DOCUMENT RESUME

ED 405 859 IR 018 309

AUTHOR	Lee, Fong-lok; Heyworth, Rex M.
TITLE	Electronic Homework.
PUB DATE	97
NOTE	12p.; Paper presented at the Annual Meeting of the American Educational Research Association (Chicago, IL, March 24-28, 1997).
PUB TYPE	Reports - Descriptive (141) -- Speeches/Conference Papers (150)
EDRS PRICE	MF01/PC01 Plus Postage.
DESCRIPTORS	Academic Achievement; Assignments; *Computer Assisted Instruction; *Computer System Design; Educational Technology; Elementary Secondary Education; *Expert Systems; Foreign Countries; *Homework; *Intelligent Tutoring Systems; Nongraded Student Evaluation; Tutors

ABSTRACT

The Electronic Homework assistant system is composed of two components: the Computer Tutor and the Homework Administrator. The Computer Tutor is an intelligent tutoring system that can provide personal assistance like supplying hints, checking errors, providing remediation and prioritizing problems. The Homework Administrator is a teacher's assistant in assigning and marking the homework, and summarizing errors for teachers' reference. Both components of Electronic Homework are composed of several modules. Different types of knowledge, mainly obtained from human experts, are incorporated into the Computer Tutor, and the pieces of knowledge, in the form of rules, are stored in the following separate modules: the expert module, which contains the knowledge that the system imparts to the student; the student module, which stores the knowledge of the students, both correct and incorrect, in the form of rules; the tutoring module, which contains the knowledge on how and when to help students correct their errors; and the communication module, which deals with the interaction between the user and the computer tutor. The Homework Administrator is responsible for handling routines normally done by teachers, which include ordering problems, collecting students' errors and marking students' work. The effect of using Electronic Homework was investigated among students of different academic abilities; in one school, students using the system performed better on less abstract problems. A major shortcoming of Electronic Homework is that it reacts very slowly in some situations. (Contains 17 references.) (AEF)

Electronic Homework

Fong-lok Lee & Rex M. Heyworth
The Chinese University of Hong Kong

paper presented at
the Annual Meeting,
American Educational Research Association, 1997.

Electronic Homework

Fong-lok Lee & Rex M. Heyworth

The Chinese University of Hong Kong

Homework can be an effective means of helping students to consolidate what they have learned. Traditionally, this is done with pencil and paper. When the students have problems, some fortunate ones may have immediate assistance from their parents, siblings or others who act as human tutors. However, most of them would have to wait until the next day before they can ask for the teachers' help. But while they are doing their homework, they would have to resort to other means of overcoming the difficulties which, if unresolved, may become sources of later errors (VanLehn, 1990). It would be desirable if a personal tutor could be made available to help each student when he or she encounters homework problems.

A Personal Tutor to Students

A personal tutor should be able to help students of varied abilities. For better students, immediate feedback should be provided to strengthen the learning effect. For students of lower ability, misconceptions or errors should be corrected immediately before they become stable errors (VanLehn, 1990). If the students do not know how to continue, immediate help should be provided. Hence students' correct behavior will be reinforced and incorrect behavior avoided. Ideally, this should be done by human tutors. However, if human tutors are not available, computer tutors that can act like human tutors may be an alternative solution.

To provide a computer tutor to each student is easier said than done. The necessary condition is that each student should have a personal computer at home, a condition which is not fully met at the present time. However, with the increasing prosperity of society and the lowering of the prices of personal computers, it is believed that in the coming few years, this condition will be satisfied.

The biggest handicap is the lack of suitable software, particularly in the area of mathematics. Most currently available computer-assisted instructional systems in mathematics focus on tutorial and drill-and-practice functions (White & Purdom, 1996). Students are given exercises to practice. The practice items are either in the form of multiple choice or short questions for which only short answers are expected. The purpose of such kind of software is to drill the students until they can reach a certain degree of competence which is measured by a test similar to the exercises. Those who pass the test will be allowed to go on to the next part of the system. Students who cannot pass the test will be asked to either revise certain parts of the materials or be given additional materials to read until they master the subject. There is no attempt to understand students' errors and all remedial measures are prespecified.

What a Homework System Should Do

Recent computer systems have attempted to understand students' errors then provide assistance to help the students overcome them. Examples can be found in the area of linear algebraic equations in one variable (Sleeman, 1987; Moore & Sleeman, 1988; Lewis, Milson & Anderson, 1987), geometry (Anderson, Boyle & Yost, 1985) and calculus (Mao & Lin, 1992). However, to be a homework assistant system, the following conditions have to be satisfied in addition to providing tutoring to students:

1. Teachers or even students should be allowed to enter problems that they would like to have as homework. In order to achieve this, the computer system has to be able to find out the answers for any problems entered as well as to detect any errors during the problem solving process.
2. Besides helping students, the system should help teachers in scoring students' work. Furthermore, it should help teachers to understand their students better by collecting and summarizing the errors and weaknesses shown in the students' work. This frees the teacher from tedious routine work, but allows them to quickly ascertain the students' progress.

Electronic Homework is thus designed to achieve this purpose. It is composed of two components: the Computer Tutor and the Homework Administrator. The Computer Tutor is an intelligent tutoring system that can provide personal assistance like supplying hints, checking errors, providing remediation and prioritizing problems. The Homework Administrator is a teacher's assistant in assigning and marking the homework, and summarizing errors for the teacher's reference. When using Electronic Homework, teachers would simply assign homework by distributing floppy disks containing the assignment for students to do at home. Students can work at their own pace under the guidance of the computer tutor. Next day when they return the disks to school, teachers do not have to mark or correct the homework because it has already been done by Electronic Homework. But they can have a clear picture of how the work was done by collecting the floppy disks and having the computer summarize students' progress and displaying it on the screen. Teachers now have more time to focus attention on improving their teaching.

System Design

In order that Electronic Homework can achieve the above purposes, both the components -- the Computer Tutor and the Homework Administrator – are themselves composed of several modules. The following sections describe the contents and functions of these modules.

Knowledge Stored in the Computer Tutor

In order that the Computer Tutor can diagnose students' errors as well as give prescription of students' errors, different types of knowledge, mainly obtained from human experts, has to be incorporated. To allow for future expansion, the pieces of knowledge, in the form of rules, are stored in separate modules. Each module is described in more details in the following paragraphs.

The Expert Module

This module contains the knowledge that the system imparts to the student. It is called an expert module since it includes what an expert in the subject area concerned should know. As the present system is intended to teach logarithmic knowledge, it thus includes knowledge required to solve logarithm problems. However, solving logarithm problems may require other mathematics knowledge like solving algebraic equations, simplifying algebraic expressions, factorizing numbers or algebraic expressions. The knowledge base therefore includes a large number of rules.

In Electronic Homework, there are two types of such rules: the strategic and the axiomatic rules, as suggested by Lewis, Milson, & Anderson (1987). Strategic rules state what strategies would be used whenever certain patterns are observed, while axiomatic rules correspond to behaviors according to mathematics axioms. The following examples found in The Teacher's Apprentice (Lewis, Milson, & Anderson, 1987) serve to illustrate this difference:

[R1]	IF	the equation to be solved contains a subexpression of the form *num*(*term1* + *term2*)
	THEN	set as a subgoal to distribute *num* over *term1* and *term2*
[R2]	IF	the goal is to distribute *num* over *term1* and *term2*
	THEN	set the subgoal to multiply *num* times *term1*
	AND	set the subgoal to multiply *num* times *term2*
	AND	set the subgoal to combine the previous results with +
[R3]	IF	the goal is to multiply *num* times *term*
	THEN	write the product of *num* and *term*
[R4]	IF	the goal is to combine *term1* and *term2* with a +
	THEN	write *term1* + *term2*

(Words in italics are variables.)

In the above examples, the rule [R1] recognizes that distribution is applicable to the equation and sets the subgoal to distribute *num* over *term1* and *term2*. It is a strategic rule. The other three are axiomatic rules since they show the actions according to distributive law, multiplication and addition facts respectively.

The strategic rules and the axiomatic rules together form the domain knowledge base of the system. However, according to Roberts & Park (1991), besides this domain knowledge base, there should be one more aspect which they call the criterion-performance model. The domain knowledge base includes both the knowledge of the contents to be taught and the knowledge on how to use the content knowledge to solve related problems. The criterion-performance model is a computer-based expert that solves the same problem given to the student so that the system can evaluate the student's performance.

Criterion-performance model Versus Model-tracing

There has been some argument as to whether the criterion-performance model is required for a computer tutor. An example of systems employing this model is PIXIE (Sleeman, 1987; Moore & Sleeman, 1988). In this system, the solutions to a problem, whether correct or incorrect, are generated before the problem is presented to the students. Students' answers are then compared with these generated solutions as models and instructions will be given to those answers found identical to an incorrect model.

On the other hand, in systems like The Teacher's Apprentice (Lewis, M. W., Milson, R., & Anderson J. R., 1987) and LISPITS (Corbett & Anderson, 1992), there is no specific criterion-performance model. Instead, they use a "model tracing" method of tutoring. At each state (step) of the process, the system infers the learner's internal state by matching his output with the problem state generated by using ideal and incorrect rules (referred to as buggy rules). Instructions will be given according to this inference.

Both the model-tracing and the criterion-performance model have their advantages and disadvantages. The criterion-performance model approach might require a lot of space to store the models and also a long period of time to generate all the possible models while the model-tracing approach might prevent the student from learning by making errors but disallow the students to explore the possible solutions. A detailed discussion on whether the criterion-performance model or model tracing method should be employed in the present study is presented later in the sections on tutoring strategies.

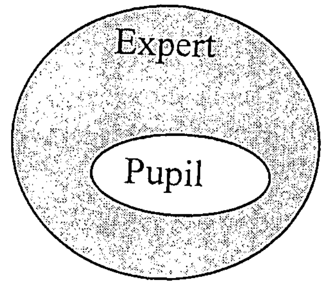
The Student Module

The function of a student module is to store knowledge of the students, both correct or incorrect, in the form of rules. Traditionally, student modeling is in two broad categories: the quantitative method (Park & Seidel, 1991), which is mostly used in conventional computer-based instruction (CBI) which will not be elaborated further here, and the qualitative method. Clancey (1988), in defining qualitative models, says "The qualitative model is neither numeric nor physical analogues. Rather, it describes objects and processes in terms of spatial, temporal, and causal relations." There have been mainly two types of methods used to model students:

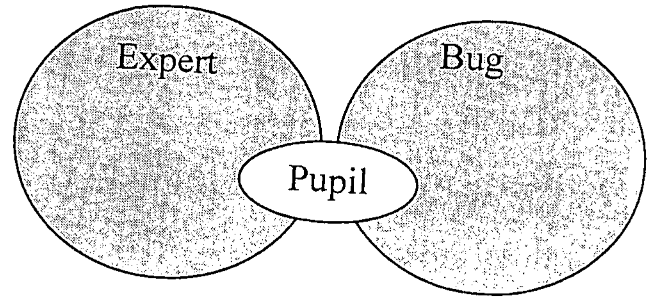
1. Overlay model: the student's performance is compared to that of the computer expert. "The expert's competence is assumed to be broken into a set of skills so small that the pupil either has them or doesn't" (Elsom-cook, 1988). In other words, the student has part of the expert's knowledge.

2. Bug identification method: the student model contains both domain knowledge as rules and misconceptions and errors (bugs) as variants of rules. In this case, the student model includes something that the expert does not have. It is thought to be more realistic than the first type.

The following shows the relationship of the student model with respect to the expert's behavior and the bugs (Elsom-cook, 1988).



Overlay Model



Bug-identification Model

While the present system is designed to help students to correct their errors and because the overlay model does not contain such knowledge, it would be reasonable to say that the bug-identification model would be more appropriate for the present use. The student module in the present system is thus formed by mal-rules, in addition to the correct rules. The mal-rules represent the students' errors obtained from a set of tests, called mal-rule collection tests, administered to 125 secondary 4 (grade 9) students in Hong Kong.

The Tutoring Module

This module mainly contains the knowledge on how and when to help students to correct their errors. For the first, evidence has been given by Lee (1995) that producing conceptual dissonance (by showing the students that their errors are contradictory to their previous knowledge) in the students' mind and having students practising the correct rules can help them to correct their errors more effectively than methods like reteaching and model-based remediation (Sleeman, Kelly, Martinak, Ward & Moore, 1989). The prescriptive rules used in Electronic Homework were based on this principle.

The second question as to when to remedy students' errors relates to the argument of which of the above models, the criterion-performance model or the model-tracing method, should be used. The main differences between the two methods, however, are the amount of freedom given to students to explore during the interaction process, and the possibility of forming mal-rules due to incomplete learning. In the former method, instructions are only given at the end of each problem, thus allowing students to flounder freely. In the process of floundering, students would make errors but it is also possible that they would discover their errors and recover them. Floundering may be good experience for those students who are able to recover errors since it helps the memorization of the correct rule. However, for those who cannot discover their own errors, floundering would become a source or future errors since the errors committed are not corrected immediately (VanLehn, 1990). On the other hand, the latter method keeps the student away from making errors, but at the same, only forces them to memorize the correct rules without really understanding them. Hence both methods have their advantages and disadvantages.

In view of practical considerations, however, the model-tracing method has the advantage that there is no need to store a large number of problem solving models, which makes it easier for a computer system to handle. The model-tracing method is thus employed in the present system.

The Communication Module

This module deals with the interaction of the human and the computer tutor. Normally, its work includes translating the human language into computer language and translating computer language into that which humans can understand. Together they form the input and output components of the system respectively. The translating of human language is not an easy task since human language is not well defined and is sometimes even illogical. To tackle this problem, some intelligent systems such as Meno Tutor (Woolf, 1987) use a kind of restricted language in which the vocabulary consists only of a limited number of terms and the grammar used is strictly defined. With this kind of language, the computer could then understand what the human user enters and react suitably.

Another type of system solves this problem by displaying some icons on the screen so that the users can choose their actions by simply clicking the appropriate icons with the mouse. An example is The Teacher's Apprentice (Lewis, Milson, & Anderson 1987). As only a limited number of icons can be displayed on the screen, the latter method is only capable of handling simple interactions. However, even the former limited-language method cannot allow complex human-computer interactions. It only works well in restricted domains such as mathematics or computer programming.

As it is believed that the displaying of icons would remind students on how to solve the problem, the former approach is adopted. Also, Electronic Homework is intended to be used by school students who may not be good at typing. For these students, it would be easier for them to use mouse as the input device. All the symbols required in a logarithmic expression are therefore displayed on the screen so that students can simply use the mouse to click the required ones to put it in their own expression, the troublesome task of typing in the expressions may be much reduced. Besides, this would also reduce their chances of making low-level errors such as missing brackets.

To reduce a student's working memory load, the required formula as well as other given values are displayed on the screen for easy access. Further, the screen is divided into three parts: one for displaying the student's steps in solving the problem, the other for displaying feedback to the student and the third one for displaying the formula and constants. In this way, the student can immediately know where to concentrate during the problem solving process.

The Homework Administrator

The Homework Administrator is responsible for the handling of routines that are normally done by teachers which include the ordering of problems, collecting students' errors and the marking of students' work. The following paragraphs describe how these are done.

How to Order Problems According to Their Difficulty

Evidence has shown that arranging problems in terms of their difficulty benefits students (Newman, Kundert, Lane, and Bull 1988). Although item difficulty is usually measured by the item difficulty ratio which is the ratio of the number of students who answer the item correctly to the total number of students attempted. As this can only be determined after the item is administered, it is impossible for the present purpose. The present system uses a measure called the Problem Complexity (Lee, 1996) to arrange the problems. The formula for calculating Problem Complexity is as follows:

$$\text{Problem Complexity} = 0.11 \times \text{Machstep} + 0.19 \times \text{Notmfac} + .17 \times \text{Familar} + 1.17$$

where Machstep is the number of steps required by the computer system to solve the problem, Notmfac is the number of operators (+, -, *, /, etc.) in the problem expression and Familiar is the degree of familiarity of the problem to the students (1 for simplifying expressions involving logarithms of numbers, 2 for simplifying expressions involving logarithms of variables and 3 for solving logarithmic equations).

The difficulty of each problem can then be calculated using this formula and problems entered by teachers can be arranged accordingly. Teachers therefore do not have to take care of the ordering of problems.

How Students' Errors Are Collected

As students are doing their homework with the computer, every error admitted is recorded whether the error is finally corrected or not. The list of errors is then stored on the floppy disk to be submitted. When all the disks are collected, both the list of errors admitted by an individual student and a summary of errors admitted by all the students can be seen on the computer monitor. The teacher can then immediately know how well the students have learned.

How Students' Work Is Scored

Whether a student can correctly solve a problem or not can be easily checked by comparing the student's answer with the machine generated one. Hence a student's score in doing an exercise can be obtained by just counting the number of problems he or she correctly finished. This score is again stored on the floppy disk to be submitted. When this disk is collected, the teacher can immediately know the performance of the whole class by having the computer display a summary of their scores.

Effects of Using Electronic Homework

The effect of using Electronic Homework was investigated by contrasting the results among students of different academic abilities, between different degrees of abstractness of the problems and among different schools. Although there was no significant effect observed in general, for one participating school, students using Electronic Homework were found to have performed better on less abstract problems.

As the present version of Electronic Homework is not equipped with visual and audio effects (i.e., the students are not reinforced with beautiful pictures or music after correctly solving a problem), and as it was observed that students in this particular school were highly motivated toward using computer-assisted instructional system in their learning, it is believed that motivation would be an important factor that affects the use of Electronic Homework. Although Electronic Homework is still not yet fully developed and was only evaluated in a short period of time, the fact that some positive effects were observed shows that it is possible to help students with systems like this.

A major shortcoming of Electronic Homework revealed from a questionnaire completed by the students is that it reacts very slowly in some situations, especially when there is no corresponding mal-rule available in the system. This slowness is due to the fact that the system has to scan over its stored rules before it can give out a "diagnosed error" and that there is quite a large number of possible combinations of rules. A solution to this is to use a faster machine, which may become possible within a few years. A further improvement may come from the fact that even though a computer can process much faster than human beings, yet in many situations, humans seem able to react quickly while the computer is still searching for possible solutions. It is thus not the processing speed but the strategies used which determines how fast a reaction is. If human strategies can be better understood and can be incorporated in the system, a much faster system will be achieved.

Another possible shortcoming of the system is the input method it allows. Currently, students can use either the keyboard or the mouse pointer to input a mathematical expression. Yet the expression displayed can only be in the form of a test expression. An example is that one half can only be displayed as 1/2 but not as the usual way of 1 over 2. Precisely how this would affect the effect of using the system has to be investigated, but it seems that the system can be much improved if some other techniques like the use of writing pad or voice input can be incorporated into the system.

References

Anderson, J. R., Boyle, C. E., & Yost, G. (1985). The geometry tutor. Proceedings of the International Joint Conference on Artificial Intelligence. Los Angeles.

Clancey, W.J. (1988). The role of qualitative models in instruction. In J. Self (Eds), Artificial intelligence and human learning. Chapman and Hall.

Corbett, A. T., & Anderson, J. R. (1992). LISP intelligent tutoring system: Research in skill acquisition. In Larkin, J. H. & Chabay, R. W. (Eds). Computer-assisted instruction and intelligent tutoring systems: Shared goals and complementary approaches. Hillsdale, NJ: Lawrence Erlbaum Associates.

Elsom-cook, M. (1988). Guided discovery tutoring and bounded user modeling. In J. Self (Eds), Artificial intelligence and human learning. Chapman and Hall.

Lee, F. L. (1995). The rule of conceptual knowledge in remediation of procedural errors. Educational Journal, CUHK, 23(1). pp. 163-179.

Lee, F. L. (1996). Electronic Homework – An intelligent tutoring system in mathematics. Unpublished Doctoral Dissertation. The Chinese University of Hong Kong.

Lewis, M. W., Milson, R., & Anderson J. R. (1987). The teacher's apprentice: Designing an Intelligent authoring system for high school mathematics. In Kearsley, G. (Eds). Artificial intelligence and instruction: Applications and Methods. Addison-Wesley.

Mao, Y & Lin, J. (1992). Intelligent tutoring system for symbolic calculating. In Frasson, C., Gauthier, G. & McCalla, G. I. (Eds), Proceedings, Intelligent tutoring systems, Second international conference, ITS '92. Springer-Verlag.

Moore, J. L., & Sleeman, D. (1988). Enhancing PIXIE's tutoring capabilities. International journal of man-machine studies, 28. pp. 605-623.

Newman, D. L., Kundert, D. K., Lane, D. S., & Bull, K. S. (1988). Effect of varying item order on multiple-choice test scores: Importance of statistical and cognitive difficulty. Applied Measurement in education, 1(1), pp. 89-97.

Park O., & Seidel R.J. (1991). Conventional CBI versus intelligent CAI: suggestions for the development of future system. In The Educational Technology Anthology Series: Expert Systems and Intelligent Computer-Aided Instruction. New Jersey; Eaglewood Cliffs.

Roberts, F.C., & Park, O. (1991). Intelligent computer-assisted instruction: An explanation and overview. IN The Educational Technology Anthology Series: Expert Systems and Intelligent Computer-Aided Instruction. New Jersey: Eaglewood Cliffs.

Sleeman, D. H. (1987). PIXIE: A shell for developing intelligent tutoring systems. In Lawler, R. W. & Yazdani, M. (Eds). Artificial intelligence and education, 1. Norwood, NJ: Ablex.

Sleeman, D. H., Kelly, A. E., Martinak, R., Ward, R. D., & Moore, J. L. (1989). Studies on diagnosis and remediation with high school algebra students. Cognitive science 13, pp. 551-568.

VanLehn, K. (1990). Mind bugs: The origins of procedural misconceptions. London: MIT Press.

White, J. A., & Purdom D. M. (1996). Viewing modern instructional technology through conceptions of curriculum. Educational technology review, 6, pp. 5-9.

Woolf, B. P. (1987). Theoretical frontiers in building a machine tutor. In G. Kearsley (Eds), Artificial intelligence and instruction, applications and methods. Addision-Wesley.

TM026643

AREA 1997

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement (OERI)
Educational Resources Information Center (ERIC)

ERIC®

REPRODUCTION RELEASE

(Specific Document)

I. DOCUMENT IDENTIFICATION:

Title: ELECTRONIC HOMEWORK

Author(s): Fong-lok LEE

Corporate Source: AERA presentation

Publication Date: March 28, 1997

II. REPRODUCTION RELEASE:

In order to disseminate as widely as possible timely and significant materials of interest to the educational community, documents announced in the monthly abstract journal of the ERIC system, *Resources in Education* (RIE), are usually made available to users in microfiche, reproduced paper copy, and electronic/optical media, and sold through the ERIC Document Reproduction Service (EDRS) or other ERIC vendors. Credit is given to the source of each document, and, if reproduction release is granted, one of the following notices is affixed to the document.

If permission is granted to reproduce the identified document, please CHECK ONE of the following options and sign the release below.

[✓] Sample sticker to be affixed to document

Check here
Permitting microfiche (4"x 6" film), paper copy, electronic, and optical media reproduction

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Sample

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Level 1

Sample sticker to be affixed to document [ ]

or here
Permitting reproduction in other than paper copy.

"PERMISSION TO REPRODUCE THIS MATERIAL IN OTHER THAN PAPER COPY HAS BEEN GRANTED BY

Sample

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Level 2

Sign Here, Please

Documents will be processed as indicated provided reproduction quality permits. If permission to reproduce is granted, but neither box is checked, documents will be processed at Level 1.

"I hereby grant to the Educational Resources Information Center (ERIC) nonexclusive permission to reproduce this document as indicated above. Reproduction from the ERIC microfiche or electronic/optical media by persons other than ERIC employees and its system contractors requires permission from the copyright holder. Exception is made for non-profit reproduction by libraries and other service agencies to satisfy information needs of educators in response to discrete inquiries."

Signature: Lee Fong Lok	Position: Assistant Professor
Printed Name: Fong-lok LEE	Organization: The Chinese University of HONG KONG
Address: Faculty of Education, The Chinese University of Hong Kong. Shatin, N.T., Hong Kong	Telephone Number: (852) 26096977
	Date: March 14, 1997

OVER

CUA

THE CATHOLIC UNIVERSITY OF AMERICA
Department of Education, O'Boyle Hall
Washington, DC 20064
202 319-5120

February 21, 1997

Dear AERA Presenter,

Congratulations on being a presenter at AERA[1]. The ERIC Clearinghouse on Assessment and Evaluation invites you to contribute to the ERIC database by providing us with a printed copy of your presentation.

Abstracts of papers accepted by ERIC appear in *Resources in Education (RIE)* and are announced to over 5,000 organizations. The inclusion of your work makes it readily available to other researchers, provides a permanent archive, and enhances the quality of *RIE*. Abstracts of your contribution will be accessible through the printed and electronic versions of *RIE*. The paper will be available through the microfiche collections that are housed at libraries around the world and through the ERIC Document Reproduction Service.

We are gathering all the papers from the AERA Conference. We will route your paper to the appropriate clearinghouse. You will be notified if your paper meets ERIC's criteria for inclusion in *RIE*: contribution to education, timeliness, relevance, methodology, effectiveness of presentation, and reproduction quality. You can track our processing of your paper at http://ericae2.educ.cua.edu.

Please sign the Reproduction Release Form on the back of this letter and include it with **two** copies of your paper. The Release Form gives ERIC permission to make and distribute copies of your paper. It does not preclude you from publishing your work. You can drop off the copies of your paper and Reproduction Release Form at the **ERIC booth (523)** or mail to our attention at the address below. Please feel free to copy the form for future or additional submissions.

Mail to: AERA 1997/ERIC Acquisitions
The Catholic University of America
O'Boyle Hall, Room 210
Washington, DC 20064

This year ERIC/AE is making a **Searchable Conference Program** available on the AERA web page (http://aera.net). Check it out!

Sincerely,

Lawrence M. Rudner, Ph.D.
Director, ERIC/AE

---

[1]If you are an AERA chair or discussant, please save this form for future use.