Algebra I Toolbook Plan

By
Beth Allred
MIT 513
2/26/04

Executive Summary

This plan describes a Toolbook application that is being constructed for low level Algebra one students with learning disabilities. The purpose of this application is to provide students with additional resources outside the regular classroom for basic algebra skills. The application contains multimedia and is interactive in order to maintain the attention of students with disabilities. The application will be provided to the exceptional children's department chair of Ashley High School on Compact Discs.

Background Information

Context

Ashley High School is a new high school located in Wilmington, NC. It has been open for three years. During these three years there has been a new ninth grade academy implemented. This academy separates the freshman from the rest of the population of the school for their four core classes. This has lead to the creation of core courses like Algebra I for students in other grades. These courses have a high concentration of exceptional children and lack high achieving students to serve as role models. The teachers of these classes are overloaded with paper work and planning for each exceptional student's modifications. The Exceptional Children's Department chair is looking for a way to help these teachers and students. Most of these students take a resource class with an exceptional children's teacher. The resource class is essentially a study hall with support from the teacher. There are usually ten to twelve students in the resource class.

Problem

The school's Algebra I scores were considerably lower than the rest of the subjects at the school and also very low compared to other Algebra I scores in the county and the state.

The resource teachers have knowledge on most of the subjects the students are taking, but the have very little knowledge or ability to help with Algebra I. They also have little time to spend individually with the students. If they have ten or twelve students in an hour and a half class, all needing help with different subjects, it is logistically impossible for each student to get the concentrated help they need.

The students are lacking the fundamental concepts that are necessary to be successful in Algebra I.
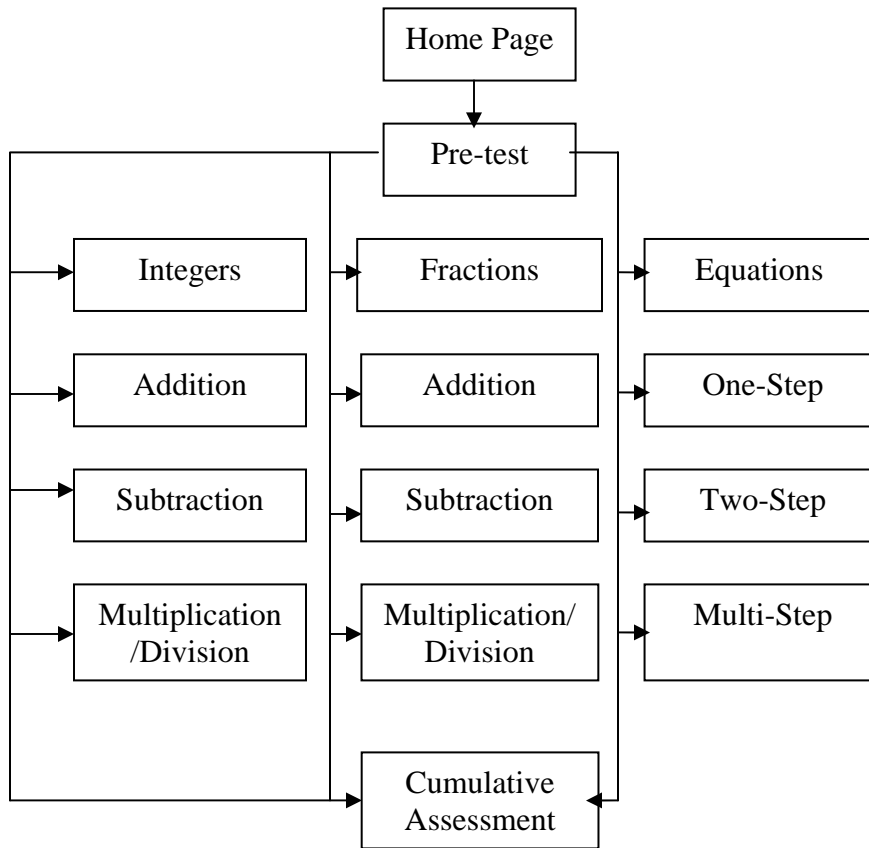
Solution

Based on my needs assessment of this problem, I proposed to create a Computer Based Instructional (CBI) CD for the resource teachers to use with Algebra I students. The needs assessment revealed a need for training for the resource teachers and the students in basic Algebra skills. CBI is appropriate for this situation due its flexibility. Since the students have varying levels of deficiency, the CBI will be able to address the levels of deficiency directly. Also, CBI has the ability to give immediate feedback, which is essential for exceptional children especially those with Attention Deficit Disorder (ADD). The CD would give the student concentrated tutoring and feedback that is fitted to their individual needs. It would also give them the ability to tune out the rest of the room because the will be wearing headphones in order to hear the feedback. Another aspect of CBI that is useful for this particular problem is the fact that CBI can be interactive. Students will have the ability to manipulate the content in a way they could not on paper. This allows them to view Algebra in a different way than they have previously.

 The CD could be used by the teachers as well. It could help them learn the concepts in order to better assist the students.

Development Plan

Navigational Structure

```
                              ┌─────────────┐
                              │  Home Page  │
                              └──────┬──────┘
                                     │
                              ┌──────▼──────┐
                        ┌─────┤  Pre-test   ├─────┐
                        │     └─────────────┘     │
                        │                          │
   ┌─────────────┐  ┌───▼─────────┐  ┌─────────────┐
   │  Integers   │  │  Fractions  │  │  Equations  │
   └─────────────┘  └─────────────┘  └─────────────┘

   ┌─────────────┐  ┌─────────────┐  ┌─────────────┐
   │  Addition   │  │  Addition   │  │  One-Step   │
   └─────────────┘  └─────────────┘  └─────────────┘

   ┌─────────────┐  ┌─────────────┐  ┌─────────────┐
   │ Subtraction │  │ Subtraction │  │  Two-Step   │
   └─────────────┘  └─────────────┘  └─────────────┘

   ┌─────────────┐  ┌─────────────┐  ┌─────────────┐
   │Multiplication│ │Multiplication/│ │ Multi-Step  │
   │  /Division  │  │  Division   │  └─────────────┘
   └─────────────┘  └─────────────┘

                    ┌─────────────┐
                    │ Cumulative  │
                    │ Assessment  │
                    └─────────────┘
```

Each box represents a concept. Each linear structure represents a chapter. Students may have to complete a concept out of a chapter or the entire chapter. There will be access to the home page upon completion of each topic. There will be a comprehensive assessment after the students have completed the topics they were assigned. The purpose of the pre-test is to see what topics they are having trouble with. Based on their performance on that pre-test students will be directed to the units they need to complete. Their results page from the pre-test will be comprised of links to the units or chapters that students must complete. At the end of each unit or concept the student will be directed back to the results page in order to go to the next unit they were assigned. The navigational structure will be comprised of "next" buttons at the bottom right corner of each page. The student will not be allowed to return to any previous material until after the final assessment. After the final assessment they will be allowed to navigate freely using a menu option that appears on the results page of the final assessment.

Analogy

An analogy will be used throughout this book. It will be a scale that represents balance of equations. This can be used with integers, fractions, and equations. The scale will remain in the upper right corner of the screen. It will move and change colors based upon student actions. The scale analogy will also be present in directions and feedback to students in text.

Multimedia

Multimedia will be used in several aspects of this book. Video, sound, and animation will be used to present materials. The use of each will vary depending on the concept. Audio and visual multimedia will be used for the purpose of providing feedback to the student based upon their actions. When the student makes a wrong decision an "uhoh, try again" sound will be played and when a student makes a correct decision a "you got it" sound will be played. The student will have the option of turning the sound on or off at any time throughout the book. In addition to the sound feedback, there will also be visual feedback in the form of a scale graphic. If the student makes an incorrect decision the scale will tilt and turn red. If the student makes a correct decision the scale will remain balanced and turn green. These multimedia aspects will have developed.
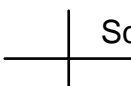
Interactivity

This will be a highly interactive book. Students will be able to manipulate each presentation and receive feedback based upon their decisions. The interactivity will be done with scripting and evaluation. For example, the screen for a student solving one step equations will look something like the one below.

```
                                   |   Scale
                          ---------+---------
  Let's Solve the following        |
  Equation
                        -5
     x + 5 = 8           5    Text/Animation/video
                         8
                        -8

                                        ┌────────┐
                                        │  Next  │
                                        └────────┘
```

The student would choose one of the numbers to the right of the equation and place it under the equation in the correct position. The text/animation/video will contain one of the three multimedia choices providing instructions and guidance for students from choice to choice. In this case the student would want to choose the negative 5 and place it under the 5. This will tilt the scale but not make it turn red because this is a correct move, but the student is not finished with the step yet.

The numbers the student chose from will disappear and a new set of choices will appear with a new set of instructions in the prompt. This will continue until the student solves the equation correctly.