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ABSTRACT

The Phase 2 effort of a task to develop a new student critique form for the Air Training Command (ATC) is described. Phase 1 recommended the further development of group specific norms for officers, NCOs, and airmen enrolled in technical training schools. In Phase 2 additional items were added to the prototype form resulting in a later version of the critique form that had a reliability of .80. The Phase 2 version of the Student Critique Form (SCF) was administered to a sample of over 1,800 students enrolled in technical training courses at six Air Force bases. Norms were gathered separately for officers, NCOs, and airmen. Seven scales emerged from a factor analysis of the Phase 2 version of the SCF: Instructor Competence, Study Environment and Testing, Specialty Training, Training Impressions, Classroom Facilities and Environment, Training Devices and Audio Visual Aids, and Training Materials Adequacy. Phase 2 of this effort was subsequently initiated to develop the computer software to score and interpret the SCF. (Author/RC)

AFHRL-TR-73-15

AIR FORCE HUMAN RESOURCES LABORATORY

DEVELOPMENT OF PSYCHOMETRIC MEASURES OF STUDENT ATTITUDES TOWARD TECHNICAL TRAINING: NORM GROUP REPORT

By

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October 1973

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This technical report was submitted by the Technical Training Division, Air Force Human Resources Laboratory, Lowry Air Force Base, Colorado 80230. Dr. Marty R. Rockway was the Project Scientist.

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Marty R. Rockway, Technical Director
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Approved for publication.

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This report describes the Phase II effort of a task to develop a new student critique form for the Air Training Command (ATC). Phase I of this effort, as reported in AFHRL-TR-70-37, Development of Psychometric Measures of Student Attitudes Toward Technical Training: Reliability and Factorial Validity, recommended the further development of group specific norms for officers, NCOs, and airmen enrolled in Air Force technical training schools. In Phase II additional items were added to the prototype form resulting in a later version of the critique form that had a reliability of .80. The Phase II version of the Student Critique Form (SCF) was administered to a sample of over 1800 students enrolled in technical training courses at six Air Force bases. Norms were gathered separately for officers, NCOs, and airmen since additional analyses indicated, as did the Phase I analyses, that the three groups were

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significantly different with respect to attitudes as measured by the SCF. Seven scales emerged from a factor analysis of the Phase II version of the SCF. The scales were named as follows: Instructor Competence, Study Environment and Testing, Specialty Training, Training Impressions, Classroom Facilities and Environment, Training Devices and Audio Visual Aids, and Training Materials Adequacy. Phase II of this effort was subsequently initiated to develop the computer software to score and interpret the SCF.

SUMMARY

Problem

The purpose of this study was to complete Phase II and develop a new student critique form for the Air Training Command (ATC). The specific objectives of Phase II were: (*a*) to generate more items for the prototype scale developed in Phase I, in order to increase scale reliability; (*b*) to administer the Phase II Student Critique Form (SCF) to sufficiently large samples of officers, NCOs, and airmen enrolled in technical training courses; (*c*) to factor analyze the SCF again to insure scale unidimensionality; and (*d*) to norm the SCF separately for officers, NCOs, and airmen.

Approach

The SCF was administered to a sample of 1,825 officers, NCOs, and airmen taking technical training courses at six Air Force bases. Scores were reported for each rank and Air Force base where the SCF was administered as individual average scores and scale scores. Norms were collected for total scale score, subscale scores, and item scores for each of the three rank groups and each base, and reported in deciles. Factor analyses were run to check the unidimensionality of the SCF while other analyses were run to determine if there were significant differences between the three Air Force rank groups.

Results

Factor analyses established that there were seven unidimensional scales in the SCF: Instructor Competence, Study Environment and Testing, Specialty Training, Training Impressions, Classroom Facilities and Environment, Training Devices and Audio-Visual Aids, and Training Materials Adequacy. An analysis of SCF scores indicated that there were significant differences between the SCF scores of officers, NCOs, and airmen on each scale of the SCF when compared by rank and base where the SCF was administered.

Conclusions

A 69 item critique form was developed that consisted of seven unidimensional scales. Norms were collected for the critique form for each base where the form was administered and for each of the three rank groups at each base. The norms will enable users of the SCF to interpret the attitudes of students enrolled in technical training courses relative to an appropriate peer group. The next phase in the development of a new critique form calls for the development of the appropriate computer software to score and interpret the SCF. Upon completion of Phase III of this project, the SCF will be recommended for ATC use.

PREFACE

This research was completed under Project 1121, Technical Training Development; Task 112103, Evaluating Individual Proficiency and Technical Training Programs. Dr. Marty R. Rockway was the Project Scientist, and Captain Wayne S. Sellman and Dr. Roger J. Pennell were the Task Scientists. The report covers research performed between December 1970 and June 1971.

The authors wish to express their appreciation to Lt Colonel Walter F. Murphy, Dr. Marty R. Rockway, Major Philip J. DeLeo, Dr. Gerard M. Deignan, and Dr. James R. Burkett for their helpful contributions. Special thanks goes to Dr. Roger J. Pennell for his helpful criticisms of several draft versions of this report.

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I. INTRODUCTION

Many educational institutions, as well as the United States Air Force, have turned to student critique ratings as an aid in evaluating the relative effectiveness of instructors and instructional programs. The adequacy of students as judges of the competency of instructors and instructional programs remains a controversial issue. Two major conflicting viewpoints on this issue were cited by Coffman (1954). He suggested that (*a*) students are too inexperienced and subjective to make accurate, bias free ratings and (*b*) student ratings, regardless of bias, provide valuable information concerning instructor and course effectiveness. The opinions and attitudes expressed by students on critique forms can obviously be due to many different factors. Students may have different frames of reference, different expectations for a course, and different ideas as to the relevancy of a particular course. Inasmuch as lack of motivation or insincerity may lead a student to improperly respond to a critique form, the interpretation of such data must of necessity be tempered with knowledge of the limitations of student ratings. The fact still remains that students do observe instruction more than anyone else and are, therefore, the most logical candidates for feedback on training and the training environment. Even though serious problems have been associated with students' ratings of the learning environment, the preponderance of studies, as reported by Coffman (1954), indicated that student ratings are somewhat reliable, need not necessarily be influenced by the halo effect (the tendency to rate individuals too high or too low on the basis of one outstanding trait) and can be quite similar to the ratings of seasoned alumni.

Anikeef (1953) conducted a study to determine the utility of student evaluation of faculty members and also to determine the effects of instructor's grading leniency and the ratings the instructor received. A not too surprising finding of the study was that the rating received by the instructor was positively correlated with the grade received by the student. McKeachie and Soloman (1958) were also interested in studying the effectiveness of students' ratings of instructors. In attempting to ascertain the validity of students' ratings, they reasoned that one criterion of instructor effectiveness would be his ability to stimulate interest in the subject, as measured by comparing students' ratings of instructors against the percentage of students who elected to take advanced courses in the same subject area. The results indicated that ratings by students of instructors were significantly correlated with the percentage of continuing students in two of the five semesters. Although the ratings were not correlated with the criterion of course selection in the same subject area in a majority of cases, the ratings did provide valuable information for instructors who wished to improve their performance. In a similar vein, Cosgrove (1959), developed a student rating technique capable of producing a diagnostic instructor profile that could be used by instructors as an aid in identifying and evaluating strong and weak elements of teaching performance. The use of the profile approach appeared to be very helpful by providing a diagnostic starting point for instructor improvement.

Weaver (1960) discussed some of the problems that may be associated with student critiques, including the overall reluctance of instructors to being rated, the relationship of the rating given an instructor or course and the grade received for that course, and the influence of the student's perception of his own achievement upon the rating he assigns an instructor or course. An investigation was subsequently made into the relationship of the rating received by the instructor and the grade the student expected to receive in the course. The question of whether student criticism is directed towards both instructor personality and teaching skill or if the halo effect attenuates students' criticism of both of these variables was investigated. Ratings of personality were not found to be related to expected grade, suggesting that the popularity of an instructor does not necessarily influence his ratings to any significant extent. Other research (Hollander, 1965) in the area of leadership agrees. Thus, even though an instructor may attain a degree of popularity based on personality, students may judge his effectiveness based upon another set of criteria, *e.g.*, the competency of the instructor.

Methods of Measuring Student Attitudes

There are various methods available that can be used to measure student attitudes and opinions. Useful information can often be derived by simply determining the number of students who agree or disagree with certain statements about the training

environment, or by requesting students to submit short written essays about specific training situations. Individualized methods such as these do not, however, provide sufficient information to compare the results of one course with another. Summarization and attempts at standardization when using these methods can be tedious at best.

The measurement of student attitudes provides the most useful data when inter- and intra-course attitudes toward a particular course can be compared. Spencer and Aleamoni (1971) state that adequate interpretation occurs when (*a*) appropriate attention is given to sampling, reliability, and validity and (*b*) the same instrument is used in a standardized manner to measure many instructors and instructional programs. Such an approach enables investigators to develop norms such that instructors, training managers, and supervisors can make useful comparisons, course by course, and instructor by instructor.

Relevant Criteria

Various limitations involved in the selection and construction of attitude and opinion instruments are also discussed by Spencer and Aleamoni (1971). Relevant criteria for selecting or constructing an appropriate instrument are listed below:

1. *Administration.* The questionnaire should be administered by the instructor himself during the regular class or examination time, so that proctors and administrators would not be necessary.

2. *Time.* It should be short enough to be acceptable to faculty in regular classes, but long enough to insure reliability and an adequate measure of a wide sample of attitudes.

3. *Content.* It should measure those opinions and attitudes which are developed or exist about the total instructional program rather than a single element therein.

4. *Scoring.* It should be objective, and preferably machine scorable so that the results could be returned promptly and scoring could be standardized and reliable.

5. *Reliability.* If one wants to insure that scores on the instrument are true representations of the students' opinions, such scores must be consistent as evidenced by similar scores reproduced through subsequent testing of the same students rating the same instructor and course.

6. *Interpretation.* It should yield scores which differentiate among instructional programs and which can be interpreted by instructors in such a manner that their instructional effectiveness can be improved. It should assist in the diagnosis of the strengths and weaknesses of the instructional program.

7. *Realism.* The attitude measures must include those critical elements which comprise the attitudes the student has and wishes to express; but the measuring instrument must be capable of eliciting "real" feelings, and not careless or merely socially acceptable or expected responses.

Air Force Student Critique Program

The Air Force, as well as other training organizations and educational institutions, has long recognized the importance of the attitudes and opinions of its trainees concerning the different aspects of the technical training environment. These factors may determine to a great extent how a student performs in a course. Valuable information can be gained through the analysis of attitudes and opinions of students enrolled in technical training courses. The Air Force currently gathers information of this nature through the student critique program.

The objectives of this program, as stated in ATCR 52-29 (Recent changes to ATCR 52-29 may not be reflected.) are: . . .to obtain from students constructive criticism of training, the training environment, and base support facilities and services. Although the students' opinions may be based upon limited background and qualifications, his attitudes and reactions affect his learning and must be considered in evaluating training. A well designed and administered critique program provides commanders and supervisors useful and necessary information for improvement of training and the student environment. (para. 2, 17 July 1970).

Federico (1970) has described the above stated objective as a closed-loop cybernetic system, wherein feedback from constructive criticism performs three vital functions:

1. Information - furnishes commanders and supervisors with data about the current state of the training system.

2. Reinforcement - it strengthens or weakens various notions about the nature of the training program; and

3. Motivation - it incites corrective action within the system when it is warranted.

Thus, criticism provides some of the information that is necessary for the training system to maintain a satisfactory, balanced level of operation.

ATC Form 736 is currently being used by the Air Force to obtain constructive criticism from students. Trainees are encouraged, but not required, to respond to this form near the end of their technical courses or after blocks or units of instruction. Student critique data are subsequently used by commanders and supervisors to modify and improve training and the training environment. Recently, however, the reliability and validity of the ATC Form 736 have been somewhat suspect due to several serious deficiencies inherent in its format. Some areas of concern are the interpretation of the rating categories, the criteria for judgments, and the likelihood of being misled by gross percentages (for a detailed discussion of these deficiencies, see Federico, 1970).

Improved Student Critique Form

Cognizant of the shortcomings of the ATC Form 736, the Air Training Command requested that the Air Force Human Resources Laboratory, Technical Training Division, develop an improved student critique form. As a result of this request-AFHRL/TT initiated a three phase program to meet the above stated objective. The objective of phase I was to originate a psychometrically sound measure of student attitudes towards Air Force technical training that could be objectively analyzed and interpreted. A thorough review of the phase I effort is presented by Federico (1970, 1971a, 1971b). In phase II, norms were to be developed for the new student critique form, such that training managers and instructors would have the necessary data available to interpret the attitudes of officers, NCOs, and airmen relative to their peers. Upon completion of phase II of this study, the new form would then be proposed as a replacement for ATC Form 736. Phase III calls for the development of the appropriate computer software to manage the entire critique program within Air Force technical training by administering, scoring, and interpreting the student critique forms.

Purpose

The purpose of this report is to discuss the development of the new student critique form and report the associated normative data.

II. DEVELOPMENT OF THE SCALE

Initial Selection of Items

The initial pool of items used in the development of the Student Critique Form (SCF) was selected from student-generated criteria from a study conducted by the Special Evaluation Branch, 3415 Technical School, Lowry Air Force Base (1967). Two critique form prototypes were constructed by Federico (1970) from the above mentioned student-generated criteria. The SCF prototypes were constructed utilizing a Guttman- and a Likert-type configuration. An extensive statistical analysis was then performed on the SCF prototypes (for a detailed discussion see Federico, 1970). On the basis of the aforementioned analysis, the Likert-type configuration was recommended for future development.

Likert Format

The final SCF developed by Federico (1970) consisted of 55 Likert-type statements constructed using the methods described by Likert (1932) and Edwards (1957). The following statement is an example of the Likert-type format used in the SCF:

Most of your study guides are easy to understand.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
( )	( )	( )	( )	( )

Student reponse to an item, such as the one above, called for checking one of the five response categories.

Scale Development

A principal components factor analysis followed by a Varimax rotation (Harman, 1967) was used on the initial and later versions of the SCF. Factor analyses of the initial form and a later version, which consisted of twenty additional items, yielded basically the same seven factors, with the exception of Scale 8 (Textbook Utility), which was eliminated. The remaining items in Scale 8 were placed in other scales based upon their factor loadings and subjective judgments of their relevance in a particular scale. The items representing these seven factors were grouped together and incorporated into the final version of the SCF. Each factor consisted of between six and sixteen statements that were found to define a common content area of attitudes towards

technical training and as such could be considered to constitute separate unidimensional scales. These scales are listed in Table 1. Their names have been modified slightly from the original names to aid in interpretation of content. The scale intercorrelations listed in Table 2 are based on the SCF responses of 1,669 students. The data in Table 2 indicate that, with the exception of the correlation between subscores 3 and 6 with subscore 2, all of the correlations are significant at the .01 level of confidence. This result must be tempered with the knowledge that a correlation of only .25 is needed for significance at the .01 level, due to the large number of subjects. The SCF can then be scored to obtain (*a*) a total score for the entire form and (*b*) a scale score for each of the seven factors. The total score presents an overall estimation of the students' attitudes towards technical training while the seven individual scales afford a more detailed description and a specific identification of potential problem areas.

Table 1. **Scales Obtained from the Likert-Type SCF**

Scale	Number of Items in the Scale
1. Instructor Competence	13
2. Study Environment and Testing	10
3. Specialty Training	8
4. Training Impressions	7
5. Classroom Facilities and Environment	6
6. Training Devices and Audio-Visual Aids	16
7. Training Materials Adequacy	9
Total	69

Table 2. **Inter-Correlations Among Scales of the SCF**

	I	II	III	IV	V	IV	VII
I	1.00	.28	.49	.51	.35	.43	.39
II		1.00	.21	.26	.31	.24	.37
III			1.00	.59	.33	.48	.37
IV				1.00	.42	.52	.43
V					1.00	.46	.42
VI						1.00	.45
VII							1.00

Note. — $r \geq .20$ $p < .05$.

Multivariate Disciminant Analysis of the SCF

A multivariate disciminant analysis (Veldman, 1967) was run on the SCF data of 100 officers, 90 NCOs, and 99 airmen, by Federico (1970) to determine how well the SCF distinguished between the attitudes of the aforementioned Air Force rank groups. The data implied that the three groups have significantly different attitudes towards technical training, in that (*a*) NCOs have more favorable impressions of technical training than do airmen, and (*b*) that officers have more positive attitudes concerning training management and impressions than do airmen. Since the three groups differed in their attitudes towards technical training, meaningful interpretations of SCF scores could be made only with reference to the appropriate peer group, *i.e.*, normal response patterns (norms) would be established separately for each group, thereby permitting SCF score interpretation within each of the three groups. Since the groups would be normed separately, the attitudes of officers would be compared with officers in the norm group, NCOs with NCOs in the norm group, and airmen with other airmen in the norm group

Reliability

Test-retest reliability was .73 for the initial SCF, but later increased to .80 by adding fourteen items to the scale. The final, more reliable version of the SCF consisted, then, of 69 items representing seven factors.

The Kuder-Richardson (1937) reliability, formula 21 (K-R 21) was computed on SCF scores of 1,685 students enrolled in technical training courses at Chanute, Keesler, Sheppard, Lowry, Lackland, and Goodfellow AFBs. The internal

consistency reliabilities of the SCF for each of the six technical training schools are presented in Table 3. Judging from these reliability coefficients it would appear that the SCF demonstrated consistent reliability at each of the six bases. The SCF responses of 1,669 students at the six bases listed above were also used to determine the reliability of each of the seven scales of the SCF. The scale reliabilities are presented in Table 4. An inspection of Table 4 indicates that most of the seven scales of the SCF are moderately reliable, the exception being Scale II (Study Environment and Testing). The only reliability coefficient above .50 in Scale II was at Lackland AFB at .54. Several of the items in Scale II correlated highly with items it Scale III and therefore may explain the low internal consistency of this scale. The most reliable and consistent scale was Scale I (Instructor Competence).

Table 3. **K-R 21 SCF Reliabilities for Six Air Force Technical Training Schools**

Base	Number	K-R 21s
I Chanute	214	.898
II Keesler	333	.878
III Sheppard	371	.883
IV Lowry	523	.883
V Lackland	182	.901
VI Goodfellow	62	.918

Table 4. **K-R 21 Reliabilities of Seven Scales for Six Technical Training Schools**

	Technical Training Schools					
Scales	Chanute	Keesler	Sheppard	Lowry	Lackland	Goodfellow
I. Instructor Competence	.73	.78	.80	.82	.78	.83
II. Study Environment and Testing	.37	.49	.47	.38	.54	.47
III. Specialty Training	.63	.73	.65	.67	.70	.73
IV. Training Impressions	.62	.56	.57	.54	.58	.64
V. Classroom Facilities and Environment	.65	.58	.52	.64	.72	.72
VI. Training Devices and Audio-Visual Aids	.65	.69	.69	.67	.60	.65
VII. Training Materials Adequacy	.66	.63	.62	.65	.63	.76
Number of Subjects	214	333	401	523	182	62

Additional Factor Analysis of the SCF

To determine the stability of the factor structure of the SCF, an additional factor analysis using a principal components analysis with a Varimax rotation (Harman, 1967) was run on the SCF scores of 1,669 students at the six technical training schools. The results of this analysis reconfirmed the seven factors reported in Table 1. A few variations in factor loadings were noted between the original and later factor analysis but were not considered to be of sufficient magnitude to warrant a change in the original factor structure.

Validity

Several estimates of validity have been determined by Federico (1970). The discriminative validity of the SCF was established in that officers, NCOs, and airmen were distinguishable by their responses to some of the items in the SCF. That the SCF has sampling validity is apparent in that (*a*) the critique form adquately sampled the objectives of the student critique program (ATCR 52-29), and (*b*) the content for the items used in the SCF was generated by students enrolled in ATC technical training courses, not instructors or training managers.

Scoring Procedure

The scoring system for the SCF is based on the assumption that students who make strong responses to questionnaire items should be differentiated from students whose responses tend to be more moderate. The student responds to the SCF by marking each statement in one of the categories of strongly agree (SA), agree (A), undecided (U), disagree (D), and strongly disagree (SD). If the student marks "SA" on a positive statement (the SCF is composed of 52 positive and 17 negative

statements), a score of 5 is given: "A" is given a score of 4; and so on, to a score of 1 for "SD." The scoring system is reversed for negative items. A "SA" response is given a score of 1, and so on, to a score of 5 for "SD" response. The final score for each student is obtained by summing the individual item scores. The complete SCF is presented in Appendix A along with the points to be assigned each response category within each item.

A high total or scale score generally indicates a positive attitude towards technical training since such a score would result from agreeing with positive items and disagreeing with negative items. The seven scales represent areas in the training environment that can be considered relatively independent from each other. As an example, a student might rate the instructors as competent but the instruction as repetitious. A situation such as this would tend to be disguised by reporting SCF total score only, whereas, the subscore report would render this information readily available.

III. PROCEDURE

Administration of the SCF

The SCF was administered between November 1971 and January 1972 to 1,825 technical trainees taking courses at the following Technical Training Schools: Lowry, Lackland, Keesler, Sheppard, Chanute, and Goodfellow. The original sample was reduced to 1,669 due to errors in responding and missing or inaccurate biographical data. The final sample consisted then of 994 airmen, 271 NCOs, and 394 officers. Technical training courses were chosen on the basis of their representativeness of the courses taught at each center; the distribution of airmen, NCOs, and officers; and whether students were at mid-course (within plus or minus one week of the middle of the course) or end-course (within one week of the end of the course). Since the minimum time any student in this sample was enrolled in his respective technical training course was the mid-course point, it was assumed that such a period of time was long enough to develop attitudes toward Air Force technical training.

Procedure

The final version of the SCF, consisting of 69 Likert-type items, was administered to the subjects in booklet form. The cover sheet of the booklet contained generalized information on the subject's task and a statement insuring that attitudes would be held in strict confidence. The subjects were instructed to read the statement on the cover sheet and wait for instructions before responding to the biographical data. On page two the subjects were requested to give biographical information consisting of name, rank, social security number, AFSC, length of service, time in technical school, technical school enrollment, age, marital status, number of dependents, and level of education. The subjects also received instructions to report the AFSC they would be awarded upon completion of the course and their course number. Subjects were instructed to respond to the attitude statements beginning on page four. If an item did not apply, subjects were asked to mark the "undecided" category. Subject supervision was provided by the test administrator and the class instructor to prevent inter-subject collaboration. Testing time varied from twelve to thirty minutes including the time spent reading instructions and any questions that were asked relative to responding to the SCF. The SCF and its associated biographical data sheet is shown in Appendix A.

Treatment of the SCF

The completed surveys were scored for obvious inconsistencies in following directions and were coded in preparation for punching into IBM cards.

As previously mentioned, the original sample of 1,825 completed SCFs was reduced to 1,669 due to certain failures to follow directions, and incorrect or inaccurate information. Responses to the survey were then punched into IBM cards and verified. Data were coded for each of the items of information in the biographical data sheet and also for each statement on the SCF.

Scoring the SCF

Scores were reported for each rank, Air Force Specialty Code (AFSC), and Air Force Base where the technical school is located, as individual average scores and as scale scores. The individual average score was derived by computing total score on the SCF using conventional Likert scoring techniques and dividing this figure by 69 (the number of items in the SCF). This score was reported only by category (rank, AFSC, base). Scale scores for each of the seven factors that are listed in Table 1 were also reported for each of the three rank classifications, AFSC, and base. Scale scores were arrived at by totaling the responses for each scale and dividing by the number of items in the scale. Both total and scale scores were reported as a number between one and five, which is the scoring range for each item in the SCF.

IV. RESULTS

The average mean scores and accompanying standard deviations for 1,669 officers, NCOs, and airmen are found in Table 5. An inspection of Table 5 shows that all of the three groups possessed attitudes that were above the "neutral" point of 3 but less than the "agree" point of 4. The technical trainees in this sample might then be described as having attitudes towards technical training that were "slightly" positive. A further inspection of Table 5 reveals that the most positive attitudes were held by NCOs, followed by officers, and airmen. These results are in general agreement with the findings reported by Federico (1970).

Table 5. **Means and Standard Deviations of SCF Scores for 3 Rank Groups**

Rank	Mean	SD
Officers	3.45	.89
NCOs	3.53	.88
Airmen	3.40	.93

Analyses of Variance of SCF Scores

An analysis of variance was run to determine if the means for the three Air Force rank groups are estimates of the same common population; *i.e.*, are the differences between the three means the result of sampling error or are the means significantly different and a result of sampling from three distinct populations? The results of this analysis are found in Table 6. With the significance level set at .05, the critical value for significance with 2 and 1,656 degrees of freedom was an F ratio greater than 19.50. Thus, it was obvious that the F of 47.03 was significant at the .05 level of confidence and that the differences between the means of the three rank groups were sufficiently great that they were assumed not to be estimates of a common population. However, it should be noted that while this F is highly significant, the actual group differences are small. The value of ω^2 (Hays, 1963) is approximately .06, which indicates that only 6 percent of the mean square variance can be predicted by group membership.

Table 6. **Analysis of Variance for 3 Rank Groups**

Source of Viration	Sum of Squares	df	Mean Square	F
Between Groups	137.19	2	68.57	47.03*
Within Groups	2417.76	1656	1.46	
Total	2554.95	1658		

Note. — * $p < .05$.

Kruskal-Wallis One-Way Analysis of Variance of SCF Scores

The knowledge that the three means in the rank category differed significantly, did not, however, reveal anything specific about the nature of the differences. What was required was a statistical test that would reveal how each mean differed from every other and whether there were significant differences between some of the means and not between others. The Kruskal-Wallis one-way analysis of variance by ranks was used to test the null hypothesis that the three rank group samples are a result of random sampling from the same or identical population with respect to averages. Since many of the assumptions necessary for parametric measurement may not be met by the data in this study, a non-parametric test was used. The only assumptions necessary for the Kruskal-Wallis test were that the variable under study had an underlying continuous distribution and the variables were at least ordinally measured. Since the strongly agree, agree, etc., response categories were examples of ordinal measurements with an underlying continuous distribution, it was assumed that the data met the aforementioned minimal requirements. The results of the Kruskal-Wallis one-way analyses of variance by ranks are presented in Table 7. With the significance level set at .01 a X^2 value of 9.21 or larger is required for significance at the .01 level and a value of 10.6 or larger is required for significance at the .005 level. An inspection of Table 7 reveals that all values are highly significant at the .005 level, leading to the

conclusion that SCF scores of the three rank groups varied significantly for each of the seven scales. The results were in agreement with those reported by Federico (1970) and as such provided further evidence for norming the SCF separately for each of the three rank groups.

Table 7. **Non-parametric Analyses of Variance of the Air Force Rank Category**

SCF Scale Factors	H value[a]
I	10.99
II	130.84
III	36.29
IV	37.13
V	38.02
VI	31.05
VII	39.22

Note. — pH > 10.06 < .005.
[a]The value derived from computing the Kruskal-Wallis one way analysis of variance by ranks.

SCF Scale Comparisons by Rank Category

The scale means, standard deviations, and response percentages for the 1,669 airmen, NCOs, and officers are found in Tables 8 through 10. The means were the average means for each of the scales; *e.g.*, the scale 1 mean score was the mean response for items 1 through 13, which comprised scale 1, etc. The response percentage was the percent of technical trainees who responded 1 through 5 for each scale. A cursory review of Tables 8 through 10 reveals that most responses were in columns 3 and 4 with very few responses in columns 1, 2, and 5, indicating fluctuations between the "undecided" response and the "agree" response. The most positive responses on Tables 8 through 10 were on Scale 1 (Instructor Competence) wherein 79 percent of officers, NCOs, and airmen manifested very positive responses towards the capability of the instructors. The "undecided" response was used frequently by airmen. Over one half of the airmen sampled were undecided about Scale 2 (Study Environment and Testing), Scale 3 (Specialty Training), Scale 4 (Training Impressions), and Scale 6 (Training Devices and Audio-Visual Aids). The only scale other than Instructor Competence that produced positive results (over 1/2 of the sample "agreed" or "strongly agreed") was Scale 5 (Classroom Facilities and Environment). The overall indecision of the airmen in this sample may have reflected a lack of comparable classroom experiences with which to develop adequate evaluation criteria. The NCOs were only "undecided" on Scales 2 and 3 (Study Environment and Testing, and Specialty Training), respectively, which points to the possibility that their attitudes may have been more crystallized than the airmen in this sample. The NCOs showed more positive "agree" responses than officers or airmen. Over half of the NCOs marked "agree" on Scales 1, 5, 6, and 7 excluding Scale 4, where 49 percent of the NCOs agreed with the positive statements in that scale. It is interesting to note that none of the NCOs scored 1 or 2 on the Instructor Competence Scale, indicating generally favorable impressions were formed by the NCOs of the competence of the instructor cadre. The responses of the officers are similar to some extent to the airmen and NCOs, with the exception of their responses on Scale 3 (Specialty Training). Over 78 percent of the officers either "disagreed" with the positive items, "agreed" with the negative items or were "undecided" about the items in Specialty Training. As were the airmen, over 50 percent of the officers were "undecided" on Scales 3, 4, and 6 (Specialty Training, Training Impressions, and Repetitious Instruction). Scales 1, 2, 5, and 7 produced the most positive responses for officers with over 50 percent displaying favorable attitudes towards items in those scales.

Table 8. **Scale Means, SD, and Response (%) for Airmen (*N*=994)**

Item Score Scale	Response (%) 1	2	3	4	5	Mean	SD
1	0	1	17	75	7	3.84	.44
2	0	5	65	30	0	3.21	.44
3	0	11	58	30	1	3.12	.57
4	0	8	56	36	0	3.28	.51
5	0	2	42	56	1	3.48	.44
6	0	3	62	36	0	3.29	.40
7	0	5	47	48	1	3.41	.47

The only scale that produced unfavorable responses with all of the three rank groups was Specialty Training. Many of the items in Scale 3 concern the adequacy of the course as a preparation for actual on the job performance. Since many of the students were unfamiliar with the actual field job requirements, they were unable to make an informed estimate of the relevance of the

Table 9. Sc ; Means, SD's, and Response (%) for NCOs (*N*=271)

Item Score Scale	Response (%) 1	2	3	4	5	Mean	SD
1	0	0	13	79	8	3.93	.42
2	0	1	63	37	0	3.33	.38
3	0	9	58	31	1	3.18	.55
4	0	6	44	49	1	3.43	.54
5	0	2	28	66	3	3.63	.45
6	0	3	42	53	2	3.44	.46
7	0	2	35	61	2	3.56	.47

Table 10. Scale Means, SD's, and Response (%) for Officers (*N*= 394)

Item Score Scale	Response (%) 1	2	3	4	5	Mean	SD
1	0	1	18	78	4	3.83	.43
2	0	1	44	55	0	3.49	.36
3	2	21	55	22	0	2.92	.62
4	1	7	62	30	0	3.19	.51
5	0	1	30	69	1	3.59	.37
6	0	3	59	38	0	3.31	.41
7	0	2	35	63	1	3.54	.42

training they had received. However, all of the three groups manifested positive attitudes towards Scales 1 and 5 (Instructor Competence and Classroom Facilities and Environment) with Scale 7 (Training Materials Adequacy) running a close third. The percentage of officers, NCOs and airmen that manifested positive (an average mean score of 3), and negative (an average mean score of 1 or 2) attitudes on the SCF is shown in Table 11. As was previously noted, the NCOs held the most positive attitudes towards technical training followed by the officers and the NCOs. It is unclear why the "undecided" category was used frequently. Perhaps these responses were due to a desire on the part of some students to complete the SCF rapidly without reading the items carefully. Students who felt slightly positive or slightly negative towards an item did not judge that their feeling was strong enough to mark the agree or disagree response. Perhaps more explicit instructions on the meaning of each response category may have evoked more agree and disagree responses on the SCF. The fact remains, though, that many of the students were neutral towards technical training as measured by the SCF and these data must be considered the baseline from which norm comparisons will be made.

Table 11. Attitudes Expressed by the Three Air Force Rank Groups on the SCF

Rank	Percent Favorable[a]	Undecided[b]	Unfavorable[c]
Officers	51	43	6
NCOs	57	40	3
Airmen	45	50	5

[a]Average mean score of 4 or 5.
[b]Average mean score of 3.
[c]Average mean score of 1 or 2.

SCF Score Comparisons by Base Category

The average mean scores and accompanying standard deviations for the SCF scores of the six technical training schools (Lackland, Sheppard, Keesler, Chanute, Lowry and Goodfellow AFBs) are shown in Table 12. As was the case with the three Air Force rank categories, all six base groups possessed attitudes, as measured by the SCF, towards technical training that could be described as "slightly positive." The most positive attitudes were expressed by students at Base E, while the most negative attitudes were found at Base F.

Table 12. SCF Average Mean Scores for Six Technical Training Schools

Base	Mean	SD
A	3.43	.90
B	3.46	.90
C	3.49	.90
D	3.37	.93
E	3.52	.89
F	3.30	.96

Analysis of Variance of SCF Scores

An analysis of variance was run to test for significant differences between the bases. The results of this analysis can be found in Table 13. With the significance level set at .05, an F ratio greater than 4.36 is significant with 5 and 1,709 degrees of freedom. Since the obtained F ratio of 9.01 was significant at the .05 level of confidence, it was concluded that the differences between the means of the six base groups were not large enough to be accounted for solely on the basis of chance.

Table 13. **Analysis of Variance of Six Technical Training Schools**

Source of Variation	Sum of Squares	df	Mean Square	F
Between Groups	179.85	5	35.97	9.01*
Within Groups	6822.39	1709	3.97	
Total	7022.14	1714		

* $p < .01$.

Kruskal-Wallis One Way-Analysis of Variance of SCF Scores

As with the Air Force ranks category, the Kruskal-Wallis test was run to determine the extent to which each mean differed from every other and whether or not there were significant differences between some means and not between others. The null hypothesis stated that the six base group samples were a result of random sampling from the same or identical populations with respect to averages. The results of the Kruskal-Wallis one-way analysis of avariance by ranks are presented in Table 14. A X^2 value of 16.7 or larger was required for significance at the .005 level of confidence. Inspection of Table 14 reveals that all of the values were highly significant at the .005 level. The results suggest that the SCF scores for the six bases varied significantly on each of the seven scales of the SCF. Thus, it is evident that due to the significant differences between the scores at the six technical schools, the SCF should be normed separately for each base, *i.e.*, comparisons between SCF scores would use data compiled for students at that base only. The differences in attitudes towards technical training between the six bases may have been due to several diverse factors. Students may have had higher morale at some bases that provided superior facilites and more opportunities for off-base entertainment. Another important influence may have been the Air Force Specialty Code (AFSC). Since some AFSCs are obviously more "popular" than others, students who were enrolled in relatively "unpopular" AFSCs may have reflected more dissatisfied responses on the SCF than similar students enrolled in a more popular course.

Table 14. **Non-parametric Analyses of Variance of the Air Force Base Category**

SCF Scale Factors	H value*
I	42.55
II	28.24
III	33.55
IV	63.45
V	40.90
VI	53.91
VII	61.47

Note — p H> 16.7 < .005.

SCF Scale Comparisons by Base Category

The scale means and standard deviations for the six technical training schools are found in Table 15. The highest scale mean for each base was consistently Instructor Competence. The only mean above 4.00 was found at Base E on (Scale 1). The most negative response was also consistent across each base for Specialty Training. The large number of undecided and negative responses on Scale 3 seems to indicate again, that students were basically unsure, especially arimen, as to whether their training was actually preparing them to perform adequately in the field.

Table 15. **SCF Scale Means (MN) for Six Technical Training Schools**

Scales	Base											
	A		B		C		D		E		F	
	MN	SD	MN	SD	MN	SD	MN	SD	MN	SD	MN	SD
Instructor Competence	3.85	.39	3.82	.44	3.90	.40	3.81	.45	4.01	.42	3.70	.52
Study Environment and Testing	3.33	.40	3.37	.43	3.32	.41	3.24	.43	3.26	.47	3.21	.42
Specialty Training	3.06	.57	3.11	.61	3.11	.57	3.01	.55	3.26	.60	2.92	.69
Training Impressions	3.29	.54	3.29	.51	3.33	.51	3.18	.50	3.49	.49	3.11	.59
Classroom Facilities and Environment	3.49	.44	3.64	.39	3.51	.38	3.48	.45	3.52	.47	3.40	.50
Training Devices and Audio-Visual Aids	3.35	.40	3.29	.41	3.41	.42	3.26	.43	3.41	.35	3.24	.41
Training Materials Adequacy	3.37	.48	3.54	.44	3.57	.42	3.38	.47	3.52	.42	3.29	.57

V. CONCLUSIONS AND RECOMMENDATIONS

The results of the factor analysis, using the data from Phase II of the effort to develop a new student critique form for the Air Training Command, basically confirmed the factor structure reported by Federico (1970). However, Scale 8 (Textbook Utility), as reported by Federico (1970), was eliminated. The items left over from the foregoing scale were placed into other scales based upon factor loadings and subjective interpretations of degree of fit to other scales. The scales were then renamed, to aid interpretation of their content by instructors and training managers.

Based upon the results of the KR-21 reliability measure of the internal consistency of the subscores of the SCF, several items are being studied for modification or elimination. An item will be eliminated if its inclusion in a subscore lowers the internal consistency of the subscore, if the content of the item results in a disproportionate number of undecided responses, or if the content of the item appears to be inappropriate. Thus, several revisions and item eliminations will be studied prior to recommending the SCF for widespread ATC usage.

The analysis established that officers, NCOs, and airmen displayed significantly different attitudes towards technical training on all seven scales of the SCF, although the differences between the SCF scores of the three groups were relatively small. Significant differences were also found between the six bases on each scale of the SCF. While these significant differences were the justification for norming the SCF separately by rank and base, it must be remembered that with a sample as large as the one reported in this study that only small differences in SCF scores were required for significance. Thus, even though significant differences were found, the differences between the SCF scores of the base and rank categories were not large. However, the data did seem to indicate that NCOs had the most favorable attitudes towards technical training, followed by officers, and airmen.

The next phase in the development of an improved critique program entails the development of the appropriate computer software to manage the entire critique program within Air Force technical training by administering scoring, and interpreting the SCF. The computer software presently being developed will provide a score, response percentage, and norm comparison for the total scale and each subscale of the SCF. A report format is being developed that will provide training commanders, supervisors, and instructors with all of the pertinent information they will need to (*a*) determine how attitudes towards technical training of the students in their class compare with the attitudes of students of a similar rank at the same technical training center, (*b*) identify "felt" problem areas, and (*c*) identify areas in technical training that are receiving a favorable response. As a result, student feedback can be obtained in a more efficient, automated manner, thereby relieving instructors and training managers of the drudgery of interpreting and summarizing the student critique forms as they presently exist.

VI. SUMMARY

1. The uses and limitations of student critiques as a tool for the valuation of technical training courses were discussed. It was suggested that student critiques can be quite reliable and effective for course evaluation. Several studies that demonstrated the utility of using students to rate the effectiveness of instructors and course content were also discussed.

2. Relevant critieria for selecting or constructing an appropriate student critique instrument were listed. A brief history of the development of the prototype critique form was presented along with evidence that demonstrated the reliability and validity of the prototype form. Additional items were added to improve the reliability of the scale with the result that the present Student Critique Form (SCF) consists of 69 items contained in seven scales.

3. As the results of a previous study had suggested, the SCF was normed separately for officers, NCOs, and airmen to accommodate for significant differences on the part of these three groups with respect to several distinct factors of training. Data from the administration of the SCF to 1,669 students enrolled in technical training courses at Lowry, Lackland, Keesler, Chanute, Sheppard, and Goodfellow AFBs was used to norm the SCF separately by rank and base.

4. Subsequent analyses indicated again that the rank and base groups were significantly different and should, therefore, be normed separately as was suggested by Federico (1970). An additional factor analysis basically reconfirmed the seven scales that were developed previously. The implementation of Phase III of the project to develop a new student critique form was also

discussed. The implementation of the program to develop the computer software to manage the entire student critique program was recommended and has since been initiated. Upon completion of Phase III of this project, the SCF will be offered to the Air Training Command for operational use.

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APPENDIX A: ATC FORM 736, STUDENT CRITIQUE

STUDENT CRITIQUE	COURSE NO.	COURSE TITLE			PERIOD OF TRAINING FROM	TO
NAME OF STUDENT (Optional)		GRADE	DATE	CLASS NO.	SHIFT	SQUADRON

INSTRUCTIONS: Below are a series of items which can be rated Outstanding (O), Satisfactory (S) or Unsatisfactory (U). Check (✓) the rating for each item which best expresses your opinion. If you rate an item unsatisfactory (U), give specific comments and recommendations for improvement.

ITEMS	COMMENTS	RATING O	S	U
1. INSTRUCTION: (Class Control, Attitude, Enthusiasm, Helpfulness, Understandable)				
2. INDIVIDUAL ASSISTANCE: (Remedial Instruction, Counseling)				
3. TRAINING METHODS: (Amount of Theory & Practical, Use of Training Time, Student Participation)				
4. TRAINING LITERATURE: (Availability, Use and Helpfulness, Student Study Guides, Workbooks, Technical Orders, Manuals, Textbooks)				
5. VISUAL AIDS: (Availability, Use and Helpfulness, Films, Transparencies, Charts)				
6. TRAINING EQUIPMENT: (Availability, Use & Helpfulness, Systems Equipment, Test Equipment, Tools)				
7. WRITTEN AND PRACTICAL TESTS: (Understandable, Administration, Critique)				
8. CLASSROOM AND TRAINING AREA: (Light, Heat, Ventilation, Work Benches, Tables, Chairs, Seating Arrangement, Noise Level)				
9. OVERALL EVALUATION OF COURSE				

ADDITIONAL COMMENTS: (Use reverse side if more space required)

ATC FORM 736 MAY 72 PREVIOUS EDITION MAY BE USED UNTIL STOCK IS EXHAUSTED.

*U.S.Government Printing Office: 1972 - 779-108/68

APPENDIX B: PROPOSED STUDENT CRITIQUE FORM

Air Force Human Resources Laboratory

Technical Training Division

Lowry Air Force Base

This booklet contains statements designed to measure student attitudes toward Air Force technical training. It is intended to give students in Air Force technical schools an opportunity to express their <u>real feelings</u> about what can be done to improve this training. Please read the following statements and respond truthfully to each. The information obtained will be used solely for research. Your attitudes will be maintained in strict confidence.

Name _____ SSAN _____

Present Grade _____ AFSC _____

Total length of service in the Air Force:

_____ years _____ months

Your Technical School _____

Number of months in Technical School _____

Number of months in present grade _____

Your age in years on your last birthday _____

Marital status: Single ( ) Married ( )

Divorced or Widowed ( )

Number of dependents _____

Education: Circle one number showing highest level reached.

1. Some grammar school (did not finish)
2. Grammar school graduate.
3. Some high school (did not finish)
4. High school graduate
5. Some college (less than two years)
6. Two or more years of college, but no degree
7. College degree
8. Graduate work, but no degree
9. Masters degree
10. Doctors degree

Please read each of the following items and indicate the amount of your agreement or disagreement with its contents. Point out the extent to which you are of the same opinion by making a check mark (✓) under the appropriate item.

EXAMPLE: Most of the time Beetle Bailey enjoys basic military training.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

If you strongly disagree with this statement, you should place a check mark (✓) under strongly disagree to show that you are of a very different opinion. If you agree with this statement, you should place a check mark (✓) under agree to show that you are of the same opinion. If you have no opinion about the statement or if you are undecided about its contents, you should place a check mark (✓) under undecided.

1. Most of your instructors seem to know their subject matter.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

2. Most of your technical instructors seem to be well educated.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

3. Most of your technical instructor's classroom presentations are well organized.

Strongly Agree	Agree	Un-decided	Dis-agree	Strongly Dis-agree
( )	( )	( )	( )	( )

4. Most of the time your technical instructor's classroom presentations are hard to understand.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

5. Most of your technical instructor's presentations are clarified by examples and illustrations.

Strongly Agree	Agree	Un-decided	Dis-agree	Strongly Dis-agree
( )	( )	( )	( )	( )

6. Most of your technical instructors seem interested in their subject matter.

Strongly Agree	Agree	Un-decided	Dis-agree	Strongly Dis-agree
( )	( )	( )	( )	( )

7. Most of the time your instructor thoroughly explains new technical material.

Strongly Agree	Agree	Un-decided	Dis-agree	Strongly Dis-agree
( )	( )	( )	( )	( )

8. Most of the training materials seems related to course objectives.

Strongly Agree	Agree	Un-decided	Dis-agree	Strongly Dis-agree
( )	( )	( )	( )	( )

9. Most of the time you are informed of the training objectives of each class session.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

10. Most of your technical school instructors seem to be experienced teachers.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

11. Most of the time your instructor gives you individual help with difficult technical meterial.

Strongly Agree	Agree	Un-decided	Dis-agree	Strongly Dis-agree
( )	( )	( )	( )	( )

12. Most of your technical instructors encourage class participation.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

13. Most of the time your technical instructor evades answering questions asked during class.

Strongly Agree	Agree	Un-decided	Dis-agree	Strongly Dis-agree
( )	( )	( )	( )	( )

14. Most of the time you have enough time during technical school class days for individual study.

Strongly Agree	Agree	Un-decided	Dis-agree	Strongly Dis-agree
( )	( )	( )	( )	( )

15. Most of the time your barracks are quiet enough for studying.

Strongly Agree	Agree	Un-decided	Dis-agree	Strongly Dis-agree
( )	( )	( )	( )	( )

16. Most of the time additional duties you are assigned interfere with your study.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

17. Most of the time you have to wait one or more weeks before you know what your score is on a particular technical school test.

Strongly Agree	Agree	Un-decided	Dis-agree	Strongly Dis-agree
( )	( )	( )	( )	( )

18. Most of the time you are not given enough time to finish your technical school tests.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

19. Most of your scores on written tests reflect how well you will be able to perform your USAF job specialty.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

20. Most of the time instructional television is used in your technical training.

Strongly Agree	Agree	Un-decided	Dis-agree	Strongly Dis-agree
( )	( )	( )	( )	( )

21. Most of the time you need individual assistance to learn technical material.

Strongly Agree	Agree	Un-decided	Dis-agree	Strongly Dis-agree
( )	( )	( )	( )	( )

22. Most of the time in technical school you are pressed to learn material at a faster rate than you are capable.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

23. Most of the time you should be given additional tests within a block in technical school.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

24. Most of the time in technical school six hours of class each working day is tiresome.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

25. Most of your formal education was considered by the Air Force in assigning you to a particular technical school.

Strongly Agree	Agree	Un-decided	Dis-agree	Strongly Dis-agree
( )	( )	( )	( )	( )

26. Most of your training materials actually teach you how to perform your new USAF job specialty.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

27. Most of what you are taught in technical school will help you get a better civilian job.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

28. Most technical school classroom lectures help you develop the new USAF skill you are trying to learn.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

29. Most of your technical instructors motivate you to learn your USAF specialty.

Strongly Agree	Agree	Un-decided	Dis-agree	Strongly Dis-agree
( )	( )	( )	( )	( )

30. Most of your skills are being properly used by the Air Force.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

31. Most of your scores on performance tests reflect how well you will be able to perform your USAF job specialty.

Strongly Agree	Agree	Un-decided	Dis-agree	Strongly Dis-agree
( )	( )	( )	( )	( )

32. Most of the time in technical school the training is so regimented that the learning environment is diminished.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

33. Most of the time your student squadron sets aside each class night enough time for sleep.

Strongly Agree	Agree	Un-decided	Dis-agree	Strongly Dis-agree
( )	( )	( )	( )	( )

34. Most of the time topics within your technical course follow a logical sequence.

Strongly Agree	Agree	Un-decided	Dis-agree	Strongly Dis-agree
( )	( )	( )	( )	( )

35. The length of your technical course is just right to prepare you for your USAF job specialty.

Strongly Agree	Agree	Un-decided	Dis-agree	Strongly Dis-agree
( )	( )	( )	( )	( )

36. Most of the time the pace of instruction within your technical course is fast enough to keep you from being borad.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

37. Most of the time your technical instructors use new and interesting training methods to teach you your course materials.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

38. Most of the time class critique of your technical school tests helps you learn the course materials better.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

39. Most of the time technical school classrooms are too small for the number of students in a class.

Strongly Agree	Agree	Un-decided	Dis-agree	Strongly Dis-agree
( )	( )	( )	( )	( )

40. Most of the time classroom temperatures are adequately maintained.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

41. Most of the time classroom lights are bright enough.

Strongly Agree	Agree	Un-decided	Dis-agree	Strongly Dis-agree
( )	( )	( )	( )	( )

42. Most of your classrooms are properly ventilated.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

43. Most of the time the seating arrangement within your classrooms allows you to adequately see the instructor and the chalkboard.

Strongly Agree	Agree	Un-decided	Dis-agree	Strongly Dis-agree
( )	( )	( )	( )	( )

44. Most of the time you have easy access to copies of AF regulations, manuals, and technical orders required as supplementary reading in your course.

Strongly Agree	Agree	Un-decided	Dis-agree	Strongly Dis-agree
( )	( )	( )	( )	( )

45. Most of the time you have easy access to hands-on trainers for extra practice during off-duty hours.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

46. Most of the time chairs and tables used in your classrooms are comfortable enough.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

47. Most of the time there are too many students using one trainer.

Strongly Agree	Agree	Un-decided	Dis-agree	Strongly Dis-agree
( )	( )	( )	( )	( )

48. Most of the time the noise in your technical school classroom is maintained at a minimum.

Strongly Agree	Agree	Un-decided	Dis-agree	Strongly Dis-agree
( )	( )	( )	( )	( )

49. Most training films help you to better understand the technical subject matter.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

50. Most training films and slide presentations motivate you to learn technical material.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

51. Most training devices that you use help to better understand new concepts.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

52. Most paper-and-pencil tests that you are given in technical school thoroughly cover the topics.

Strongly Agree	Agree	Un-decided	Dis-agree	Strongly Dis-agree
( )	( )	( )	( )	( )

53. Most course days there is enough time allowed for you to practice on/with hands-on training aids.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

54. Most of the different kinds of training aids/equipment used in technical school are available for your self-study.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

55. Most training films used in your technical course help you learn important facts about performing your USAF job specialty.

Strongly Agree	Agree	Un-decided	Dis-agree	Strongly Dis-agree
( )	( )	( )	( )	( )

56. Most of t'a time closed-circuit TV is an effective training technique.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

57. According to your instructor most of the training films you see are out-of-date by the time you see them.

Strongly Agree	Agree	Un-decided	Dis-agree	Strongly Dis-agree
( )	( )	( )	( )	( )

58. Most of the time there are too many students practicing on one training device.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

59. Most of your technical instruction is spent viewing training films.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

60. Most of the time your technical training equipment is not operational.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

61. You can understand most of your training materials.

Strongly Agree	Agree	Un-decided	Dis-agree	Strongly Dis-agree
( )	( )	( )	( )	( )

62. Most of the written tests you receive in technical school are easy to understand.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

63. Most of your student study guides are easy to understand.

Strongly Agree	Agree	Un-decided	Dis-agree	Strongly Dis-agree
( )	( )	( )	( )	( )

64. Most of the time your instructor must supplement the training materials because he says they are not current.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

65. Most of the time your instructor refers you to material which supplements your training guide.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

66. Most of the information in your training materials is up-to-date and accurate.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

67. Most of your training materials have enough illustrations to help you learn the topics.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

68. Most of the time your training materials cover course topics in enough depth and detail.

Strongly Agree	Agree	Un-decided	Dis-agree	Strongly Dis-agree
( )	( )	( )	( )	( )

69. Most of the time there is enough training literature available to adequately cover the course.

Strongly Dis-agree	Dis-agree	Un-decided	Agree	Strongly Agree
( )	( )	( )	( )	( )

APPENDIX C: STUDENT CRITIQUE FORM ITEM RESPONSES

Table C1. Item Means, SDs, and Response Percentages for Airmen (*N*=994)

ITEM	RESPONSE (PERCENTAGE) 1	2	3	4	5	M.	S.D.
1	0	3	2	69	25	4.15	0.65
2	0	7	10	68	15	3.90	0.73
3	1	12	13	65	9	3.69	0.85
4	1	10	12	70	7	3.72	0.78
5	1	9	8	71	14	3.90	0.77
6	1	8	12	64	15	3.84	0.79
7	1	14	15	61	9	3.64	0.87
8	2	5	8	70	14	3.89	0.78
9	2	11	9	67	11	3.72	0.89
10	3	16	12	56	12	3.59	0.99
11	1	8	9	65	19	3.91	0.81
12	2	7	9	63	18	3.88	0.86
13	1	5	5	58	30	4.11	0.82
14	9	31	11	42	7	3.04	1.17
15	28	28	17	24	3	2.44	1.20
16	19	26	19	32	4	2.76	1.21
17	1	0	2	37	61	4.57	0.60
18	5	3	2	44	45	4.22	1.01
19	19	31	24	20	4	2.60	1.12
20	22	22	36	15	4	2.58	1.12
21	3	21	12	56	8	3.45	1.01
22	8	22	21	43	7	3.21	1.10
23	5	28	20	39	8	3.17	1.07
24	11	33	15	38	4	2.91	1.13
25	19	25	27	26	3	2.69	1.15
26	4	19	24	47	6	3.32	0.99
27	9	14	26	38	13	3.33	1.14
28	3	11	24	58	5	3.53	0.85
29	2	16	19	55	8	3.52	0.92
30	14	23	30	31	3	2.87	1.09
31	11	32	25	29	3	2.81	1.06
32	6	20	29	39	6	3.19	1.01
33	7	14	19	53	7	3.38	1.04
34	2	9	11	72	6	3.72	0.80
35	9	21	43	25	2	2.89	0.94
36	4	19	14	56	7	3.43	1.01
37	4	32	23	37	4	3.04	1.00
38	5	20	24	44	6	3.29	1.01
39	5	13	11	62	9	3.57	0.99
40	10	21	8	57	5	3.27	1.13
41	0	3	2	86	9	3.99	0.52
42	5	16	5	70	5	3.53	0.98
43	1	6	3	78	11	3.92	0.71
44	4	15	25	49	6	3.37	0.95
45	16	32	32	18	2	2.58	1.02
46	5	15	7	71	2	3.50	0.94
47	4	23	24	46	4	3.23	0.96
48	2	5	5	80	8	3.87	0.68

Table C1 *(Continued)*

49	1	13	29	46	8	3.42	0.95
50	4	21	31	39	6	3.22	0.96
51	1	5	16	71	7	3.78	0.67
52	4	18	12	61	5	3.44	0.98
53	3	19	26	50	2	3.28	0.90
54	8	35	30	26	1	2.76	0.96
55	4	18	32	41	4	3.23	0.93
56	6	9	65	17	3	3.02	0.77
57	8	31	35	24	2	2.81	0.95
58	5	23	25	45	3	3.18	0.97
59	1	4	12	63	21	4.01	0.73
60	5	17	21	51	6	3.37	0.99
61	2	8	7	74	9	3.78	0.80
62	3	18	10	63	6	3.50	0.96
63	5	19	12	59	5	3.38	1.02
64	3	26	25	44	2	3.17	0.93
65	2	43	22	30	2	2.87	0.94
66	4	15	23	57	2	3.39	0.90
67	1	13	13	71	3	3.60	0.80
68	2	17	17	61	3	3.47	0.89
69	3	14	17	62	4	3.50	0.89

Table C2. **Item Means, SDs, and Response Percentages for NCOs (*N*=271)**

ITEM	RESPONSE (PERCENTAGE) 1	2	3	4	5	M.	S.D.
1	1	4	2	75	18	4.02	0.73
2	1	8	10	69	12	3.92	0.78
3	0	13	4	73	10	3.90	0.80
4	0	4	4	77	14	4.01	0.61
5	0	7	3	75	16	4.00	0.67
6	1	6	9	69	16	3.94	0.74
7	0	8	9	76	7	3.82	0.68
8	0	6	3	77	14	3.99	0.65
9	0	9	4	72	15	3.92	0.77
10	2	17	10	61	10	3.61	0.94
11	0	6	6	72	15	3.96	0.71
12	0	3	3	72	21	4.11	0.62
13	2	6	2	65	25	4.05	0.84
14	8	30	6	50	6	3.15	1.15
15	17	18	41	23	1	2.74	1.04
16	5	11	19	52	13	3.56	1.02
17	1	0	1	41	56	4.51	0.68
18	5	6	3	53	33	4.04	1.02
19	24	43	17	13	3	2.27	1.05
20	35	30	28	4	3	2.09	1.02
21	2	10	4	70	13	3.83	0.85
22	4	9	8	66	13	3.76	0.92
23	5	22	14	52	6	3.33	1.04
24	4	24	8	57	7	3.41	1.04
25	17	37	24	20	3	2.56	1.08
26	6	28	14	49	4	3.17	1.05
27	4	16	23	48	9	3.42	1.00
28	1	13	11	71	4	3.65	0.78
29	1	17	19	55	8	3.51	0.92
30	16	17	11	52	4	3.11	1.22
31	10	46	18	25	1	2.62	1.01
32	2	6	18	63	11	3.73	0.82
33	2	4	54	33	7	3.40	0.76
34	4	9	4	76	7	3.73	0.88
35	8	30	29	33	1	2.90	0.99
36	6	14	6	67	7	3.56	1.00
37	3	32	13	50	2	3.16	1.00
38	3	18	13	58	8	3.51	0.98
39	4	11	6	70	9	3.68	0.93
40	7	15	3	68	7	3.54	1.05
41	2	1	1	86	9	3.99	0.60
42	4	13	3	72	8	3.66	0.95
43	4	5	0	82	8	3.95	0.81
44	3	9	13	65	10	3.69	0.89
45	7	24	31	33	5	3.05	1.03
46	2	8	5	78	6	3.77	0.78
47	2	25	24	45	4	3.24	0.94
48	2	6	3	81	6	3.87	0.68

Table C2 *(Continued)*

49	4	13	13	21	9	3.59	0.96
50	2	21	17	52	7	3.41	0.97
51	1	4	15	74	6	3.78	0.66
52	2	15	7	68	7	3.53	0.89
53	3	16	30	48	4	3.35	0.88
54	4	26	22	45	3	3.18	0.99
55	3	20	23	50	5	3.35	0.94
56	5	8	76	9	2	2.94	0.67
57	7	29	21	42	2	3.03	1.03
58	4	20	30	42	4	3.23	0.96
59	1	1	4	72	22	4.13	0.61
60	2	9	19	59	11	3.67	0.87
61	0	3	3	83	10	4.00	0.52
62	2	20	8	66	4	3.19	0.94
63	2	12	10	71	5	3.55	0.84
64	1	18	14	62	4	3.51	0.88
65	3	53	11	31	2	2.78	0.99
66	1	17	11	65	5	3.54	0.90
67	0	14	9	73	4	3.66	0.81
68	1	14	7	72	6	3.68	0.81
69	1	9	8	74	7	3.74	0.82

Table C3. **Item Means, SDs, and Response Percentages for Officers (*N*=394)**

ITEM	RESPONSE (PERCENTAGE) 1	2	3	4	5	MN.	S.D.
1	1	5	3	70	21	4.04	0.72
2	1	5	10	72	13	3.99	0.69
3	1	11	10	69	9	3.73	0.82
4	1	7	8	71	13	3.86	0.77
5	1	6	9	72	12	3.90	0.70
6	0	9	8	68	15	3.88	0.79
7	1	16	15	62	6	3.56	0.87
8	1	7	9	70	13	3.88	0.75
9	3	15	7	61	14	3.68	0.99
10	6	22	16	48	7	3.29	1.07
11	1	6	10	65	18	3.94	0.76
12	1	6	8	61	24	3.99	0.83
13	1	3	6	58	31	4.15	0.78
14	8	18	10	51	12	3.41	1.16
15	4	6	54	28	8	3.31	0.87
16	2	4	40	28	25	3.70	0.96
17	2	3	4	30	62	4.47	0.84
18	7	3	5	43	42	4.12	1.09
19	34	30	25	9	1	2.14	1.03
20	44	19	34	2	2	1.97	0.99
21	1	7	7	57	28	4.03	0.87
22	1	5	9	58	27	4.05	0.81
23	1	16	13	48	22	3.74	1.01
24	17	28	15	36	4	2.83	1.20
25	30	19	18	28	5	2.58	1.31
26	9	28	22	38	2	2.97	1.06
27	16	24	28	27	4	2.80	1.13
28	2	14	19	61	4	3.52	0.86
29	4	19	20	55	3	3.35	0.94
30	15	22	23	37	3	2.91	1.15
31	18	38	28	15	1	2.42	0.98
32	3	9	13	63	11	3.71	0.89
33	2	3	65	21	9	3.31	0.76
34	3	13	10	70	4	3.60	0.86
35	12	33	36	19	1	2.64	0.95
36	10	23	11	54	3	3.16	1.11
37	7	41	19	32	1	2.78	1.00
38	8	25	18	44	5	3.13	1.10
39	2	6	8	72	13	3.90	0.75
40	20	22	4	50	4	2.95	1.29
41	1	2	2	82	13	4.06	0.54
42	12	17	4	60	6	3.32	1.18
43	1	4	2	78	15	4.04	0.62
44	1	8	6	66	18	3.92	0.81
45	9	19	49	21	3	2.89	0.92
46	1	7	3	84	5	3.85	0.66
47	3	11	54	28	4	3.18	0.80
48	1	7	4	81	7	3.94	0.70

Table C3 *(Continued)*

49	3	9	26	50	11	3.57	0.93
50	6	21	29	40	3	3.14	1.00
51	1	5	26	64	3	3.66	0.69
52	6	25	15	51	3	3.22	1.03
53	4	14	54	27	1	3.07	0.77
54	4	20	31	43	2	3.19	0.91
55	5	17	33	42	4	3.23	0.94
56	5	8	75	9	3	2.98	0.70
57	9	27	34	30	2	2.91	0.97
58	3	13	54	27	2	3.11	0.78
59	0	1	13	58	28	4.14	0.64
60	2	7	38	46	8	3.50	0.81
61	0	2	3	75	20	4.15	0.53
62	4	15	9	63	7	3.53	1.00
63	1	11	8	74	7	3.75	0.77
64	3	18	18	57	3	3.39	0.92
65	3	60	14	23	1	2.60	0.90
66	3	16	11	65	4	3.48	0.95
67	1	14	13	68	3	3.54	0.87
68	2	14	9	70	4	3.54	0.84
69	1	6	9	77	6	3.79	0.77