Computer Assisted Task Selection in US Army SQT Development

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The SQT is the US Army's major diagnostic instrument for evaluation of individual training and is an annual assessment of performance on 25 to 35 selected tasks. These tasks are selected by the service school which is proponent for each Military Occupational Specialty (MOS). However, there is little formal input from field units within this task selection process. This omission is compounded by an increasing rate of attrition on among subject matter experts at the schools and the diversion of experienced military personnel away from the training development area. Although the service school is formally responsible for the content of the SQT test plan, the knowledge and experience base at the operational level may be far removed from the field; thus, perceptions of the appropriate task emphasis may be inaccurate.

The Computer Assisted Task Selection (CATS) system is a data driven technology intensive alternative to the current SQT development system. CATS actively involves the field in the task selection process early in the SQT development cycle and continually solicits and monitors input from the field units regarding the importance of evaluating various tasks.

The CATS system operates on an automated data base of military tasks which is updated frequently with results of field surveys and on-going SQT testing and adjusts the content of the developing test plan in accordance with the subjective and objective requirements of the field. Through the use of self-adjusting automated systems like CATS the Army may produce more relevant, timely, and higher quality training products at lower cost.

The Skill Qualification Test (SQT) is the US Army's major individual training diagnostic instrument for enlisted personnel. It is developed and administered on an annual basis and evaluates performance on selected critical tasks in the soldier's Military Occupational Specialty (MOS). These critical tasks, the conditions under which they are performed, the standards of acceptable performance, and the specific elements which comprise the task are detailed in the Soldier's Manual (SM) for each MOS. The SQT is the primary determinant of individual training emphasis throughout the Army.

Although the Army Training Support Center (ATSC) is responsible for the production and distribution of SQT material, and scoring and reporting of SQT performance results, each of the 22 separate service schools and agencies, through their Directorates of Training Development (DTD), is contractually responsible to ATSC for the construction of their specific SQTs each year. The actual number of SQT produced, along with all the supporting material for each test, ranges from 12 to 170 separate test series annually for each school.

The ATSC provides guidance and test construction assistance to the schools through the SQT Management Directorate (SMD) and the publication of circulars, pamphlets, and directives. During the past 2 years, ATSC has also placed one or more test development specialists at each school for the purpose of monitoring the construction of, and assuring a high level of quality in, the SQT.

Within each school, the SQTs for which it is responsible are typically in different phases of a 15 month test development cycle, since each SQT has its own publication and administration dates. Additionally, the testing orientation and performance emphasis is different for combat arms, combat support, and combat service support branches of the force due to their differing technical requirements.

As can be seen in this brief description, the SQT is a large, complex, and resource intensive production and evaluation effort. To be effective and efficient, the technical quality and field relevance of SQT products must be as high as possible.

An attempt to assure the quality of SQT products has been made through provision of technical guidance and the establishment of developmental procedures by the ATSC test psychologist and specialists. An attempt to provide field relevant input to the SQT development process has been made through provision of SQT test plans to Major Army Command (MACOM) and Army Readiness and Mobilization Region headquarters and the provision of on-going test results to the schools. Unfortunately, neither of these attempts has been sufficient to accomplish the goal of high quality, field-relevant SQT. First, there is no mandatory documentation and audit of the process by which tasks to be evaluated by the SQT are selected. Second, there is no mandatory consideration of field input in the selection

of tasks for the SQT. An additional negative influence is the rate of attrition among test development staff at the schools and the resulting loss of institutional memory and the rotation or diversion of recently experienced military personnel away from the SQT development area. The knowledge and experience base at the schools thus may be far removed from current field reality and the resulting perception of appropriate training emphasis, which is driven by the SQT, may be inaccurate.

Clearly, new mechanisms must be developed and implemented in order to enhance the quality and relevance of the SQT evaluation system.

A brief review of the SQT development process at this point may be helpful in identifying the areas in which an alternative approach is required. The first crucial step in SQT construction is the selection of tasks from the SM to be included in the SQT test plan. The SQT test plan is comprised of 25 to 35 tasks selected from approximately 200 to 500 tasks which are appropriate for an MOS. The SQT test plan for an MOS is usually developed by one subject matter expert (SME), military or civilian, working alone, supplied with published guidance from ATSC. The SME may have recent field experience or he may have been assigned to the school for several years. The guidance with which the SME is supplied specifies, in detail, the selection process for each task, but does not require

documentation of the process. The SME is required to evaluate each task which is appropriate for the MOS (the task pool) on approximately 20 different characteristics. The characteristics include performance deficit, frequency of use, performance time, doctrinal currency, etc. If the task obtains high ratings on these characteristics, then its testing payoff is high and it is selected for inclusion in the test plan. If the task obtains low ratings on these characteristics, then its testing payoff is low and it is not selected for inclusion in the test plan. Ideally, all tasks in the MOS task pool will be subjected to this process, and only the highest rated (highest testing payoff) tasks will be selected for the SQT test plan. A common concern among those who observe this process at the schools is that these procedures are not followed consistently due to personnel shortages, lack of training, or lack of incentive to accomplish this time-consuming, labor-intensive task. Monitoring this undocumented, largely mental and unobservable process adequately consumes an exhorbitant amount of time and duplication of effort on the part of the evaluator.

Additionally, beyond the requirements for task selection on their individual characteristics, there are additional requirements for the composition of the final test plan as a whole. The number of tasks which fall into certain categories must not exceed quotas which are determinded by ATSC and by the relative number of tasks in certain other categories in the SQT test plan. These quotas are often unrelated to the importance of the task for the MOS and, in many instances, do

not accurately reflect the characteristics of the MOS task pool as a whole. If these SQT test plan quotas are exceeded, then the test plan must be reconstructed or a request for exception to policy must be initiated and forwarded to ATSC through the commandant of the school. Since the final approval of the SQT test plan rests with ATSC, and the produce test plan is easier to evaluate and verify in terms of task quotas than the process by which it is developed, it is far easier to construct an SQT test plan be selecting tasks which simply fit the guideline quotas than it is to carefully construct the test plan with tasks which form an integrated, meaningful and relevant whole which is seen as important and useful. The current system puts great pressure on the test developer to produce a test plan which satisfies policy but may ignore the actual training needs of the Army.

In regard to field input, under the current SQT development system, SQT test plans are sent to field commands (for informational purposes only) approximately 1 year prior to the test administration date. The importance of task groups and individual tasks to the field commander may or may not be communicated and considered by the schools for future SQT development. The comments are often not received in time to effect changes in composition of the current SQT test plan. The current system effectively ignores the input of the ultimate user of SQT results, the field unit commander.

The lack of documentation of task characteristics, objectivity in task selection, the mechanistic quality of task selection and the loss of intitutional memory through military personnel rotation and civilian personnel attrition, has converged in the need to automate the SQT test plan construction system. The use of computers to assist in the development of tests, test administration, and instructional management generally is extensively documented in the literature and will not be reviewed here. (Baker, 1980, Lippey, 1974, Smith, 1977, 1980.) It would be appropriate for the Army to investigate the effectiveness of a prototype computer assisted SQT development system which is now under development at the US Army Infantry School and which operates on the existing TRADOC computer network.

The Computer Assisted Task Selection (CATS) System establishes an automated file containing documentation of individual task characteristics and the selection criteria for the SQT test plans. This file is processed by a computer program which mimics the behavior of the human test developer in selecting tasks for the SQT test plan. The computer program makes an initial pass through the task file and marks as rejected those tasks which are doctrinally inappropriate for the MOS. During this initial pass the program also sums the testing payoff ratings for each task and adds or subtracts testing payoff points for increased or decreased emphasis of certain subject areas which are specified by the test developer. At the end of this initial

pass, the system reports the number of tasks in the various categories, thereby summarizing the composition of the task pool. The task file is also rearranged at this point by skill level, track, and testing payoff from high to low values. This assures that the final test plans will contain tasks which are specific to the MOS and track, and will be high in payoff. The second phase of CATS continues with several passes through the task file, one for each skill level and track in the MOS. Each task record is evaluated and accepted or rejected for inclusion in the test plan. Running totals of task characteristics and other program control parameters are maintained as the run progresses until the test plan is completed. The system then is reset and processing begins for the next test plan. Each test plan is evaluated for guideline compliance as it is developed and the status of success or failure is reported to the user.

The CATS system thus relieves the schools of the labor intensive and time consuming task of test plan construction. ATSC guideline compliance is automatically verified as the test plan is developed. CATS provides increased field input through incorporation in individual task records of the results of frequent surveys of field unit commanders regarding the emphasis they put on different aspects of the total task pool.

The CATS system is a data driven, technology intensive alternative to the current SQT development system. It operates on an automated data base of military task characteristics which is updated frequently with results of field surveys and on-going SQT testing. The system adjusts the content of the developing test plan in accordance with the objective requirements of the field. The utilization of this technology may provide the necessary mechanism to enhance the SQT construction effort.

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