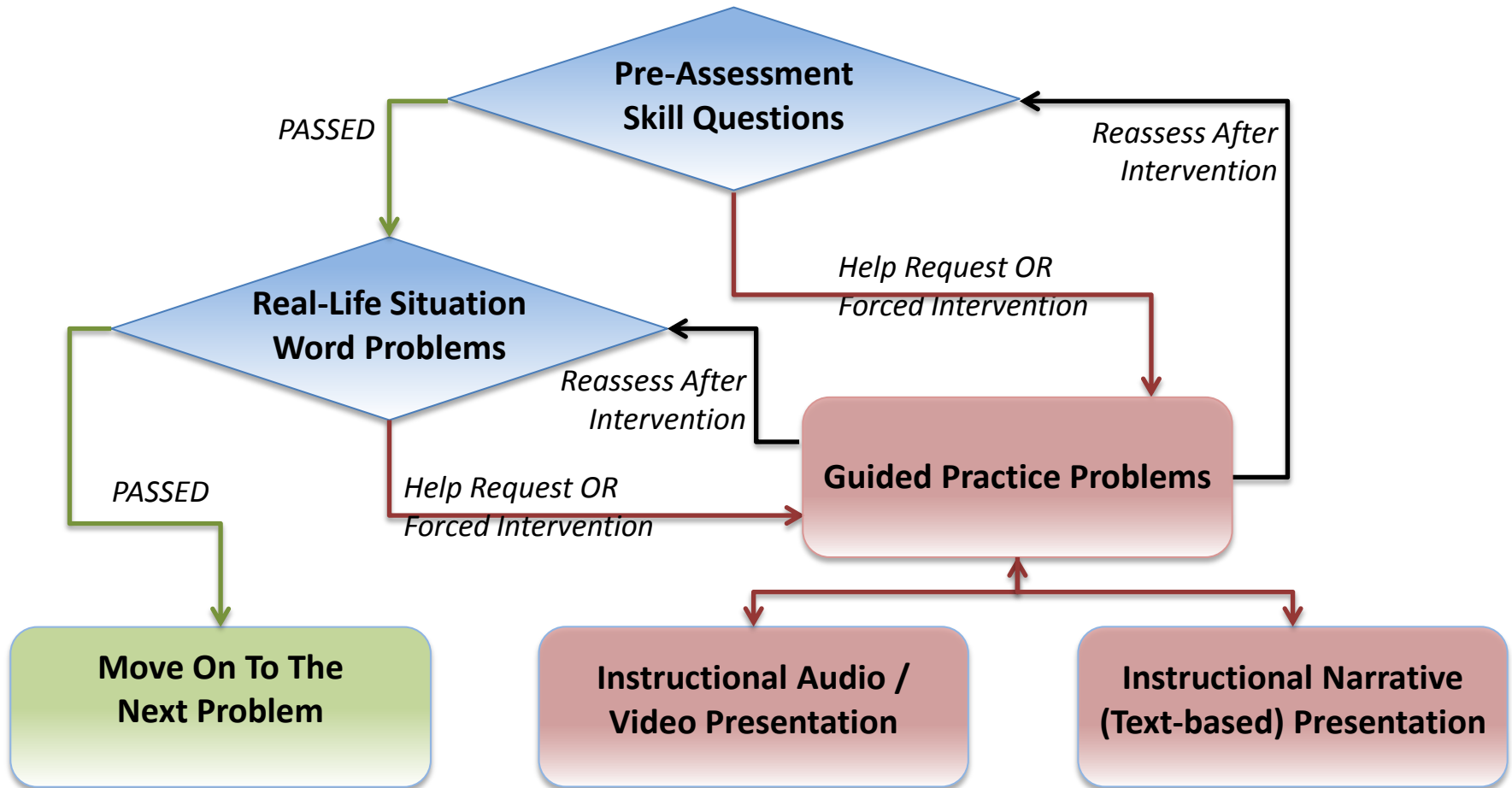
# Comprehensive Pre-Algebra Curriculum

| <b>1. Whole Numbers</b>            | <b>5. Ratios, Proportions, and Percentages</b> | <b>9. Statistics and Probability</b> |
|------------------------------------|--|--------------------------------------|
| Properties and Order of Operations | Rates and Ratios                               | Introduction to Experiments          |
| Factors and Multiples              | Proportions                                    | Measures of Center and Variability   |
| Variables and Expressions          | Converting                                     | Data Displays                        |
| <b>2. Integers</b>                 | Percentages                                    | Probability                          |
| Introducing Integers               | <b>6. Equations</b>                            | <b>10. Geometry Introduction</b>     |
| Adding Integers                    | One-Step Equations                             | Angles                               |
| Subtracting Integers               | Two-Step Equations                             | Triangles                            |
| Multiplying and Dividing Integers  | Distributive Property                          | Right Triangles: Pythagorean Theorem |
| <b>3. Fractions and Decimals</b>   | Equations with Variables on Each Side          | Distance and Mid-Point               |
| Review                             | <b>7. Inequalities</b>                         | Line and Angle Relationships         |
| Identifying Rational Numbers       | Writing and Graphing                           | Transformations                      |
| Converting and Comparing           | One-Step Inequalities                          | Quadrilaterals                       |
| Adding and Subtracting Fractions   | Multistep Inequalities                         | Polygons                             |
| Multiplying and Dividing Fractions | <b>8. Graphing</b>                             | Circles                              |
| Adding and Subtracting Decimals    | The Coordinate Plane and Ordered Pairs         | Volumes                              |
| Multiplying and Dividing Decimals  | Functions                                      | Surface Area                         |
| <b>4. Exponents and Roots</b>      | Graphing Linear Equations Using Tables         |                                      |
| Introducing Powers and Exponents   | Slope and Rate of Change                       |                                      |
| Prime Factorization                | Slope Intercept Form                           |                                      |
| Laws of Exponents                  | Direct Variations                              |                                      |
| Square Roots and Cube Roots        | Solving Systems                                |                                      |
| Writing in Scientific Notation     |  |                                      |

# Curriculum and Standards Compliance



# Automated Intervention & Remediation



# Formative Evaluation - Student Survey

| Survey Items<br>(student population survey size = 97)  | % answered Yes |
|--|----------------|
| Do you like math?  | 60%            |
| Do you prefer computer-based learning for math / pre-algebra?  | 64%            |
| Do you like to play games on the computer?   | 92%            |
| Did you enjoy playing the game, <i>Pi and the Lost Function</i> ?  | 87%            |
| Would you play the game at home to help you with math / pre-algebra?   | 72%            |
| Do you feel that it helped you understand math/ pre-algebra?   | 87%            |
| Do you think playing the game helped you to remember what you learned about pre-algebra from the teachers running the math camp? | 92%            |

## Significantly increases student engagement

- Students are enthusiastic about the game play
- Data shows the students are playing the game at school and at home
- “...I have most of my kids up and running. They love it!”  
- *Chesterbrook Elementary; Fairfax County Schools, VA*



# Formative Evaluation - Teacher Survey

| Select Survey Items<br>(teacher population survey size = 16)    | Mean<br>(5-point Likert Scale) |
|---|--------------------------------|
| Usefulness of the game in teaching pre-algebra                  | 4.38                           |
| Usefulness of the game as a learning tool.                      | 4.50                           |
| Use of the game for interaction, participation, and discussion. | 5.00                           |
| Applicability and usefulness for your teaching assignment.      | 4.88                           |
| Likelihood of using this game with your students.               | 4.88                           |
| Comfort level with using the game to support teaching.          | 4.86                           |
| Overall evaluation of math camp effectiveness                   | 4.80                           |

## Teacher enthusiasm is high!

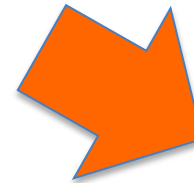
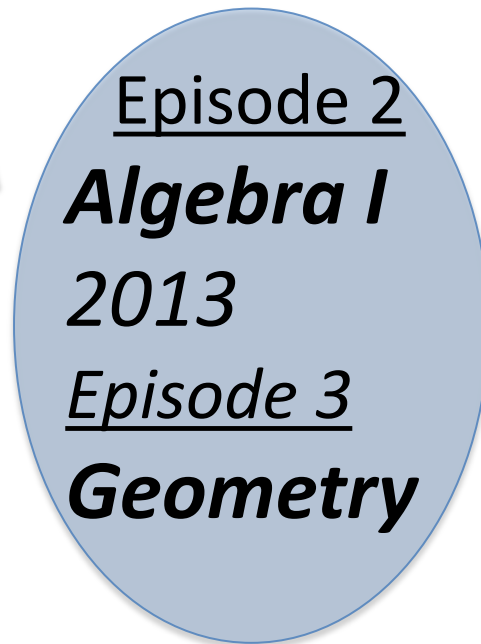
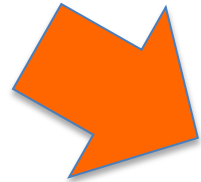
- Teachers have indicated that this is a tool they would use
- Game use includes classroom augmentation and out-of-class (guided and independent learning)

# Pi and the Lost Function

## Release Schedule

Episode 1

***Pre-Algebra***  
***2012***



Episode 4  
***Algebra II***  
***2014***



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