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ABSTRACT

In 1988 a study was conducted to determine the validity of candidate teacher licensure examinations for use in Tennessee under the 1984 Comprehensive Education Reform Act. The Department of Education conducted a study to determine the validity of 11 previously unvalidated or extensively revised tests for certification and to make recommendations about the minimum qualifying scores for any of these tests found valid. Some of the tests were National Teacher Examinations specialty area tests developed or revised since 1984--art education; music education; school guidance and counseling; school psychologist; and special education. An additional six tests, developed by a consortium of states in conjunction with the Educational Testing Service (ETS), were tested: earth/space science; health education; marketing and distributive education; psychology; teaching hearing impaired students; and teaching visually impaired students. A total of 270 personnel from higher education institutions and local school districts reviewed each test as follows: (1) content review by teacher educators; (2) job relevance review by local educators; and (3) knowledge estimation review by members of both groups for 11 of the tests not previously reviewed in Tennessee. Seventeen educational and lay representatives further served as a Standards Committee, using the information from the panels to make decisions on validity and minimum qualifying scores. The Committee recommended minimum qualifying scores for four tests, but did not recommend scores for eight tests lacking normative data. Minimum scores will be set when data are available. The Committee further recommended that the impact of the tests on special groups of examinees, such as minorities, be monitored carefully. Five appendices contain recommended qualifying scores and summaries of data. (SLD)

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INITIAL TEACHER LICENSURE TESTING IN TENNESSEE:
TEST VALIDATION

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Introduction

Statutory requirements for initial licensure/certification and endorsement of public school personnel in Tennessee were established by the Comprehensive Education Reform Act of 1984. The legislation mandated that applicants for initial certification must present minimum qualifying scores on secured tests of communication skills, general knowledge, professional knowledge, and endorsement area specializations. The act stipulated that the requirements would become effective July 1, 1984, or as soon thereafter as the tests could be validated and have minimum qualifying scores established.

Two studies have been conducted to ascertain the validity of candidate teacher licensure examinations for use in Tennessee and the minimum qualifying scores for valid tests. A brief overview of the results and implementation of the recommendations from the first study in 1984 is presented. The recent 1988 study is described in more detail because the latter study demonstrates the procedures used in both studies.

Overview of 1984 Study

A statewide study conducted in 1984 determined that the three NTE Core Battery tests and 23 of the 25 NTE Specialty Area tests were valid to use as initial certification tests in Tennessee. The study also provided the data to establish minimum qualifying scores for the valid tests. Upon completion of the study, the State Board of Education immediately established minimum score requirements for the NTE Core Battery covering communication skills, general knowledge, and professional knowledge. Subsequently, the State Board of Education instituted minimum score requirements as recommended for NTE Specialty Area tests that correspond to 14 endorsement areas. The tests used and recommended minimum scores from the 1984 study are presented in Appendix A.

Objectives of the 1988 Study

The study conducted for the Tennessee State Department of Education in 1988 had two objectives. They were (1) to determine the validity of 11 previously unvalidated or extensively revised ETS tests as measures of the knowledge and academic skills required for specific initial certification endorsements of public school personnel in Tennessee and (2) to formulate recommendations on minimum qualifying scores for any of these tests determined to be valid and three previously validated tests for use in Tennessee. The study was delimited to potential use of the ETS tests for initial certification endorsement rather than to select personnel for employment.

Description of Candidate Tests

The 14 tests addressed in the study are secured instruments that are available from Educational Testing Service, a private, non-profit testing organization. Eight NTE Specialty Area tests that have been developed or revised since 1984 were included in the study (Art Education, Biology, Chemistry, Music Education, Physics, School Guidance and Counseling, School Psychologist, and Special Education). A consortium of states with testing programs for teacher certification has been formed to work with ETS in the development of tests for specific specialized areas that are not included among the NTE Specialty Area tests. Six tests developed by the state-sponsored testing program (SSTP) consortium were available for the study (Earth/Space Science, Health Education, Marketing and Distributive Education, Psychology, Teaching Hearing Impaired Students, and Teaching Visually Impaired Students).

Strategy

The methodology employed in the study involved groups or panels of teacher education institutional personnel in the review of test content, local school

district professional staff in the assessment of test item job relevance, and both types of personnel in the estimation of knowledge levels by test item among minimally qualified applicants for the respective endorsement areas. The content review and job relevance review functions were applied with only 11 of the 14 tests because the tests for Biology, Chemistry, and Physics had been previously validated for use in Tennessee. A separate committee was named to review the data analyses of the responses from these panels in order to make decisions on test validity and recommendations on minimum qualifying scores for valid tests.

Participant Nomination and Selection

The nomination of potential panel members was solicited by letter that specified the number of nominees to be identified for each area of specialization. Nominations were requested from the chief academic administrators of the teacher education units in Tennessee with approved preparation programs for the applicable specializations. The superintendents of representative local school districts throughout the state were requested to make nominations.

The selection of panel members was performed by the study staff with attention being given to several factors. To the extent possible within each area of specialization, nominees were selected on the basis of requisite expert qualifications, representation of gender groups, inclusion of relevant racial groups, and representation of institutions offering specialized preparation programs in Tennessee. A total of 270 personnel from higher education institutions and local school districts participated in the study.

Panel Functions

A current form of each ETS test was supplied by Educational Testing

Service for review by the panel members selected for each test. The panel members worked independently in conducting the reviews based on instructions given by ETS personnel, who supervised the data collection sessions. One-day meetings to collect the data were held in Chattanooga, Knoxville, Johnson City, Memphis, Jackson, and Nashville, respectively, during the time period of April 13-22, 1988.

Each content review panel member representing a higher education institution in Tennessee performed three tasks. First, the panelist examined each item on the assigned test to judge whether or not at least 90% of the students completing the appropriate preparation program would have the opportunity to acquire the knowledge or academic skills to choose the correct response for the item. Second, the panelist made judgments about the congruence between the proportion of the test devoted to each topic and the emphasis on the topic in the curriculum required for professional preparation. Third, the panelist indicated the degree to which the test as a whole was congruent with the total professional preparation program.

Each job relevance review panel member from a local school district reviewed each test item on the assigned test to make judgments about the relevance of the knowledge or academic skills to competent performance as a beginning specialized practitioner in Tennessee. The relevance of each item was judged as Crucial, Important, Questionable, or Not Relevant.

The knowledge estimation panel members for 11 tests were the individuals who performed the content review and job relevance assessments. The knowledge estimation panel for each of the tests that had already been validated was also composed of subject-matter specialists from higher education institutions and local school districts. At the test item level, each panelist made judgments about the difficulty of each item for persons who have minimum levels of

knowledge and academic skills necessary for competent performance as a beginning specialized practitioner in Tennessee.

Standards Committee

A group of 17 educational and lay representatives was selected to serve as the Standards Committee for the study. The committee met in Nashville on August 10-11, 1988, to perform two tasks. First, the committee reviewed the data on appropriateness (content review and job relevance review) for each test to make decisions on the validity of the 11 ETS tests under consideration for use in Tennessee. Second, the committee developed recommendations on minimum qualifying scores for the valid ETS tests based on a review of the knowledge estimation data and examinee performance data.

Presentation of Data

Two types of information are summarized in this section of the paper. They are demographic data on panel participants and the Standards Committee and results of the panel functions (content review, job relevance review, and knowledge estimation).

Demographic Data

The personnel who performed the three panel functions were described by gender and racial background. The three panel groups were distributed on these variables as follows:

	Content Review (N=99)	Job Relevance Review (N=113)	Knowledge Estimation (N=270)
Gender			
Male	62%	24%	48%
Female	36%	76%	51%
No Response	2%	0%	1%
Racial Group			
Black	9%	14%	11%
White	84%	83%	82%
No Response	7%	3%	7%

The 17-member Standards Committee was a broadly representative group of educators and lay personnel from Tennessee. The committee was described on the variables of gender and racial background as follows:

Gender	
Male	52%
Female	47%

Racial Group	
Black	35%
White	65%

Content Review

The content review of the ETS tests was performed at three levels: test item, test topic, and total test. Appendix B presents the results of the item review for each of the 11 tests. The data indicated that over 50% of the panelists who reviewed each test reported at least 87% of the items for all tests except Art Education are included in the curricula of the specialized preparation programs. While the percentages of items included are generally lower, the same patterns exist when the 60% and 70% criteria are applied to the responses of the panelists.

Appendix C contains a derived index for each test that represents the degree of difference between the topical emphases of the test and the specialized preparatory curriculum. Based on an index of 0 (close similarity) to 100 (little similarity), the range of the index values was from 14.4 for the Teaching Visually Impaired Students test to 64.7 for the School Guidance and Counseling test. With the exception of the latter test, the index values for the remainder of the tests were less than 50.

The data summarized in Appendix D represent the comparison of each total test and the overall related professional preparatory curriculum. The percentages of panelists who indicated close parallel or some difference were

relatively high for most tests. Only two tests as a whole were judged to be appreciably dissimilar to the related preparatory program.

Job Relevance Review

Appendix E presents the results of the job relevance ratings of test items for each ETS test by local school district personnel. Responses of Crucial or Important were defined as indicating relevance for items in this analysis. Over 50% of the panelists who reviewed each test indicated that more than 80% of the items were relevant to competent performance as a beginning specialized practitioner in Tennessee. Over 70% of the panelists for each test judged about 60% or more of the items as being job relevant.

Knowledge Estimation

The responses of panel members in performing the knowledge estimation function for each of the 14 tests were analyzed to derive estimated raw score means for minimally qualified certification applicants. Using conversion factors provided by ETS, the scaled score equivalent of the raw score mean was computed for each test. The results for the 1988 study are reported in Table 1.

The scaled scores for each ETS subject-matter test can vary from a low of 250 to a high of 990, a 740-point difference between the lowest and highest scores possible. Scores cannot be compared directly among the subject-matter tests for two reasons. First, the tests are normed independently on different groups of examinees. Second, the standard errors of measurement, an index of the precision of test scores, vary to a considerable degree among the tests.

Standards Committee Actions

In order to act formally as a committee, the Standards Committee elected a member to serve as chair during its deliberations. The decisions on test

Table 1
 Summary of Analyses on Estimated Scores for Minimally
 Qualified Certification Candidates by Test

Test (Number and Name)	Items Total/Score	Mean		N
		Raw Score	Scaled Score	
11 Music Education	150/150	64.641	551.193	19
13 Art Education	150/145	62.296	552.839	21
23 Biology	150/150	69.456	480.158	24
24 Chemistry	120/120	52.602	458.556	18
26 Physics	120/119	53.457	547.478	20
27 Teaching Hearing Impaired Students	120/120	66.175	531.364	18
28 Teaching Visually Impaired Students	120/120	72.359	579.463	19
35 Special Education	150/148	73.525	543.612	19
39 Psychology	120/120	57.533	464.147	18
40 School Psychologist	135/122	60.792	511.004	16
42 School Guidance and Counseling	145/140	73.553	592.008	18
55 Health Education	120/119	60.594	491.914	22
56 Marketing and Distributive Education	120/120	69.459	556.902	19
57 Earth/Space Science	120/116	56.892	504.139	19

validity and recommendations on minimum qualifying scores and related matters are reported below.

Test Validity Decisions

The Standards Committee was presented all data collected and analyzed in performing the content review and job relevance review functions. (Knowledge estimation data were not released to the committee until the test validity decisions had been made.) The committee considered concurrently the content review results (test item, test topic, and total test levels) and job relevance review results for each test independently in making decisions on test validity. Utilizing this approach, the committee concluded that 9 of the 11 ETS tests for which decisions were required were valid to use in Tennessee as initial certification endorsement area tests (see Table 2). The two tests declared invalid for this purpose were the Art Education and Earth/Space Science tests that were judged to be insufficiently congruent in content with the related professional preparatory programs.

Recommended Minimum Qualifying Scores

The Standards Committee received the results of the knowledge estimation function for minimally qualified professional practitioners based on the judgments of the panel members who reviewed the 14 ETS tests. The data were presented for two sub-sets of tests - the five tests (four of these having been judged valid) with sufficient numbers of examinees to derive normative information and the nine tests (eight of these having been judged valid) without sufficient numbers of examinees to derive normative information.

The data reported for the tests with normative information were the following: number of examinees; scaled score mean, standard deviation, and standard error of measurement; and knowledge estimation scaled score mean. In

Table 2

Compilation of Committee Decisions on Validity of
Selected ETS Subject-Matter Tests for Teacher
Licensure Endorsements in Tennessee - 1988 Study

Test (Number and Name)	Validity Decision
11 Music Education	Valid
13 Art Education	Not Valid
27 Teaching Hearing Impaired Students	Valid
28 Teaching Visually Impaired Students	Valid
35 Special Education	Valid
39 Psychology	Valid
40 School Psychologist	Valid
42 School Guidance and Counseling	Valid
55 Health Education	Valid
56 Marketing and Distributive Education	Valid
57 Earth/Space Science	Not Valid

addition, the values for scaled score means minus 1, 2, 3, and 4 standard errors of measurement were derived. The information for the tests with relatively small numbers of examinees included the following data: number of examinees, raw score mean and standard deviation, scaled score mean and standard deviation, and knowledge estimation mean. Data were not available for any of the tests on score distributions of examinees classified by any variable (e.g. region, state, or racial group).

After a thorough review of the examinee performance data, the committee

recommended specific minimum qualifying scores for the four valid tests with normative data (Biology, Music Education, School Guidance and Counseling, and Special Education). Further, the committee recommended that all applicants for initial certification with endorsements in the eight areas corresponding to the valid tests without normative data should be required to submit scores on the appropriate tests without any minimum qualifying scores being established. The recommendations for the 12 valid tests are summarized in Table 3.

Table 3
Committee Recommendations on Minimum Qualifying Scores
for Valid ETS Tests to Use in Tennessee - 1988 Study

Test (Number and Name)	Recommendation*
11 Music Education	480
23 Biology	420
24 Chemistry	No minimum
26 Physics	No minimum
27 Teaching Hearing Impaired Student	No minimum
28 Teaching Visually Impaired Students	No minimum
35 Special Education	490
39 Psychology	No minimum
40 School Psychologist	No minimum
42 School Guidance and Counseling	540
55 Health Education	No minimum
56 Marketing and Distributive Education	No minimum

* Note: No minimum - score submission required without minimum score established

Additional Recommendations

The committee as a whole was concerned about the potential adverse impact of recommended minimum qualifying scores on legally protected minorities as well as the lack of sufficient examinee performance data to recommend minimum qualifying scores for several tests. In response to these concerns, the committee recommended to the State Board of Education the following:

1. Monitor the performance of examinees on the four tests for which minimum qualifying scores are recommended in order to determine the impact on special groups of examinees because data are not available currently to make judgments on this matter.
2. Collect data on the performance of examinees who are required to submit scores for the eight tests without minimum qualifying scores, these data to include racial group membership, until sufficient data are available to be considered for setting minimum qualifying scores.

Appendix A

Recommended Minimum Qualifying Scores on Valid NTE Core Battery and Specialty Area Tests by Time Period - 1984 Study

Test	Minimum Qualifying Score by Time Period			
	1984-86	1986-87	1987-88	After 1987-88
<u>Core Battery</u>				
Communication Skills	640	644	647	651
General Knowledge	637	640	644	647
Professional Knowledge	631	635	639	643
<u>Specialty Area*</u>				
(Test Number and Name)				
1 Education in the Elementary School	490	540	560	590
2 Early Childhood Education	490	560	580	610
3 Biology and General Science	520	560	580	600
4 English Language and Literature	480	520	540	570
5 Industrial Arts Education	550	610	630	650
6 Mathematics	520	590	610	640
7 Chemistry, Physics, and General Science	500	580	600	620
8 Social Studies	490	540	570	590
9 Physical Education	540	610	630	660
10 Business Education	530	580	600	630
11 Music Education	480	520	540	570
12 Home Economics Education	490	510	540	560
17 French	490	570	590	610
18 German	470	500	520	550
19 Spanish	480	530	560	580
20 Introduction to the Teaching of Reading	470	510	540	560
22 Speech Communication	480	560	590	620
30 Reading Specialist	480	520	550	570
31 Media Specialist--Library and Audiovisual Services	500	520	550	570
33 Speech-Language Pathology	510	540	570	590
34 Audiology	570	590	610	630
41 Educational Administration and Supervision	530	550	580	610
42 Guidance Counselor	540	580	600	630

*Scaled scores for the NTE Specialty Area Tests are reported as multiples of 10.

Appendix B

Summary of Data Analyses on Content Review Ratings
of Test Items by Test*

Test (Number and Name)	No. of Items	Percentage of College Personnel Who Rated Item Content As Appropriate for Curriculum					N
		Over 50%	Over 60%	Over 70%	Over 80%	Over 90%	
11 Music Education	150	87	73	65	55	36	12
13 Art Education	150	75	62	48	31	12	9
23 Biology	150	NA	NA	NA	NA	NA	NA
24 Chemistry	120	NA	NA	NA	NA	NA	NA
26 Physics	120	NA	NA	NA	NA	NA	NA
27 Teaching Hearing Impaired Students	120	99	98	89	74	45	9
28 Teaching Visually Impaired Students	120	93	93	77	77	44	6
35 Special Education	150	94	90	79	57	32	10
39 Psychology	120	93	86	71	44	13	9
40 School Psychologist	135	90	79	79	64	33	7
42 School Guidance and Counseling	145	99	98	91	81	41	9
55 Health Education	120	92	87	82	73	50	11
56 Marketing and Distributive Education	120	94	94	78	48	15	8
57 Earth/Space Science	120	93	78	62	40	18	9

*Percentages may not equal 100% for a test due to omissions.
NA = Not Applicable

Appendix C

Summary of Data Analyses on Comparisons of Curriculum Content and Test Topic Emphasis by Test

Test (Number and Name)	Difference in Relative Emphasis Index*	N
11 Music Education	18.4	11
13 Art Education	29.2	9
23 Biology	NA	NA
24 Chemistry	NA	NA
26 Physics	NA	NA
27 Teaching Hearing Impaired Students	28.8	8
28 Teaching Visually Impaired Students	14.4	6
35 Special Education	20.6	9
39 Psychology	37.6	9
40 School Psychologist	48.1	7
42 School Guidance and Counseling	64.7	7
55 Health Education	19.1	11
56 Marketing and Distributive Education	47.3	8
57 Earth/Space Science	48.1	7

*Index range: 0 to 100

Low score indicates close similarity; high score indicates little similarity.

Appendix D

Summary of Data Analyses on Comparisons of Curriculum Content and Test Content by Test

Test (Number and Name)	Percentage of College Personnel Choosing Each Response Option*				N
	Close Parallel %	Some Difference %	Much Difference %	Little Similarity %	
11 Music Education	27	46	27	0	11
13 Art Education	22	56	22	0	9
23 Biology	NA	NA	NA	NA	NA
24 Chemistry	NA	NA	NA	NA	NA
26 Physics	NA	NA	NA	NA	NA
27 Teaching Hearing Impaired Students	13	88	0	0	8
28 Teaching Visually Impaired Students	0	50	33	0	6
35 Special Education	33	67	0	0	9
39 Psychology	0	56	33	11	9
40 School Psychologist	14	57	14	0	7
42 School Guidance and Counseling	29	57	0	0	7
55 Health Education	0	82	9	0	11
56 Marketing and Distributive Education	13	63	13	0	8
57 Earth/Space Science	0	57	43	0	7

*Percentages may not equal 100% for a test due to omissions.
NA = Not Applicable

Appendix E

Summary of Data Analyses on Job Relevance Ratings of Tests Items by Test*

Test (Number and Name)	No. of Items	Percentage of Public School Personnel Who Rated Item Content as Relevant to Job					N
		Over 50%	Over 60%	Over 70%	Over 80%	Over 90%	
11 Music Education	150	83	70	59	48	20	9
13 Art Education	150	82	76	67	51	37	12
23 Biology	150	NA	NA	NA	NA	NA	NA
24 Chemistry	120	NA	NA	NA	NA	NA	NA
26 Physics	120	NA	NA	NA	NA	NA	NA
27 Teaching Hearing Impaired Students	120	98	89	78	59	30	9
28 Teaching Visually Impaired Students	120	96	93	86	78	66	13
35 Special Education	150	90	86	78	64	44	9
39 Psychology	120	95	86	78	63	32	10
40 School Psychologist	135	87	76	61	43	19	9
42 School Guidance and Counseling	145	96	90	75	49	20	9
55 Health Education	120	87	81	72	59	48	12
56 Marketing and Distributive Education	120	98	96	94	88	66	11
57 Earth/Space Science	120	96	90	78	58	25	10

*Percentages may not equal 100% for a test due to omissions.
NA = Not Applicable