DOCUMENT RESUME

ED 376 367 CE 067 680

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| TITLE | TV Math--Video Training for Tutors. |
| INSTITUTION | Philadelphia Mayor's Commission on Literacy, PA. |
| SPONS AGENCY | Pennsylvania State Dept. of Education, Harrisburg. Bureau of Adult Basic and Literacy Education. |
| PUB DATE | 30 Jun 94 |
| CONTRACT | 98-4030 |
| NOTE | 56p.; Report contains some pages that may not reproduce well. |
| PUB TYPE | Reports - Descriptive (141) -- Guides - Classroom Use - Teaching Guides (For Teacher) (052) |
| EDRS PRICE | MF01/PC03 Plus Postage. |
| DESCRIPTORS | Adult Basic Education; *Adult Literacy; Basic Skills; Inservice Teacher Education; *Literacy Education; *Mathematics Anxiety; *Numeracy; Teaching Guides; Training; *Tutors; *Videotape Recordings |
| IDENTIFIERS | 353 Project |

ABSTRACT

In this document are a final report and guide from a project to produce a 30-minute training videotape that provided volunteer tutors and paid adult educators with concrete methods, techniques, and activities to help adult learners improve their numeracy skills. According to the final report, representatives of various adult education programs/advocacy groups who had expertise or interest in math were invited to comprise the design team to collaborate on content. The design team also developed the video's viewer's guide, "Math Anxiety, a Video Guide for Adult Literacy Tutors." A scriptwriter, production company, and post-production editing facility were retained to execute the actual production of the video. Appended to the report are correspondence, needs assessment, math video script, and the video evaluation form. The introduction to the video guide covers why the video was produced and by whom and how it should be watched. A video outline is comprised of three elements: a summary of each scene in the video, stopping points with questions designed to generate discussion, and specific tutoring suggestions located in boxes throughout the section. A summary of tips describes the main ideas of the video in these three areas: suggestions for beginning tutoring, suggestions for preparing lessons, and suggestions for teaching a lesson. A form to evaluate the video and guide is provided. The final resource section contains lists of 3 videos and 16 books and booklets that can help in teaching and tutoring mathematics. (YLB)

# TV Math - Video Training For Tutors

**Donna Cooper**
**Executive Director**

**Ione Graves**
**Director of Education**

**1993-1994**

**MAYOR'S COMMISSION ON LITERACY**
**1500 Walnut Street 18th Floor**
**Philadelphia, PA 19102**
**215-685-6602**

**Contract Number: 98-4030**
**$24,700**

Department of Education
Bureau of Adult Basic and Literacy Education
333 Market Street
Harrisburg, PA 17126-0333

DATE COMPLETED: June 30, 1994

The activity which is the subject of this report was supported in part by the U.S. Department of Education. However, the opinions expressed herein do not necessarily reflect the position or policy of the U.S. Department of Education or the Pennsylvania Department of Education and no official endorsement should be inferred.

## ABSTRACT PAGE

Title: TV Math—Video Training for Tutors

Project No: 98-4030 Funding: $24,700

Project Director: Donna Cooper Phone No.:215-685-6602

Contact Person: Donna Cooper Phone No.:215-685-6602

Agency Address: Mayor's Commission on Literacy, 1500 Walnut Street, 18th Floor, Philadelphia, PA 19119

**Purpose:** To develop and produce a training video to aid volunteer tutors and paid adult educators in meeting the numeracy needs of their adult learning constituents. The specific goal was to develop a thirty minute videotape that provides tutors with concrete methods, techniques and activities to help learners improve their numeracy skills.

**Procedures:** Representatives of various adult education programs/advocacy groups who had expertise or interest in math were invited to comprise the design team to collaborate on the content of the video. A scriptwriter, a production company and a post-production editing facility were retained to execute the actual production of the the video. The design team also developed the video's viewer's guide.

**Summary of Findings:** A survey of the numeracy needs of local adult education programs and tutors indicated that many tutors, while adequately trained to help learners improve their reading skills, received little or no training in math. Feelings of "math anxiety" were common in tutors as well as learners. The video, the first in a planned series, addresses ways to overcome math anxiety.

**Comments:** The video format for training purposes is an effective, efficient, flexible, economical training tool that presents a consistent training message. The viewer's guide makes it possible to reinforce and expand upon the information included in the video. Video is a readily available vehicle for teaching and learning purposes. The up-front costs represent the most significant barrier to its widespread use at this time.

**Products:** A video entitled "Math Anxiety" and an accompanying viewer's guide are the products of this project.

**Descriptors (To be completed only by Bureau staff):**

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## INTRODUCTION

The Mayor's Commission on Literacy recognized the need to develop effective training materials to aid volunteer tutors and paid adult educators in meeting the numeracy needs of their adult learning constituents and therefore applied for Adult Education Act's 353 Funds to produce a training video for adult literacy volunteer tutors. The goal of this project, "TV Math—Video Training for Tutors," was to produce a thirty minute videotape that provides tutors with concrete methods, techniques and activities to help learners improve their numeracy skills.

Several factors serve as barriers to mathematical literacy in both tutors and learners: "math anxiety" or fear of math, the language used to perform calculations and the difficulties in handling mathematical techniques. The term "math anxiety" was coined in the 1970s and stems from the perception that math is a predictable, infallible discipline to be committed to memory but not necessarily understood. Feelings of math anxiety are common in adult learners, generally as a result of previous school failures. Math is the one subject that most adult education students have the least confidence according to Sharon Jackson, GED on TV project director. Many volunteer tutors, who have been trained to teach reading and writing skills, also experience math anxiety, math phobia, or math avoidance when faced with teaching math.

Research indicates that the most effective instruction for adults is based on identifying and meeting the needs and interests of learners. Mathematics instruction, in particular, should reflect methods that will engage tutors in helping learners to use their numeracy skills in practical situations, to have confidence to perform calculations, to interpret numerical information and to solve problems.

Video as an instructional medium is a fairly recent development and is consistent with MCOL's position of promoting instructional approaches related to

current/popular technology. Research by cognitive psychologists indicates that lessons learned through visual stories, i.e. videos, are stored in the brain the same way that lessons learned through actual experience are stored. Videos are also economical. While videotapes can never replace a human touch in training situations, the videos have the advantage of being able to accommodate one or many tutors, repeatedly, at no extra cost. The flexibility of videos for training purposes allows viewing at the scheduling convenience of tutors as well as during formal presentations. The ability to pause and playback a videotape allows tutors unlimited review opportunities. Finally, videos present a consistent training message, in contrast to the various stylistic nuances inherent among different trainers. Consequently, video was viewed as an extremely effective and efficient training tool and an appropriate vehicle for introducing math into literacy tutoring.

## Timeframe

The timeframe for the video project was:

| | |
|---|---|
| June, 1993 | Established a working committee that comprised the design team |
| July | Developed the needs assessment; surveyed tutors and learners; solicited video producers, reviewed their work samples; visited production facilities |
| August | Design team met; researched and reviewed commercially available math video products; selected the video production team |
| September thru December | Design team met on a regular basis to determine video content |
| January, 1994 | Design team retained a scriptwriter to fashion the content of the video into a script |
| February | Design team and scriptwriter collaborated to create the final draft of the script |
| March | Finalized script; recruited video talent |
| April | Video production team taped and edited the video; design team planned the video viewer's guide |
| May | Presented video at Drexel University's Computers in Adult |

| | |
|---|---|
| | Literacy Conference; began evaluation process of the video |
| June | Completed video project |

**Staff and Other Key Personnel**

The overall administration for this project was conducted by Donna Cooper, Executive Director of the Mayor's Commission on Literacy. The specific execution of the project, including the compilation of a needs assessment to draw information from educators and tutors regarding their most pressing issues in mathematics, identification of the design team to determine the content of the video, coordination of the videotape production, dissemination of training materials to adult educators, and the collection and compilation of evaluative data, was the responsibility of Ione Graves, Director of Education of the Commission.

The Commission sought individuals who were experienced in teaching math within a lifeskills and learner-centered context. Initially, twelve experts in mathematics were recruited from Philadelphia's adult literacy community to join the design team. In addition to MCOL staff described above, the actual working group was reduced to four active and two auxiliary members: Joe Beech, Adult Education Instructor, Genesis II; Iddo Gal, The Numeracy Project, National Center on Adult Literacy; Fred Leinhauser, Instructional Technology Center, Temple University; Gerry Goff, ABE Program, Penn State University; Jane McGovern, Workforce Literacy, Center for Literacy; and Catherine DeLong Smith, Curriculum Coordinator, Center for Literacy.

The Commission invited eight independent video producers to submit samples of their work for consideration as the designated production crew. Shirley Road Productions and its producer, Fran McElroy, were selected as the production company; Eileen Lucas from WHYY wrote the script; and Center City Film and Video served as the post production/editing facility.

**Audience**

The audience for this video was volunteer tutors who have been trained to help adults improve their reading/writing skills but have received little or no training in helping learners to develop their numeracy skills. Additionally, learners benefit from viewing the video because the video articulates the anxiety about math that they as well as tutors experience and learners recognize that tutors do not "know everything."

**Source of Dissemination**

As the central literacy coordinating office in Philadelphia, the MCOL serves as the clearinghouse for tutor training and staff development information. In addition to distribution to local literacy organizations, the MCOL made permanent copies of the video and its accompanying viewer's guide available at the following locations: Pennsylvania Department of Education, Bureau of Adult Basic and Literacy Education, 333 Market Street, Harrisburg, PA 17126-0333; AdvancE, 333 Market Street, Harrisburg, PA 17126-0333; Western Pennsylvania Literacy Resource Center, 5347 William Flynn Highway, Route 8, Gibsonia, PA 19544.

The existence of the video and viewer's guide is being publicized on a continuing basis through MCOL's quarterly newsletter, "Read On" and is available for loan through MCOL's Resource Room. Also, the video is being incorporated into MCOL's Basic and GED Tutor Trainings.

**Additional Comments**

The MCOL was challenged to raise additional funds to support the cost of creating the video and an accompanying viewer's guide. Several corporate and philanthropic sources were solicited and Dolfinger-McMahon Foundation generously responded with a $2,500. grant. The lack of additional funds caused several modifications of the original project. It was necessary to reduce the length of the video from 30 minutes to 20 minutes and the evaluation was developed and conducted in-house.

## STATEMENT OF PROBLEM

Numeracy and mathematical applications are frequently given little attention in adult literacy programs, particularly those which rely on volunteer tutors. Tutor training typically does not include an emphasis on the importance of mathematics in the range of basic skills taught to learners, nor does the training offer any strategies for teaching math. Yet, evidence of the lack of attention to mathematics is seen throughout adult education programs, especially in regard to educational services provided by volunteer tutors. The Mayor's Commission on Literacy believes that this situation exists because the mechanisms for training tutors are not geared towards preparing tutors to work with learners in mathematics.

Many of today's adult learners simply did not learn math well during their formal schooling. The term "math anxiety" describes their fear of mathematics. Tutors also struggle to overcome math anxiety in their learners and often in themselves. By combining state of the art technology and sound, proven educational practices and tutoring strategies, the Mayor's Commission on Literacy proposed to produce a training video that addressed issues of how to tutor adults in mathematics.

## GOALS AND OBJECTIVES

The goal of the project, TV Math—Video Training for Tutors, was to produce a thirty minute videotape that provides tutors with concrete methods, techniques and activities to help learners improve their numeracy skills. The project addressed the State priority for Special Experimental Demonstration Projects in Adult Education.

The specific objectives of the the project, as described in the proposal, were to demonstrate to tutors via videotape:

- the use of manipulatives and real life situations for the development of addition, subtraction, multiplication and division skills;

- the methods to help learners analyze problems so they know when to add, subtract, multiply and divide;
- the techniques to help learners work through multi-step problems; and
- the approach to thinking in/understanding mathematical language.

## PROCEDURES

In June 1993, representatives of various adult education programs/advocacy groups who had expertise or a special interest in math were invited to participate as design team members whose purpose was to collaborate on the content of the video. (Attachment 1) The design team was comprised of a curriculum developer/instructor, two math instructors, a university professor specializing in adult numeracy education and MCOL's director of education. The first team meeting was held on June 25, and its purpose was to introduce the participants to the project and to each other, brainstorm ideas regarding the form and content and establish a time-line. At the onset of the project, a letter was sent to 8 video producers/production houses to solicit a sample of each firm's work and their interest in producing the video. (Attachment 2)

During July 1993, the design team met on several occasions to develop a needs assessment and to review video samples submitted by video producers. In addition, the team researched and reviewed commercially available resources, materials, and videos.

Research indicates that the most effective instruction for adults is based on identifying and meeting the needs and interests of learners. The adult education instructor at Genesis II, a residential treatment facility, volunteered to develop and conduct the needs assessment to determine the math needs of local literacy providers. It was decided that the needs assessment format would be free form rather than a

rating system, in order for the respondents to express their opinions outside the context of leading questions. While 53 telephone calls were made to local adult literacy service providers, the needs assessment was specifically conducted with 18 tutors and 8 site coordinators whose programs had a math component. Each respondent was asked the following five open-ended questions:

1. Do you have individual or group instruction?
2. How do you provide math instruction?
3. Do you think a video would be helpful in your instruction?
4. What should the video include?
5. How should the video content be organized?

Though a summary of the results of the assessment is included as Attachment 3, the findings were consistent with the results of a survey to determine training needs conducted among local literacy providers by the MCOL in May 1993 in which 84% of the respondents indicated a need for teaching math to adult learners. It was also found that the need and expectation for a math video differed among two very distinct types of adult education programs. Neighborhood-based programs such as those held in churches or recreation centers were more concerned with developing reading skills than math but wanted a math video to concern itself with situational life skills and problem solving. Programs associated with educational institutions were interested in seeing that the math video could be integrated into an overall math development curriculum. The majority of respondents in both types of programs, while proficient in teaching reading skills, indicated a fear of not being competent enough to teach math.

The design team met often during the fall to brainstorm ideas for the content of the video. Design team members usually departed each meeting with an assignment to be be presented at the next meeting. The first several meetings were spent clarifying the issues between the mathematical content of the video and the actual

production of the video. Issues related to content included the goal of the video, assumptions about math, skills, approach, balance and time. Final decisions about content were made after the audience for the video was solicited for its input. Simultaneously, the design team considered production issues by reviewing commercially produced videos to determine effective formats used in other math instructional videos and viewed sample tapes submitted by local production companies. The producer selected handled the logistics associated with the production including hiring the camera and crew, reserving studio time and managing the editing process.

Several scenarios were developed by the design team prior to shaping the final outline of the content of the video. The outline was then fashioned into a script by the scriptwriter who worked in concert with the production team. (Attachment 4) The theme of the video was based on efforts of tutors and learners to address and overcome math anxiety. The video script consisted of several brief scenes of structured conversation between an actor/tutor and an off camera narrator about the tutor's ear of teaching math to a learner, interspersed with real life tutors and learners. The vignettes had the look and tone of a 1950s educational film—black and white, simple set, voice-over. The minimal set included a table, chair, various props and a blackboard and was treated to look like an old film clip. The segments with real tutors and learners were in color and their stories reinforced the information provided in the vignettes. The video was entitled *"Math Anxiety"* and edited at Center City Film and Video, where the sound track and special effects were added.

Once the video was produced, the design team resumed meeting to create the accompanying viewer's guide. The guide was originally intended to present and explain a number of effective instructional techniques, but as the focus on math anxiety took shape, the purpose of the video and guide was redirected to help both tutors and

learners overcome their math anxiety as well as to present a few introductory ideas and suggestions that might aid them in their collaboration. The viewer's guide consists of 4 components: a video outline that summarizes each scene in the video, stopping points for discussion and specific tutoring suggestions located in boxes throughout the text; a summary of tips that describes the main ideas of the video; and an annotated resource list videos, computer software, textbooks and books to aid in teaching or tutoring mathematics.

**Positive Results of Objectives**

The Mayor's Commission on Literacy benefited tremendously from its first experience producing a videotape for training purposes. This opportunity afforded the Commission the ability to continue to explore avenues for incorporating technology into the delivery of instructional services. While the MCOL and other literacy organizations traditionally emphasize reading skills, the formation of the design team became the genesis of a committee of math experts from the adult literacy community to advocate for improved math instruction in both tutor training and literacy programs. The design team was especially fortunate to have as members the project director of The National Center of Adult Literacy's numeracy project and several certified math instructors as well as two math curriculum developers. Participation on the design team became a forum for these experts, previously unknown to each other, to network and share information.

The project further demonstrated to the literacy community that MCOL is interested in and responsive to the varied needs of its adult learning constituency.

**Negative Results of Objectives**

The negative results of the video project were negligible. The process for developing the project was just as important as the product. The amount of time necessary to allow the design team to get to know one another's perspective and

philosophy on math instruction needed to be increased before a consensus could be reached regarding the form of the video. In fact, the goal to create a video "to help tutors teach math skills to adult learners" proved to be too broad for the budget of the project; therefore, the design team chose to address math anxiety first and expand to additional math topics in future projects.

Due to the design team's relative inexperience in the process of producing a video, the final edit was done without the input of the entire group and resulted in some disagreement regarding certain information presented. The segment in question involved math tricks or techniques. Two team members felt that reliance on tricks without a caveat that tricks may not be helpful to everyone was questionable and an erroneous impression was presented regarding the format for utilizing Dr. Richard Cooper's TIC TAC TOE Math. However, the viewer's guide attempted to clarify these issues. For future projects, adequate time will be provided for careful review by all participants.

**Evaluation**

The evaluative portion of the video project was to have been designed by Dr. Tara Knott, President of Evaluation Resources, Inc. and would include: the creation and administrative procedure for the needs assessment conducted among tutors and literacy providers, the development of the most useful learning materials possible, and the design of an instrument to attain information from tutors regarding the usefulness of the video and viewer's guide. It was aniticipated that the cost of the evaluation would be covered by funds raised through additional sources.

Once the video project was underway, it was clear that the activities associated with the evaluation would need to be conducted in-house due to budget constraints. Consequently, an evaluation instrument was developed by MCOL's Director of Education. (Attachment 5) Viewer's from a variety of settings were asked to complete

the evaluation form to determine if the video served its purpose of helping tutors overcome their fears of teaching math to adult learners. The results of the evaluation, compiled from 33 respondents, are as follows:

> 87% indicated that the video achieved its purpose of helping tutors overcome their fears of teaching math to adult learners; 9% indicated that the video did not achieve its purpose; 3% were unsure.
> 90% indicated that the video should be included in tutor trainings; 6% indicated that the video should not be included; 3% were unsure.
>
> 72% indicated that they would use the video for teaching/training purposes; 15% would not; 12% did not respond.

In addition, viewers were asked to rate the video on a scale of 1 to 10 ( 10=excellent). 91% responded with an average rating of 7.

Several open-ended questions designed to elicit respondents' suggestions for content in the viewer's guide and other uses of the video was also a component of the evaluation. The suggestions were remarkably similar.

> ***Describe how the video could be used in other settings.*** 60% responded that the video should be shown to learners/ in classrooms as well as tutors; 20% responded that the video could be used in job training, staff development and sensitivity training; 20% responded that the video could be used in ESL settings and with middle school children.
>
> ***What information should be included in the video's viewer's guide?*** 24%responded that the tricks and techniques should be expanded; 24% responded that specific examples/worksheets should be included;12% responded that topics for discussion should be included; 20% responded that a resource listing should be included; and 20% responded that a summary of tips mentioned in the video should be included.

The results of the evaluation indicate that the majority of the viewer's reacted favorably to "Math Anxiety." Also, evaluation of the video is on-going; an evaluation form is included in each copy of the viewer's guide with instructions for completion.

## Procedure for Dissemination

Dissemination for the *"Math Anxiety"* was accomplished via several avenues. In addition to multiple copies made available to AdvanceE, Western Pennsylvania Literacy Resource Center and MCOL's Resource Room for loan, the video's existence will continue to be advertised in MCOL's newsletter, *"Read On."* Copies were also sent to all PDE Act 143 funded programs and to participants who attended the Computers in Adult Literacy Conference's panel on math anxiety on May 5, 1994, at Drexel University. In addition, copies were made available for inclusion in tutor trainings offered by Philadelphia's primary training agencies: MCOL, Center for Literacy, Lutheran Settlement House Women's Program and the YMCA. Individuals associated with adult literacy programs in Pennsylvania are invited to request a copy of "Math Anxiety."

## Conclusions and Recommendations

The cooperation, experience and commitment of a dedicated group of adult literacy math professionals and the production team of Shirley Road Productions and Center City Film and Video were the facilitating factors that made the creation of "Math Anxiety" possible. Though extremely economical as a training tool in the long run, the production of a quality video is an expensive proposition at the onset. Budget constraints hindered the production of a 30 minute video; instead, a 20 minute video was produced.

The Mayor's Commission on Literacy and the math experts who comprised the design team were grateful for the opportunity to respond to the need for numeracy education among adult learners via instructional support for tutors and teachers. The most obvious lesson from the experience of creating and producing an instructional

video was that one 20 or 30 minute video can not possibly cover the gamut of math content useful for adult learners. The design team recognized early in the process that it would be necessary to develop an entire series of math instructional videos. It is anticipated that "Math Anxiety" represents the first volume in that series.

***

# APPENDIX 1

## Letter to Math Experts

# CITY OF PHILADELPHIA

MAYOR'S COMMISSION ON LITERACY
1500 Walnut Street, 18th Floor
Philadelphia, Pa. 19102
875-6602
FAX No. 735-6586

EDWARD G. RENDELL
Mayor

DONNA COOPER
Executive Director

To: Mathematics Aficionados

From: Ione Graves, Director of Education

Date: June 17, 1993

Subject: Math Video

**The Mayor's Commission on Literacy** has been awarded a grant by the PDE to develop an innovative, visually exciting 30 minute training video to help tutors teach mathematics to adult learners. The purpose of the video is to provide volunteer tutors with a clear understanding of the best methods for teaching numeracy, applications in mathematics, and critical thinking skills pertinent to math. A study guide will accompany the video.

A committee of mathematics experts and literacy practitioners particularly interested in math is being formed to determine the content aspects of the video. **Your name was suggested as one who could offer valuable in-put. Please accept this invitation to join us for a planning session on Friday, June 25th at 3:00 p.m. to discuss this very exciting project.**

Please let me know as soon as possible that you will be able to participate. Call 875-6602 to confirm.

# APPENDIX 2

## Letter to Video Producers

# CITY OF PHILADELPHIA

MAYOR'S COMMISSION ON LITERACY
1500 Walnut Street, 18th Floor
Philadelphia, Pa. 19102
875-6602
FAX No. 735-6586

EDWARD G. RENDELL
Mayor

DONNA COOPER
Executive Director

June 18, 1993

Lou Stricoff
Center City Film and Video
1503 Walnut Street
Philadelphia, PA 19102

Dear Mr. Stricoff:

Philadelphia's Mayor's Commission of Literacy was recently awarded a Pennsylvania Department of Education grant to produce a 30 minute training video to help volunteer tutors teach mathematics to adult learners. The purpose of the video is to provide tutors with a clear understanding of the best methods for teaching numeracy, mathematical applications, and critical thinking skills pertinent to math. A study guide will accompany the video.

A committee of mathematics experts and literacy practitioners particularly interested in math will meet to determine the content aspects of the video.

The MCOL is seeking a video producer to bring this project to fruition. It is our intent that the video will be visually exciting with a contemporary MTV feel to it, incorporating a combination of elements such as graphics, live action, and special effects.

The content committee will meet with the video producer in August and a final decision on content will be made by September. The grant timeline requires that the video will be completed by December 1993.

The budget for the production of this video project includes $15,000 already raised. We expect to receive another $10,000 very soon. These funds are in addition to the funds for the writers.

If this project appeals to you, we invite you to submit a video that is representative of your firm's work by July 9, 1993. Please call me at 875-6602 if you have any questions.

Sincerely,

Ione Graves
Director of Education

# APPENDIX 3

## Needs Assessment

Needs Assessment for Math Video

Population Surveyed:
Tutors and site coordinators. Although a total of 53 phone calls were made only those programs that had a math component were interviewed. A total of 26 people were interviewed; 8 site coordinators and 18 tutors. The remaining 27 programs, over 50% had no math program, only reading.

Method of Assessment
Questions and Interviews
The following questions were asked to all participants. General discussion usually followed each question. Here are the results of the questions.

1- Do you have individual or group instruction?
Ind. 22, Group 8 (4 people do both class and ind.)

2- How do you do math instruction?
Books 26, audio 1, video 7, work sheets 12

3- Do you think a Video would be helpful in your instruction?
Yes 18, no 6, unsure 2

4- What should be on the video?
(+)4, (-):0, (x)26, (*)26, (/)24, (.)24, (%) 24, (Basic), (Alg)3,
(Problem solving)26. (Charts and graphs) 16.

5-How should it be organized?
(One long video) 3, (short (5 to 15 min. pieces) 12, (unsure) 6.

Discussions of interest and concern:-
While doing this assessment I found two types of adult education programs The Neighbourhood A/Ed programs (churches, recreation centers, private homes,etc....) and the City Regional A/Ed programs (Y's., C*L, Phila Board of Ed., colleges, etc...) The need and expectation for a math video differed.

Most neighborhood programs had no math component. They were mostly concerned with reading development. They wanted the video to concern itself with situational life skills problem solving, (riding the bus, purchasing store items, reading utility meters, writing a check). Showing the video would also be a problem since there were many programs [illegible] no access to VCR players. [illegible] technologies and resources available [illegible] concerned with a video that could be part of their adult development program. They wanted short [illegible] assist classroom or individual instruction. They were concerned with improving test taking skills, as well as life skills.

# APPENDIX 4

## Math Video Script

***Math Tutor Script***
~~First Draft~~ Final Script

*voice/over*

**THIS IS JOHN. JOHN IS AN ACE READING TUTOR.**

*video*

John (retro nerd) beaming - halo appears over head (sound effect when halo appears)

**NOW HE HAS BEEN ASKED TO TUTOR MATH.**

*video*

John becoming increasingly agitated (pacing back and forth, perhaps a close-up sweating, loosening tie, a bit wild-eyed)

*cut to*

**UH-OH, JOHN HAS -- MATH ANXIETY!** (big reverb)

*video*

John completely disheveled and wild-eyed in panic - zoom him back and start him spinning a la "High Anxiety" / with cool sound effects

fade to black, then fade up on tutor and learner

*cut to real life tutor/learner* talking about his/her feelings about tutoring/learning math

*cut to*

John sitting with head in hands, looking morose and still disheveled.

*cut to voice-over*

**WHAT'S THE MATTER, JOHN? FIRST MEETING WITH YOUR LEARNER...DISAPPOINTING?**

Flashback to John's first meeting with tutor:

John, still completely disheveled, looking slightly manic and carrying too many books, rulers, protractors and papers, greets the learner (camera). Learner (camera) backs off, then turns and runs away.

*cut back to* John still sitting with head in hands, discouraged.

LET ME GUESS. YOU DON'T THINK YOU KNOW ENOUGH ABOUT MATH TO TEACH IT, RIGHT? HERE, HAVE SOME CAKE.

(camera hands john a very big cake-or pizza if we can't get a very big cake)
john shakes head no, waves pie away

*(v/o gets testy)*
HAVE SOME CAKE, JOHN. MY MOTHER MADE IT.

john shrugs and takes cake and cutter.

BEFORE YOU DIG IN, COULD YOU MEASURE THE DIAMETER OF THE CAKE ?

john gives a questioning look.

FOR MOM'S RECORDS.

john takes measuring tape out of pocket, measures and holds tape up to camera.

THANKS.

john again tries to cut piece of cake.

SAY, I ALMOST FORGOT, I NEED TO KNOW THE RADIUS, TOO.

john looks exasperated.

MOM KEEPS EXTENSIVE RECORDS.

john gives quizzical grimace

*v/o a bit defensively*

THE GUINNESS PEOPLE ARE VERY INTRIGUED WITH MOTHER'S CAKES.

john figures out radius and shows camera.
he then tries to cut it again.

AHH... WHY DONT'T YOU DIVIDE THAT INTO SIXTHS BEFORE YOU CUT IT.

john gives a "huh, why?" gesture

IT'S SO MUCH NEATER THAT WAY,
DON'T YOU THINK? AND MAKE SURE YOU PUT ASIDE
TWO PIECES FOR MOM - SHE'S A BIG EATER.

john grudgingly complies.

SO, HOW MUCH OF THAT CAKE IS LEFT?

john looks in disbelief at the request

HUMOR ME.

john writes on paper and holds up to camera: 4/6 or 2/3.
*v/o impressed (exaggeratedly)*

SAY, FOR A GUY WITH ZERO MATH SKILLS YOU SURE KNOW YOUR WAY AROUND A CAKE. WHY, YOU'VE JUST SUBTRACTED AND REDUCED FRACTIONS AND FOUND DIAMETER AND RADIUS. WHY, WITH JUST A LITTLE HELP YOU'D MAKE A GREAT MATH TUTOR. WHADDYA SAY? WANT TO TRY AGAIN?

john perking up and by end of voice-over he is sheepishly proud. at end of v/o he gives a big nod yes.

*cut to* learner and tutor each talking about their first math tutoring session

*cut to voice-over*
READY FOR YOUR FIRST PRACTICE SESSION?

john nods eagerly. camera hands him a doll (kind of doll to be determined). john takes the doll but is confused.

A STAND-IN FOR YOUR LEARNER.

john grimaces or rolls eyes.

*voice-over admonishes*
BEING OPEN TO ALTERNATIVE IDEAS IS ESSENTIAL
FOR A TUTOR.
NOW, SHOW ME HOW YOU'LL BEGIN.

john takes out nameplate or puts sign on himself, MR. TUTOR PROFESSOR, SIR, brings out pipe and puts leg up on chair across from learner.

*voice-over coughs ,then:*

**REMEMBER THIS, JOHN?**

(replay him spinning with math anxiety)

john sheepishly takes off sign, puts down pipe and goes and sits next to learner/doll (puts arm around?)

**THAT'S BETTER. YOU WANT THE LEARNER TO HAVE CONFIDENCE IN YOU, NOT BE AFRAID OF YOU. YOU TWO ARE A TEAM.**

john brings out two baseball hats and puts one on him and one on doll

**AHH, RIGHT. ANYWAY.**
**MAKE SURE YOU LISTEN TO THE LEARNER. FIND OUT HOW THEY FEEL ABOUT MATH , WHAT THEIR GOALS ARE FOR THE TUTORING SESSIONS, WHAT THEIR INTERESTS ARE.**
**HERE, YOU'D BETTER WRITE DOWN SOME OF THESE OTHER TIPS.**

(full screen font with fifties generic music)

- *meet in a quiet place*
- *establish goals*
- *assess learner's skill level*
- *set objectives for future*

*cut to* learner/tutor telling us what methods worked best for them

*cut to*
john chatting away merrily with the doll.

*voice-over trying to get his attention - getting louder each time*

**JOHN.** (pause) **JOHN.** (pause) **JOHN.**

he finally looks up.

**I'M GLAD YOU TWO ARE GETTING ALONG SO WELL, BUT I THINK IT'S TIME WE DISCUSSED HOW YOU PREPARE FOR A TUTORING SESSION.**

john pats pockets as if looking for something, holds up his finger in a wait sign, and from next to his chair proudly produces "THE BIG WORKBOOK OF BORING AND IRRELEVANT MATH EXERCISES"

*voice-over sigh*

**HOW DID YOU FEEL ABOUT THOSE EXERCISES WHEN *YOU* WERE IN SCHOOL?**

john crosses fingers as if warding away a vampire.

**EXACTLY.**
**AND DO YOU THINK THEY RELATE TO YOUR LEARNER'S LIFE INTERESTS AND MATH OBJECTIVES?**

john tosses THE BIG MATH WORKBOOK

**OK, START AGAIN. SAY YOUR LEARNER IS BUYING A COUCH AND A RUG. SHE NEEDS TO FIGURE OUT BOTH HOW BIG OF AN AREA IN SQUARE FEET THE RUG WILL COVER AND WHETHER TO BUY A COUCH OR A LOVE SEAT. HOW WOULD YOU APPROACH THAT?**

john brings out floor plan, doll furniture, doll rug, doll measuring tape.

**NOW YOU'VE GOT THE IDEA. MAKE THE EXERCISES BOTH PRACTICAL AND INTERACTIVE. THAT WAY MATH BECOMES LESS INTIMIDATING - FUN, EVEN.**
**AND YOU CAN USE THAT EXAMPLE TO TEACH SEVERAL IMPORTANT MATH CONCEPTS; SQUARE FOOTAGE, AREA, ESTIMATION AND DIVIDING MEASUREMENTS.**

full screen font

- *have clear objective*
- *prepare alternative plan*
- *select objective-specific exercises*
- *consider student's interests*

*cut to* learner/tutor with more stories about their tutoring/learning experiences

*cut to*
john at table, still with floor plan and furniture, measuring tape and calculator.

HOW'S THE TUTORING GOING, JOHN?

john gives thumbs up. john nudges doll, then shakes it, then opens its eyes and has it give a thumbs up sign.

I'M THE LAST ONE TO BE CRITICAL, BUT I GET THE FEELING YOUR LEARNER IS A BIT FRUSTRATED WITH YOUR TUTORING TECHNIQUES. IS THAT POSSIBLE, MR. TUTOR PROFESSOR, SIR?

john shaking his head no, gestures to doll to tell the narrator he is wrong. not surprisingly, the doll has nothing to say. (john, upset, turns the doll's back to him.)

JOHN, JOHN. THAT'S A BIT CHILDISH, DON'T YOU THINK? THERE ARE BOUND TO BE ROUGH SPOTS IN EVERY RELATIONSHIP - EVEN IN TUTORING. THE TWO OF YOU HAVE TO TAKE THE TIME TO TALK OUT YOUR PROBLEMS. IT'S A BUMPY ROAD TO MATH PARADISE.

john grimaces at bad line

HEY, PAL, AT LEAST I'M NOT MAD AT A DOLL.

(pause)

LOOK, I DON'T WANT YOU TO GO AWAY MAD. LET ME SHOW YOU A MATH TRICK, ER, TECHNIQUE. WRITE DOWN THE NUMBERS NINE TO ZERO IN DESCENDING ORDER. STARTING NEXT TO THE EIGHT WRITE THE NUMBERS ONE TO NINE BESIDES THEM. WHAT DO YOU HAVE?

john thinking hard, coming up with nothing.

THE NINE TIMES TABLE! SEE, NINE TIMES TWO IS EIGHTEEN. NINE TIMES THREE IS TWENTY-SEVEN, NINE TIMES FOUR IS THIRTY-SIX, ETCETERA, ETCETERA.
AND HERE'S SOMETHING ELSE. WHAT DOES EACH OF THOSE ANSWERS ADD UP TO?

john impressed, slightly astounded, holds up nine fingers.

**EXACTLY. NOW TURN THAT PAPER OVER AND WRITE THIS DOWN.**

full screen font

- *Review previous work.*
- *Be brief. Don't lecture. Get learner involved.*
- *Teach processes in steps.*
- *Re-teach only what learner doesn't understand.*
- *End on positive note.*

*cut to* tutor/learner

*cut to*
john at table with same paraphernalia as last time

*cut to voice-over*

**WELL, JOHN, IT LOOKS LIKE YOU'RE READY TO TUTOR.**

john gives affirmative sign, dismisses narrator with a good-bye motion.

**BEFORE I GO, I HAVE JUST ONE QUESTION. HOW WILL YOU KNOW IF YOUR TUTORING METHODS ARE WORKING?**

john looks affronted and/or john takes out picture of Einstein and puts it over doll's face - pointing first to himself and then to the doll.

**MY THAT'S WONDERFUL PROGRESS. I'M SURE YOU'VE RECORDED YOUR STUNNING RESULTS IN YOUR TUTOR LOG.**

john looks at screen blankly

**CERTAINLY AN ACE TUTOR LIKE YOU KEEPS A LOG OF EACH SESSION - A RECORD OF OBJECTIVES, ACCOMPLISHMENTS, DIFFICULTIES?**

john nods, motions that he left it home.

AH, OF COURSE. WELL THEN, I THINK
WE'VE COVERED EVERYTHING. GOOD LUCK, JOHN.
NOW, YOU CAN KEEP THE REST OF THE CAKE BUT I NEED THE DOLL
BACK. I HAVE ANOTHER TRAINING SEESION TOMORROW.

hand reaches in to get doll, john grabs doll away. fade to black.

*cut to* tutor or learner with closing comments about how tutoring/learning makes them feel.

*cut to*
john all cleaned up and prepared, awaiting learner. Learner arrives, john shakes hand. shot opens up to show doll. john introduces doll to learner, learner backs off, then turns and runs. fade to black.

# APPENDIX 5

## Evaluation Form

# MATH ANXIETY

## EVALUATION

The purpose of the video, MATH ANXIETY, is to help tutors overcome their fears of teaching math to adult learners. Your reaction, comments, and suggestions are valuable to us. Please respond to the following questions:

1. Does the video achieve its purpose? If so, why? If not, why not?

2. Should the video be included in tutor training? Why or why not?

3. Describe how the video could be used in other settings.

4. A viewer's guide will accompany the video. What information should the guide include?

5. **What other technological resources are you familiar with that could be used in teaching math?**

6. **Would you use this video? Why or why not?**

7. **On a scale of 1 to 10 (10 = excellent), how would you rate this video?_____**

8. **Additional comments?**

Agency_____

Position_____

Number of years in adult education_____

*If you would like to know more about this project, please contact the Mayor's Commission on Literacy, 1500 Walnut Street, 18th Floor, Philadelphia, PA 19102, (215) 875-6602.*

98-4030

# MATH ANXIETY

## A Video Guide for Adult Literacy Tutors

Mayor's Commission on Literacy
1500 Walnut Street, 18th floor
Philadelphia, PA 19102
215-685-6602

# ACKNOWLEDGEMENTS

The Mayor's Commission on Literacy wishes to thank a number of individuals who were instrumental in creating, coordinating, and producing the Math Anxiety video and the accompanying guide.

We would like to thank the design team members including Joe Beech, Adult Education Instructor, Genesis II; Iddo Gal, The Numeracy Project, National Center on Adult Literacy; Fred Leinhauser, Instructional Technology Center, Temple University; Gerry Goff, ABE Program, Penn State University; Jane McGovern, Workforce Literacy, Center for Literacy; and Catherine DeLong Smith, Curriculum Coordinator, Center for Literacy. Each of these individuals made a valuable contribution to this project and their hard work and innovative thinking shine through in the final products.

The task of turning the design team's ideas into a pedagogically sound and visually interesting video was capably handled by three individuals/organizations. Shirley Road Productions and Fran McElroy produced the video; Eileen Lucas from WHYY wrote the script; and Center City Film and Video served as the post production/editing facility.

Of course, none of these good ideas and none of the hard work put into the making of the Math Anxiety video or the video guide would have been possible without the generous financial support of two organizations. The Commission is grateful to the Pennsylvania Department of Education, Bureau of Adult Basic and Literacy Education and the Dolfinger-McMahon Foundation for their funding of this project.

Finally, the Commission needs to acknowledge the efforts of four of its own staff members who helped see this project through its initial conception, the coordination of its many parts, and the resolution of its final products. The overall administration for this project was conducted by Donna Cooper, Executive Director of the Mayor's Commission on Literacy. Ione Graves, Director of Education of the Commission, coordinated each of the project's many parts and was the driving force behind the timely completion of each phase of Math Anxiety. Debra Moran, the MCOL's Communications Assistant, ably coordinated the many revisions of the video guide. Dan McGrath, an intern with the Commission, worked closely with Ione Graves to write and revise the video guide.

# TABLE OF CONTENTS

# INTRODUCTION

**Why Was This Video Produced?**

The video and viewer's guide are directed at beginning tutors but, as they address the fundamentals of tutor-learner relationships and math teaching strategies, they are appropriate for learners as well as experienced tutors. In discussions with potential mathematics tutors, the design team discovered that too many current adult literacy tutors were concerned about their ability to tutor a learner in mathematics. Often, even those who use mathematics on their jobs every day had little confidence in their ability to teach the subject to someone else. Also, many learners, when interviewed by the design team, revealed considerable apprehension over studying mathematics. In recognition of these reservations regarding math, the design team aimed to produce a video to help both tutors and learners overcome their math anxiety, while simultaneously presenting a few introductory ideas and suggestions that might assist them as they work together to better understand how to use mathematics.

**Who Produced the Video?**

The Mayor's Commission on Literacy recognized the need to develop effective training materials to aid volunteer tutors and paid adult educators in meeting the numeracy needs of their adult learning constituents. Preliminary planning and the overall design of "Math Anxiety" were performed by a team consisting of a literacy site director, a literacy trainer, a university professor specializing in adult numeracy education and a number of practicing mathematics tutors. The actual production was carried out by a television script writer and production company. However, the speakers in the color portions of the video are real life tutors and adult learners from the Philadelphia area.

## INTRODUCTION

**What is in the Video Guide?**

The viewer's guide consists of a Video Outline which includes several suggested stopping points with questions designed to generate discussion, a Summary of Tips that describes the main ideas of the video, and a listing of Resources of books, videos and computer software that can help in teaching and tutoring mathematics. Boxed sections containing suggestions and techniques are located throughout the guide.

**How should the video be watched?**

One of the advantages of the video format is the flexibility it provides tutors and learners. Tutors, as well as learners, are encouraged to watch in groups. The video makes an ideal exercise for tutor training workshops, especially early in the workshop. Of course, the video can be watched alone. However, "Math Anxiety" is intended to provoke thought and generate conversation about math and math teaching.

Whether you are watching in a group or alone, we strongly suggest you follow the Video Outline, stopping at the points suggested and thinking about or discussing the questions raised. While the viewer may not agree with every point presented, the video is an attempt to initiate pro-active discussions of math tutoring and learning.

Note to trainers: You may want to preview the video to determine how to incorporate it into your training. Add topics as needed and feel free to disagree with the video. Remember that the video's goal is to facilitate discussion.

**As with reading and writing, doing math involves making meaning. Therefore, doing math with understanding is as important as reading with comprehension, or writing to express meaningful ideas. In all three cases, learning is most successful when it makes use of the learner's existing knowledge and experience. Students of math need to understand what the numbers refer to. The chief concerns of basic math, computation of whole numbers and fractions, can always be related to quantifiable things in the students' experience, whether it be time, money or concrete objects.... The difference between reading and writing on the one hand, and math on the other, is that in math the meaning is always related to quantity.**

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# VIDEO OUTLINE

This section is comprised of three elements: a summary of each scene in the video, stopping points, and specific tutoring suggestions located in boxes throughout the section. Each stopping point provides an opportunity to discuss ideas as they arise in the video. The times are approximate and will vary because of differences among video cassette recorders.

**With success in using numbers comes satisfaction. Math can be seen as a recreational puzzle rather than a dangerous test, if it is approached in an exploratory manner.... One student who found math very difficult said after a tutoring session in which she began to see the meaning of work with fractions, "All this thinking makes my mind feel good." When anxiety about math has been removed, the student is free to enjoy the pleasure of understanding something that didn't make sense before.**

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The following time distinctions and italicized text represent the sequence of scenes in the video "Math Anxiety." In addition to the designated stopping points, feel free to pause at any point for discussion or clarification.

*00:00*

*Tutors and learners: Ione on balancing her checkbook; Trevor on his fear of math; Aja on thinking it uncool to be smart in school; Joe on addition, subtraction, multiplication and division being all there is to know; Walter on how he'd had trouble with fractions; Torri on how she loved math in school; Freddy on his teacher who taught math poorly.*

*01:25*

*John, the reading tutor, is asked by the off-camera narrator if he is experiencing math anxiety at the prospect of having to tutor someone in math.*

## VIDEO OUTLINE

*01:45*

*The title of the video, "Math Anxiety," is shown in special effects.*

*01:50*

*Learners and tutors compare math to animals: Trevor—spider; Freddy—lion; Joe—dog; Torri—chameleon; Aja—cheetah.*


***Stopping Point #1 02:35***

***To what animal would you compare math? Is the animal analogy a good one for you? What kind of analogy would work better for you?***

***You may find this kind of exercise useful, especially early in your tutoring sessions. Both tutors and learners need to know that they are not alone in their feelings of anxiety when it comes to math. Tutors and learners should share these feelings. Acknowledge fears rather than act as though they don't exist.***

**The best way for students to work on problem-solving skills is to bring in their own situations involving numbers. This approach is useful for several reasons. First, students know they are working on their own goals. Second, the situation is easier to think about because it is familiar to them. Third, it ensures that they are thinking about math concepts in concrete terms. Fourth, it provides an opportunity to use math for its most common purpose, which is solving people's problems. If students need help in formulating a problem, tutors can start the process by asking students for a situation that will produce information to work with and then asking them to put it together into a problem.**
**Adult Literacy Handbook for Students and Tutors, Center for Literacy, 4th Ed.**

*02:35*

*John is asked to measure the diameter and radius of a cake, to divide the cake in sixths and set aside two pieces. When asked how much of the cake is left, John says 4/6 or 2/3. John is then assured by the narrator that he does know something about math.*


***Stopping Point #2 05:20***

***Think of an activity you do daily or often. Are there mathematical elements to the activity? Could there be? Think about your daily routines. Describe the math functions you perform daily.***

***Many people develop estimation skills or some sense of numbers over the years. Unfortunately, this knowledge is often "patchy" and people are able to invoke it in some, but not other, situations. As a result, people think that what they know doesn't count or is not "real" knowledge. The goal is to build on whatever skills people already bring with them, help them see how to apply their existing skills in new areas, and extend their skills by supporting them with the more "formal" knowledge of basic principles and concepts which they may already possess informally.***

Estimating serves two purposes. For practical projects, it allows for preliminary rough plans, such as calculating the probable cost of a project at the stage where not enough information has been collected for precise calculations. It also serves as a check against mistakes. In everyday life, people estimate more often than they make exact calculations, for example, counting their change, getting to places on time, looking over a bill in a restaurant, estimating the cost of groceries before they get in the checkout line, or the cost of a vacation.

The student's goals determine the degree of accuracy needed for solving a problem. In planning projects, there is always the question of the purpose of the calculations. If a person only needs a rough idea of what a project would cost, or how long it would take, in order to decide whether or not to do it, then rounding off the numbers and estimating the result is the most efficient approach. On the other hand, if the task requires precision, such as buying window shades or cutting a cake recipe in half, estimating is only useful as a first step.

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Center for Literacy, 4th Ed.

*05:20*

*Walter's and Torri's sentiments overlap in talking about their feelings on the first meeting.*

*05:45*

*John is given a Raggedy Ann learner doll by the narrator.*


**Stopping Point #3 06:15**

***How would you characterize the video's representations of the tutor and the student? What is your opinion of the representations? What do they mean for the teaching/learning process?***

***We believe that learners actively construct new knowledge and try to fit what you tell them with what they already know. This process takes time and you can help learners by giving them time to think and asking them to explain why things work in a certain way. Make them feel comfortable bringing up their informal knowledge and using whatever techniques work for them (e.g., counting on their fingers).***

*06:15*

*Joe goes through a Tic Tac Toe technique for the 3 times tables. Torri says she thinks the Tic Tac Toe is neat.**

*07:20*

*Walter talks about how he starts tutoring--he typically starts with fractions, talks about yardsticks, buying fabric, and money. Math should relate to the learner's real life.*

*08:05*

*The narrator asks John to show how he will begin his tutoring session. Suggestions are provided for beginning tutoring.*

Suggestions for beginning tutoring are listed in "Summary of Tips" on page 11. Viewers may wish to take a moment to review the list, which contains information additional to the video. Tutors in workshops may want to stop at this point to do some activities around preparing to meet learners. One of the suggestions concerns assessments for which tutors often find difficult. Please see the boxed section at the top of page 7 for some tips on asssessment.

**The grid shown in the video is only for the three times table. The pattern for other times tables will differ. For more information on Tic Tac Toe Math, please contact the Center for Alternative Learning, 30 Summit Grove Avenue, P.O. Box 716, BrynMawr, PA 19010, (610) 525-8337.*

## Suggestions for Assessment

**Here are some ways to make the initial math assessment more accessible to the learner.**

**• ALLOW the learner to use a variety of computational processes; paper and pencil, mental math, manipulatives (concrete objects), or a calculator.**

**• LIMIT the number of items on the initial assessment to 25, and the amount of time spent with the test to one half hour. Adults returning to school don't need to encounter a comprehensive test that shows them how much they don't know or don't remember.**

**• WRITE each problem on a 3" x 5" card. Ask the learner to separate the cards into three piles: (a) I definitely know how to do these; (b) I'm not sure; (c) I definitely don't know how to do these.**

**• ASK the student to write "twenty-one" as many ways as s/he can. This will give you some idea of his or her sophistication with numbers. For example, "7 x 3" or "20 + 1" is not as sophisticated as "19.9 + 1.1" or "$\sqrt{400} + \sqrt{1}$".**

**• ASK students to write word problems using the computation problems on the test.**

**• TALK about the test and the strategies used to solve problems. Remember, communication is an integral part of doing math.**

Changing the Rules
Used by permission, New Readers Press

*09:10*

*Trevor and Ione give advice to tutors: The tutor should not be fearful; the tutor should admit her own fears; the tutor should teach the process of learning the steps of the right methods and help the learner practice.*

**Most learning requires practice. People learn by doing, and by doing again and again. There are several ways to provide practice. Tutors can make up exercises, and as they become more proficient, students can make up problems for their tutor or fellow group members to do.**

**While students are working, tutors need to do more than explain procedures and check answers. As with teaching reading and writing, they need to observe students as they work through problems. It is very helpful for students to think out loud as they work. This can be difficult, especially the first few times, but it is worth the effort. The tutor can ask the student to explain a problem to him or her. Hearing students' explanations can reveal their understanding and misconceptions.**

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*09:35*

*The narrator, using a blueprint and the placement of furniture in a sample lesson, shows John how to prepare for a tutoring session and provides a list of suggestions for preparing lessons.*

Suggestions for preparing lessons are listed in "Summary of Tips" on page 11. Viewers may wish to take a moment to review the list, which contains information additional to the video. Tutors in workshops may want to stop at this point to do some activities around preparing lessons.

**The tutor might be tempted to make sure the student masters facts before working on the higher level computations. This is not recommended. Instead, students should start working on challenging material while continuing to review basic facts. Obviously, students will be able to do math faster if they do not have to count on their fingers or look at multiplication tables. On the other hand, working on nothing but the basic facts can become very boring. Tutors and students should periodically review... while the tutor continues to instruct the student in higher level math.**

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*11:10*

*Learners and tutors discuss what tutors should do: Torri talks about how helpful her high school math teacher's joking was; Trevor speaks of how frustrating his high school math teacher was; Aja suggests tutoring be thorough, and not too fast or too slow. Joe and learners add suggestions: find out why learners are there; develop a relationship; tap into learners interests; teach what you like to teach; go over material thoroughly; and, teach what you know--that's what learners need.*

*12:05*

*John is satisfied with his tutoring. The narrator suggests the learner may not be so happy, but that it is natural for the tutoring relationship to experience rough spots. The tutor and learner may need to talk out problems and to vary techniques.*

*12:55*

*The narrator gives John more tips, including "math tricks, er, techniques." The first technique is a method for learning the nines times table by writing digits in two columns, ascending and descending; the ascending list is the tens place, descending list is the ones place.*

*13:25*

*Joe shows a method for doing the nines times tables on his fingers.*

*14:40*

*The narrator returns to the columns method for the nines table and asks for the total of each row. John holds up nine fingers.*


**Stopping Point #4 14:45**

***What do you think was the narrator's purpose in introducing the math techniques as "math tricks, er, techniques"? What are your feelings about math tricks/ techniques? Can you think of a math trick that you use? Why does it work for you? When do you use it? Would it be helpful for all people? Can you explain why it works? If you couldn't use the trick, what would you do? Math tricks often help temporarily to relieve math anxiety, and learners certainly should be encouraged to use whatever techniques work consistently for them, however, tutors should be wary of introducing math tricks, especially those that rely on rote memorization and teach isolated skills. Remember, all math teaching should lead the learner toward a greater understanding of math, not around it.***

*14:45*

*The narrator provides a list of suggestions for teaching a lesson.*

Suggestions for teaching a lesson are listed in "Summary of Tips" on page 12. Viewers may wish to take a moment to review the list, which contains information additional to the video. Tutors in workshops may want to stop at this point to do some activities around teaching a lesson.

*15:20*

*Tutors and learners give more advice: Walter—create a relaxed environment and find out the learner's areas of difficulty; Freddy—have patience and show that you want the learner to improve.*

*15:55*

*The narrator asks John how he will know the learner is progressing. The narrator suggests tutors should maintain a log.*

**Students and tutors should write a learning log together at the end of each session. Either tutors, students or both can do the actual writing, but both should decide what to include. The learning log provides a record of what materials and activities were used. The student and tutor should also describe how they felt about the session, what they felt was successful, and why. This information is extremely useful for stimulating reflection, which is an important part of learning. The process of discussing and recording what was learned also makes the learning more likely to be remembered. Finally, recording what was done is an aid to planning, both short-range and long-range.**

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*16:35*

*Learners and tutors talk about the need learners have for math and what tutors can gain: Math is needed for many careers and occupations. People without math competency tend to be victims. Tutors learn much from their learners, and tutors help people to feel better about themselves.*

cut here

# SUMMARY OF TIPS

### *Suggestions for Beginning Tutoring:*

✔ Meet in a private, comfortable place.

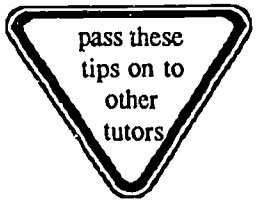
✔ Assess the learner's skill level:
- Consider the learner's emotions and attitudes, long and short term goals, and everyday math experiences;
- Observe the learner's computational and problem solving processes;
- Note whether the learner can use the skills in context;
- Note the learner's reading level;
- Observe the learner's learning style and pace.

✔ Learner and tutor are a team. Collaborative planning can be introduced as early as the first session.

✔ Establish goals together. Set short term goals that will lead the learner to longer term goals. Short term goals allow the learner to experience success and help motivate the learner to continue.

✔ Be aware of potential perceptual disabilities such as difficulty memorizing times tables or paying attention to symbols, and problems with following oral directions or counting out loud.

✔ Set objectives for future sessions.




cut here

***Suggestions for Preparing Lessons*** ➡

## SUMMARY OF TIPS

### *Suggestions for Preparing Lessons:*

✔ Relate to learner's life interests and objectives.

✔ Have a clear objective and plan objective specific exercises.

✔ Make exercises practical and interactive.

✔ Encourage the learner to be as eager to ask questions as to give answers.

✔ Raise questions to the learner rather than give quick answers; co-investigate possible strategies and answers.

✔ Allow the learner to use a variety of computational processes--paper and pencil, calculator, mental math, concrete objects, etc.

✔ Build on examples to teach several concepts by showing all possible relationships and looking for commonalities.

✔ Prepare an alternative lesson plan.

---

### *Suggestions for Teaching a Lesson:*

✔ Review previous work concepts before presenting new materials.

✔ Be brief, don't lecture.

✔ Involve the learner.

✔ Teach processes in steps.

✔ Re-teach only what learner does not understand.

✔ Provide a homework assignment that reinforces concepts already covered and that the learner will be comfortable doing at home.

✔ End the session on a positive note, with an activity that summarizes the lesson.

**Mayor's Commission on Literacy**
**1500 Walnut Street, 18th Floor**
**Philadelphia, PA 19102**
**215-685-6602**

# CONCLUSION

As the video ends, remember that this is neither the end of your training in math tutoring nor the end of resources in math tutoring. Many people, including tutors and learners, have concerns about teaching and using math. The Resources section of this guide lists just a sample of videos, software, and books that can help you in tutoring math and dealing with math anxiety. If any additional assistance or information is required, users may contact: Director of Education, Mayor's Commission on Literacy, 1500 Walnut Street, 18th Floor, Philadelphia, PA 19102, (215) 685-6602. We would also appreciate receiving any comments or suggestions users may have in regard to the MATH ANXIETY video.

# NOTES

cut here

cut here

## EVALUATION

Your reaction, comments and suggestions are valuable to us. Please respond to the following questions:

1. What were the video's and the video guide's strengths in helping to reduce anxiety about tutoring math? In providing useful ideas for beginning tutoring math?

2. What were the video's and video guide's weakness?

3. How would you change the video? The video guide?

4. Would you recommend the video and video guide? *(please circle)*

Video

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| not at all | | | | highly recommend |

Video Guide

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| not at all | | | | highly recommend |

Agency_____

Position_____

Number of years in adult education_____

affix stamp here

**"Math Anxiety" Evaluation**
**Mayor's Commission on Literacy**
**1500 Walnut Street, 18th Floor**
**Philadelphia, PA 19102**



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# RESOURCES

The following lists a few of the many resources available to math tutors. Consult with your local program curriculum coordinator for more information or contact AdvancE, Department of Education Bureau of Adult Basic and Literacy Education, 333 Market Street, Harrisburg, PA 17126-0333, 1-800-992-2283.

## VIDEOS

*Changing the Rules.* (1990). New Readers Press, Box 131. Syracuse, NY 13210. Viewer's Guide by Mary Jane Schmidt, Helen Jones and Esther Leonelli.

*Complete real life math series with word problems.* Video Tutorial Service. Video Tutorial Services, 7610 13th Avenue, Brooklyn, NY 11228, (718) 745-8988. A 12 part video series that offers a comprehensive review of basic skills, beginning with fractions, decimals and percents, especially designed for students needing remedial help. The skits involve real-life situations such as paying rent, choosing a car loan, avoiding finance charges, balancing a checkbook and selecting bargains. Interactive exercises and companion workbooks complement the visuals. The package is geared to teens, but could be used with adults.

Math Basics. KET, The Kentucky Network Enterprise Division, 2230 Richmond Road, Suite 213, Lexington, KY 40502-7311. A new TV and video series for adults with "math phobia." Designed to help adults develop "number sense" and the confidence to succeed at mathematics. De-emphasizes learning rate calculations and focuses on thinking skills, especially estimation.

## BOOKS and BOOKLETS

### Math Anxiety

Handler, J.R. (1990). Math anxiety in adult learning. *Adult Learning*, February 1990. A brief journal article.

Tobias, Sheila. (1994). *Overcoming math anxiety.* NY: Norton. Written in an accessible and down-to-earth language and available in most bookstores, this is a classic for those who have avoided math.

Zaslavsky, Claudia (1994). *Fear of math; how to get over it and get on with your life.* NJ: Rutgers University Press. Written in an accessible and down-to-earth language, it should be available in most bookstores.

### General Interest

Barrow, J.D. (1992). *Pi in the sky: Counting, thinking and being.* Oxford: Claredon Press. An exploration of the origins, meaning, and mystery of mathematics: What is the history of mathematics? Who are the people involved? Did we invent math or does it exist on its own? How does it help us to understand the mysteries of the universe?

Benjamin, A. and Shermer, M.B. (1993). *Mathemagics: How to look like a genius without really trying.* LA: Lowell House. Tricks and techniques to help you add, subtract, multiply and divide quickly and more easily in your head. Also intended to help your memory for numbers.

## RESOURCES


Boyer, C.B., revised by Merzbach, U.C. (1991). *A history of mathematics, second edition.* NY: John Wiley & Sons, Inc. History of our relationship with numbers. Includes a thorough table that tracks historical and mathematical developments through time.

Flansburg, S. with Hay, V. (1993). *Math magic.* NY: William Morrow and Co., Inc. Scott Flansburg, "The Human Calculator," offers an approach that connects the learning of math essentials to real world needs.

Howard, W.J. (1992). *Doing simple math in your head.* Coos Bay, Oregon: Coast Publishing. Rather than pencil-and-paper techniques, this book emphasizes techniques that help you to do everyday math in your head: tipping at restaurants, adding up grocery bills, etc.

Pappas, T. (1989). *The joy of mathematics: Discovering mathematics all around you, revised edition.* San Carlos, CA: Wide World Publishing/Tetra.

Paulos, J.A. (1988). *Innumeracy: Mathematical illiteracy and its consequences.* NY: Hill and Wang. An entertaining book that argues that our poor math skills hurt us in making personal decisions and government policies, and make us easily tricked by all sorts of phony sciences.

Paulos, J.A. (1991). Beyond numeracy: Ruminations of a Numbers Man. NY: Alfred A. Knopf. A wide-ranging book filled with the personality of the author. Includes a broad range of math concepts and how they have influenced history. Also, gives examples of how we may know more math and use it more often in our everyday lives than we think.


### Teaching Math


Bernstein, Peg. *Math Without Fear.* 353 Project, AdvancE, Pennsylvania Department of Education. A curriculum guide that bridges the gap between numerals as symbols and the reality upon which they are based by using manipulative materials to experience math concepts. Written by an adult educator who experimented in her classroom.

Kepner, Henry S. and Johnson, David R. (1977). Guidelines for the tutor of mathematics. National Council of Teachers of Teachers of Mathematics. Reston, VA.

Kline, Kathy. *GED Mathematics Teacher's Guide for Non-Math Teachers.* 353 Project, AdvancE, Pennsylvania Department of Education. Designed to be used by non-math teachers who are teaching GED math in their GED classrooms, this guide allows the instructor to determine the topic of concern and locate it in the index or table of contents. Special attention is paid to teaching the algebra and geometry portions of the GED in conjunction with general math.

Literacy Volunteers of Ame[illegible]. (1982). *Basic math skills: A handbook for tutors.* Literacy Volunteers of America, Inc. 5759 Widewater Parkway, Syracuse, NY 13214. Designed for tutors of reading in Basic Reading or English as a Second Language whose students need assistance in basic math, this handbook specifically addresses math anxiety and includes a math screening device (assessment tool). Explains how to develop a math sequence for your learner and how to begin to introduce basic math analysis and computation skills. Emphasis on the similarities between teaching reading and teaching math make this handbook especially useful.

Pomerance, Anita H. (1993). *Adult Literacy Handbook for Students and Tutors, Fourth Edition.* Philadelphia: Center for Literacy, 636 South 48th Street, Philadelphia, PA 19143, 215-474-1235. A thorough reference book for tutors of reading and mathematics.