CAPSTONE PROJECT

Using 3D graphic and animation software to enhance learning experience in GED Math
By
Willy Benson Ochaya

A Capstone Project to be submitted in partial fulfillment of the requirements for the Degree of Master of Science in Multidisciplinary Studies With Concentration in Information Technology

Rochester Institute of Technology
Center for Multidisciplinary Studies
31 Lomb Memorial Drive
Rochester, NY 14623-5603

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Introduction

The Rochester City school district accounts for the largest school dropout rate in Monroe County.

Most of this group is at-risk* young people between 12 and 25 years of age and between grade 6 to 12.

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*Threshold is a multi-service agency located in downtown Rochester with satellite programs in city schools and neighborhood community centers. Services and programs include Primary Heath Care, Family Planning, Health Education, a High School Diploma Equivalency Program, Vocational Programs, Job Placement, Computer Training, Life Skills, Prevention and Supportive Services, and Community Outreach. Threshold serves Rochester’s highest risk young people aged 12 to 25. Each year, more than 5,000 people are served at the downtown site and thousands more through the satellite operations.
Objective

This study is designed to explore trends in the use of 3D graphics and animation software within an educational to enhance learning and to promote the use of calculators for a broader Learning experience.
Target Audience

The study targeted students in the GED component of Threshold Center for Alternative Youth Development who specifically were preparing to take the math section of the examination.
Threshold students' record

Over the past four years Threshold student record indicates that:

- 30% are pregnant or parenting
- 35% are involved with the criminal justice system
- 21% are homeless, and
- 10% have been involved in domestic violence requiring police interventions

They fall between grade 6 to 12 level. They are high school dropout*. 

*A dropout is defined as any student who left school before graduation for any reason except death and did not enter another school or high school equivalency preparation program. 
http://www.emsc.nysed.gov/irts
Rochester City

Where Do Drop Outs Come From? 2001 Ch.655
N = 3685

Figure Adapted from http://www.rit.edu/~jmkgcj/research/OtherStudies/School.pdf

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http://www.emsc.nysed.gov/irts
Student Diversity

Contributing factors to school dropout may be:

- Domestic problems (pregnancy, fending for oneself)

- Peer pressures (drugs, alcohol, crimes)

- Poverty

- An individual may been out school for a long time for one reason or another and has forgotten about mathematical concepts and principles and need self improvement.
Special Consideration

Educationally this is diverse and require special consideration, to address and accommodate.

Especially, the diverse backgrounds in terms of age, gender, culture, life experience and educational attainment.

This diversity prohibits “one-size-fits” all approach to learning.
What is it for me?
What is it for me?
It gave me an opportunity to design and create a tutorial that might eliminate the traditional teaching approach wherein the teacher serves as the dispenser of knowledge, using “talk and chalk,” while the students sit, listen, and accept the instruction.

This non-technical approach to communication, historically, has been the only way that some schools have been able to provide.

Fundamental to this study is the belief that a technological approach, using 3D graphics and animation bundled, and stand alone software could be used to effectively enhance the learning experience.
Research

1. Little has been done to study the use of 3D graphic and animation software in enhancing learning among high school dropouts.

2. Because research in the use of 3D graphics and animation has mostly been informal, content specific or non-existent.

There is much to be done. This study is just the beginning.
Ms Multidisciplinary Studies

Concentration A
Learning & Technology
- Interactive Courseware
- Instructional Multimedia
- Performance Support System Design

Trends & Context

Concentration B
Multimedia
- Interactive Multimedia
- Programming in interactive Multimedia
- Topic in Multimedia
- Elective: Current Theme in IT

Capstone Project

Concentration C
Computer Graphic
- ST.3D Interactive Animation
- Animation/Graphic Film 1
- Lighting for Film & TV.

Trends & Context + Capstone Project = Ms Multidisciplinary Studies
Skills

The Skills acquired from multidisciplinary and cross disciplinary studies, work experience and qualification as noted in my study plan, and resume help me to create the tutorial.
In 2002, the GED Testing Service chose the Casio \textit{fx}-260 Solar calculator for math tests.

In response to this need, I designed, created and produced a manual, Instructor guide, and Powerpoint presentation to go With the Casio \textit{fx}-260 Solar calculator.
Problems

Research in the use of 3D graphics is primarily informal, for example gaming and in many cases, non-existent in other areas.

Nothing specific has been designed for youth at-risk, ages 12 to 25, in Rochester even though there would seem to be a significant need.

Not only does Rochester lead the rest of the county in its rate of school drop outs, according to the New York State for the Bureau of Women’s Health (1999), Rochester also has the highest rate of teen pregnancy in Monroe County.
Goal

To show how using 3D Graphics and animation software can enhance learning experiences in GED math.

To design 3D interactive abstract framework to demonstrate how 3D graphics and animation software can enhance learning.

To visualize the evolutionary dynamics of software, such as Maya, Flash, Word Draw tools and Photoshop systems.

To convert Casio fx-260 graphic into 3D graphic
Premise

Well designed 3D graphics and animation instructional software:

- Enhance student ability.
- Improve computing skills.
- Provide improved instructional strategies.
Literary Review

CAI aims to enhance student achievement of specific content-related instructional objectives (Simonson & Thompson, 1994; Weller, 1996). Findings on the effectiveness of CAI.

Jegede, Okebukola, and Ajewle (1991) compared the achievement of 12th grade Nigerian students who studied biology for three months under two different approaches.

Lazarowitz and Huppert (1993) assessed the influence for integrating a computer-assisted learning program into classroom-laboratory instruction on 10th grade respondents (82% female) gained knowledge of bacterial growth and science process skills.

Yalcinalp, Geban, and Ozkan (1995) compared the effect of utilizing a CAI tutorial program versus traditional recitation sessions to supplement classroom instruction on students’ understanding of chemical formulas and the mole concept.
Computer & Education

There are a variety of terms used to describe the educational use of computers and each has a slightly different meaning. Such uses, according to Tarlor (1980), can be divided into three main groups:

(1). The computer as a tool (via word processor, data base, spread sheet, and graphics application)

(2). The computer as learner (as “taught” by the user who issues a set of instructions to the computer through a programming language such as Logo, and games

(3). The computer as an instructor (or provider of instructional material).
Methodology

I converted the existing materials like the Casio fx-260 graphic into interactive 3D graphic, (interaction and animation) and animated geometrical shapes into animation movies using Flash, action script, Word, draw tool, Adobe Photoshop, Maya, Power Point, etc).

The tutorial, which is designed for use with the Casiofx-260 solar calculator, and which features 3D graphic, movie clips, and interactive quiz, are tried on Threshold students preparing for their GED math test
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Procedure

In testing the module, two interactive quizzes were randomly administered to 15 students.

One quiz was designed with a timer, and one without. Data were collected by means of observations, informal discussions, informal interviews.

Fifteen participants were invited into a computer lab, and they were asked to register their name, grade, date, and given instruction on how to proceed with the quiz.

They start with the timed quiz which is usually fast and requires alertness, and the second phase uses the same quiz but this time not timed, and they are allowed as much time as they like to complete the quiz.
CASIO fx-260 Solar Calculator
Figure: Showing the performance with and without timed quiz. And grade level ranging from 9 to 12 and over.
Note: the 12+ group is instructors, and college students tested randomly.
Figure: Figure showing the scores are better with time for those in grade 9 while those in grade 10 seem to do well without timer. Note: the 12+ group is instructors and college students tested randomly.
Analysis and Conclusion

According to this survey the students who took the quiz with the benefit of a timer perform on average, (18%) better than that taken without (17%).

Those results indicate that the use of interactive quizzes does improve performance.

Those who participated in the survey (interactive quiz) seems to get more motivate to learn and kept coming for more.
Conclusion

The results of this study indicate that students who had tried the interactive 3D graphics and animation instructional software:

1. Learn more and with ease;

2. Were better able to work under pressure because of the timed quizzes,

3. Were able to use the Casio \( \text{fx} - 260 \) Solar calculator more easily than the actual traditional calculator.

3D graphic and animation software had, indeed, enhanced their learning experience.
Note that

“Teaching students with “differing ability, background and interest [tend] to posed an external dilemma to educators.

Instruction, for example, that is appropriate and beneficial to one student may have a negative effect on another...

Some students require additional explanations, while others have grasped the materials and are ready to go on”*.

Solution: Self-phase modular curriculum approach seem to be the answer as this study seem to prove.

*Report presented to the US Congress entitled Teachers and Technology, Making the Connection, the Office of Technology Assessment (1995)
Guide to user interface

Screenshots guide to User interface
Interactive buttons

Specific Target Population

Introduction

Movie button
Quiz Movie button
History button
Activities button
Magnify button
Information button
Back
Next
Video Control Interface

Point your cursor on the horizontal line shown in figure A to access the video control.

A

Horizontal bar

Stop - Play

Forward

Back

Volume control

B
This Quiz is intended for those preparing to take their GED test, the Grade level of the participants varies between Grade 6 - 11 or less. It is generally intended for those who have failed to attained their High School Diploma and are prepared to have a second chance. Try to guess the answer. There are three possible answer to each question. Select only one correct one. You are timed! Try to be fast!

Please type in your name and press the ENTER button.

willy

ENTER

Quiz interface
Name the following Geometrical Shapes

A. Cube
B. Rectangle
C. Cylinder

Score: 0
Time: 8
Quiz
With Timer
Guess question number 11
and use calculator with quiz
without timer

Instruction
End of timed quiz
End of Quiz
Screenshot for Movie Clip

GEOMETRICAL SHAPES
MOVIE CLIPS
Cube Movie Clip
Cylinder Movie Clip
Casio fx-260 Solar Calculator

Casio *fx*-260 user interface
Please use the mouse to identify the name of the button and write it on a piece of paper to show your instructor.
CASIO fx-260 Solar

What is the role of Shift button?

Please use the mouse to identify the name of the button and write it on a piece of paper. Show your instructor.
Show how you can use basic math operator button.

Please use the mouse to identify the name of the button and write it on a piece of paper show your instructor.
Specific Target Population

This project is intended to show that there are software's that can provide teachers and students alike with 3D dimension graphic tool for enhance learning experience in a classroom.

The program is intended for those preparing to take their GED test, the Grade level of the participants varies between Grade 6 - 12 or less. It is generally intended for those who have failed to attain their High School Diploma and are seeking to have a second chance. I have worked with this kind of group for three years as a Career educator at Threshold Center for Youth Development. Based on my observation and also on opportunity I was accorded by New York State Department of Labor, when they first introduced Casio fx-260 calculator to educators. To be introduced perceptually and hand on to assist those who have been out of school for a long time. I decided to design a calculator guide which I use to teach with student coming to Threshold. I have a powerpoint version, text version and now the web/CD version on how to use a Casio fx-260 Calculator.

This web/CD guide does not cover all the calculator’s functionalities to correspondence with the GED mathematics curriculum materials. It is not meant to be a complete guide for the use on a Casio fx-260, but select to show how 3D graphic can be use to enhance learning experience in a classroom. Please refer to the fx-260 instruction sheet for further information related to this calculator and instruction sheet that comes with it, otherwise follow the examples shown by GED instructor.
Use the operator to multiply, divide, add, subtract, any number you want and show what you got to your instructor, try to calculating [a] a perimeter of a rectangle [b] area of a square and use all the operator with any number you want. !! NB the next module will explore the use of scientific calculation
Interactive tutorial
Study Guide

GEOMETRICAL SHAPES

Casio fx-260 Solar Calculator

Quiz with Time

Quiz without Time
THE FOLLOWING SHAPES

IDENTIFY THE
A CUBE FLASH MOVIE CLIP
A SOLID RECTANGLE FLASH MOVIE CLIP
Instructional Multimedia

Geometrical Shapes Flash Interactions: Type in name of shapes labeled 1-3

Type 3 name of Shapes

Name1

Name2

Name3

Click to transfer.