A project provided teachers and other school personnel with a set of practical instruments for assessing students' generalizable mathematics skills in the secondary vocational training programs in Illinois. The major accomplishments of the project were advisory committee identification and selection; population and sample identification and selection; coordination of project activities with the "Change Skills" project activities; development of the set of student self-ratings, teacher ratings, and performance test mathematics assessment instruments; field testing of instruments; development of strategies for using the instruments; and production of a user manual, resource directory, and final report. The instruments were found to possess content and face validity relative to the mathematics skills required in vocational programs and occupations and were highly reliable in terms of internal consistency reliability and test-retest reliability. Following the 25-page narrative, these appendixes are provided: project correspondence, a chart of generalizable mathematics skills, and the instruments (student self-ratings, teacher ratings, and performance test). (Author/YLB)
The Development of Strategies and Procedures for Assessing the Generalizable Skills of Students in Secondary Vocational Programs: Generalizable Mathematics Skills

FINAL PROJECT REPORT

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)"
The Development of Strategies and Procedures for Assessing the Generalizable Skills of Students in Secondary Vocational Programs: Generalizable Mathematics Skills

James P. Greenan
Principal Investigator

Department of Vocational and Technical Education
College of Education
University of Illinois
at Urbana-Champaign

Illinois State Board of Education
Walter W. Naumer, Jr.
Chairman
Donald G. Gill
State Superintendent of Education

Department of Adult, Vocational and Technical Education
Research and Development Section
June, 1984
Acknowledgements

A special acknowledgement is extended to all the area vocational center directors, students, and teachers who participated in this project. The project's success depended greatly upon their cooperation, assistance, and support. Their response was enthusiastic and conscientious.

Drs. L. Allen Phelps and Hercules C. Kazanas, Co-Project Directors, Department of Vocational and Technical Education, University of Illinois; and Dr. Peter Seidman, Contract Administrator, Illinois State Board of Education, Department of Adult, Vocational, and Technical Education provided support and assistance throughout the study. Jo Ann Powell, research assistant, provided excellent assistance in developing the resource directory. Their input and suggestions were appreciated.

Special attention is also extended to the project advisory committee members for their valuable suggestions and recommendations for the duration of the project. Each member was extremely helpful in the project phases that included reviewing materials, instruments, products, and reports. The project advisory committee included:

Dr. James A. Dunn, Director
Institute for Occupational Education
College of Education
Cornell University

Dr. John C. Ory, Coordinator
Examination Services
Instructional Resources
University of Illinois

Dr. Maurice Tatsuoka
Dept. of Educational Psychology
College of Education
University of Illinois

Kay Smoot, Resource Teacher
VOTEC
Catlin Road
Danville, Illinois

Mr. William Rosser, Counselor
Decatur Area Vocational Center
Decatur, Illinois

James Facko, Mathematics Teacher
Sauk Area Career Center
Robbins, Illinois
Additional thanks and appreciation are due to Lilian Del Barco and Selena Douglass for typing, proofing, and other secretarial tasks related to the production of this and other products of the project. Their conscientiousness, patience, efficiency, and enthusiasm helped make this study successful.
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acknowledgements</td>
<td>i</td>
</tr>
<tr>
<td>Department of Adult, Vocational, and Technical Education Funding</td>
<td></td>
</tr>
<tr>
<td>Agreement Number</td>
<td>1</td>
</tr>
<tr>
<td>Official Project Title</td>
<td>1</td>
</tr>
<tr>
<td>Project Director</td>
<td>1</td>
</tr>
<tr>
<td>Funded Agency</td>
<td>1</td>
</tr>
<tr>
<td>Location of Funded Agency</td>
<td>1</td>
</tr>
<tr>
<td>Time Period Covered</td>
<td>1</td>
</tr>
<tr>
<td>Final Report Abstract</td>
<td>2</td>
</tr>
<tr>
<td>Expenditure of Funds</td>
<td>3</td>
</tr>
<tr>
<td>Paid Participants in Activity</td>
<td>3</td>
</tr>
<tr>
<td>Product Abstract</td>
<td>5</td>
</tr>
<tr>
<td>Conference/Workshop Summary(ies)</td>
<td>9</td>
</tr>
<tr>
<td>Resource Listing</td>
<td>11</td>
</tr>
<tr>
<td>Accomplishments, Including Significant Findings</td>
<td>11</td>
</tr>
<tr>
<td>Major Activities and Events</td>
<td>12</td>
</tr>
<tr>
<td>Problems</td>
<td>17</td>
</tr>
<tr>
<td>Publicity</td>
<td>17</td>
</tr>
<tr>
<td>Resource Persons</td>
<td>18</td>
</tr>
<tr>
<td>Summations of Evaluation Data Collected</td>
<td>19</td>
</tr>
<tr>
<td>Statement of Impact</td>
<td>20</td>
</tr>
<tr>
<td>Conclusions and Recommendations</td>
<td>21</td>
</tr>
<tr>
<td>Staff Development</td>
<td>23</td>
</tr>
<tr>
<td>Other Activities</td>
<td>23</td>
</tr>
<tr>
<td>Materials Developed</td>
<td>24</td>
</tr>
<tr>
<td>Appendices</td>
<td>25</td>
</tr>
</tbody>
</table>
A. Department of Adult, Vocational, and Technical Education Funding
   Agreement Number: R-31-24-D-0222-470

B. Official Project Title: The Development of Strategies and Procedures
   for Assessing the Generalizable Skills of Students in Secondary
   Vocational Programs: Generalizable Mathematics Skills

C. Project Director: James P. Greenan, Associate Project Director and
   Principal Investigator
   L. Allen Phelps, Co-Project Director
   Hercules C. Kazanas, Co-Project Director

D. Funded Agency: Department of Vocational and Technical Education
   Office of Career Development for Special Populations
   College of Education
   University of Illinois

E. Location of Funded Agency: Champaign, Illinois 61820

F. Time Period Covered: July 1, 1983 - June 30, 1984
Final Report Abstract

The Development of Strategies and Procedures for Assessing the Generalizable Skills of Students in Secondary Vocational Programs: Generalizable Mathematics Skills.

Department of Adult, Vocational and Technical Education Funding Agreement Number: R-31-24-D-0222-470

Project Director: James P. Greenan, Associate Project Director and Principal Investigator; L. Allen Phelps, Co-Project Director; Hercules C. Kazanas, Co-Project Director

Funded Agency: Department of Vocational and Technical Education, Office of Career Development for Special Populations, College of Education, University of Illinois

Location of Funded Agency: 345 Education Building, 1310 South Sixth Street
Champaign, Illinois 61820

Time Period Covered: July 1, 1983 - June 30, 1984

Primary Accomplishments of the Project:

1. Identified and selected the project advisory committee.
2. Identified and selected the population and sample.
3. Coordinated the "Generalizable Skills" project activities with the "Change Skills" project activities.
5. Field tested the generalizable mathematics assessment instruments.
6. Determined the reliability and validity of the assessment instruments.
7. Developed strategies and procedures for using the generalizable mathematics skills assessment instruments.

Potential Impact on Vocational Education:

This project provided teachers and other school personnel with a set of practical instruments for assessing students' generalizable mathematics skills in the secondary vocational training programs in the State of Illinois. The instruments may be used for identifying the functional learning abilities and problems of students having difficulty in successfully completing their programs. Further, upon identifying students' mathematics skill levels, a basis may be provided on which to prescribe and deliver the instructional, remedial, and support services necessary for students to succeed in their chosen vocational programs. In addition, the concept of generalizable mathematics skills could then be applied to planning, assessment, curriculum, instruction, and evaluation in students' individualized education programs. This project also contributed and impacted upon the program improvement programmatic emphasis concerning the "new basics" in vocational education.

Products Delivered: (Indicate titles, types, quantity, recipients and date of delivery)

1. Two (2) copies of Quarterly Progress Reports (October 1, 1983; January 1, 1984; and April 1, 1984).
4. Twenty (20) copies of the final report delivered to DAVTE by June 30, 1984.
H. Expenditure of Funds:

A budget revision was requested and approved during the month of January. The budget revision included a decrease from $26,125 and $3,152 to $23,221 and $2,912 in the salary and benefits of the principal investigator. The funds were used to create the research assistant position ($2,904 salary; $12 benefits), and increase the salary ($1,620 to $1,741) and benefits ($196 to $218) of the Clerk Typist III. In addition, due to the reprinting of the Executive Summary, the printing line-item was increased from $1,200 to $2,300. This modification represented an increase from the original amount requested from DAVTE. Other than the requested and approved budget revision, there were no discrepancies between the Illinois State Board of Education/Department of Adult, Vocational and Technical Education Funding Agreement amount and actual expenditures claimed.

I. Paid Participants in Activity:

Dr. James P. Greenan
Associate Project Director and Principal Investigator
Department of Vocational and Technical Education
Office of Career Development for Special Populations
University of Illinois

James P. Greenan is currently an assistant professor in the Department of Vocational and Technical Education at the University of Illinois. For the past five years he has been the research and development coordinator of the Office of Career Development for Special Populations. During 1983-84 Dr. Greenan served as the associate project director and principal investigator of the 'Generalizable Skills' project. He was responsible for all planning, administrative, operational, and evaluation activities of the project.
Dr. Greenan has extensive teaching, research, and service experiences at the local, state, regional, and federal levels. He has conducted several research studies, published numerous articles and reports, and given several presentations at professional conferences. His occupational work experiences, education and training, and research activities have focused on vocational/industrial education, career education, research, and special needs. Presently, Dr. Greenan is actively involved in several professional associations, such as, the American Vocational Association and the Council for Exceptional Children. He is currently president-elect of the Illinois Association of Vocational Education Special Needs Personnel.

Jo Ann Powell  
Research Assistant  
Department of Vocational and Technical Education  
Office of Career Development for Special Populations  
University of Illinois

Jo Powell was appointed 50% time in the 'Generalizable Skills' project from January 21 - June 30, 1984. Ms. Powell is a full-time doctoral student in the College of Education. Her responsibilities included assisting on several project activities, and specifically, planning, organizing, and producing the Generalizable Mathematics Skills Resource Directory.
Product Abstract

1. Title of material: Generalizable Mathematics Skills User Manual

2. Date material was completed: June 30, 1984

3. Please check one: New material ☒ Revised material _____ Field-tested material _____

4. Originating agency: Department of Vocational and Technical Education, College of Education

   Address: University of Illinois, 1310 S. Sixth St., Champaign, IL 61820

5. Name(s) of developer(s): Dr. James P. Greenan

   Address: Same as Above

6. Developed pursuant to Contract Number: R-31-24-D-0222-470

7. Subject Matter (Check only one according to Department of Education Code):

   Code:
   01 Agricultural Education
   03 Business and Office Education
   04 Distributive Education
   07 Health Occupations Education
   09 Home Economics Education
   10 Industrial Arts Education
   16 Technical Education
   17 Trade and Industrial Education
   22 Cooperative Education
   X Other (Specify) Comprehensive Vocational Education

8. Education Level:

   Pre-K Thru 6 ☒ 7-8 ☒ 9-10 ☒ 11-12 ☒
   Post-Secondary ☒ Adult ☒ Teacher (Pre-service) ☒ Other (Specify) ☒

9. Intended for Use By:

   X Student ☒ Teacher Educator ☒ Classroom Teacher ☒ Local Administrator ☒ Guidance Staff ☒ State Personnel ☒ Other (Specify) ☒

10. Student Type:

    X Regular ☒ Disadvantaged ☒ Handicapped ☒ Limited-English Proficiency ☒ Other (Specify) ☒

11. Medium and Format of Materials:

    X HARDCOPY ☒ VIDEOTAPE ☒ FILM ☒ MICROFICHE

    No. of pages: 5
    Minutes: B & W
    Color: B & W
    Color: B & W
    Other (Specify): m.:
12. Availability:

- [X] One copy free
- For sale @ $__ per copy
- [X] Not available
- [X] Loan copy available

Contact: Name: Dr. James P. Greenan, OCUSP
         Department of Vocational and Technical Education
         Address: College of Education, University of Illinois
         Zip Code: 61820

13. Copyright Restrictions:

Contact: Name: (In the Public Domain)
         Phone: ( )
         Address: ___________________________
         Zip Code: ___________________________

14. What level(s) of assistance is required to provide implementation of this outcome?

- [X] awareness
- [X] understanding
- deciding
- [X] implementing

15. Are Consultive/Inservice (or staff development) available? Yes [X] No [ ]

Contact: Illinois State Board of Education
         Department of Adult, Vocational and Technical Education
         Research and Development Section, E-426
         100 North First Street
         Springfield, IL 62777
         (217) 782-4620

16. General Description (State the general objective and suggested method of use. Summarize the content and tell how it is organized. Write the description so that it can be used to promote the material. Continue on back of this sheet or on another sheet if necessary.)

17. Person Completing this Abstract: Dr. James P. Greenan

Full Address: Office of Career Development for Special Populations
              Department of Vocational and Technical Education
              College of Education
              345 Education Building
              University of Illinois
              1310 S. Sixth Street
              Champaign, Illinois
              Zip Code: 61820
16. General Description:

This product will provide teachers and other school personnel with a set of practical instruments for assessing students' generalizable mathematics skills in the secondary vocational training programs in the State of Illinois. The instruments may be used for identifying the functional learning abilities and problems of students having difficulty in successfully completing their programs. Further, upon identifying students' mathematics skill levels, a basis will be provided on which to prescribe and deliver the instructional, remedial, and support services necessary for students to succeed in their chosen vocational programs. In addition, the concept of generalizable mathematics skills could then be applied to planning, assessment, curriculum, instruction, and evaluation in students' individualized education programs.
Product Abstract

1. Title of material: Generalizable Mathematics Skills Resource Directory

2. Date material was completed: June 30, 1984

3. Please check one: New material  X  Revised material  ___  Field-tested material  ___

4. Originating agency: Department of Vocational and Technical Education, College of Education

Address: University of Illinois, 1310 S. Sixth St., Champaign, IL 61820

5. Names of developer(s): Dr. James P. Greenan

Address: Same as Above

6. Developed pursuant to Contract Number: R-31-24-D-0222-470

7. Subject Matter (Check only one according to Department of Education Code):

   - 01 Agricultural Education
   - 02 Business and Office Education
   - 03 Distributive Education
   - 04 Health Occupations Education
   - 05 Home Economics Education
   - 06 Industrial Arts Education
   - 07 Technical Education
   - 08 Trade and Industrial Education
   - 09 Career Education
   - 10 Other (Specify) Comprehensive Vocational Education

8. Education Level:

   - Pre-K Thru 6
   - 7-8
   - 9-10  X
   - 11-12
   - Post-Secondary
   - Adult
   - Teacher (Pre-service)
   - Other (Specify)

9. Intended for Use By:

   - X Student
   - Teacher Educator
   - Classroom Teacher
   - Guidance Staff
   - Local Administrator
   - Other (Specify)
   - X  State Personnel

10. Student Type:

    - X Regular
    - Limited-English Proficiency
    - Disadvantaged
    - Handicapped
    - Other (Specify)

11. Medium and Format of Materials:

    - X HARDCOPY
    - VIDEOTAPE
    - FILM
    - MICROFICHE

    No. of pages: Paper bound X
    ___ Minutes
    ___ B & W
    ___ Color
    ___ inches
    Photos: Yes X

    ___ Minutes
    ___ B & W
    ___ Color
    ___ mm

**12. Availability:**

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- [X] In ERIC system (No.
- [X] For sale @ $____ per copy
- [X] Not available
- [X] Loan copy available

**Contact:**
- Name: Dr. James P. Greenan, OCDSP
- Department of Vocational and Technical Education
- Address: College of Education, University of Illinois
- Zip Code: __________

**13. Copyright Restrictions:**

- (In the Public Domain)

**14. What levels(s) of assistance is required to provide implementation of this outcome?**

- [X] Awareness
- [X] Understanding
- [X] Deciding
- [X] Implementing

**15. Are Consultive/Inservice (or staff development) available?**

- Yes [X] No

**Contact:**
- Illinois State Board of Education
- Department of Adult, Vocational and Technical Education
- Research and Development Section, E-426
- 100 North First Street
- Springfield, IL 62777
- (217) 782-4620

**16. General Description** (State the general objective and suggested method of use. Summarize the content and tell how it is organized. Write the description so that it can be used to promote the material. Continue on back of this sheet or on another sheet if necessary.)

**17. Person Completing this Abstract:**

- Dr. James P. Greenan

**Full Address:**
- Office of Career Development for Special Populations
- Department of Vocational and Technical Education
- College of Education
- 345 Education Building
- University of Illinois
- 1310 S. Sixth Street
- Champaign, Illinois
- Zip. 61820
16. General Description:

This product will provide vocational teachers and other school personnel with a resource directory of materials useful in teaching mathematics skills in vocational programs. The directory provides information that includes: (a) titles, (b) authors, (c) source, (d) description, and (e) cost. The directory may be used in combination with the Generalizable Mathematics Skills User Manual. After accessing students' mathematics skills, teachers may use the directory to locate and select appropriate instructional materials to teach mathematics skills.
K. Conference/Workshop Summary

The provisions of this contract did not specifically call for the project to develop and conduct conferences or workshops. Listed below are the conferences, workshops, and meetings attended by the project staff members. While attending these conferences the 'Generalizable Skills' project was discussed with other participants. The project abstract, general information, manuscripts, publications, and draft materials were exchanged. Staff attendance at these conferences provided excellent opportunities to obtain input, suggestions, and recommendations from researchers and practitioners regarding present and future project activities. Regular staff meetings and individual meetings with staff, project advisory committee members, ISBE personnel, and other resources have all been detailed in previous quarterly progress reports. The conferences, workshops, and meetings attended by the staff include:

May 18, 1983
Dr. Peter Seidman, Contract Administrator
ISBE/DAVTE
Springfield, Illinois

July 27, 1983
DAVTE Project Directors' Conference
Sangamon State University
Springfield, Illinois

July 1, 1983 - June 30, 1984
Met individually with project advisory committee members several times

August 15-19, 1983
IVA Conference
Springfield, Illinois

September 22, 1983
'Generalizable Skills' and 'Change Skills' project staff and DAVTE personnel meeting, Springfield, Illinois

October 4-5, 1983
Illinois High Technology Conference
Springfield, Illinois

October 19-22, 1983
Division on Career Development International Conference, PAC meeting, and CEC/DCD Executive Board meeting
Chicago, Illinois
<table>
<thead>
<tr>
<th>Date</th>
<th>Event and Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>November 7, 1983</td>
<td>PAC meeting Champaign, Illinois</td>
</tr>
<tr>
<td>November 9-10, 1983</td>
<td>Mississippi Valley Industrial Education Conference Chicago, Illinois</td>
</tr>
<tr>
<td>December 2-6, 1983</td>
<td>American Vocational Association Conference Anaheim, California</td>
</tr>
<tr>
<td>February 24, 1984</td>
<td>'Generalizable Skills' and 'Change Skills' and DAVTE personnel meeting Springfield, Illinois</td>
</tr>
<tr>
<td>March 8-9, 1984</td>
<td>Meeting of the BIG 10 University Consortium on Career Development for Special Populations University of Minnesota St. Paul, Minnesota</td>
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<tr>
<td>March 15, 1984</td>
<td>IVA/DAVTE Workshop Triton College Chicago, Illinois</td>
</tr>
<tr>
<td>March 27-28, 1984</td>
<td>National Network Conference Denver, Colorado</td>
</tr>
<tr>
<td>April 3-4, 1984</td>
<td>Teacher Education Conference Springfield, Illinois</td>
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<td>April 3, 1984</td>
<td>'Generalizable Skills' and 'Change Skills' and DAVTE personnel meeting Springfield, Illinois</td>
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<tr>
<td>April 6, 1984</td>
<td>IDCD-ILAVESNP Conference Chicago, Illinois</td>
</tr>
<tr>
<td>April 23-27, 1984</td>
<td>Council for Exceptional Children Conference, CEC/DCD Executive Board meeting, CEC annual business meeting, NAC meeting and CEC Research Committee meeting Washington, D.C.</td>
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<tr>
<td>April 30-May 1, 1984</td>
<td>Rupert N. Evans Symposium Allerton, Illinois</td>
</tr>
<tr>
<td>May 21, 1984</td>
<td>Met with Bloomington AVC personnel Bloomington, Illinois</td>
</tr>
<tr>
<td>June 6, 1984</td>
<td>Conduct inservice training on teaching generalizable skills Chicago, Illinois</td>
</tr>
<tr>
<td>June 22, 1984</td>
<td>Meet with DAVTE personnel</td>
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L. Resource Listing:

The resources obtained through this project have been added to the library of the Department of Vocational and Technical Education. Several of the resources (publications and instructional materials) were obtained at no cost. A special section of the library related to generalizable skills has been established as a result of this project. This section of the library is used by undergraduates and graduate students in the Department of Vocational and Technical Education, and by several faculty members from the Department and College of Education. The specific instructional materials used in the undergraduate programs are placed in a special section of the library.

M. Accomplishments, Including Significant Findings:

The major accomplishments of the project include the following:

1. Identified and selected the project advisory committee.
2. Identified and selected the population and sample.
3. Coordinated the 'Generalizable Skills' project activities with the 'Change Skills' project activities.
5. Field tested the generalizable mathematics assessment instruments.
6. Determined the reliability and validity of the assessment instruments.
7. Developed strategies and procedures for using the generalizable mathematics skills assessment instruments.

The staff has been invited to describe the project activities in several classes, professional conferences, and meetings. Technical
assistance requests were received (and fulfilled) from local, state, and national levels regarding research and practice in the area of generalizable skills. Descriptions of conference presentations, journal articles and research reports, and technical assistance/service activities have been included in each of the previous quarterly progress reports.

N. Major Activities and Events:

This section lists the major activities of the 'Generalizable Skills' project during 1983-84 that include:

Task 1:  Identify and select the Project Advisory Committee

1.1 Identify additional potential (PAC) members.

1.2 Select and telephone call each prospective PAC member informing him/her of the project, activities, and requesting their participation.

1.3 Send a follow-up letter to each PAC member (See Appendix A) expressing appreciation for serving on the committee, a list of PAC member activities, and a project proposal.

Task 2:  Identify and select the population and sample

2.1 Select from the 32 secondary area vocational centers (AVC) a purposive (or representative) sample of 3 AVCs in the State of Illinois: (a) Danville VOTEC, (b) Decatur Area Vocational Center, (c) Sauk Area Career Center. The final selection was based on the number of students, number of teachers, and number and variety of programs.

2.2 Telephone call each prospective AVC director participant informing him of the project, activities, requesting his
AVCs participation, and establishing tentative dates for field testing.

2.3 Send a follow-up letter (See Appendix B) to each AVC director expressing appreciation for his willingness to participate in the project, and providing a tentative schedule of activities.

2.4 Attend DAVTE Project Director Meeting.

2.5 Attend Illinois Vocational Association Conference.

Task 3: Coordinate "Generalizable Skills" project activities with "Change Skills" project staff activities

3.1 Attend first meeting with the "Change Skills" project staff and DAVTE personnel.

3.2 Write quarterly progress report #1.

3.21 Attend and present at Illinois High Technology Conference.

3.22 Attend and present at DCD Conference and Executive Board meeting.

3.23 Attend Mississippi Valley Conference.

3.24 Attend and present at the American Vocational Association Conference.

3.3 Attend second meeting with the 'Change Skills' project staff and DAVTE personnel.

3.4 Write quarterly progress report #2.

3.5 Attend third meeting with the 'Change Skills' project staff and DAVTE personnel.

3.6 Write quarterly progress report #3.

3.61 Attend and present at BIG 10 Research Consortium Meeting.

3.62 Attend and present at IVA/DAVTE workshop.

3.63 Attend and present at National Network Conference.
3.64 Attend and present at Illinois Teacher Education Conference.
3.65 Attend IDCD-ILAVESNP Conference.
3.66 Attend and present at National Network Conference.
3.67 Attend CEC, CEC/DCD Executive Board meeting, DCD annual business meeting, NAC meeting and CEC Research Committee meeting.
3.68 Attend Evans Symposium.
3.69 Meet with Bloomington Area Vocational Center personnel.
3.70 Conduct inservice training on teaching generalizable skills in Chicago.
3.71 Meet with DAVTE personnel.

**Task 4:** Develop a set of student self-ratings, teacher ratings, and performance test assessment instruments designed to measure the generalizable mathematics skills of students in secondary vocational programs.

4.1 Identify and select the list of generalizable mathematics skills developed by Greenan (1983) as a basis for developing the assessment instruments (See Appendix C).

4.2 Conduct a review of literature regarding instrument design and theory of student self-ratings, teacher ratings, and performance tests in the area of mathematics. The review concerned existing theory on variables related specifically to the instrument development phase of the study.

4.3 Develop a draft set of student self-ratings, teacher ratings, and performance test mathematics assessment instruments.

4.4 Send the draft instruments to the PAC members for review and critique.
4.5 Revise the assessment instruments according to PAC members' comments, additions, and/or deletions in terms of content, meaning, clarity, and readability.

4.6 Send the revised instruments to the PAC members for review and critique.

4.61 Convene PAC meeting.

4.7 Revise the assessment instruments according to the PAC members' comments, additions, and/or deletions in terms of content, meaning, clarity, and readability.

4.8 Send the revised assessment instruments to the PAC members for review and critique and pilot test the assessment instruments on a random sample of students and teachers in selected secondary area vocational centers.

4.9 Produce the final versions of the student self-ratings, teacher ratings, and performance test of generalizable mathematics skills (See Appendix D).

4.10 Print the appropriate number of assessment instruments.

Task 5: Field test the assessment instruments

5.1 Contact each participating AVC (Danville VOTEC, Decatur AVC, Sauk ACC) and confirm the field test schedules. Call each AVC to obtain lists of students/programs.

5.2 Make all necessary arrangements for field testing activities.

5.3 Field test instruments in Danville VOTEC.

5.4 Field test instruments in Decatur Area Vocational Center.

5.5 Field test instruments in Sauk Area Career Center.

5.6 Send a follow-up letter to each AVC expressing appreciation for participating in the field testing (See Appendix E).
Task 6: Determine the reliability and validity of the mathematics skills assessment instruments

6.1 Develop and write SPSS computer programs (internal consistency reliability, test-retest reliability, item analysis, and correlations) for analyzing the data provided by the student self-ratings, teacher ratings, and performance test according to the control variables (type of vocational program, gender, and level of mathematics aptitude) (See Appendix F).

6.2 Process instruments by entering and verifying data on tape.

6.3 Run computer programs and revise as necessary.

6.4 Compile all computer output on the assessment instruments (See Appendix G).

6.5 Analyze data and construct data tables (See Appendix H).

Task 7: Formulate strategies and procedures for using the generalizable mathematics skills assessment instruments

7.1 Conduct a survey and follow-up (See Appendix I) to determine the AVCs present capabilities and procedures for identifying, assessing, and/or teaching mathematics skills.

7.2 Conduct a review of literature regarding strategies and procedures for identifying, assessing, and/or teaching mathematics skills.

7.3 Collect data through interviews and observations during the field testing to determine alternative procedures for identifying, assessing, and/or teaching mathematics skills.

7.4 Synthesize all data and information and develop strategies and procedures for identifying, assessing, and/or teaching mathematics skills.
Task 8: **Produce the product and final report**

8.1 Develop the draft product (Mathematics Skills User Manual) and final report.

8.2 Send the draft User Manual and final report to the PAC members and DAVTE personnel for their review, critique, and pilot testing.

8.3 Produce and disseminate the User Manual and final report according to the PAC members' and DAVTE personnel comments, additions, and/or deletions; and pilot test information.

O. Problems:

There were no major problems relative to the progress made on the 'Generalizable Skills' project this year.

P. Publicity:

The 'Generalizable Skills' project received direct publicity primarily through class presentations, presentations at professional conferences and meetings, publications, and technical assistance to LEAs, SEAs, and national level agencies and persons. Dr. Greenan's involvement in professional associations in leadership capacities has further publicized the project activities. His past and current publication record also reflects the present program of research in generalizable skills. In summary, Dr. Greenan's several instructional, research, and service activities have all contributed to receiving publicity for the generalizable skills project and its products.
Q. Resource Persons:

The principal resource persons for the 'Generalizable Skills' project were the Project Advisory Committee (PAC) members. The PAC members included:

Dr. James Dunn, Director
Institute for Occupational Education
College of Education
Cornell University
Ithaca, New York

Dr. Maurice Tatsuoka
Department of Educational Psychology
College of Education
University of Illinois
Champaign, Illinois

Dr. Frank Pratzner
The National Center for Research in Vocational Education
Ohio State University
Columbus, Ohio

Kay Smoot, Resource Teacher
VOTEC
Danville, Illinois

Mr. William Rosser, Counselor
Decatur Area Vocational Center
Decatur, Illinois

Dr. John C. Ory
Department of Educational Psychology
College of Education
University of Illinois
Champaign, Illinois

Dr. Brandon B. Smith, Director
Minnesota Research and Development Center for Vocational Education
University of Minnesota
St. Paul, Minnesota

Dr. James J. Hirstein
Secondary and Continuing Education
College of Education
University of Illinois
Champaign, Illinois

James Facko, Mathematics Teacher
Sauk Area Career Center
Robbins, Illinois

Dr. James D. Raths
CIRCE/TE
College of Education
University of Illinois
Champaign, Illinois

Several faculty, staff, and graduate students from various departments (Educational Psychology) and units (Office of Career Development for Special Populations) in the College of Education at the University of Illinois also provided helpful suggestions and recommendations regarding project activities. The area vocational center directors and several teachers and students also provided input especially in the review of procedures, instruments, materials, and
products. Numerous teacher educators, researchers, state education agency personnel, and local education agency personnel from other states provided feedback and suggestions regarding project activities at professional conferences and meetings.

The contributions of these individuals varied according to their individual expertise and needs of specific project activities. For example, some persons provided suggestions and recommendations with respect to instrumentation and research design, while other persons reviewed and critiqued materials and products. The collective input from all individuals was extremely valuable to the success of the project.

R. Summations of Evaluation Data Collected:

The principal evaluation data collected through this project were formative evaluation data for each of the major tasks. Formative evaluation included: (a) immediate participant (i.e., area vocational center directors, consultants, teachers, and PAC members' evaluation and feedback), (b) PAC review, and (c) adherence to timelines. The results of these formative evaluations were communicated in the quarterly progress reports for each task to DAVTE personnel and PAC members. Listed below are the results of the evaluation data collected:

**Task 1:** Based on the outline in the procedures section and input from project staff and DAVTE personnel, the project advisory committee will be identified and selected.

**Task 2:** Based on the outline in the procedures section and input from project staff, PAC members, and DAVTE personnel, the population and sample for the study will be identified and selected.

**Task 3:** The 'Generalizable Skills' project and the 'Change Skills' project activities will be considered coordinated based on the outcomes of the quarterly meetings.
Task 4: The student self-ratings, teacher ratings, and performance test of generalizable mathematics skills will be developed and considered adequate according to project staff fulfillment of sub-tasks, consultant review, and input from the PAC members, AVC directors, teachers, students, and DAVTE personnel.

Task 5: The mathematics skills assessment instruments will be adequately field tested according to the outline provided in the procedures section, and input from PAC members, AVC directors, teachers, students, and DAVTE personnel.

Task 6: Based on the procedural outline, review and critique by PAC members, DAVTE personnel, and consultants, the student self-ratings, teacher ratings, and performance test will be considered sufficient and adequate in terms of reliability and validity.

Task 7: Strategies and Procedures for using the generalizable mathematics skills assessment instruments will be formulated and considered adequate according to project staff adherence to the completion of sub-tasks, and review and critique by the PAC members, DAVTE personnel, and school personnel.

Task 8: The ISBE members, DAVTE personnel, consultants, and school personnel will review and critique the comprehensiveness and quality of the product (Mathematics Skills User Manual) and final report.

5. Statement of Impact:

The dissemination plan included the delivery of 50 copies of the Generalizable Mathematics Skills User Manual and Generalizable Mathematics Skills Resource Directory and 20 copies of the final report to the ISBE/DAVTE. In addition, copies of each report were sent to the PAC members. The remaining copies will be disseminated upon individual requests while the supply lasts to at least the following target groups: LEA and SEA personnel, state and local advisory councils, teacher educators, researchers, and national research and development centers. The reports will also be submitted to the ERIC Clearinghouse.

The results and products of this project are expected to have short-range and long-range impact. However, the impact of the
dissemination is difficult to determine presently because dissemination is just beginning to occur at the end of the project period. Dissemination impact will be more easily assessed after the project reports, products, and information have been widely circulated.

T. Conclusions and Recommendations:

The conclusions of this study are based on the data presented for each of the two objectives and include:

1. The generalizable mathematics student self-ratings, teacher ratings, and performance test assessment instruments possess content and face validity relative to the mathematics skills required in vocational programs and occupations.

2. The assessment instruments are highly reliable in terms of internal consistency reliability and test-retest reliability for students in different vocational programs, males and females, and students who have high, medium, and low mathematics aptitude.

3. The student self-ratings and teacher ratings relate or agree moderately with students' scores as measured by the performance test.

4. The items contained in the performance test assessment instrument are moderately easy or difficult and discriminate well between those students who score high and those students who score low.

5. The generalizable mathematics skills assessment User Manual and Resource Directory are considered to possess an adequate degree of reliability and validity and are potentially useful in secondary vocational programs.
6. The 'Generalizable Skills' project and 'Change Skills' project activities were coordinated as evidenced by quarterly meetings, joint conference/workshop presentations, and other activities. Based on the research methods, findings, and conclusions of this study, several recommendations can be made for practice and future research. The recommendations include:

1. Future field testing of the generalizable mathematics skills assessment instruments (student self-ratings, teacher ratings, performance test) should include other populations at the secondary, post-secondary, and/or adult levels. The more general vocational programs including industrial arts, consumer homemaking, and general business could be investigated. The rationale, instruments, and procedures used in this study should be equally applicable to other populations/samples. Future studies should use populations where special populations (handicapped, disadvantaged, and limited-English proficient) as well as non-special populations are known to exist.

2. Students and school personnel including teachers, counselors, administrators, paraprofessionals should begin to use the generalizable mathematics skills student self-ratings, teacher ratings, and performance test assessment instruments for assessment, planning, curriculum development, instructional methods and delivery, and evaluation.

3. School personnel need to begin teaching and/or coordinate their teaching of generalizable mathematics skills as they relate to individual vocational programs.

4. School personnel need to work more closely with "academic" teachers (e.g. mathematics, English, reading), remedial teachers
and support service providers, and special needs teachers to effectively provide the necessary instruction and related services to students known to lack generalizable mathematics skills.

5. Pertaining to generalizable mathematics skills, vocational educators need to evaluate their instructional/support service delivery systems regarding the services provided, persons involved in delivering services, when services are provided, how services are provided, where services are provided, and the procedures used to evaluate the adequacy, quality, and effect of services provided to students.

6. Program evaluations need to formulate and convey the necessary instructional procedures personnel will use to increase students' generalizable mathematics skills.

U. Staff Development:

The staff development activities for the project staff consisted primarily of participation in several professional conferences, workshops, and meetings. These are listed in the "Conference/Workshop Summary(ies)" section. Interaction with the Project Advisory Committee members and other resource persons provided additional staff development.

V. Other Activities:

Several additional activities were undertaken by the project staff beyond those described in the proposal. For example, the staff delivered several presentations at national, state, regional, and local conferences. The presentations are listed in the "Conference/Workshop Summary(ies)" section. The Generalizable Mathematics Skills Resource Directory is an additional product produced by the staff.
Various dissemination and technical assistance activities were also carried out by the project staff.

W. Materials Developed:

The following major materials and products were developed by the 'Generalizable Skills' project staff during 1983-84:

1. Quarterly Progress Reports (October 1, 1983; January 1, 1984; April 1, 1984).
Appendix A

Project Advisory Committee Letter
July 14, 1983

Dr. Frank Pratzner
The National Center for Research
In Vocational Education
Ohio State University
1960 Kenny Road
Columbus, OH 43210

Dear Dr. Pratzner:

I would like to thank you for your willingness to serve on the advisory committee for the project entitled: "The Development of Strategies and Procedures for Assessing the Generalizable Skills of Students in Secondary Vocational Programs: Generalizable Mathematics Skills." The project is being funded by the Illinois State Board of Education/Department of Adult, Vocational, and Technical Education. Your interest, expertise and involvement will provide an invaluable contribution to the project.

The major focus of the project advisory committee (PAC) activities will be to provide input and feedback on concepts generated, instruments produced, data analysis, products developed, and other activities for the duration of the project. In addition, if possible, the entire PAC will meet at least once during the next twelve months.

Enclosed you will find a copy of the project proposal and abstract for your review. The proposal contains all phases of project operation. In particular, you will want to focus on the objectives, procedures, and evaluation sections since they specify the major project activities. Upon reading the procedures section you will have an idea of the scope of activities involving the PAC during the project.

Again, I would like to thank you for your participation on the PAC and look forward to working with you. If you have any questions, don't hesitate to contact me.

Sincerely,

James P. Greenan

JPG/cja/G
Enclosure: Project proposal and abstract
Appendix B

Area Vocational Center Director Follow-up Letter
Mr. T. James Oettel, Director
Decatur Area Vocational Center
300 East Eldorado Street
Decatur, Illinois 62523

Dear Mr. Oettel:

I enjoyed talking with you on the telephone today, and thank you for the information you provided to me regarding your AVC's types of programs, numbers of teachers, and projected student enrollments for the 1983-84 school year. The information will be helpful in planning future project activities for the Illinois State Board of Education/Department of Adult, Vocational, and Technical Education (DAVTE) funded project entitled, "The Development of Strategies and Procedures for Assessing the Generalizable Skills of Students in Secondary Vocational Programs: Generalizable Mathematics Skills." Last year mathematics skills were identified which are basic to, necessary for success in, and transferable within and among secondary vocational training programs. The expectation of the project is that practical instruments and procedures will be developed that are capable of assessing students' mathematics skills, and suggesting areas in which students need instruction and/or support services.

The "Generalizable Skills" project staff and DAVTE personnel wish to thank you for your AVC's interest and willingness to participate in the project. As I discussed during our conversation, the project staff would like to possibly include several of your teachers and students in the field testing of a set of instruments and procedures designed to measure the generalizable mathematics skills of students in secondary vocational training programs. I anticipate the field testing will occur over 1-2 days during this Fall or early Winter. Your leadership and your teachers' and students' participation will greatly help us in the task of developing and validating the instruments and procedures intended to eventually assist students to succeed in their vocational programs.

I will contact you in the next several weeks to discuss specific scheduling, plans and activities regarding the field testing. Thank you in advance for your cooperation and assistance and I look forward to working with you. If you have any questions, please don't hesitate to contact me.

Sincerely,

James P. Greenan
Principal Investigator

32 Education Building
1310 South Sixth Street
Champaign, Illinois 61820
(217) 333-0185
Appendix C

Generalizable Mathematics Skills
Mathematics Skills

Whole Numbers

1. Read, write, and count single and multiple digit whole numbers
2. Add and subtract single and multiple digit whole numbers
3. Multiply and divide single and multiple digit whole numbers
4. Use addition, subtraction, multiplication, and division to solve word problems with single and multiple digit whole numbers
5. Round off single and multiple digit whole numbers

Fractions

6. Read and write common fractions
7. Add and subtract common fractions
8. Multiply and divide common fractions
9. Solve word problems with common fractions

Decimals

10. Carry out arithmetic computations involving dollars and cents
11. Read and write decimals in one and more places
12. Round off decimals to one or more places
13. Multiply and divide decimals in one or more places
14. Add and subtract decimals in one or more places
15. Solve word problems with decimals in one or more places

Percent

16. Read and write percents
17. Compute percents
Mixed Operations

18. Convert fractions to decimals, percents to fractions, fractions to percents, percents to decimals, decimals to percents, common fractions or mixed numbers to decimal fractions, and decimal fractions to common fractions or mixed numbers.

19. Solve word problems by selecting and using correct order of operations.

20. Perform written calculations quickly.


Measurement and Calculation

22. Read numbers or symbols from time, weight, distance, and volume measuring scales.

23. Use a measuring device to determine an object's weight, distance, or volume in standard (English) units.

24. Use a measuring device to determine an object's weight, distance, or volume in metric units.

25. Perform basic metric conversions involving weight, distance, and volume.

26. Solve problems involving time, weight, distance, and volume.

27. Use a calculator to perform basic arithmetic operations to solve problems.

Estimation

28. Determine if a solution to a mathematical problem is reasonable.

KEY

- High Generalizability
  ($\bar{x} = 5.01 - 7.00$)
- Medium Generalizability
  ($\bar{x} = 3.00 - 5.00$)
- Low Generalizability
  ($\bar{x} = 1.00 - 2.99$)
Appendix D

Student Self-Ratings, Teacher Ratings, 
and Performance Test
GENERALIZABLE VOCATIONAL MATHEMATICS SKILLS ASSESSMENT

Student Self-Ratings

Directions: In the spaces provided, write your name, check (✓) your sex, write your teacher's name, check (✓) your area vocational center, and check (✓) your vocational training program.

Student Name: ____________________________________________

Student Sex: ___ Male ... 1 ___ Female ... 2

Teacher Name: ____________________________________________

Area Vocational Center:

___ Danville VOTEC ................................................................. 1
___ Decatur Area Vocational Center ........................................ 2
___ Sauk Area Career Center ................................................ 3
___ Other (please specify) _____________________________________ 4

46
Vocational Program Area/Training Program:

<table>
<thead>
<tr>
<th>Occupational Area</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural Occupations</td>
<td>1</td>
</tr>
<tr>
<td>Conservation</td>
<td>01</td>
</tr>
<tr>
<td>Agricultural Mechanics</td>
<td>02</td>
</tr>
<tr>
<td>Ornamental Horticulture</td>
<td>03</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>04</td>
</tr>
<tr>
<td>Business, Marketing, and Management Occupations</td>
<td>2</td>
</tr>
<tr>
<td>Secretarial</td>
<td>01</td>
</tr>
<tr>
<td>Business Data Processing Systems</td>
<td>02</td>
</tr>
<tr>
<td>Computer Programming</td>
<td>03</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>04</td>
</tr>
<tr>
<td>Health Occupations</td>
<td>3</td>
</tr>
<tr>
<td>Nurse Aide</td>
<td>01</td>
</tr>
<tr>
<td>Practical Nursing</td>
<td>02</td>
</tr>
<tr>
<td>Health Occupations Cooperative Education</td>
<td>03</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>04</td>
</tr>
<tr>
<td>Home Economics Occupations</td>
<td>4</td>
</tr>
<tr>
<td>Food Management, Production, and Service</td>
<td>01</td>
</tr>
<tr>
<td>Child Care</td>
<td>02</td>
</tr>
<tr>
<td>Child Development</td>
<td>03</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>04</td>
</tr>
<tr>
<td>Industrial Occupations</td>
<td>5</td>
</tr>
<tr>
<td>Construction and Building Trades</td>
<td>01</td>
</tr>
<tr>
<td>Electronics</td>
<td>02</td>
</tr>
<tr>
<td>Machine Shop</td>
<td>03</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>04</td>
</tr>
</tbody>
</table>
Directions: Indicate, by circling the number, how well you believe you can do each of the following mathematics skills.

Example:

<table>
<thead>
<tr>
<th>Mathematics Skill</th>
<th>Cannot Do</th>
<th>Cannot Do</th>
<th>Can Do</th>
<th>Can Do</th>
<th>Too Well</th>
<th>Fairly Well</th>
<th>Well</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read and write common fractions</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Degree of Skill

WHOLE NUMBERS

1. Read, write, and count whole numbers

   examples:
   - 6, six
   - 54, fifty-four
   - 375, three hundred seventy-five
   - 4,128; four thousand one hundred twenty-eight

2. Add and subtract whole numbers

   examples:
   - Add:
   - Subtract:
   - 8 + 3 = 11
   - 15,821 + 3,147 = 19,968
   - 76 - 23 = 53
   - 12,872 - 983 = 11,889

   1  2  3  4   1  2  3  4
<table>
<thead>
<tr>
<th>Mathematics Skills</th>
<th>Degree of Skill</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Multiply and divide whole numbers</td>
<td>Cannot Do</td>
</tr>
<tr>
<td>examples:</td>
<td>Can Do</td>
</tr>
<tr>
<td>Multiply:</td>
<td>Can Do</td>
</tr>
<tr>
<td>Divide:</td>
<td>Can Do</td>
</tr>
<tr>
<td>$80 \times 3$</td>
<td>1</td>
</tr>
<tr>
<td>$543 \times 81$</td>
<td>2</td>
</tr>
<tr>
<td>$7/147$</td>
<td>3</td>
</tr>
<tr>
<td>$125/34318$</td>
<td>4</td>
</tr>
<tr>
<td>4. Add, subtract, multiply, and divide whole numbers to solve word problems</td>
<td>Cannot Do</td>
</tr>
<tr>
<td>1</td>
<td>Can Do</td>
</tr>
<tr>
<td>2</td>
<td>Can Do</td>
</tr>
<tr>
<td>3</td>
<td>Can Do</td>
</tr>
<tr>
<td>4</td>
<td>Can Do</td>
</tr>
<tr>
<td>5. Round off whole numbers</td>
<td>Cannot Do</td>
</tr>
<tr>
<td>1</td>
<td>Can Do</td>
</tr>
<tr>
<td>2</td>
<td>Can Do</td>
</tr>
<tr>
<td>3</td>
<td>Can Do</td>
</tr>
<tr>
<td>4</td>
<td>Can Do</td>
</tr>
</tbody>
</table>

FRACTIONS

6. Read and write common fractions

examples:

1. one-eighth

$\frac{1}{8}$

5. five-fourths

$\frac{5}{4}$

3. three and six-sevenths

$3\frac{6}{7}$
7. Add and subtract common fractions

**Examples:**

Add:
\[
\begin{align*}
\frac{2}{5} + \frac{5}{8} + \frac{10}{2} &= \frac{6}{7} + \frac{5}{9} + \frac{18}{3} \\
\frac{1}{5} + \frac{1}{3} + \frac{1}{4} &= \frac{3}{7} + \frac{1}{3} - \frac{15}{6}
\end{align*}
\]

Subtract:
\[
\begin{align*}
\frac{2}{5} - \frac{5}{8} - \frac{10}{2} &= \frac{6}{7} - \frac{5}{9} - \frac{18}{3} \\
\frac{1}{5} - \frac{1}{3} - \frac{1}{4} &= \frac{3}{7} - \frac{1}{3} - \frac{15}{6}
\end{align*}
\]

8. Multiply and divide common fractions

**Examples:**

Multiply:
\[
\frac{1}{2} \times \frac{1}{3} = \frac{5}{9} \times \frac{3}{15} = \frac{12}{4} \times \frac{3}{5}
\]

Divide:
\[
\frac{3}{8} \div \frac{9}{10} \div \frac{2}{3} = \frac{9}{15} \div \frac{2}{5}
\]

9. Add, subtract, multiply, and divide common fractions to solve word problems
Mathematics Skills

10. Read and write decimals

   examples:
   
   .2, two-tenths
   .43, forty-three hundredths
   .875, eight hundred seventy-five thousandths
   .0964, nine hundred sixty-four ten thousandths

Degree of Skill

   Cannot Do  Cannot Do  Can Do  Can Do
   Too Well    Fairly Well  Well

11. Add and subtract decimals

   examples:

   Add: .3 125.2 + 38.3 + 16.8
   .1
   +.2
   .00789 + .00023

   Subtract: .7 320.8 - 18.6
   -.2
   124 - .009

   1 2 3 4
### Mathematics Skills

<table>
<thead>
<tr>
<th>Degree of Skill</th>
<th>Cannot Do</th>
<th>Cannot Do Too Well</th>
<th>Fairly Well</th>
<th>Well</th>
</tr>
</thead>
</table>

#### 12. Multiply and divide decimals

**Examples:**

- **Multiply:**
  - \( .6 \times 3 \)
  - \( 110 \times .854 \)
  - \( 1,425 \times 7.63 \)

- **Divide:**
  - \( 15/8.70 \)
  - \( 75.2/128.764 \)
  - \( 8 \div .004 \)

#### 13. Add, subtract, multiply, and divide common decimals to solve word problems

1, 2, 3, 4

#### 14. Solve problems involving dollars and cents

1, 2, 3, 4

#### 15. Round off decimals

1, 2, 3, 4
Mathematics Skills

PERCENT

16. Read and write percents

examples:

32\%, thirty-two percent

8\frac{1}{3}\%, eight and one-third percent

115.6\%, one hundred fifteen and six-tenths percent

17. Solve problems involving percents

---

MIXED OPERATIONS

18. Change fractions to decimals, percents to fractions, fractions to percents, percents to decimals, decimals to percents, fractions or mixed numbers to decimal fractions, decimal fractions to fractions or mixed numbers

19. Solve word problems by selecting and using the correct order of addition, subtraction, multiplication, and division for whole numbers, fractions, decimals, and percents
### Mathematics Skills

<table>
<thead>
<tr>
<th>Task</th>
<th>Cannot Do</th>
<th>Cannot Do Too Well</th>
<th>Can Do Fairly Well</th>
<th>Can Do Well</th>
</tr>
</thead>
<tbody>
<tr>
<td>20. Find averages (means)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>21. Do written calculations quickly</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

### MEASUREMENT AND CALCULATION

<table>
<thead>
<tr>
<th>Task</th>
<th>Cannot Do</th>
<th>Cannot Do Too Well</th>
<th>Can Do Fairly Well</th>
<th>Can Do Well</th>
</tr>
</thead>
<tbody>
<tr>
<td>22. Read numbers or symbols from time, weight, distance, and volume measuring scales</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>23. Use measuring scales to determine an object's weight, distance, and volume in standard (English) units</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>24. Use measuring scales to determine an object's weight, distance, and volume in metric units</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>25. Do basic metric conversions involving weight, distance, and volume</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>26. Solve problems involving time, weight, distance, and volume</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>27. Use a calculator to solve problems involving addition, subtraction, multiplication, and division</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Mathematics Skills</td>
<td>Degree of Skill</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------</td>
<td>-----------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cannot Do</td>
<td>Cannot Do</td>
<td>Can Do</td>
<td>Can Do</td>
</tr>
<tr>
<td></td>
<td>Too Well</td>
<td>Fairly Well</td>
<td>Well</td>
<td></td>
</tr>
</tbody>
</table>

28. Determine if a solution or answer to a mathematics problem is reasonable

STOP, YOU ARE FINISHED
GENERALIZABLE VOCATIONAL MATHEMATICS SKILLS ASSESSMENT

Teacher Ratings

Directions: In the spaces provided, write the name of the student whom you are rating, check (✓) the student's sex, write your name, check (✓) your area vocational center, and check (✓) the vocational training program in which you teach.

Student Name: __________________________________________ 1-3

Student Sex:  1  Male ...  2  Female ...

Teacher Name: __________________________________________ 5-6

Area Vocational Center:

1  Danville VOTEC .......................................................... 1
2  Decatur Area Vocational Center .......................................... 2
3  Sauk Area Career Center .................................................. 3
4  Other (please specify) ...................................................... 4

5  ___________________________ 6  ___________________________ 7

1-8
Vocational Program Area/Training Program:

<table>
<thead>
<tr>
<th>Agricultural Occupations</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conservation</td>
<td>01</td>
</tr>
<tr>
<td>Agricultural Mechanics</td>
<td>02</td>
</tr>
<tr>
<td>Ornamental Horticulture</td>
<td>03</td>
</tr>
<tr>
<td>Other (please specify)</td>
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<tr>
<td>Other (please specify)</td>
<td>04</td>
</tr>
</tbody>
</table>
Directions: Indicate, by circling the number, how well you believe the student named on the cover sheet can do each of the following mathematics skills.

Example:

<table>
<thead>
<tr>
<th>Mathematics Skill</th>
<th>Cannot Do</th>
<th>Cannot Do</th>
<th>Can Do</th>
<th>Can Do</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read and write common fractions</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

### Degree of Skill

#### WHOLE NUMBERS

1. Read, write, and count whole numbers

   examples:
   - 6, six
   - 54, fifty-four
   - 375, three hundred seventy-five
   - 4,128; four thousand one hundred twenty-eight

2. Add and subtract whole numbers

   examples:
   Add: 8  15,821 + 3  3,147 = 14,968
   Subtract: 76  12,872 - 23  983 = 11,949

<table>
<thead>
<tr>
<th>Degree of Skill</th>
<th>Cannot Do</th>
<th>Cannot Do</th>
<th>Can Do</th>
<th>Can Do</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHOLE NUMBERS</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
Mathematics Skills

Degree of Skill

Cannot Do  Cannot Do  Can Do  Can Do
Too Well  Fairly Well  Well

3. Multiply and divide whole numbers

examples:

Multiply:  Divide:

\[
\begin{array}{cccc}
80 \times 3 & 543 \times 81 & 7/147 & 125/34,318 \\
1 & 2 & 3 & 4 \\
\end{array}
\]

4. Add, subtract, multiply, and divide whole numbers to solve word problems

1 2 3 4

5. Round off whole numbers

1 2 3 4

FRACTIONS

6. Read and write common fractions

examples:

\[
\begin{align*}
1, \text{ one-eighth} & \\
5, \text{ five-fourths} & \\
36, \text{ three and six-sevenths} & \\
\end{align*}
\]
Mathematics Skills

<table>
<thead>
<tr>
<th>Degree of Skill</th>
<th>Cannot Do</th>
<th>Cannot Do</th>
<th>FaVery Well</th>
<th>Well</th>
</tr>
</thead>
</table>

7. Add and subtract common fractions

examples:

Add:
\[
\begin{align*}
\frac{2}{5} & \hspace{0.5cm} \frac{5}{8} & \hspace{0.5cm} 10\frac{1}{2} \\
\frac{6}{7} & \hspace{0.5cm} \frac{5}{9} & \hspace{0.5cm} 18\frac{2}{3} \\
\frac{1}{5} & \hspace{0.5cm} \frac{1}{3} & + \frac{1}{4} \\
-\frac{3}{7} & \hspace{0.5cm} \frac{1}{3} & -15\frac{1}{6}
\end{align*}
\]

Subtract:
\[
\begin{align*}
\frac{2}{5} & \hspace{0.5cm} \frac{5}{8} & \hspace{0.5cm} 10\frac{1}{2} \\
\frac{6}{7} & \hspace{0.5cm} \frac{5}{9} & \hspace{0.5cm} 18\frac{2}{3} \\
\frac{1}{5} & \hspace{0.5cm} \frac{1}{3} & + \frac{1}{4} \\
-\frac{3}{7} & \hspace{0.5cm} \frac{1}{3} & -15\frac{1}{6}
\end{align*}
\]

8. Multiply and divide common fractions

examples:

Multiply:
\[
\begin{align*}
\frac{1}{2} \times \frac{1}{3} & \hspace{0.5cm} \frac{5}{9} \times \frac{3}{15} & \hspace{0.5cm} \frac{12}{43} \\
\frac{4}{5} & \hspace{0.5cm} \frac{15}{15} & \hspace{0.5cm} \frac{15}{43}
\end{align*}
\]

Divide:
\[
\begin{align*}
\frac{3}{8} \div \frac{9}{10} & \hspace{0.5cm} \frac{2}{3} \div \frac{4}{15} & \hspace{0.5cm} \frac{9}{7} \\
\frac{15}{42} & \hspace{0.5cm} \frac{4}{2} & \hspace{0.5cm} \frac{5}{9}
\end{align*}
\]

9. Add, subtract, multiply, and divide common fractions to solve word problems

1 2 3 4
### DECIMALS

10. Read and write decimals

examples:
- \(0.2\), two-tenths
- \(0.43\), forty-three hundredths
- \(0.875\), eight hundred seventy-five thousandths
- \(0.0964\), nine hundred sixty-four ten thousandths

### Add and subtract decimals

examples:

Add:
- \(0.3 + 0.1 + 0.2 = 0.6\)
- \(0.00789 + 0.00023 = 0.00812\)

Subtract:
- \(0.7 - 0.2 = 0.5\)
- \(124 - 0.009 = 123.991\)
<table>
<thead>
<tr>
<th>Mathematics Skills</th>
<th>Degree of Skill</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cannot Do</td>
</tr>
<tr>
<td></td>
<td>Too Well</td>
</tr>
</tbody>
</table>

12. Multiply and divide decimals

**Examples:**

Multiply: \[ \begin{array}{c}
.6 \\
\times 3 \\
\times .854 \\
\end{array} \]

\[ 110 \times .854 = 1,425 \times 7.63 \]

Divide: \[ \begin{array}{c}
15/8.70 \\
75.2/128.764 \\
8 \div .004 \\
\end{array} \]

13. Add, subtract, multiply, and divide common decimals to solve word problems

14. Solve problems involving dollars and cents

15. Round off decimals

---

**Degree of Skill:**

- 1: Cannot Do
- 2: Too Well
- 3: Fairly Well
- 4: Can Do
- 5: Can Do Too Well
Mathematics Skills

Degree of Skill

<table>
<thead>
<tr>
<th>Cannot Do</th>
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<th>Can Do</th>
<th>Can Do</th>
<th>Can Do</th>
</tr>
</thead>
<tbody>
<tr>
<td>Too Well</td>
<td>Fairly Well</td>
<td>Well</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PERCENT

16. Read and write percents
   
   examples:
   
   32\%, thirty-two percent
   
   8\% \frac{1}{3}, eight and one-third percent
   
   115.6\%, one hundred fifteen and six-tenths percent

17. Solve problems involving percents

MIXED OPERATIONS

18. Change fractions to decimals, percents to fractions, fractions to percents, percents to decimals, decimals to percents, fractions or mixed numbers to decimal fractions, decimal fractions to fractions or mixed numbers

19. Solve word problems by selecting and using the correct order of addition, subtraction, multiplication, and division for whole numbers, fractions, decimals, and percents
<table>
<thead>
<tr>
<th>Mathematics Skills</th>
<th>Degree of Skill</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cannot Do</td>
</tr>
<tr>
<td>20. Find averages (means)</td>
<td>1</td>
</tr>
<tr>
<td>21. Do written calculations quickly</td>
<td>1</td>
</tr>
</tbody>
</table>

**MEASUREMENT AND CALCULATION**

<table>
<thead>
<tr>
<th></th>
<th>Cannot Do</th>
<th>Cannot Do Too Well</th>
<th>Can Do Fairly Well</th>
<th>Can Do Well</th>
</tr>
</thead>
<tbody>
<tr>
<td>22. Read numbers or symbols from weight, distance, and volume measuring scales</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>23. Use measuring scales to determine an object's weight, distance, and volume in standard (English) units</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>24. Use measuring scales to determine an object's weight, distance, and volume in metric units</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>25. Do basic metric conversions involving weight, distance, and volume</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>26. Solve problems involving time, weight, distance, and volume</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>27. Use a calculator to solve problems involving addition, subtraction, multiplication, and division</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
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<td></td>
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28. Determine if a solution or answer to a mathematics problem is reasonable

1 2 3 4

STOP, YOU ARE FINISHED
GENERALIZABLE VOCATIONAL MATHEMATICS SKILLS ASSESSMENT

Performance Test

Directions: In the spaces provided, write your name, check ( ) your sex, write your teacher's name, check ( ) your area vocational center, and check ( ) your vocational training program.

Student Name: ________________________________

Student Sex: ___ Male ... 1 ___ Female ... 2

Teacher Name: ________________________________

Area Vocational Center:

___ Danville VOTEC ................................................................. 1
___ Decatur Area Vocational Center ........................................ 2
___ Sauk Area Career Center .................................................. 3
___ Other (please specify) ________________________________ 4

(TURN PAGE)
Vocational Program Area/Training Program:

<table>
<thead>
<tr>
<th>Occupational Area</th>
<th>Code</th>
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<tbody>
<tr>
<td>Agricultural Occupations</td>
<td>1</td>
</tr>
<tr>
<td>Conservation</td>
<td>01</td>
</tr>
<tr>
<td>Agricultural Mechanics</td>
<td>02</td>
</tr>
<tr>
<td>Ornamental Horticulture</td>
<td>03</td>
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<tr>
<td>Other (please specify)</td>
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<tr>
<td>Other (please specify)</td>
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</table>
Directions: Do each of the following problems by circling the correct answer. Please use the scratch paper provided to work out your answers.

Example:

Add: \[
\begin{array}{c}
8 \\
+7
\end{array}
\]

(a) 6 (b) 25 (c) 15 (d) 5

---

WHOLE NUMBERS

1. 97 is written as:
   (a) nine hundred seven
   (b) nine thousand seventy
   (c) ninety-seven
   (d) seventy-nine

2. 4,132 is written as:
   (a) four thousand one hundred thirty-two
   (b) forty-one thousand thirty-two
   (c) forty-one hundred thirty
   (d) four hundred thirty-two
3. Eight is represented by which number?
   (a) 8   (b) 6   (c) 800   (d) 80

4. Five thousand nine hundred nineteen is represented by which number?
   (a) 519   (b) 59   (c) 591   (d) 5,919

5. How many dots are there in the following diagram? 
   
   (a) 10   (b) 30   (c) 8   (d) 5

6. How many lines are there in the following diagram? 
   
   (a) 13   (b) 22   (c) 15   (d) 32

7. Add: 
   \[ \begin{array}{c}
   9 \\
   +7 \\
   \end{array} \]
   (a) 26   (b) 2   (c) 16   (d) 17

8. Add: 
   \[ \begin{array}{c}
   302 \\
   +431 \\
   +58 \\
   \end{array} \]
   (a) 791   (b) 792   (c) 691   (d) none of these
9. Add:
   12,031
   1,224
   8,341
   + 489
   (a) 22,985  (b) 22,085  (c) 21,085  (d) 22,075

10. Subtract:
    98
    -27
    (a) 61  (b) 81  (c) 125  (d) 71

11. Subtract:
    926
    -336
    (a) 590  (b) 690  (c) 592  (d) 692

12. Subtract:
    13,104
    - 785
    (a) 13,319  (b) 13,621  (c) 12,329  (d) none of these

13. Multiply:
    37
    x 8
    (a) 276  (b) 296  (c) 306  (d) 302

14. Multiply:
    40
    x 29
    (a) 1,160  (b) 1,189  (c) 1,260  (d) 1,060
15. Multiply: \[ 
\begin{array}{c}
789 \\
\times \ 46 \\
\end{array} 
\]
(a) 35,294   (b) 37,284   (c) 7,890   (d) 36,294

16. Divide:
\[ 
\begin{array}{c}
8 \div 224 \\
\end{array} 
\]
(a) 30   (b) 26   (c) 28   (d) 27

17. Divide:
\[ 
\begin{array}{c}
27 \div 3,321 \\
\end{array} 
\]
(a) 13   (b) 132   (c) 1,230   (d) none of these

18. Divide:
\[ 
\begin{array}{c}
326 \div 44,018 \\
\end{array} 
\]
(a) 135   (c) 105 R=148
(b) 135 R=8   (d) 135 R=80

19. Mr. Jones has 9 acres of farm land. He intends to buy 6 acres in the spring, 15 in the summer and 48 in the fall. How many acres will he have at the beginning of next Winter?

(a) 30   (b) 68   (c) 58   (d) 78
20. Ms. Smith typed 126 pages on Wednesday. On Thursday she typed 58 pages. How many more pages did Ms. Smith type on Wednesday than on Thursday?

(a) 68  (b) 184  (c) 78  (d) 168

21. Sixteen ounces of flour were called for in a recipe. If the recipe were doubled, how many ounces of flour would be needed?

(a) 16  (b) 28  (c) 32  (d) none of these

22. How many 3-feet square sections can be cut from a piece of sheet metal 3-feet wide by 30 feet long?

(a) 90  (b) 10  (c) 33  (d) 8

23. 64 rounded off to the nearest tens place is:

(a) 60  (b) 70  (c) 65  (d) 80

24. 1,553 rounded off to the nearest hundreds place is:

(a) 1,500  (b) 1,550  (c) 1,600  (d) 2,000

25. 23,974 rounded off to the nearest thousands place is:

(a) 23,900  (b) 23,000  (c) 24,900  (d) 24,000
FRACTIONS

26. \( \frac{1}{4} \) is written as:
   
   (a) one-eighth  
   (b) one-fourth  
   (c) one-fourteenth  
   (d) one-fortieth

27. \( \frac{7}{3} \) is written as:
   
   (a) three-seventieths  
   (b) seventy-thirds  
   (c) three-sevenths  
   (d) seven-thirds

28. \( 2 \frac{5}{8} \) is written as:
   
   (a) twenty-five eighths  
   (b) two and eight-fifths  
   (c) two and five-eighths  
   (d) twenty-eight fifths

29. Four-fifths is written as:
   
   (a) \( \frac{4}{5} \)  
   (b) \( \frac{4}{50} \)  
   (c) \( \frac{5}{4} \)  
   (d) none of these

30. Nine-sixths is written as:
   
   (a) \( \frac{6}{9} \)  
   (b) \( \frac{9}{6} \)  
   (c) \( \frac{90}{6} \)  
   (d) \( \frac{96}{6} \)
31. Four and eleven-eighteenths is written as:
   (a) \( \frac{411}{18} \)  (b) \( \frac{4}{1118} \)  (c) \( 4 \frac{11}{18} \)  (d) \( 4 \frac{11}{8} \)

32. Add:
   \[
   \begin{array}{c}
   \frac{5}{8} \\
   + \frac{2}{8} \\
   \hline
   \frac{7}{8}
   \end{array}
   \]
   (a) \( \frac{3}{8} \)  (b) \( \frac{5}{8} \)  (c) \( \frac{7}{8} \)  (d) \( \frac{7}{16} \)

33. Add:
   \[
   \begin{array}{c}
   \frac{4}{6} \\
   + \frac{2}{6} \\
   \hline
   \frac{6}{6}
   \end{array}
   \]
   (a) \( \frac{1}{3} \)  (b) \( \frac{1}{2} \)  (c) 6  (d) 1

34. Add:
   \[
   \begin{array}{c}
   \frac{3}{4} \\
   + \frac{1}{8} \\
   \hline
   \frac{7}{8}
   \end{array}
   \]
   (a) \( \frac{7}{8} \)  (b) \( \frac{1}{2} \)  (c) \( \frac{3}{8} \)  (d) \( \frac{1}{3} \)

35. Add:
   \[
   \begin{array}{c}
   \frac{1}{15} \\
   + \frac{5}{6} \\
   \hline
   \frac{7}{10}
   \end{array}
   \]
   (a) \( \frac{7}{10} \)  (b) \( \frac{29}{30} \)  (c) \( \frac{23}{30} \)  (d) none of these
36. Add: \[ \frac{9}{10} \quad \frac{7}{25} \]

\[ \frac{19}{50} \quad \frac{9}{50} \quad \frac{9}{50} \quad \frac{16}{35} \]

37. Add: \[ 12 \frac{7}{8} \quad 5 \frac{1}{6} \]

\[ 17 \frac{3}{24} \quad 17 \frac{1}{24} \quad 18 \frac{1}{24} \quad 17 \frac{5}{24} \]

38. Subtract: \[ \frac{8}{9} \quad \frac{3}{9} \]

\[ 5 \quad \frac{11}{9} \quad \frac{1}{9} \quad \frac{5}{9} \]

39. Subtract: \[ \frac{5}{6} \quad \frac{3}{6} \]

\[ 2 \quad \frac{1}{3} \quad \frac{11}{6} \quad \frac{1}{6} \]
40. Subtract: \[\frac{8}{9} \quad \frac{-2}{3}\]

   - (a) \[\frac{4}{9}\]
   - (b) \[\frac{1}{3}\]
   - (c) \[\frac{2}{9}\]
   - (d) 6

41. Subtract: \[10 \frac{1}{12} \quad \frac{-4}{1}\]

   - (a) \[5 \frac{11}{12}\]
   - (b) 6
   - (c) \[5 \frac{1}{2}\]
   - (d) \[6 \frac{1}{12}\]

42. Subtract: \[16 \frac{7}{10} \quad \frac{-12}{2}\]

   - (a) \[4 \frac{1}{2}\]
   - (b) \[4 \frac{43}{90}\]
   - (c) \[4 \frac{44}{90}\]
   - (d) none of these

43. Subtract: \[34 \frac{1}{10} \quad \frac{-12}{4}\]

   - (a) \[21 \frac{5}{6}\]
   - (b) \[20 \frac{5}{6}\]
   - (c) \[20 \frac{1}{6}\]
   - (d) \[21 \frac{1}{6}\]

44. Multiply: \[\frac{1}{4} \times \frac{1}{8}\]

   - (a) \[\frac{1}{22}\]
   - (b) \[\frac{1}{12}\]
   - (c) \[\frac{1}{32}\]
   - (d) \[1 \frac{1}{2}\]
45. Multiply: \( \frac{2}{5} \times \frac{4}{7} \)
   
   (a) \( \frac{1}{2} \)  (b) \( \frac{6}{35} \)  (c) \( \frac{6}{7} \)  (d) \( \frac{8}{35} \)

46. Multiply: \( \frac{5}{21} \times \frac{3}{35} \)
   
   (a) \( \frac{1}{7} \)  (b) \( \frac{8}{56} \)  (c) \( \frac{1}{49} \)  (d) none of these

47. Multiply: \( 8 \frac{1}{6} \times 4 \frac{2}{7} \)
   
   (a) 32 \( \frac{1}{21} \)  (b) 35  (c) 5 \( \frac{5}{6} \)  (d) 4 \( \frac{2}{7} \)

48. Multiply: \( \frac{3}{4} \times \frac{4}{9} \times \frac{6}{7} \)
   
   (a) \( \frac{2}{7} \)  (b) \( \frac{13}{20} \)  (c) \( \frac{3}{14} \)  (d) \( \frac{1}{14} \)

49. Multiply: \( 48 \frac{3}{4} \times 3 \frac{3}{4} \)
   
   (a) 1,443 \( \frac{3}{4} \)  (b) 144  (c) 180  (d) 144 \( \frac{3}{4} \)

50. Divide: \( \frac{5}{8} \div \frac{1}{4} \)
   
   (a) \( \frac{2}{5} \)  (b) 2 \( \frac{1}{2} \)  (c) \( \frac{5}{32} \)  (d) 5 \( \frac{3}{5} \)
51. Divide: \( \frac{3}{5} \div \frac{1}{10} \)
   (a) 6     (b) 3     (c) 1     (d) none of these

52. Divide: \( \frac{5}{6} \div 2 \)
   (a) 1 \( \frac{2}{3} \)     (b) \( \frac{3}{5} \)     (c) 2 \( \frac{5}{6} \)     (d) \( \frac{5}{12} \)

53. Divide: \( 3 \frac{1}{3} \div 2 \frac{1}{2} \)
   (a) 8 \( \frac{1}{3} \)     (b) 1 \( \frac{1}{3} \)     (c) 6 \( \frac{1}{6} \)     (d) 5 \( \frac{2}{5} \)

54. Divide: \( \frac{3}{10} \)
   (a) \( \frac{1}{9} \)     (b) 9     (c) \( \frac{9}{100} \)     (d) \( \frac{1}{3} \)

55. Divide: \( 5 \frac{1}{7} \)
   (a) 2 \( \frac{2}{7} \)     (b) 11 \( \frac{4}{7} \)     (c) 10 \( \frac{4}{7} \)     (d) 7 \( \frac{11}{28} \)
56. A farmer removed \( \frac{1}{2} \) of all the corn in a silo and a week later removed \( \frac{1}{4} \) of the original amount of corn. What fractional part of the corn was removed from the silo?

(a) \( \frac{1}{8} \)  
(b) \( \frac{3}{4} \)  
(c) \( \frac{1}{2} \)  
(d) \( \frac{1}{4} \)

57. A secretary typed an entire report on 5 \( \frac{3}{4} \) pages. However, he/she was supposed to type the report on no more than 4 \( \frac{1}{2} \) pages. How many extra pages did the secretary type?

(a) 2 \( \frac{1}{2} \)  
(b) 1  
(c) \( \frac{1}{4} \)  
(d) 1 \( \frac{1}{4} \)

58. A dress needing repair was sewn \( \frac{3}{4} \)" up a seam. However, the repair should have been made 3 times that length. How many inches should the repair have been made?

(a) 2 \( \frac{1}{4} \)  
(b) \( \frac{1}{4} \)  
(c) 2  
(d) 4

59. A worker has two pieces of sheet metal. How many quarters will he/she have if each piece is cut into equal sizes?

(a) 2  
(b) 4  
(c) 8  
(d) 12
DECIMALS

60. .26 is written as:
   (a) twenty-six tenths
   (b) twenty-six hundredths
   (c) twenty-six thousandths
   (d) twenty-six

61. .0048 is written as:
   (a) forty-eight thousandths
   (b) forty-eight hundredths
   (c) forty-eight ten thousandths
   (d) four hundred and eighty

62. Seven-tenths is represented by which number?
    (a) .7   (b) .07   (c) .007   (d) 7

63. Ten ten thousandths is represented by which number?
    (a) 10,000   (b) .010   (c) .0001   (d) .0010
64. Add: \[ \begin{array}{c}
.2 \\
.3 \\
+.4 \\
\end{array} \]

(a) .09  (b) .9  (c) 9  (d) .009

65. Add: \[ \begin{array}{c}
.4 \\
.6 \\
+.9 \\
\end{array} \]

(a) 1.9  (b) 19  (c) .19  (d) .019

66. Add: \[ \begin{array}{c}
8.7 \\
5.2 \\
+2.4 \\
\end{array} \]

(a) 15.13  (b) .163  (c) 1.63  (d) none of these

67. Add: \[ \begin{array}{c}
24 + 3.5 + .28 \\
\end{array} \]

(a) 27.78  (b) 24.378  (c) 28  (d) 2.778

68. Add: \[ \begin{array}{c}
136.2 + 4.362 + 1.4 + .054 \\
\end{array} \]

(a) 142.1016  (c) 142.016

(b) .00142016  (d) 136.8302
69. Add: \(0.00826 + 0.001931\)
   
   \(\begin{align*}
   (a) & : 0.0010191 \\
   (b) & : 0.010191 \\
   (c) & : 0.02757 \\
   (d) & : 0.002757
   \end{align*}\)

70. Subtract: \(0.8 - 0.3\)
   
   \(\begin{align*}
   (a) & : 0.5 \\
   (b) & : 0.05 \\
   (c) & : 5 \\
   (d) & : 0.24
   \end{align*}\)

71. Subtract: \(9.2 - 6.4\)
   
   \(\begin{align*}
   (a) & : 3.8 \\
   (b) & : 38 \\
   (c) & : 2.8 \\
   (d) & : 0.28
   \end{align*}\)

72. Subtract: \(45.032 - 7.63\)
   
   \(\begin{align*}
   (a) & : 38.662 \\
   (b) & : 37.662 \\
   (c) & : 38.402 \\
   (d) & : 37.402
   \end{align*}\)

73. Subtract: \(26 - 4.82\)
   
   \(\begin{align*}
   (a) & : 22.18 \\
   (b) & : 21.18 \\
   (c) & : 21.82 \\
   (d) & : \text{none of these}
   \end{align*}\)

74. Subtract: \(498.3 - 4.983\)
   
   \(\begin{align*}
   (a) & : 0 \\
   (b) & : 492.317 \\
   (c) & : 493.317 \\
   (d) & : 493.1283
   \end{align*}\)
75. Subtract: 252 - .004

   (a) 248  (b) 242.006  (c) 252.004  (d) 251.996

76. Multiply: \( \frac{.8}{x} \) 3

   (a) 2.4  (b) .24  (c) 24  (d) .024

77. Multiply: \( \frac{34.5}{x} \) .26

   (a) .897  (b) 897  (c) 89.7  (d) 8.97

78. Multiply: \( \frac{100}{x} \) .432

   (a) .432  (b) 43.2  (c) 4.32  (d) .00432

79. Multiply: .25 \( \times \) .25

   (a) .0625  (b) .625  (c) 6.25  (d) none of these

80. Multiply: 18.2 \( \times \) 3.64

   (a) 662.48  (b) 6624.8  (c) 66.248  (d) .66248

81. Multiply: 1500 \( \times \) 6.75

   (a) 101.25  (b) .10125  (c) 10.125  (d) 10,125
82. Divide: \( \frac{14}{7.28} \)
   (a) 5.2   (b) 52   (c) .52   (d) .052

83. Divide: \( \frac{4}{.0024} \)
   (a) 6   (b) .006   (c) .6   (d) .0006

84. Divide: \( \frac{6}{3} \)
   (a) .5   (b) 50   (c) .05   (d) 5

85. Divide: \( \frac{.25}{1.6125} \)
   (a) 645   (b) .645   (c) .0645   (d) .00645

86. Divide: \( \frac{86.8}{140.616} \)
   (a) 1.62   (b) .162   (c) 16.2   (d) none of these

87. Divide: \( .022 \div 4 \)
   (a) .5   (b) .005   (c) .0055   (d) .05
88. Joe removed .5 of all the flowers from a box and Cindy removed .3 of the original number of flowers. What decimal part of the flowers was removed from the box?

(a) .2   (b) .8   (c) .8   (d) .08

89. Mr. Best sold .24 of the suits he wanted to sell at his clothing store one day. What decimal part of his suits still need to be sold?

(a) 26   (b) .76   (c) 7.6   (d) 24

90. A patient needs to take 2.75 ounces of medicine per day. After 5 days, how many ounces of medicine will the patient have taken?

(a) 13.75   (b) 1.375   (c) .1375   (d) 137.5

91. A carpenter has 1 board of lumber. If he/she cuts the board into 10 equal pieces, what decimal part would one piece be?

(a) .01   (b) 10   (c) 1   (d) .1

92. Add:

$14.26
$ 3.3
$ .98
+$.07

(a) $7.62   (b) $8.62   (c) $17.62   (d) $18.62

93. Celery seeds cost $.59 per pack, lettuce seeds cost $.54 per pack, and carrot seeds cost $.48 per pack. What is the cost if one of each pack of seeds is bought?

(a) $1.61   (b) $16.10   (c) $.16   (d) $2.61
94. Subtract: $24.31
   - $5.42
   (a) $29.73  (b) $18.89  (c) $28.89  (d) $19.73

95. Mrs. Perez paid for $15.26 worth of groceries with a twenty dollar bill. How much change should she receive?
   (a) $5.74  (b) $5.84  (c) $4.74  (d) $4.84

96. Multiply: $24.99
   x 3
   (a) $74.97  (b) $749.07  (c) $7.49  (d) $7.49

97. If paint costs $12.49 per gallon, how much would fourteen gallons cost?
   (a) $124.90  (b) $174.86

98. Divide: $25/2.00
   (a) $80  (b) $8  (c) $0.80  (d) $0.80

99. Ten pounds of nails cost $12.40. How much would one pound cost?
   (a) $1.24  (b) $0.12  (c) $0.14  (d) $2.24
100. \( \cdot 84 \) rounded off to the nearest tenths place is:

(a) \( \cdot 8 \)  (b) \( \cdot 9 \)  (c) \( \cdot 85 \)  (d) \( \cdot 83 \)

101. \( \cdot 9829 \) rounded off to the nearest thousandths place is:

(a) \( \cdot 982 \)  (b) \( \cdot 983 \)  (c) \( \cdot 9820 \)  (d) \( \cdot 98 \)

102. \( \cdot 00175 \) rounded off to the nearest ten thousandths place is:

(a) \( \cdot 0017 \)  (b) \( \cdot 0020 \)  (c) \( \cdot 00176 \)  (d) \( \cdot 0018 \)
103. 48% is written as:
   (a) forty percent
   (b) four hundred eighty percent
   (c) forty-eight percent
   (d) eighty-four percent

104. 125.5% is written as:
   (a) one hundred twenty-five and five-tenths percent
   (b) one thousand two hundred fifty-five percent
   (c) twenty-five and five-tenths percent
   (d) one hundred twenty-five percent

105. $9\frac{3}{4}$% is written as:
   (a) ninety-three fourths percent
   (b) nine and three-fourths percent
   (c) nine and four-thirds percent
   (d) ninety-four thirds percent
106. Seventy-five percent is represented by which of the following?
   (a) 70\%  (b) 75\%  (c) 85\%  (d) 57\%  

107. Six and nine-tenths percent is represented by which of the following?
   (a) \(\frac{69}{10}\%\)  (b) 6910\%  (c) 6.9\%  (d) none of these  

108. One hundred fifty-six and one-half percent is represented by which of the following?
   (a) \(156\frac{1}{2}\%\)  (b) 156.1\%  (c) 156\%  (d) 10056 \(\frac{1}{2}\%\)  

109. 8 is what percent of 32?
   (a) 33\%  (b) 25\%  (c) 50\%  (d) 75\%  

110. 75\% of 48 is:
   (a) 12  (b) 24  (c) 36  (d) 48  

111. 40 is 20\% of what number?
   (a) 60  (b) 100  (c) 20  (d) none of these  

TURN PAGE
MIXED OPERATIONS

112. \( \frac{4}{5} \) changed to a decimal is:
   (a) 4%  (b) \( \frac{1}{5} \)  (c) .75  (d) .80

113. 30% changed to a fraction is:
   (a) \( \frac{3}{100} \)  (b) \( \frac{3}{10} \)  (c) \( \frac{1}{30} \)  (d) .03

114. \( \frac{5}{8} \) changed to a percent is:
   (a) 62 \( \frac{1}{2} \)  (b) 625%  (c) 6.2 \( \frac{1}{8} \)  (d) none of these

115. 92\% changed to a decimal is:
   (a) .092  (b) 92  (c) 9.2  (d) .92

116. .023 changed to a percent is:
   (a) 23\%  (b) 23  (c) 2.3\%  (d) .23\%

117. \( \frac{1}{2} \) changed to a decimal is:
   (a) .50  (b) .05  (c) 50  (d) .2
118. $6 \frac{3}{5}$ changed to a decimal is:
   (a) .066   (b) 66   (c) .66   (d) none of these

119. .75 changed to a fraction is:
   (a) $\frac{1}{4}$   (b) .50   (c) $\frac{3}{4}$   (d) $\frac{5}{7}$

120. 2.45 changed to a fraction is:
   (a) $\frac{1}{245}$   (b) $2 \frac{4}{5}$   (c) $2 \frac{9}{20}$   (d) 24.5%

121. A machine produces 150 items per hour. If one morning run of four hours gave 24 defective items, what percent of items produced were defective?
   (a) 4%   (b) 16%   (c) 6.25%   (d) 2%

122. A farmer harvested 100 bushels of corn on Monday, 85 bushels on Tuesday, and 40 bushels on Wednesday. If he/she wants to harvest 300 bushels of corn by Thursday, what part of the corn still needs to be harvested?
   (a) .75   (b) .25   (c) .50   (d) .10

123. If 1,000 bricks are needed to build a wall and only 650 are on the work site, what part of the bricks needed are available?
   (a) $\frac{7}{10}$   (b) $\frac{13}{10}$   (c) $\frac{13}{20}$   (d) $\frac{7}{20}$
124. Find the average (mean) of the following numbers: 55, 31, 26, 48

(a) 35  (b) 160  (c) 40  (d) 80

125. Find the average (mean) of the following numbers: 12.1, 8.9, 16.5

(a) 12.5  (b) 13.5  (c) 11.5  (d) 14

126. A salesperson sold $80.50 of clothing on Monday, $100.27 on Tuesday, $93.76 on Wednesday, $85.24 on Thursday, and $125.08 on Friday. What was his/her average sales per day?

(a) $76.97  (b) $96.97  (c) $116.97  (d) $93.76
127. What time is shown on the clock?

(a) 12:50  (b) 12:52  (c) 12:48  (d) 12:43

128. How much do the vegetables weigh?

(a) 9 ounces  (b) 8 ounces  (c) 10 ounces  (d) 11 ounces
129. How much does the meat weigh?

- (a) 200 grams
- (b) 300 grams
- (c) 225 grams
- (d) 250 grams

130. What is the length of the screw to the nearest quarter inch?

- (a) 2"  
- (b) $2 \frac{1}{2}$"  
- (c) $2 \frac{3}{4}$"  
- (d) 3"
131. How long is the nail to the nearest tenth of a centimeter?

(a) 5.5 centimeters  (c) 5.7 centimeters
(b) 5 centimeters  (d) 6 centimeters

132. What is the volume of milk?

(a) 2 ounces  (b) 3 ounces  (c) 4 ounces  (d) 5 ounces
133. What is the volume of water?

(a) 50 ml.  (b) 75 ml.  (c) 100 ml.  (d) 200 ml.

134. .25 kilograms are equal to:

(a) \(\frac{1}{250}\) gram  (c) 2,500 grams  
(b) 25 grams  (d) 250 grams

135. 11 pounds are equal to:

(a) 5 kilograms  (c) 50 grams  
(b) 50 kilograms  (d) 500 grams
136. 10 centimeters are equal to:
   (a) 1 meter (b) .1 meter (c) .01 meter (d) none of these

137. 5 inches are equal to:
   (a) 127 millimeters (c) 10 millimeters
   (b) .127 millimeters (d) 127 centimeters

138. 2 liters are equal to:
   (a) 2 milliliters (c) 2,000 milliliters
   (b) 20 milliliters (d) 200 milliliters

139. 1.06 quarts are equal to:
   (a) 4 milliliters (c) 1 milliliter
   (b) 4 liters (d) 1 liter

140. A farmer began plowing a field at 5:35 a.m. He/she finished 13 hours and 8 minutes later. What time was it when the farmer finished plowing the field?
   (a) 6:35 p.m. (c) 5:35 p.m.
   (b) 6:43 p.m. (d) 6:35 a.m.
141. A customer bought 10 pounds of pork chops, 6 pounds 8 ounces of steak, 1 pound of bacon, and 4 pounds 15 ounces of chicken. How much meat did the customer buy?

(a) 21 pounds 7 ounces  (c) 44 pounds  
(b) 23 pounds  (d) none of these

142. A patient weighs 100 kilograms, but needs to lose 25 kilograms. How much will the patient weigh when he/she loses the necessary weight?

(a) 125 kilograms  (c) 125 pounds  
(b) 75 kilograms  (d) 100 kilograms

143. If one wall stud is 8 feet long and there are 12 studs in a wall, how many linear feet of lumber (assuming zero waste) will a carpenter need for all the studs in the wall?

(a) 20 feet  (b) 56 feet  (c) 96 feet  (d) 106 feet

144. A piece of pipe is 12 meters long. If the pipe is cut into 4 equal pieces, what would be the length of each piece (assuming zero waste)?

(a) 8 meters  (c) 16 meters  
(b) 3 meters  (d) none of these
145. A cook needs ten 8-ounce cartons of milk for a recipe. How many quarts of milk would be used?

(a) 80 quarts  
(b) 10 quarts

(c) 5 quarts  
(d) 2.5 quarts

146. After a car traveled 260 miles its tank was refilled with 10.4 liters of gasoline. How many miles per liter did the car get?

(a) 25  
(b) 20  
(c) 30  
(d) 27
147. A secretary organized his/her work and determined that it will take 25 minutes to type letters, 2 hours to type a mailing list, 45 minutes to proofread a manuscript, and 1 1/2 hours to do file work. While none of the following answers is correct, which answer is a reasonable estimate of the time it will take to do the work?

(a) about 3 hours  
(b) about 6 1/2 hours  
(c) about 8 hours  
(d) about 4 hours 45 minutes

148. A welder has 1 1/2 feet of welding rod but he/she needs 3 times that amount to complete a job. While none of the following answers is correct, which answer is a reasonable estimate of the amount of welding rod needed to complete the job?

(a) about 3 feet  
(b) about 4 3/4 feet  
(c) about 7 feet  
(d) about 10 feet

149. On a given day a machine shop earns $480 and pays $183.50 in overhead costs. While none of the following answers is correct, which answer is a reasonable estimate of the profit made by the machine shop?

(a) about $250.50  
(b) about $663.50  
(c) about $290.00  
(d) about $350.00
150. A child drank 451 milliliters of milk on Monday, 675 milliliters on Tuesday, and 524 milliliters on Wednesday. While none of the following answers is correct, which answer is a reasonable estimate of the average (mean) amount of milk the child drank per day?

(a) about 545 milliliters  
(b) about 650 milliliters  
(c) about 483 milliliters  
(d) about 800 milliliters

STOP, YOU ARE FINISHED
Appendix E

Area Vocational Center Follow-up Letter
March 2, 1984

Dr. Ronald Foreman, Director
Sauk Area Career Center
138th and Crawford Avenue
Crestwood
P.O. Robbins, IL 60472

Dear Ron:

I want to thank you for your cooperation and assistance while conducting the recent field testing at Sauk Area Career Center. You and your staff were very helpful and cordial during my visit, and contributed to the successful field testing.

I will keep you informed regarding future project activities. Thanks again!

Sincerely,

Jim

James P. Greenan
Principal Investigator

JPG/cja
Appendix F

Sample Computer Program
RUN NAME       STUDENT PERFRMNC TEST RELIABLTIES
VARIABLE LIST  PTEST, P101, P104, P105, P107, PVPA, P108, P111 TO P178, P179, 
                P201, P205 TO P278, P279, P301, P305 TO P313
SUBFILE LIST   CONS (21) SECY (20) NRSAID (20) FOOD (20) BLDTDRD (20)
                AGMECH (21) DP (22) LPN (20) CHLDCR (20) ELECT (20)
                ORNHORT (09) COMP (19) HLTH (16) CHLDDEV (19) MACHINE (15)
INPUT MEDIUM    DISK
INPUT FORMAT   (F1, T1, F3, F1, F2, F1, F1, T8, F3, 68F1, F2/ 
                F4, 74F1, F2/ 
                F4, 9F1)

ACCORDING TO YOUR INPUT FORMAT, VARIABLES ARE TO BE READ AS FOLLOWS

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<td>27-27</td>
</tr>
</tbody>
</table>
Appendix G

Sample Computer Output
### Summary of Test Statistics

- **Number of Items**: 150
- **Mean Score**: 98.93
- **Median Score**: 99.38
- **Standard Deviation**: 26.38
- **Reliability (KR-20)**: 0.968
- **Reliability (KR-21)**: 0.958
- **S.E. of Measurement**: 4.73
- **Possible Low Score**: 0
- **Possible High Score**: 150
- **Obtained Low Score**: 28
- **Obtained High Score**: 150
- **Number of Scores**: 359
  - Blank Scores: 0
  - Invalid Scores: 0
  - Valid Scores: 359

### Test Frequency Distribution

<table>
<thead>
<tr>
<th>Raw Score</th>
<th>Standard Score</th>
<th>Percentile</th>
<th>Percent</th>
<th>Freq</th>
<th>Cum Freq</th>
</tr>
</thead>
<tbody>
<tr>
<td>150</td>
<td>694</td>
<td>99</td>
<td>0.3</td>
<td>1</td>
<td>359</td>
</tr>
<tr>
<td>149</td>
<td>690</td>
<td>99</td>
<td>0.0</td>
<td>0</td>
<td>358</td>
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<tr>
<td>148</td>
<td>686</td>
<td>99</td>
<td>0.0</td>
<td>0</td>
<td>358</td>
</tr>
<tr>
<td>147</td>
<td>682</td>
<td>99</td>
<td>0.0</td>
<td>0</td>
<td>358</td>
</tr>
</tbody>
</table>

* Each * represents 1 person(s)
Appendix H

Sample Data Table
INTERNAL CONSISTENCY RELIABILITY COEFFICIENTS (KUDER-RICHARDSON [KR-20]) OF THE PERFORMANCE TEST OF GENERALIZABLE MATHEMATICS SKILLS

<table>
<thead>
<tr>
<th>ASSESSMENT INSTRUMENT</th>
<th>Conservation</th>
<th>Agricultural Mechanics</th>
<th>Horticulture</th>
<th>Secretarial</th>
<th>PROGRAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>(n=21) (SEM=4.86) (KR-20=96)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(21) 4.82 .95</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(9)   4.56 .90</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(20)  4.56 .97</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(22)  3.78 .93</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(19)  4.28 .97</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(20)  4.54 .97</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(20)  4.10 .94</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(18)  4.82 .94</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(20)  4.79 .95</td>
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<tr>
<td>(20)  4.66 .96</td>
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</tr>
<tr>
<td>(20)  4.29 .96</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(15)  4.56 .96</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(111) 3.97 .99</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(171) 4.02 .99</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(128) 4.32 .97</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(136) 4.45 .96</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(18)  4.16 .96</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(282) 4.73 .97</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GENDER</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(171) 4.02 .99</td>
<td>Female</td>
</tr>
<tr>
<td>(111) 3.97 .99</td>
<td>Male</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MATHEMATICS APTITUDE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(128) 4.32 .97</td>
<td>High</td>
</tr>
<tr>
<td>(136) 4.45 .96</td>
<td>Medium</td>
</tr>
<tr>
<td>(18)  4.16 .96</td>
<td>Low</td>
</tr>
<tr>
<td>(282) 4.73 .97</td>
<td>Total</td>
</tr>
</tbody>
</table>

TOTAL 156
Appendix I

Generalizable Mathematics Skills Assessment Survey
The "Generalizable Skills" project funded by the Illinois State Board of Education/Department of Adult, Vocational, and Technical Education (DAVTE) is currently in its second phase. This year the project is concerned with developing strategies and procedures for assessing the mathematics skills of students in secondary vocational programs. The expectation of the project is that the secondary area vocational centers will have practical instruments and procedures that teachers and other school personnel can use to identify students' functional learning abilities and problems in the area of mathematics. The assessment information could provide a basis upon which to prescribe the necessary instruction and/or support services necessary for students to succeed in their vocational programs.

Your leadership, cooperation, and assistance last year greatly contributed to the project's success. The project staff and the DAVTE would appreciate your participation and assistance again in this year's study. Your continued leadership and support will greatly help us in the task of developing and validating the project's assessment strategies and procedures.

Enclosed is a survey and a stamped, self-addressed envelope which I would like you to complete. The survey generally is concerned with describing the existing mathematics assessment and instructional strategies/procedures currently used in the AVCS. I would appreciate it if you would complete and return your survey to me by August 14, 1983. You may designate a person to complete the survey (e.g., mathematics teacher, guidance counselor, support services personnel) if appropriate. This information will help us in adding to our knowledge base, and planning and conducting future project activities. Thank you in advance for your cooperation and assistance. If you have any questions, please don't hesitate to contact me.

Sincerely,

James P. Greenan
Assistant Professor and Principal Investigator
Generalizable Mathematics Skills Assessment Survey

Directions: Please provide the information requested by placing check marks (✓) and writing in the spaces below. The information will assist the 'Generalizable Skills' project by adding to the mathematics skills assessment knowledge base and in planning and conducting future project activities.

1. Does your area vocational center (AVC) instructional personnel (e.g., vocational teachers, guidance counselors, support personnel) have access to assessment information that describes an individual student's level of mathematics skills?

   ___ yes   ___ no

2. What kinds of instruments, strategies, and/or procedures are used to assess the levels of mathematics skills of students enrolled in your AVC?

   ___ Standardized mathematics tests

      (specify)

      ____________________________

   ___ Teacher developed mathematics tests

      (describe)

      ____________________________

   ___ Other

      (specify)

      ____________________________

   ___ None
3. Who conducts or administrates assessments of students' mathematics skills?

___ Comprehensive high school personnel
(specify: e.g., mathematics teacher)

___ AVC personnel
(specify: e.g., vocational teacher)

___ Other personnel
(specify)

___ No one

4. Is there a need in your AVC for practical instruments, strategies, and procedures designed to assess the mathematics skills that are necessary for students to succeed in vocational programs?

___ yes ___ no

Explain: ____________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
5. Specify how mathematics skills assessment information could be effectively used in the instructional process by AVC personnel for helping students to succeed in vocational programs?

Assessment: 

Planning: 

Curriculum: 

Instruction: 

-3- 171
6. Who provides mathematics instruction to students in your AVC?

___ Comprehensive high school personnel
   (specify: e.g., mathematics teacher)

___ AVC personnel
   (specify: e.g., vocational teacher)

___ Other personnel
   (specify)

___ No one

7. Describe the process (if any) for identifying, referring, and/or providing instruction and support services to students who need instruction or additional assistance in mathematics to succeed in their vocational programs?
3. You may comment or provide any additional, helpful information regarding mathematics skills assessment in your AVC.