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AUTHOR Rice, Myrtle W.
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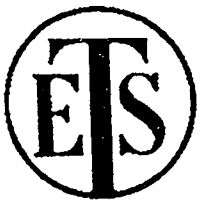
ABSTRACT

This review attempts to describe the current state of Educational Testing Service (ETS) activity in innovative instruction and assessment at the classroom level. Project reports are preceded by summaries of conclusions drawn from recent research and current issues under examination. Research now supports much that was previously hypothesized, confirming that students can adapt to new expectations and new ways of learning and assessment. Research also suggests that naturalistic assessment methods are appropriate for the primary level and that curriculum materials from "real life" are effective in promoting learning. Educational technology can play an important role in instruction, and research is supporting its use in various media. Current issues focus on: (1) assessment methodology; (2) psychometric concerns; (3) cognitive issues; (4) equitable performance tasks for all students; and (5) teacher preparation and development. One table summarizes ongoing projects. Individual project summaries are given for 40 ETS projects. (SLD)

TAC-B-439

ED 385 542

Assessment and Instruction at the Classroom Level: Current and Recent ETS Projects



Prepared by Myrtle W. Rice
Educational Testing Service
Princeton, NJ

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Part 1:

Assessment and Instruction at the Classroom Level: Current and Recent ETS Projects

Introduction

This review was prepared as background material for the Consortium on Educational Process and Technology, a collaborative effort among ETS, the David Sarnoff Research Center, and the Williamstown Education Foundation. The goal of the consortium is to combine technological and educational planning to create learning environments that will motivate students, help them achieve high levels of learning, and provide equity to all learners.

The review is an attempt to describe the current state of ETS activity in innovative instruction and assessment at the classroom level. Most of the projects included in the review are concerned with what has recently come to be known as "instructional assessment" — assessment that is designed to inform instruction. All of the projects contribute toward the development of the instructional assessment concept, although a few are designed to focus more narrowly on either assessment or instruction. All of the projects involve one or both of the major innovations in classroom instruction — technology and performance assessment.

The format of the review is designed to facilitate updating as new projects are initiated and as new conclusions emerge from projects currently in progress.

- **What We Have Learned** summarizes the conclusions drawn from research conducted to date. Although there are no surprises here, it is important to note that we now have evidence to support what were merely hypotheses a few years ago.

- **Summary of Current Issues** summarizes the issues under examination in current projects. Many of the issues are being addressed in more than one project at different grade levels, in several curriculum areas, and from a variety of perspectives.

- **Issues Being Addressed in Current Projects** lists the questions and issues that are of current concern and specifies the projects in which they are being addressed.

- **Assessment and Instruction at the Classroom Level: Overview** is a chart that presents basic information about all the projects reviewed. The chart includes the status of the project (current or completed), the educational level and subject matter targeted by the project, the focus of the project (assessment, instruction, or instructional assessment), the type of technology used, whether the project involves performance assessment, and whether the project includes a teacher training component. In order to keep similar projects near each other, projects are grouped by educational level and content area.

Information on projects was assembled primarily from existing sources: from project reports, abstracts, and proposals; from information gathered recently in the preparation of updates for the *Research Reporter*; and from information gathered for the summary of portfolio and work-sample projects prepared last year. When no current information was available in print, project directors were interviewed by telephone.

What We Have Learned

- Students at all educational levels can adapt to new expectations and new ways of learning, such as becoming aware of and active in the learning process, taking more responsibility for their own learning, and self-evaluation.

  Evidence: Rhode Island Literacy Portfolio Project *(Fowles)* - Elementary
  R & D in Mathematics *(Lesh)* - Middle
  Middle School Science *(Gong)* - Middle
  Arts PROPEL *(Gitomer)* - Middle, Secondary
  Computer Integration in Math *(Morris)* - Secondary

- At the primary level, naturalistic assessment methods ("documentation") are appropriate and effective in reading instruction and may be applicable to other subject areas.

  Evidence: Classroom-Based Assessment *(Chittenden)* - Elementary

- Curriculum materials drawn from "real-life" situations and problems are effective in engaging students' attention, in promoting learning at both the factual and conceptual levels, and in helping students to acquire basic thinking and problem-solving skills.

  Evidence: Interactive Videodisc Applications to Math *(Bejar)* - Elementary
  R & D in Math *(Lesh)* - Middle
  Middle School Science *(Gong)* - Middle

- Integration of the computer into writing instruction improves the quality of students' writing by making it easy for students to revise drafts and by creating products that increase students' pride in their own writing and their interest in reading the writing of others.

  Evidence: Maryland Education Project *(Fowles & Wilder)* - Elementary, Middle

- Artificial intelligence can be used to score constructed responses in some subjects, producing partial credit scores where appropriate and diagnostic feedback about errors in either the answer or the process used to arrive at it.

  Evidence: Using AI to Score Constructed Responses in Algebra *(Bennett)*-Secondary
  AP Computer Science Practice System *(Bennett)*-Secondary

- Systems thinking with simulation modeling enhances students' problem-solving skills and their conceptual understanding of subject matter.

  Evidence: STACI[R] *(Mandinach)* - Middle, Secondary

- Videodisc-based lessons featuring an electronic student response system are effective in promoting learning for students who bring little previous knowledge and/or low self-confidence to the subject.

  Evidence: Evaluation of a Mathematics Videodisc Project *(Moe)* - Middle

- Two design principles that help to promote equity in performance assessments are

  1) keeping the assessment tasks relatively short (limited to two class periods, for example) to reduce the opportunities for some students to take advantage of resources available to them but not to others (*e.g.*, older siblings, interested parents, materials in the home);

  2) allowing students some choice in response modalities so that no students are penalized by having to use a form of communication that is particularly difficult for them.

  Evidence: Pacific Telesis program *(Jorgensen)* - Elementary, Middle

- Teachers can adapt to the new role of facilitator or coach required by the shift to technology-based and/or performance-based instruction and assessment; but the change in the educational model is dramatic, and teachers need training, guidance, organizational support, and adequate planning time in order to implement it successfully.

  Evidence: Classroom-Based Assessment *(Chittenden)* - Elementary
  Middle School Science *(Gong)* - Middle
  Arts PROPEL *(Gitomer)* - Middle, Secondary
  STACI® *(Mandinach)* - Middle, Secondary

- Two critical factors in the successful implementation of technology-based programs in public schools are

  1) a close match between the technology and the existing curriculum and instructional patterns;

  2) strong and continuing administrative leadership and support.

  The changes required in teachers' roles and responsibilities can be a barrier to successful implementation, but this can be overcome by strong, committed leadership that fosters a climate for change.

  Evidence: Implementation of Technology in Schools *(Stecher & Wilder)* - All levels

- Videotapes of demonstration classrooms are powerful communication tools that help teachers, administrators, and parents understand the purposes and the effectiveness of classroom innovations such as naturalistic assessment, portfolios, and instruction that nurtures the development of higher order thinking skills and metacognitive processes.

  Evidence: Videotape Demo of Naturalistic Assessment *(Chittenden)* - Elementary
  Pacific Telesis program *(Jorgensen)* - Elementary, Middle
  Reflections of Learning *(Jorgensen)* - Elementary, Middle, Secondary

- Video portfolios including tapes of teachers' classrooms can be used as a means of assessing accomplished teaching; the process of preparing portfolios and the process of learning to score them contribute to the professional development of the participants and have beneficial effects on participants' classroom practice.

  Evidence: Video Portfolio Assessment *(J. Frederiksen)* - Secondary

Summary of Current Issues

Methodology

Creation of new or improved performance measures and scoring systems.

Extension of successful methods from one content area into others.

Developing a way to aggregate information across automatically scored items to detect and describe instructionally meaningful patterns in the scores and diagnostic information produced by the system.

Providing evidence for enhanced student learning in forms that can be communicated to administrators, parents, and others concerned with accountability.

Interrelationships among standardized test scores, performance assessments, and teacher and parent observations as measures of student progress and ability.

Use of performance assessments to identify gifted and talented students.

Psychometric Concerns

Ensuring reliability of performance-based measures.

Establishing validity of performance-based measures.

Exploring the role of standardization in performance-based measures.

Examining the ways in which differing degrees of structure in open-ended questions affect the effectiveness of an automated scoring system.

Testing the applicability of new, cognitively driven measurement models to interactive assessments using AI.

Cognitive Issues

Determining whether constructed-response item types in algebra measure a different dimension from that measured by multiple-choice items.

Determining what mathematical skills are prerequisite to students' effective use of simulation modeling techniques.

Determining the effects of maturity and cognitive development on students' ability to benefit from the systems thinking approach.

Learning what alternative assessments reveal about students' understanding at the conceptual level; learning what mental models they use to understand and explain scientific phenomena and how different forms of instruction contribute to development of different kinds of models.

Understanding the cumulative effect on performance of students' working on a sequence of performance tasks or a series of systems thinking courses.

Finding evidence of generalizability and transfer of thinking skills developed through performance- or technology-based instruction.

Analysis of deaf students' reading performance and preference for written English or a particular version of sign language.

Examination of the nature of the difficulties deaf students face in accessing the meaning of written English.

Equity

Ensuring equity by designing performance tasks that are engaging and revealing for all students.

Designing performance tasks and instructional models that will increase participation in math and science by members of disadvantaged groups and/or by groups in which such participation is traditionally low.

Examination of differences among ethnic, gender, and grade-level groups on three forms of assessment: standardized tests, performance assessments, and teacher and parent observations.

Effectiveness of a test preparation program for deaf students, using interactive videodisc to provide translations in American Sign Language.

Teacher Preparation and Development

Development of effective techniques for training teachers in the use of performance-based and/or computer-based instruction and assessment.

Development of course-specific guidelines to help teachers conduct classroom activities and select instructional tasks.

Determining the teacher training and curriculum development activities that should accompany the establishment of high technology classrooms.

Training and assisting teachers in the design of materials for performance-based instruction and assessment.

Analysis of the forms of representation used by choral music teachers to communicate subject matter to their students.

Development of performance-based standards and assessment procedures for teachers.

Changes in teachers' perceptions of student ability and in teachers' substantive knowledge as a result of implementing alternative assessment strategies in science and math.

Classroom Practice

Discovering ways to facilitate development of an adaptive teaching/learning environment.

Examining the effects of portfolios and other performance measures on classroom practice.

Comparing the effectiveness of various strategies for integrating technology-based activities into the curriculum.

School Organization and Administration

Documenting ways in which school organization and climate can promote and support the shift to performance-based or technology-based instruction in the classroom.

Usefulness for accountability and parent-communication purposes of information gained through performance-based measures.

Benefits and drawbacks of a teacher-centered versus an instrument-centered assessment program.

Issues Being Addressed in Current Projects

Methodology

- Applicability of naturalistic methods developed for primary-level reading to other primary-level subjects.

  Projects: Young Children's Science Learning *(Chittenden)* - elementary
  Classroom-Based Documentation of Literacy and Science Development in Urban Minority Children *(Jones & Senior)* - elementary

- Design of curriculum-embedded performance assessments in reading, writing, math, and science at all grade levels.

  Projects: Alternative Assessment of Science and Math for Early Childhood Urban Minority Students *(Jones)* - elementary
  California Assessment Project *(Sheingold)* - elementary–secondary
  Pacesetter *(Kimmel)* - secondary

- Design of criteria for organic portfolios in reading, writing, math, and science, to be used statewide.

  Project: California Assessment Project *(Sheingold)* - elementary–secondary

- Development of common goals, standards, and documentation strategies for performance assessment activities that will yield aggregatable data, in math and science in grades 3–6.

  Project: Authentic Assessment our Multiple Users *(Jorgensen)* - elementary

- What qualities of performance should be assessed, and how should they be presented?

  Project: Performance Assessment in Middle School Science *(Frederiksen)* - middle

- Extension of AI scoring systems to other classes of content and other difficulty levels

  Projects: AI for Constructed Responses in Algebra *(Bennett)* - secondary
  AP Computer Science Practice System *(Bennett)* - secondary

- Refinement of algebra AI scoring rubric to reduce remaining discrepancies between human and automatic scoring.

  Project: AI for Constructed Responses in Algebra *(Bennett)* - secondary

- The characteristics of effective questions to assess complex understanding in science.

  Project: Assessment of Complex Understanding in Science Education *(Gitomer)* - secondary

- Interrelationships among standardized test scores, performance assessments, and teacher and parent observations as measures of student progress and ability.

  Project: Alternative Special Education Assessment of Urban Minority Students *(Jones)* - elementary

- Use of performance assessments to identify gifted and talented students.

  Project: Alternative Assessment of Science and Math for Early Childhood Urban Minority Students *(Jones)* - elementary

Psychometric Concerns

- Ways in which differing degrees of structure in open-ended questions affect the effectiveness of an automatic scoring system.

  Project: AI for Constructed Responses in Algebra *(Bennett)* - secondary

- Design of criteria for grading portfolios and other forms of performance assessment, to ensure reliability.

  Projects: California Assessment Project *(Sheingold)* - elementary–secondary
  R & D in Math *(Lesh)* - middle
  Performance Assessment in Middle School Science *(Frederiksen)* - middle
  Issues and Technical Procedures in Rating Portfolios *(Myford & Mislevy)* - secondary

- Validity of performance assessments and portfolio-based assessments.

  Projects: South Brunswick Portfolio Project *(Chittenden)* - elementary
  California Assessment Project *(Sheingold)* - elementary–secondary
  Issues and Technical Procedures in Rating Portfolios *(Myford & Mislevy)* - secondary

- Necessity for standardizing and controlling delivery of assessment tasks, versus using alternative tasks designed by teachers and/or embedded within a curriculum.

  Project: Performance Assessment in Middle School Science *(Frederiksen)* - middle

- Aggregation of information across automatically scored items to detect and describe instructionally meaningful patterns in scores and diagnostic information.

  Project: AI to Score Constructed Responses in Algebra *(Bennett)* - secondary

- Applicability of new, cognitively driven measurement models to interactive assessments using AI.

  Project: AI to Score Constructed Responses in Algebra *(Bennett)* - secondary

Cognitive Issues

- Do constructed-response item types in algebra measure a different dimension from that measured by multiple-choice items?

  Project: AI to Score Constructed Responses in Algebra *(Bennett)* - secondary

- Effectiveness of "authentic" mathematics assessments in increasing students' understanding of and ability to use mathematical principles.

  Project: R & D in Math *(Lesh)* - middle

- Development of strategies and evaluation criteria that assess students' knowledge bases in science and also reflect the principles of scientific thinking.

  Project: SEPIA *(Gitomer)* - middle
  Assessment of Complex Understanding in Science Education *(Gitomer)* - secondary

- What alternative assessments reveal about students' understanding.

  Project: SEPIA *(Gitomer)* - middle

- Understanding of the mental models students use to understand and explain scientific phenomena and of the ways in which different forms of instruction contribute to the development of different kinds of models.

  Project: Middle School Science *(Gong)* - middle

- Cumulative effect on student performance of engaging in a sequence of assessment tasks throughout the duration of a course.

  Project: Performance Assessment in Middle School Science *(Frederiksen)* - middle

- Cumulative effect on analytic reasoning skills of progressing through several years of systems thinking courses.

  Project: STACI[N] *(Mandinach)* - middle, secondary

- Impact of the systems approach on students' acquisition of content knowledge.

  Project: STACI[N] *(Mandinach)* - middle, secondary

- Determining what mathematical skills are prerequisite to the effective use of simulation modeling techniques.

  Project: STACI[N] *(Mandinach)* - middle, secondary

- Effects of maturity and cognitive development on students' ability to benefit from the systems approach.

  Project: STACI[N] *(Mandinach)* - middle, secondary

- Analysis of deaf students' reading performance and preference for written English or a particular version of sign language.

  Project: Videodisc and Sign Language for Improving Reading Skills *(Hansen)* - middle

- The nature of the difficulties deaf students face in accessing the meaning of written English.

  Project: Videodisc and Sign Language for Improving Reading Skills *(Hansen)* - middle

Equity

- Ensuring equity by designing performance tasks that are engaging and revealing for all students.

  Project: California Assessment Project *(Sheingold)* - elementary–secondary

- Design of performance assessments targeted toward groups in which math participation is currently low.

  Project: R & D in Math *(Lesh)* - middle

- Determining what instructional models will develop skill in scientific inquiry in less advantaged populations.

  Project: Performance Assessment in Middle School Science *(Frederiksen)* - middle

- Examination of differences among ethnic, gender, and grade-level groups on three forms of assessment: standardized tests, performance assessments, and teacher and parent observations.

  Project: Alternative Special Education Assessment of Urban Minority Students *(Jones)* - elementary

- Use of performance assessments to identify children with exceptional ability in science and math.

  Project: Alternative Assessment of Science and Math for Early Childhood Urban Minority Students *(Jones)* - elementary

- Effectiveness of a test preparation program for deaf students, using interactive videodisc to provide translations in American Sign Language.

  Project: Sign Language and Videodisc for Test Preparation *(Hansen)* - secondary

Teacher Preparation and Development

- Appropriate and effective techniques for training teachers in the use of performance- and/or computer-based instruction.

  Projects: Documenting Young Children's Science Learning *(Chittenden)* - elementary
  Videotapes of Naturalistic Assessment Methods *(Chittenden)* - elementary
  Alternative Special Education Assessment Urban Minority Students *(Jones)* - elementary
  Alternative Assessment of Science and Math for Early Childhood Urban Minority Children *(Jones)* elementary
  Classroom-Based Documentation of Literacy and Science Development in Urban Minority Children *(Jones & Senior)* - elementary
  SEPIA *(Gitomer)* - middle
  Middle School Science *(Gong)* - middle
  Performance Assessment in Middle School Science *(Frederiksen)* - middle
  Assessment of Complex Understanding in Science Education *(Gitomer)* - secondary
  STACI[N] *(Mandinach)* - middle, secondary
  Pacesetter *(Kimmel)* - secondary

- Training and assisting teachers in the design of performance-based instruction and assessment.

  Projects: Alternative Assessment of Science and Math for Early Childhood Urban Minority Children *(Jones)* - elementary
  Classroom-Based Documentation of Literacy and Science Development in Urban Minority Children *(Jones)* - elementary
  R & D in Math *(Lesh)* - middle

- Developing guidelines to help teachers conduct classroom activities and select instructional tasks.

  Project: SEPIA *(Gitomer)* - middle

- How can teachers use the knowledge gained through performance assessments to inform further instruction?

  Projects: SEPIA *(Gitomer)* - middle
  Middle School Science *(Gong)* - middle

- What teacher training and curriculum development activities should accompany the installation of high technology classrooms?

  Project: Hunterdon Central Prototype Classrooms *(Morris)* - secondary

- Analysis of the forms of representation used by choral music teachers to communicate subject matter to their students.

  Project: Teachers' Subject Matter Representations *(Reynolds)* - elementary

- Development of a model of the scoring process used to assess video portfolios of classroom teachers.

  Project: Video Portfolio Assessment *(J. Frederiksen)* - secondary

- Examination of the role of video clubs in the development of video portfolios for teacher assessment: What are the effects of the use of exemplar tapes? How can clubs construct libraries of exemplar tapes from their own districts?

  Project: Video Portfolio Assessment *(J. Frederiksen)* - secondary

- Appropriateness and effectiveness of the standards and assessment practices advocated by the National Board for Professional Teaching Standards in assessing teachers and contributing to their professional development.

  Project: Implementation of a Staff Development Model in the South Brunswick Public Schools *(Chittenden)* - elementary

Classroom Practice

- Ways to facilitate development of an adaptive teaching/learning environment.

  Project: Middle School Science *(Gong)* - middle

- Effects of portfolios or other performance-based techniques on classroom practice.

  Projects: South Brunswick *(Chittenden)* - elementary
  Performance Assessment in Middle School Science *(Frederiksen)* - middle

- Effectiveness of a portfolio-based approach in fostering a conceptual-change model of teaching.

  Project: SEPIA *(Gitomer)* - middle

- Effects of the use of various strategies for integrating technology and simulation modeling activities into the curriculum.

  Project: STACI[R] *(Mandinach)* - middle, secondary

- How does participation in a video club affect teaching practice?

  Project: Video Portfolio Assessment *(J. Frederiksen)* - secondary

School Organization and Administration

- Ways in which school organization and climate can promote and support the shift to performance-based or technology-based instruction at the classroom level.

  Project: Middle School Science *(Gong)* - middle

- To what extent can evidence gained by naturalistic methods replace test scores as critical data?

  Projects: Formative Evaluation of Naturalistic Assessment Methods for Beginning Reading *(Chittenden)* - elementary
  SEPIA *(Gitomer)* - middle

- What are the benefits and drawbacks of a teacher-centered versus an instrument-centered assessment program?

  Project: Formative Evaluation of Naturalistic Assessment Methods for Beginning Reading *(Chittenden)* - elementary

- What are the system-wide implications of the use of alternative assessment procedures?

  Project: Classroom-Based Documentation of Literacy and Science Development in Urban Minority Children *(Jones & Senior)* - elementary

Assessment and Instruction at the Classroom Level: Overview

Project *(Director)*	Project Status	Educational Level	Subject Matter	Project Focus	Type of Technology	Performance Assessment?	Teacher Training?
Implementation of a Staff Development Model in the South Brunswick Public Schools *(Chittenden)*	Current	Elementary	Many	Assessment	Videotapes	Yes	Yes
Classroom-Based Assessment in Early Childhood Education *(Chittenden)*	Completed	Elementary	Reading	Instructional Assessment	None	Yes	Yes
Videotape Demonstration of Naturalistic Assessment Methods *(Chittenden)*	Current	Elementary	Reading	Instructional Assessment	Videotapes	Yes	Yes
Formative Evaluation of Naturalistic Methods for Assessing Beginning Reading *(Chittenden)*	Current	Elementary	Reading	Instructional Assessment	None	Yes	No
South Brunswick Portfolio Project *(Chittenden)*	Current	Elementary	Reading	Instructional Assessment	None	Yes	Yes
Alternative Special Education Assessment of Urban Minority Students *(Jones)*	Completed	Elementary	Reading, Writing	Assessment	None	Yes	Yes
Evaluation of New York City District 27 Alternative Assessments *(Jones)*	Completed	Elementary	Many, including non-cognitive	Assessment	None	Yes	Yes
Teachers' Subject Matter Representations in Elementary School Music *(Reynolds)*	Current	Elementary	Music	Instruction	None	No	No
Rhode Island Literacy Portfolio Presentation Project *(Fowles)*	Completed	Elementary	Literacy (across subjects)	Instructional Assessment	None	Yes	Yes
Classroom-Based Documentation of Literacy and Science Development in Urban Minority Children *(Jones & Senior)*	Current	Elementary	Literacy, Science	Instructional Assessment	None	Yes	Yes
Interactive Videodisc Applications to Mathematics Education *(Bejar)*	Completed	Elementary	Math	Instruction	Computer/ Videodisc	No	No
Assessment in Mathematics in Monmouth Junction School *(Chittenden)*	Current	Elementary	Math	Instructional Assessment	None	Yes	Yes

Project *(Director)*	Project Status	Educational Level	Subject Matter	Project Focus	Type of Technology	Performance Assessment?	Teacher Training?
Documenting and Understanding Young Children's Science Learning *(Chittenden)*	Current	Elementary	Science	Instructional Assessment	None	Yes	Yes
Alternative Assessment of Science and Math for Early Childhood Urban Minority Students *(Jones)*	Current	Elementary	Science, Math	Instructional Assessment	None	Yes	Yes
Authentic Assessment for Multiple Users *(Jorgensen)*	Current	Elementary	Math, Science	Instructional Assessment	None	Yes	Yes
Pacific Telesis Foundation "Education for the Future" Program *(Jorgensen)*	Canceled in 1992	Elementary, Middle	Math, Science	Instructional Assessment	None	Yes	Yes
Maryland Education Project, Assessment Measures Task Force *(Fowles & Wilder)*	Completed	Elementary, Middle	Writing, Math	Instruction	Computers	Yes	No
Design of an Integrated, Self-Improving Assessment System for California Schools *(Sheingold)*	Current	Elementary - Secondary	Many	Assessment	None	Yes	No
Implementation of Technology in Schools: Lessons from Eight Sites *(Stecher & Wilder)*	Completed	Elementary - Secondary	Many	N/A	Computers	N/A	No
PACKETS™ *(Katims)*	Current	Elementary - Secondary	Many	Instructional Assessment	None	Yes	No
"Reflections of Learning" Training Seminars *(Jorgensen)*	Current	Elementary - Secondary	Many	Instructional Assessment	Videotapes	Yes	Yes
Videodisc Technology and Sign Language to Improve Reading Skills of Deaf Students *(Hansen)*	Current	Middle	Reading	Instruction	Computer/ Videodisc	No	No
Inside Story: Dateline Brazil *(Katims)*	Completed	Middle	Language Arts, Crit. Thinking	Instruction	Computer	No	No
Evaluation of a Mathematics Videodisc Project *(Moe)*	Completed in 1992	Middle	Math	Instructional Assessment	Computer/ Videodisc	No	No
Research and Development in Mathematics using "Authentic Assessments" *(Lesh)*	Current	Middle	Math	Instructional Assessment	None	Yes	Yes
Project GIMS (An NSF statewide systemic initiative project in Georgia) *(Jorgensen)*	Current	Middle	Math, Science	Assessment	None	Yes	Yes

Project *(Director)*	Project Status	Educational Level	Subject Matter	Project Focus	Type of Technology	Performance Assessment?	Teacher Training?
SEPIA (Science Education through Portfolio Instruction and Assessment) *(Gitomer)*	Current	Middle	Science	Instructional Assessment	None	Yes	Yes
Middle School Science Project *(Gong)*	Current	Middle	Science	Instructional Assessment	Computer	Yes	Yes
Performance Assessment as a Tool for Enhancing Learning in Middle School Science *(J. Frederiksen)*	Current	Middle, Secondary	Science	Instructional Assessment	None	Yes	Yes
Evaluation of Hunterdon Central High School Prototype Classrooms	Current	Secondary	Math, Science, Industrial Arts	Instruction	Computer, CD, Telecomm., other	No	No
Video Portfolio Assessment *(J. Frederiksen)*	Current	Secondary	Math	Assessment	Videotapes	Yes	Yes
CIESE Projects – Evaluation of Computer Integration in Math Education *(Morris)*	Completed in 1992	Secondary	Math	Instruction	Computer	No	Yes
Use of Artificial Intelligence to Score Constructed-Response Items in Algebra *(Bennett)*	Current	Secondary	Math	Instructional Assessment	Computer/AI	No	No
Practice and Feedback System for AP Computer Science *(Bennett)*	Current	Secondary	Computer Science	Instructional Assessment	Computer/AI	Yes	No
Sign Language and Videodisc for Test Preparation Materials for Deaf Students *(Hansen)*	Current	Secondary	Reading	Instruction	Computer/ Videodisc	No	No
Systems Thinking and Curriculum Innovation Network — STACI™ *(Mandinach)*	Current	Middle, Secondary	Many	Instruction	Computer/ Simulation-Modeling Software	Yes	Yes
Pacesetter™ *(Kimmel)*	Current	Secondary	Many	Instructional Assessment	None	Yes	Yes
Arts PROPEL *(Gitomer)*	Completed in 1992	Middle, Secondary	Writing, Art, Music	Instructional Assessment	None	Yes	Yes
Issues and Technical Procedures in Rating Portfolios *(Myford & Mislevy)*	Current	Secondary	AP Studio Art	Assessment	None	Yes	No

Deleted: Assessment of Complex Understanding in Science Education (Discontinued)

Part 2:

Project Descriptions

Table of Contents: Project Descriptions

(Projects are listed in the same order in which they appear on the chart in Part 1)

Deleted: Assessment of Complex Understanding in Science Education (Discontinued)

Implementation of a Staff Development Model in the South Brunswick Public Schools

Project Director Ted Chittenden
Project Status Current
Educational Level Elementary
Subject Matter Many
Focus Assessment
Type of Technology Used Videotapes
Performance Assessment? Yes
Teacher Training Component? Yes

Description

The purpose of the project is to develop models for professional staff development that use the standards and assessment measures advocated by the National Board for Professional Teaching Standards. A core group of teachers will initiate the process of using the standards and exploring their value as a framework for assessing the work of teachers in the classroom. Based on this experience, a model of staff development will be clarified and tried out throughout the district. The use of videotapes will follow the pattern established in the Video Portfolio Assessment Project.

Questions/Issues Addressed

How effective are the standards as a framework for assessing teaching practice?

How effective are the standards in contributing to individual teachers' professional development?

Questions/Issues Remaining

N/A

Classroom-Based Assessment in Early Childhood Education

Project Director Ted Chittenden
Project Status Completed
Educational Level Elementary
Subject Matter Reading
Focus Instructional Assessment
Type of Technology Used None
Performance Assessment? Yes
Teacher Training Component? Yes

Description

Development of "naturalistic" assessment methods to document the developing reading skills of K-3 students.

Questions/Issues Addressed

Can the outcomes of research on children's emergent reading be converted into strategies that classroom teachers can use in place of traditional tests to monitor and assess the development of children's reading ability? **Yes**

Will the use of such strategies and instruments contribute to more effective reading instruction? **Yes**

Questions/Issues Remaining

To what extent can evidence yielded by naturalistic methods replace test scores as critical data?

What are the benefits and drawbacks of a teacher-centered versus an instrument-centered assessment program?

Both questions are being addressed in other studies, i.e., Formative Evaluation of Naturalistic Methods for Assessing Beginning Reading and South Brunswick Portfolio Project.

Videotape Demonstration of Naturalistic Assessment Methods

Project Director Ted Chittenden
Project Status Current
Educational Level Elementary
Subject Matter Reading
Focus Instructional Assessment
Type of Technology Used Videotape
Performance Assessment? Yes
Teacher Training Component? Yes

Description

Development of a series of videotapes and supporting materials to illustrate the use of systematic, naturalistic methods for documenting young children's progress in learning to read.

Questions/Issues Addressed

Can videotapes be used effectively to help teachers learn how to use naturalistic assessment strategies? **Yes**

Can videotapes be used effectively to illustrate the method to administrators considering adopting naturalistic methods and to parents whose children are in such classrooms? **Yes**

Questions/Issues Remaining

N/A

Formative Evaluation of Naturalistic Methods for Assessing Beginning Reading

Project Director Ted Chittenden
Project Status Current
Educational Level Elementary
Subject Matter Reading
Focus Instructional Assessment
Type of Technology Used None
Performance Assessment? Yes
Teacher Training Component? No

Description

Evaluation of the use of alternative assessment methods and their impact on the school organization.

Questions/Issues Addressed

To what extent can evidence yielded by naturalistic methods replace test scores as critical data?

What are the benefits and drawbacks of a teacher-centered versus an instrument-centered assessment program?

Questions/Issues Remaining

N/A

South Brunswick Portfolio Project

Project Director Ted Chittenden
Project Status Current
Educational Level Elementary
Subject Matter Reading
Focus Instructional Assessment
Type of Technology Used None
Performance Assessment? Yes
Teacher Training Component? Yes

Description

Development of a portfolio assessment system for a "developmentally appropriate" reading program in grades K-2.

Questions/Issues Addressed

Can such a system by designed? **Yes**

Can appropriate instruments be developed to give structure and consistency to the portfolio assessment system? **Yes**

Can a rating system be designed to ensure the credibility of the portfolio assessment system beyond individual classrooms? **A holistic rating system and literacy scale have been designed.**

How does the use of the portfolio affect classroom practice?

How reliable and valid is the literacy scale used for rating the contents of the portfolios?

Questions/Issues Remaining

N/A

Alternative Special Education Assessment of Urban Minority Students

Project Director Jacqueline Jones
Project Status Completed
Educational Level Elementary
Subject Matter Reading, Writing
Focus Assessment
Type of Technology Used None
Performance Assessment? Yes
Teacher Training Component? Yes

Description

The study examined the interrelationships among three methods of gathering evidence about the abilities of a group of urban minority special education students. The three forms of evidence were standardized test scores, newly developed performance-based instruments, and teacher and parent observations. The study also examined the mean differences among ethnic, gender, and grade level groups on the three assessment types. The project director met weekly with groups of special education teachers and parents of children enrolled in the special education programs, to assure competence and consistency in the use of the portfolio and observation ratings. The project took place in an elementary school in the South Bronx, New York City. The students in the study were 130 Hispanic and African American students, predominately classified as learning disabled.

Questions/Issues Addressed

Interrelationships among standardized test scores, performance-based assessments, and teacher and parent observations as measures of student progress and ability.

Differences among ethnic, gender, and grade level groups on the three forms of assessment.

Questions/Issues Remaining

Can the understandings gained be generalized to other groups of students and to other subject matter? **Being addressed in "Alternative Assessment of Science and Mathematics for Early Childhood Urban Minority Students," a follow-up to this project.**

Evaluation of NYC District 27 Alternative Assessments

Project Director Jacqueline Jones
Project Status Completed
Educational Level Elementary
Subject Matter Linguistic, logical-mathematical, interpersonal, intrapersonal, and spatial abilities
Focus Assessment
Type of Technology Used None
Performance Assessment? Yes
Teacher Training Component? Yes

Description

This project provided consulting services to New York City Public School District 27 in connection with their design of alternative assessments to identify gifted and talented students. The project director consulted with the Director of Gifted and Talented Programs and with staff involved in the administration, scoring, and interpretation of the assessment instruments. A critical analysis of the criteria and scoring dimensions was conducted.

Questions/Issues Addressed

Use of performance assessments to identify gifted and talented students.

Identification of appropriate criteria.

Development of scoring standards.

Questions/Issues Remaining

None

Teachers' Subject Matter Representations in Elementary School Music

Project Director Anne Reynolds
Project Status Current
Educational Level Elementary
Subject Matter Music
Focus Instruction
Type of Technology Used None
Performance Assessment? No
Teacher Training Component? No

Description

To communicate information in meaningful ways, teachers use representations such as diagrams, verbal metaphors, demonstrations, illustrations, and tone of voice. When subject matter is represented in ways students cannot understand, the students are at risk of failure. In order to diagnose why some representations fail, this project will investigate how teachers understand this subject matter, how they select and employ representations, and how students understand these representations. Results of this study will further the development of teacher performance assessments and add to the library of cases available for teacher education.

Questions/Issues Addressed

The forms of representations choral music teachers use to communicate the subject matter.

How these representations are alike and different across choral music teachers.

How a teacher's understanding of the subject matter and of students influences the teacher's construction, selection, and use of representations.

Questions/Issues Remaining

N/A

Rhode Island Literacy Portfolio Presentation Project

Project Director Mary Fowles
Project Status Completed
Educational Level Elementary (Grade 3)
Subject Matter Literacy (across subjects)
Focus Instructional Assessment
Type of Technology Used None
Performance Assessment? Yes
Teacher Training Component? Yes

Description

This project was an outgrowth of ETS's participation in the design and implementation of the Rhode Island statewide writing assessment and the portfolio-based validity study for it. The Portfolio Presentation Project was designed to promote effective literacy instruction in the classroom, to assess evidence of literacy learning, and to promote assessment as part of the instructional process. Students created portfolios containing samples of their work in math, speaking & listening, reading & writing, and other content areas. Teams of students presented their portfolios to scorers, and presentations were rated on the degree to which they reflected understanding of the process and concepts of literacy development. Ratings were used to assess the effectiveness of the literacy program, not the literacy levels of individual students.

Questions/Issues Addressed

Development of a method for assessing the effectiveness of the literacy program. **The portfolio presentation method was effective.**

Can instructional assessment enhance programs to promote literacy across subject areas at the elementary school level? **Yes**

Can elementary students learn to take more active roles in their own learning by becoming aware of the learning process, taking responsibility for their own learning, and evaluating their own work products? **Yes**

Questions/Issues Remaining

Can such a program be implemented statewide? **The state is searching for necessary funding to bring this about.**

Can the program be implemented at other grade levels? **Some teachers have expressed interest in adapting it for other grade levels.**

Classroom-Based Documentation of Literacy and Science Development in Programs for Urban Minority Children

Project Directors Jacqueline Jones & Ann Marie Senior
Project Status Current
Educational Level Elementary (early childhood)
Subject Matter Reading, Writing, Science
Focus Instructional Assessment
Type of Technology Used None
Performance Assessment? Yes
Teacher Training Component? Yes

Description

This project is a subcontract of the Trenton Early Childhood Transition Demonstration Project, which provides a comprehensive approach to providing educational and support services to at-risk children and their families. The Transition Project is designed to demonstrate how the gains associated with pre-school programs such as Head Start can be sustained and enhanced through implementation of developmentally appropriate educational practices across the kindergarten and primary years. The purpose of ETS's subcontract is to broaden the base of assessment strategies in early childhood education at both the classroom and systemic levels. ETS researchers will observe in classrooms and help teachers develop their own classroom-based alternative assessments. Researchers will meet with administrators, school board personnel, and the National Transition Research Team to investigate the system-wide implications of the new documentation procedures. Consultation and workshops for staff training will be provided.

Questions/Issues Addressed

Development of classroom-based alternative assessment procedures in literacy and science for the early elementary grades.

Investigation and articulation of the system-wide implications of the use of alternate assessment procedures.

Teacher training in the development of alternative assessments and in understanding the physical, cognitive, and affective growth and development of children.

Questions/Issues Remaining

N/A

Interactive Videodisc Applications to Mathematics Education

Project Director Isaac Bejar
Project Status Completed (prior to 1985)
Educational Level Elementary
Subject Matter Math
Focus Instruction
Type of Technology Used Videodisc
Performance Assessment? No
Teacher Training Component? No

Description

Fraction problems were embedded in the story of a space crew on a rescue mission, presented on videodisc. In the field test student reactions were positive, but some students did not benefit as much as had been expected from the built-in instructional sequences.

Questions/Issues Addressed

Evaluate the limitations of videodisc-computer technology for classroom use.

Assess the economic feasibility of producing a pedagogically and artistically sound videodisc. [Unresolved--production was expensive]

Questions/Issues Remaining

Specific to this project: Can students' problems with fractions be diagnosed more precisely, so that a more effective instructional sequence can be designed? **Similar problem being addressed in Bennett's AI projects.**

Larger issues: Can high quality videodisc-computer programs be produced within reasonable budgets? **Still an issue in all technology-based efforts.**

Can results from psychological and educational research be distilled and integrated into the design of videodisc-based instruction? **Being addressed in numerous projects, with respect to technology in general, rather than videodisc applications in particular.**

Assessment in Mathematics in Monmouth Junction School

Project Director Ted Chittenden
Project Status Current
Educational Level Elementary
Subject Matter Math
Focus Instructional Assessment
Type of Technology Used None
Performance Assessment? Yes
Teacher Training Component? Yes

Description

ETS staff are providing consultation to teachers on the design and evaluation of open-ended and performance-based assessment tasks for mathematics.

Questions/Issues Addressed

Design of assessment tasks appropriate for the district's mathematics program.

Questions/Issues Remaining

N/A

Documenting and Understanding Young Children's Science Learning

Project Director Ted Chittenden
Project Status Current
Educational Level Elementary
Subject Matter Science
Focus Instructional Assessment
Type of Technology Used None
Performance Assessment? Yes
Teacher Training Component? Yes

Description

To enhance the teaching of science in the primary grades, programs of documentation will be developed, built around classroom observations, records of children's language, and samples of children's work such as writings, drawings, and constructions.

Questions/Issues Addressed

Can naturalistic methods of instruction and assessment (based on those developed for emergent reading by Chittenden, et al.) be used to enhance science learning in grades K-3?

Can appropriate materials be developed to promote teachers' abilities to observe, record, and understand young children's science learning?

Can guidelines and illustrative materials suitable for introducing the concept into teacher enhancement and teacher education programs be developed?

Questions/Issues Remaining

N/A

Alternative Assessment of Science and Mathematics for Early Childhood Urban Minority Students

Project Director Jacqueline Jones
Project Status Current
Educational Level Elementary
Subject Matter Science, Mathematics
Focus Instructional Assessment
Type of Technology Used None
Performance Assessment? Yes
Teacher Training Component? Yes

Description

This three-year project is an outgrowth of "Alternative Special Education Assessment for Urban Minority Children," with funding from a different source. This project will involve five schools in School District 9 in New York City and will focus on science and math. The ETS effort is part of Project CUE (Creating Urban Excellence), which seeks to develop a science and mathematics program in District 9 and to identify students with exceptional talent in these areas. ETS researchers will assist teachers in the development of performance assessments in science and math and will conduct classroom observations and weekly meetings with designated groups of teachers, to define types of performance data to be collected as well as to develop parameters for the assessment of work samples. During the course of the project, a series of survey instruments will be administered to teachers to evaluate changes in the fundamental ways in which they view student ability in science and math and to note any increase in teachers' substantive knowledge in these areas.

Questions/Issues Addressed

Development of performance assessments in elementary science and math.

Documentation of changes in teachers' perceptions of student ability in science and math as a result of implementation of performance assessment techniques.

Documentation of gains in teachers' substantive knowledge of science and math as a result of implementation of performance assessment techniques.

Use of performance assessments to identify children with exceptional ability in science and math.

Questions/Issues Remaining

N/A

Authentic Assessment for Multiple Users

Project Director Margaret Jorgensen
Project Status Current
Educational Level Elementary
Subject Matter Math, Science
Focus Instructional Assessment
Type of Technology Used None
Performance Assessment? Yes
Teacher Training Component? Yes

Description

ETS staff are working with math and science teachers in grades 3-6 in six school systems to develop a common rationale and common goals and standards across grades and subjects for performance assessment activities that will yield aggregatable data. Goals emphasize higher order thinking and metacognitive skills, to be gained and demonstrated in the context of the content of the curriculum.

Questions/Issues Addressed

Development of goals, standards, and documentation strategies that are consistent across grade levels and content areas.

Questions/Issues Remaining

N/A

Pacific Telesis Foundation "Education for the Future" Program

Project Director Margaret Jorgensen
Project Status Canceled in 1992
Educational Level Elementary, Middle
Subject Matter Math, Science
Focus Instructional Assessment
Type of Technology Used Videotape
Performance Assessment? Yes
Teacher Training Component? Yes

Description

ETS provided workshops and ongoing support for teachers in the development of performance-based assessment/instruction materials. The program targeted at-risk students in two California schools.

Questions/Issues Addressed

Ways to get teachers to deal with the "Big Ideas" of higher order thinking skills and metacognitive processes. **The message must be presented in powerful ways: Hands-on experience and videotapes of students engaging in and demonstrating metacognitive activities are convincing.**

Ways of promoting equity in performance assessments. 1) **Relatively short performance activities (limited to two class periods, for example) reduce the opportunities for some students to take advantage of resources (older siblings, interested parents, materials in the home) available to them but not to others; in general, the more extended the activity, the greater the chance for lack of equity.** 2) **Allowing the student a choice of response modalities reduces the possibility that the prescribed method of demonstration will be punitive to some children.**

Are there some general features of the task of designing performance assessments that all teachers learning this approach need to understand? 1) **The difference between the kind of informal, day-to-day appraisals good teachers routinely carry out and the systematic observation to inform instruction, which is the nature of performance assessment.** 2) **The role of simplicity and sampling in performance assessment, in preference to extended, complicated projects.**

NOTE: See the description of "Reflections of Learning " Training Seminars for explanation of the ways in which these ideas are being put to use.

Questions/Issues Remaining

None

Maryland Education Project, Assessment Measures Task Force

Project Directors Mary Fowles and Gita Wilder
Project Status Completed
Educational Level Elementary, Middle
Subject Matter Writing, Math
Focus Instruction
Type of Technology Used Computers
Performance Assessment? Yes
Teacher Training Component? No

Description

ETS worked with the Assessment Measures Task Force of the Maryland Education Project to develop a framework for assessing the progress made by schools, teachers, and students in integrating computers into instruction.

Questions/Issues Addressed

How does the introduction of computers into schools affect the learning process for students, the instructional practices of teachers, the classroom process for both teachers and students, and the organizational context of the schools? How can these effects be judged? **A framework was developed that delineates levels of progress in integrating computers for instruction in these areas: motivation; use of word processing in the writing process; production and performance for purposes of communication; integration of reading and writing; gathering, integrating, analyzing, and using information; solving complex problems; and adapting instruction to the needs of individual students. Within each area, indicators of progress were established for five levels of progress in teacher and student attitudes, behaviors, and skills related to the use of technology as a teaching and learning tool.**

As an example of the kind of information teachers brought to the task force deliberations, the project states that the computer contributed to the writing process by making it easy for students to revise drafts and by creating products that increased both their pride in their own writing and their interest in reading the writing of others.

Questions/Issues Remaining

The framework is a described as a working document. Task Force members intend that those who use it should provide feedback that will contribute to its continual development.

Design of an Integrated, Self-Improving Assessment System for California Schools

Project Director Karen Sheingold
Project Status Current
Educational Level Elementary, Middle, Secondary
Subject Matter Math, Science, Language, Social Studies
Focus Assessment
Type of Technology Used None
Performance Assessment? Yes
Teacher Training Component? No

Description

A multi-year research and development project to design, test, and validate elements of the California Assessment Program.

Questions/Issues Addressed

Design of curriculum-embedded assessments in each of the subject areas at all grade levels.

Design of criteria for an organic portfolio to be used statewide.

Testing the viability of these designs for instructional and assessment purposes.

Design of learning/assessment tasks that are engaging and revealing for all students, to assure equity and access.

Assuring validity of new assessments

Assuring reliability and generalizability of new assessments.

Questions/Issues Remaining

N/A

Implementation of Technology in Schools: Lessons from Eight Sites

Project Directors Brian Stecher, Gita Wilder
Project Status Completed
Educational Level Elementary, Middle, Secondary
Subject Matter Many
Focus N/A
Technology Used Computers
Performance Assessment? N/A
Teacher Training Component? No

Description

This project used a case study approach to examine the factors affecting implementation of computer technology in schools. The directors were cautious about making generalizations from such a small and diverse sample, and they noted that future studies of implementation should be longitudinal, because the implementation process takes several years to complete. However, the information they assembled and the conclusions they drew will be useful to developers of technology-based programs.

Questions/Issues Addressed

Importance of the implementation process to the ultimate effectiveness of a technology-based program. **The implementation process is "an important (if not the most important) element in technological innovation and that this process is both complex and lengthy, lasting many years in the sites we visited."**

Factors that influence the implementation of technology-based programs in public school settings. **The two most important factors in successful implementation were**

1) a close match between the technology and the existing curriculum and instructional patterns, and

2) strong and continuing administrative support and leadership.

The change required in teachers' roles and responsibilities was a significant barrier to successful implementation, although this barrier was overcome in some schools because of strong, committed leadership that fostered a climate for change.

(See ETS RM-91-4 for full discussion.)

Questions/Issues Remaining

Study of the implementation process at the classroom level, to determine the effects of teacher and classroom-level variables on the implementation process.

PACKETS™

Project Director Nancy Katims
Project Status Current
Educational Level Elementary, Middle, Secondary
Subject Matter All
Focus Instructional Assessment
Type of Technology Used None
Performance Assessment? Yes
Teacher Training Component? No

Description

A series of performance-assessment materials for use by classroom teachers. Each set focuses on a particular subject and level. The first (and only, so far) is middle school math, using materials developed by Dick Lesh. Materials for all PACKETS will be produced as part of other ETS performance-assessment projects.

Questions/Issues Addressed

None. All research questions are addressed in the course of the projects in which the materials are originally developed.

Questions/Issues Remaining

N/A

"Reflections of Learning" Training Seminars

Project Director Margaret Jorgensen
Project Status Current
Educational Level Elementary, Middle, Secondary
Subject Matter All
Focus Instructional Assessment
Type of Technology Used Videotape
Performance Assessment? Yes
Teacher Training Component? Yes

Description

Training seminars are offered for classroom teachers in all subjects, to teach them how to develop and use performance assessment activities to promote learning of higher order thinking and metacognitive skills in the context of their disciplines. Standards developed by professional organizations in the content fields are used to define the thinking skills to be taught (*e.g.*, problem solving, reasoning, reflecting on the learning process, self-correcting, using different ways to communicate ideas, predicting).

Questions/Issues Addressed

N/A, but see the description of the Pacific Telesis project for a description of some of the principles applied to the seminars.

Questions/Issues Remaining

N/A

Videodisc Technology and Sign Language for Improving Reading Skills of Deaf Middle School Students

Project Director Eric Hansen
Project Status Current
Educational Level Middle
Subject Matter Reading
Focus Instruction
Type of Technology Used Computer, Interactive videodisc
Performance Assessment? No
Teacher Training Component? No

Description

This project explores the challenges deaf students face in comprehending written English and examines the assistance that may be afforded by signed versions of text presented via an interactive videodisc system capable of presenting reading comprehension passages and questions in either American Sign Language (ASL) or English-based sign. In Phase 1, each participant in the study will be presented with reading passages and accompanying questions in six different forms: English test only, ASL only, English-based sign only, English test plus optional ASL, English text plus optional English-based sign, and English test plus both signed options. In Phase 2, participants will use additional system functions and tools such as corrective feedback, a dictionary, and diagnostic probe questions.

Questions/Issues Addressed

Phase 1: Issues of performance and preference for a particular language version will be studies in light of content variables and student variables.

Phase 2: The nature of the difficulties deaf students face in accessing the meaning of written English, *e.g.*, how deaf students with different backgrounds try to handle difficult inferencing problems; to what extent deaf students have trouble with particular vocabulary versus higher-level constructions.

Questions/Issues Remaining

N/A

Inside Story: Dateline Brazil

Project Director Nancy Katims
Project Status Completed
Educational Level Middle School
Subject Matter Language Arts/Critical Thinking Skills
Focus Instruction
Type of Technology Used Computer (CAI)
Performance Assessment? No
Teacher Training Component? No

Description

A computer-assisted instruction unit in critical thinking skills was developed for use in language arts classes. The unit combines computer activities with classroom activities. Assessment is done by the teacher through activities within the unit.

Questions/Issues Addressed

Can the computer be used to present an interactive critical-thinking-skills unit appropriate for middle school students? **Yes**

Questions/Issues Remaining

How well can such a unit be incorporated into existing language arts programs?

What kinds of teacher training are necessary for it to be implemented effectively?

To what extent do students acquire transferrable critical thinking skills as a result of working through the unit?

Evaluation of a Mathematics Videodisc Project

Project Director John V. Moe
Project Status Completed 1992
Educational Level Middle School
Subject Matter Math
Focus Instructional Assessment
Type of Technology Used Videodisc
Performance Assessment? No
Teacher Training Component? No

Description

Two mathematics videodisc lessons were developed as part of a project to interest minorities and girls in mathematics and to assist teachers as they teach mathematics. Only one of the two was used in final tryouts, which took place in three schools with nearly 100% minority enrollments, in three different cities. An important feature of the project was the use of an electronic student response system to monitor student responses to questions presented as instruction occurred.

Questions/Issues Addressed

How effective were the lessons in terms of student achievement? **They were effective for virtually all students and more effective for girls than for boys. Girls, who scored lower than boys on the pretest, made greater gains than boys, although their posttest scores did not quite reach the level of boys' posttest scores.**

Other findings:

Using an electronic student response system encourages shy students and students who have had little previous experience with the topic to participate actively in the lesson.

Blending technological applications with more traditional approaches (*e.g.*, teacher explanations, students working at the blackboard) is likely to be more effective than using either approach alone.

[Technical recommendations specific to this application of videodisc technology were also included in the project report.]

Questions/Issues Remaining

Further exploration of the effects of frequent, low threat student/teacher and student/student interactions on the learning process for groups of students.

Expansion of this technique to other areas of the curriculum.

Incorporating recent theories of cognition into the development of other lessons using the videodisc technique.

Research and Development in Mathematics using "Authentic Assessments"

Project Director Dick Lesh
Project Status Current
Educational Level Middle School
Subject Matter Math
Focus Instructional Assessment
Type of Technology Used None
Performance Assessment? Yes
Teacher Training Component? Yes

Description

Development of math activities that combine assessment and instruction. Math problems are presented in the context of realistic newspaper articles that yield three types of questions:

Test-like questions that deal with facts and skills;

Homework-like problems that are somewhat more complex;

"Model-eliciting" projects that produce results that become the basis for a new article. These may take up to 50 minutes to solve and are often undertaken as group activities.

Questions/Issues Addressed

Can "authentic assessments" such as that described above be created? **Yes**

How effective are such assessments in increasing students' understanding of and ability to use mathematical principles?

In the "model-eliciting" problems, how can reliability be assured?

How can teachers and test developers learn to create such assessments?

Will the use of such assessments help to identify more students with high math ability?

Can assessments be designed that are targeted toward groups in which math participation is currently low?

Questions/Issues Remaining

N/A

Project GIMS (Georgia Innovations in Math and Science, an NSF statewide systemic initiative)

Project Director Margaret Jorgensen
Project Status Current
Educational Level Middle School
Subject Matter Math, Science
Focus Assessment
Type of Technology Used None
Performance Assessment? Yes
Teacher Training Component? Yes

Description

ETS is one participant in the NSF-sponsored "statewide systemic initiative program for Georgia, designed to radically change instruction in science and math. The University of Georgia administers the program; the ETS Atlanta Office is responsible for designing assessments.

Questions/Issues Addressed

Subcontract is essentially for development. As the project progresses, research issues may emerge.

Questions/Issues Remaining

N/A

SEPIA (Science Education through Portfolio Instruction and Assessment)

Project Director Drew Gitomer
Project Status Current
Educational Level Middle School
Subject Matter Science
Focus Instructional Assessment
Type of Technology Used None
Performance Assessment? Yes
Teacher Training Component? Yes

Description

The project is designed to foster the construction of scientific meaning in students and to encourage conceptual development consistent with the growth of scientific knowledge. Students will create portfolios containing collections of their work that reflects the processes of scientific thinking, such as students' explanations of scientific phenomena, student-created models of systems, reflections on science activities, and self-evaluations of progress. Teachers will develop assessment techniques that reveal more about students' understanding of science topics than do traditional tests.

Questions/Issues Addressed

How effective is the portfolio-based approach in fostering a conceptual-change model of teaching?

How do students adapt to their changed roles, as they are asked to take more responsibility for their learning and to take more control in assessing their own work?

What instructional and curriculum guidelines will effectively assist teachers in conducting classroom activities and selecting and sequencing instructional tasks?

What teacher in-service programs are needed in order to implement conceptual-change teaching reforms?

What strategies and evaluation criteria can be developed that will assess students' knowledge bases in science and reflect the principles of scientific thinking?

What do alternative assessments designed by teachers reveal about students' understanding? How can that knowledge be used to inform further instruction?

How can alternative assessment strategies like portfolios be used to communicate learning outcomes to administrators and parents?

Questions/Issues Remaining

N/A

Middle School Science Project

Project Director Brian Gong
Project Status Current
Educational Level Middle School
Subject Matter Science
Focus Instructional Assessment
Type of Technology Used Computers
Performance Assessment? Yes
Teacher Training Component? Yes

Description

Development and implementation of a program of instructional assessment to enhance the learning of science at the middle school level.

Questions/Issues Addressed

How can the development of an adaptive teaching/learning environment be facilitated?

What kind of teacher training is needed to implement such a program?

How can the school organization promote this type of adaptive teaching/learning?

Can science units be developed that

integrate assessment with instruction? **Yes**
integrate technology and its uses with other aspects of science? **Yes**
motivate students by focusing on everyday, real-world problems? **Yes**

Can the learning of science be integrated with other subjects? **Yes**

What kinds of mental models do students at this level use to understand and explain scientific phenomena? How do different forms of instruction contribute to the development of different kinds of mental models?

How do teachers use assessment information to guide practice?

Questions/Issues Remaining

N/A

Performance Assessment as a Tool for Enhancing Learning in Middle School Science

Project Director John Frederiksen
Project Status Current
Educational Level Middle, Secondary
Subject Matter Science
Focus Instructional Assessment
Type of Technology Used None
Performance Assessment? Yes
Teacher Training Component? Yes

Description

The project will explore the use of student projects and extended performance tasks ("inquiry-based science") that enhance the teaching and learning of science, that meet psychometric standards for validity, fairness and reliability, and that provide information necessary for public accountability.

Questions/Issues Addressed

Can principles be developed for constructing and scoring performance tasks?

What qualities of performance should be assessed, and how should they be presented?

What is the best way to construct systems ("rubrics") for scoring complex performances? How useful for various assessment purposes are the analytical and the holistic models?

Can scoring rubrics be designed to communicate to students, through instructional feedback, the goals of scientific inquiry?

How can teachers be trained to accurately and reliably score performance tasks? Can consensus moderation groups be used to maintain the accuracy of scoring?

How important is standardization of performance tasks and conditions of administration?

Do students show improvement in their quality of performance over a sequence of assessment tasks throughout a semester or year? Is improvement generally noticeable, or is it restricted to particular performance tasks?

Does the introduction of a performance-assessment system result in beneficial changes in teaching practice? What additional teacher training is required?

What instructional models will develop knowledge and skill in scientific inquiry in less advantaged populations?

Questions/Issues Remaining

N/A

Evaluation of Hunterdon Central High School Prototype Classrooms

Project Director Lori Morris
Project Status Current
Educational Level Secondary
Subject Matter Mathematics, Science, Industrial arts
Focus Instruction
Type of Technology Used Computers, telecommunications, laser and CD players, projection capability
Performance Assessment? No
Teacher Training Component? No (but see description below)

Description

The school system is establishing three prototype classrooms (a biochemistry lab, a physics/electronics lab, and an applied technology lab), using advanced technology. Each room will include a teacher/presentation area equipped with laser disc and CD players, telecommunications capacity, and projection capability for video and computer-generated material. The biochemistry lab will have 12 computer stations, each connected with the school's library/media center/communication center as well as to external databases. In addition, the school has also created a computer lab for the Mathematics Department. The purpose of this project is to evaluate what teachers need in the way of training and curriculum development. The project director will also help the school district seek funding for these activities.

Questions/Issues Addressed

What training do teachers need in order to be able to make effective use of the high technology classrooms?

What curriculum development activities should be undertaken?

Questions/Issues Remaining

N/A

Video Portfolio Assessment

Project Director John Frederiksen
Project Status Current
Educational Level Secondary
Subject Matter Math
Focus Assessment
Type of Technology Used Videotapes
Performance Assessment? Yes
Teacher Training Component? Yes

Description

This project explores the feasibility of using classroom videotapes as a source of data for an assessment system for certifying masterful teachers. The goal of the project is to create a performance assessment of accomplished teaching that will make a direct and positive contribution to the professional development of teachers. The project focuses on math teachers at the secondary level; the principles developed through the poject will be applicable to other subjects and levels.

Questions/Issues Addressed

What concepts do accomplished teachers use in evaluating teaching? **The project identified four criteria: Pedagogy, Climate, Mathematical Thinking (or a corresponding content specific goal for other subjects, and Management.**

Can teachers develop common perceptions of teaching based on a shared set of concepts used as an interpretive framework? **Yes.**

Can teachers integrate evaluations based upon separate concepts in making overall judgments of teaching expertise? **Judgments can be made for each criterion of teaching expertise; however, because the weighting of criteria and the integration of video portfolio scores with other information are beyond the scope of the project, no overall scores were assigned to the portfolios.**

Can the contents of video portfolios be scored with reliability? **Yes. Further research is being done to create a model of the scoring process and to compare it with the scoring models used in the classroom observation component of The Praxis Series: Professional Assessments for Beginning Teachers™.**

What is the best way to facilitate development of a socially shared understanding of assessment concepts among teachers who develop or score video portfolios? **One good way is through video clubs, in which teachers meet to view and reflect upon their own and others' videotapes and to discuss the criteria on which the portfolios will be scored. Further research on video clubs is under way.**

Questions/Issues Remaining

N/A

CIESE Projects — Evaluation of Computer Integration in Math Education

Project Director Lori Morris
Project Status Completed 1992
Educational Level Secondary
Subject Matter Math
Focus Instruction
Type of Technology Used Computers
Performance Assessment? No
Teacher Training Component? No

Description

The Center for Improved Engineering and Science Education (CIESE was established by Stevens Institute of Technology to help integrate computer-based instruction in mathematics at the pre-college level. This project was part of the evaluation of the effectiveness of the CIESE project at the secondary level in five demographically diverse school districts.

Questions/Issues Addressed

Barriers to integration. **Primary barriers are time (to preview software and prepare lesson plans) and money (to purchase hardware, software, disks, and paper). CIESE's formal presentations to school boards and informal conversations with administrators played an integral role in resolving these issues.**

Impact on teachers. **Computer integration encouraged teachers to self-reflect on their teaching styles and pedagogies. Teacher's role changed from authoritarian to coach. Teachers of higher academic level students tend to use the computer to encourage higher order thinking skills through the discover method of learning (rather than using the time saved to cover a wider range of skills).**

Changes in student attitudes. **Students gained autonomy in their pursuit of understanding of math, being able to make mistakes privately at the computer rather than in front of the class. Discussion of math among students increased. In lower ability classes, students' self-esteem and attitudes toward math improved and discipline problems decreased.**

Effects on the social structure of the schools. **The process of integration encouraged collaborative relations among teachers, and, in some cases, between administrators and teachers.**

Responsiveness of the CIESE project to the needs of teachers. **CIESE staff's nondirective approach empowered teachers, providing them with confidence to independently develop their own criteria for judging software. CIESE workshops were considered successful by teachers because time was provided for teachers to reach their goals; workshops were flexible enough for teachers to work informally in groups or alone; teachers had the opportunity to interact with math teachers outside their schools; teachers felt they were treated like professionals.** *(continued on next page)*

CIESE Projects (continued)

Other findings. **Advantages of the computer cited by teachers include enhanced quality and quantity of visual examples and ability to cover more material in a shorter time. Evaluation of student achievement outcomes (by Stevens researchers) showed that students made gains that were maintained over time.**

Questions/Issues Remaining

None

Use of Artificial Intelligence to Score Constructed-Response Items in Algebra

Project Director Randy Bennett
Project Status Current
Educational Level Secondary
Subject Matter Algebra
Focus Instructional Assessment
Type of Technology Used Computer, Expert System, Automated Scoring
Performance Assessment? No
Teacher Training Component? No

Description

Development of interactive math assessments in which students work on problems similar to those encountered in academic work or employment. Students' solutions are scored automatically. Partial credit is given for varying degrees of correctness. Diagnostic information about errors is provided.

Questions/Issues Addressed

Can constructed responses to math items be scored automatically, giving partial credit for partially correct responses, and providing diagnostic information about errors? **Yes**

Can an automatic scoring system diagnose and evaluate the process used to arrive at an answer? **Yes**

How does the effectiveness of the scoring system vary across four different types of open-ended questions, representing four degrees of structure in presenting the problem and four levels of constraint in the response?

How applicable are new, cognitively-driven measurement models to such interactive assessments?

Can the system be extend d to other content classes and to other difficulty levels within the algebra domain?

Can the scoring rubric be refined to reduce discrepancies between automatic and human scorers?

Do these constructed-response item types measure a different dimension from that measured by traditional (multiple-choice) items?

How can information be aggregated across items to detect and describe instructionally meaningful patterns in the scores and diagnostic information?

Questions/Issues Remaining

Can such a system be integrated into classroom instruction?
Does the system enhance the learning process in algebra?

A Practice and Feedback System for AP Computer Science

Project Director Randy Bennett
Project Status Current
Educational Level Secondary
Subject Matter Computer Science
Focus Instructional Assessment
Type of Technology Used Computer, Expert System, Automated Scoring
Performance Assessment? Yes
Teacher Training Component? No

Description

The Advanced Placement Computer Science Practice System was developed to explore issues relating to classroom instructional assessment, to the use of complex constructed-response tasks in large-scale testing, and to the integration of the two. Items included in the system emphasize important data structures taught in the APCS curriculum. After a problem is selected, the student is transferred to the editing mode, in which the student can write, compile, and run a solution, and then request a semantic analysis and grading of the solution. The system provides a score on the APCS scale and diagnostic comments about errors.

Questions/Issues Addressed

Can responses to performance tasks in computer science be analyzed automatically? **Yes**

Can a system with the following features be designed? **Yes**
runs on classroom computers
analyzes responses in real time
allows student to interact with it directly
can be modified to add new problems

How can knowledge bases for diagnostic analysis be constructed? **By reviewing problem solutions from ETS files, identifying approaches students used and errors they made, and encoding the correct and incorrect elements of the solutions. Example Compiler, a development tool, was developed to facilitate the process.**

Addition of other classes of problems ("class" = group of problems all having the same underlying data structure) representing other data structures included in the AP curriculum.

Questions/Issues Remaining

Evaluation of effectiveness of classes of problems in helping students learn to recognize the underlying structure of a problem.

Evaluation of operational classroom use of the system in AP courses.

Sign Language and Videodisc for Test Preparation Materials for Deaf Secondary School Students

Project Director Eric Hansen
Project Status Current
Educational Level Secondary
Subject Matter Reading
Focus Instruction
Type of Technology Used Computer, Interactive videodisc
Performance Assessment? No
Teacher Training Component? No

Description

Development and evaluation of a computer-based test preparation system using sign language for deaf secondary school students preparing for reading comprehension tests. The system will consist of a pretest, an instruction component, and a posttest. In the instruction component, the student will be able to request American Sign Language translations of virtually all text.

Questions/Issues Addressed

Effectiveness of the system in preparing students for reading comprehension tests.

Questions/Issues Remaining

N/A

Systems Thinking and Curriculum Innovation Network (STACI")

Project Director Ellen Mandinach
Project Status Current
Educational Level Middle, Secondary
Subject Matter Science, Math, Social Studies, Humanities
Focus Instruction
Type of Technology Used Computers and Simulation-Modeling Software
Performance Assessment? Yes
Teacher Training Component? Yes

Description

A multi-year research effort examining the cognitive impact of the use of a systems thinking approach and simulation-modeling software to supplement and enhance instruction in a variety of content areas. The project studies the effects of systems thinking on acquisition of content-specific knowledge and general problem-solving skills, the effects on teacher performance and classroom processes, and the effect on oganizational structure and functioning.

Questions/Issues Addressed

Can secondary school students learn the principles of systems thinking and apply them in their courses? **Yes**

Do students acquire problem solving skills through the use of systems thinking and simulation modeling? **Yes**

In contrast to students in traditional courses, do systems-thinking students evidence greater conceptual understanding of topics being studied? **Yes**

How does use of the systems approach affect students' acquisition of content knowledge?

What are the effects of the use of various strategies and methods for integrating modeling activities into the curriculum?

What mathematical skills are prerequisite to the effective use of modeling activities?

What is the effect of cognitive development on students' ability to benefit from the systems approach?

Do analytic reasoning skills have a cumulative effect as students progress through several years of systems thinking courses?

How does the role of the teacher change when a systems approach is implemented? **Teacher becomes a facilitator who works interactively with students.**

What kind of training can best prepare teachers to use the systems approach?

Questions/Issues Remaining N/A

Pacesetter™

Project Director Ernest Kimmel
Project Status Current
Educational Level Secondary
Subject Matter English, History, Science, Math
Focus Instructional Assessment
Type of Technology Used None
Performance Assessment? Yes
Teacher Training Component? Yes

Description

"Pacesetter, a major college Board initiative, is an array of secondary school syllabi and related assessments, supported by professional development opportunities for teachers. It is designed to develop challenging standards, raise expectations and improve performance for all American students, and to ensure that educators are at the forefront of defining and delivering that effort. Developed in cooperation with leading professional associations in the academic disciplines and educational practitioners at all levels, its initial offering in mathematics is projected for 1993, followed by offerings in English, world history, science, and another subject to be determined."

Questions/Issues Addressed

Development and evaluation of the following components:

The syllabus, describing course content and anticipated learning outcomes.

Teacher training and support activities.

Classroom assessments intended to permit teachers to monitor and shape instruction, as well as to provide feedback to students.

End-of-course achievement tests, which will include both multiple-choice and performance-based sections.

A system for scoring the end-of-course achievement tests on a state, regional, or local level, including the training of teachers who score them.

Questions/Issues Remaining

N/A

Arts PROPEL

Project Director Drew Gitomer
Project Status Completed 1992
Educational Level Middle, Secondary
Subject Matter Writing, Art, Music
Focus Instructional Assessment
Type of Technology Used None
Performance Assessment? Yes
Teacher Training Component? Yes

Description

The goal of the project was to develop powerful modes of encouraging and assessing artistic learning in a wide range of students, not just those recognized as artistically talented. The project focused on artistic development in imaginative writing, music, and visual art. The project developed a model that employs "domain projects," which consist of sequences of instruction about a central problem or project. Using portfolios, students selected, saved, and reflected upon the diverse body of material that underlay their final productions or performances.

Questions/Issues Addressed

Can assessment and instruction be integrated as interactive and iterative components of the learning process? **Yes**

Can students learn to look critically at their own work and the work of their peers and to reflect upon the learning and creating processes? **Yes**

Can teachers adapt to new roles as facilitators and moderators? **Yes**

Does this approach improve student learning? **Yes**

Questions/Issues Remaining

Can this approach be adapted to other subject areas? **An experimental project in science (SEPIA) is under way.**

Issues and Technical Procedures in Rating Portfolios

Project Directors Carol Myford & Robert J. Mislevy
Project Status Current
Educational Level Secondary
Subject Matter AP Studio Art
Focus Assessment
Type of Technology Used None
Performance Assessment? Yes
Teacher Training Component? No

Description

Focusing on the AP Studio Art program, this project examines issues related to portfolio assessment and performance assessment from both statistical and naturalistic perspectives. From the statistical perspective, the project is using data from the AP Studio Art program to gain insights into important generalizability problems and to build expertise with analytical tools for such data. The naturalistic perspective provides insights into the processes underlying the patterns detected by statistical analysis. The issues being addressed are those that arise in many performance assessment settings, and the technical procedures used can be applied in a variety of contexts. The project can serve as a model for other programs that seek to monitor the effectiveness of rating procedures and to establish quality control over those procedures.

Questions/Issues Addressed

Defining rating standards.

Assuring consistency in ratings (reliability).

Assuring the construct validity of the AP Studio Art portfolios; examination of possible differences between the values and perspectives of secondary school art teachers and those of art teachers at universities and art schools.

Questions/Issues Remaining

N/A