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ABSTRACT

The University of Washington (UW) investigated the use of three general examinations of the College Level Examination Program (CLEP) to increase flexibility in curricular arrangements, to assess the impact of curriculum upon student learning, and to formulate upper-division matriculation standards. Tests were administered to a sample of 333 student volunteers in order to establish a local norm relevant to UW. Analysis of the test results revealed a moderate to insignificant relationship between scores on a CLEP exam and the amount of course work in the related field. UW performance was higher than the national norm. CLEP performance was related positively to college grades and reflected the application of traditional scholastic abilities. Analysis also inferred correlation between performance on a CLEP exam and experience in the related curriculum. CLEP Humanities and Social Sciences-History are almost totally described by a verbal component, whereas CLEP Natural Sciences shows significant loadings on problem solving, verbal, and quantitative factors in that order. UW will grant up to one year's credit for successful performance of the general exams. A common state-wide policy is being considered. (PR)

NORMS, FACTOR STRUCTURE AND INSTITUTIONAL POLICY ON THE GENERAL EXAMINATIONS

The University of Washington, like many other colleges and universities, became interested recently in increasing the use of educational assessment techniques and for this reason entered into limited experimentation with the general examinations of CLEP because these examinations appeared to offer rather comprehensive coverage of lower-division general education. The University is seeking mechanisms which introduce greater flexibility into curricular arrangements, which promise use in assessing the impact of curriculum upon student learning, and which offer the possibility for setting upper-division matriculation standards--CLEP appears adapted to such uses.

From the initial brush with CLEP some two years back, it became quite clear that we had but limited information about how University of Washington students would fare on the exams. There was an article here and there about how other institutions used CLEP, and of course there were the published national findings about score distributions including relationships among grades and relevant subject-matter examinations. Our research and curriculum staff though, remained skeptical about the utility of national norms after rather careful perusal of the composition of the national sample. There was the haunting suspicion that CLEP achievement was not independent of other traditional measures of scholastic ability

about which we had some information. We knew from our state-wide testing program, for example, that the mean performance of community college students on both verbal and quantitative ability measures was at the approximate 35th percentile for the composite state-wide college population in contrast to UW students whose average performance on the same measures placed at the 70th percentile. If such ability measures turned out to be related to CLEP performance then the national norms, composite in nature, would be limited in use for individual institutions. The CEEB, cognizant of this problem, draws attention to the need for local norms in its publications. Given the norms question, we requested ETS to supply score information for large multi-purpose universities only but were informed this could not be done.

We undertook in Fall 1968, then, to test a group of students who two years previously had entered the University directly from high school and who were, in Fall 1968, making the transition from sophomores to juniors. This group was tested on three of the CLEP general exams about which we had peculiar interest--these were the Humanities, the Social Sciences-History and the Natural Science exams. Three hundred thirty-three volunteers across all nine undergraduate colleges served as the sample. This was a disappointing 20 percent of all students contacted. A comparison of the non-volunteer with the volunteer group on pertinent educational data, however, disclosed only minor variations on grade point achievement, patterning of credits earned, sex distribution, declaration of major and the like. We had reasonable confidence that the sample, apart from volunteerism, was little different from the available population of rising juniors at the University of Washington and therefore was one which would

give us useful if not totally definitive data.

Examination performance offered some interesting analyses. In conformance with face validity expectations the natural science, social science and humanities majors all achieved highest average scores on specific examinations tailored for their respective areas of concentration. In each case the major group scored fifteen percentile points higher than any other group on the relevant exam. The natural science majors as a group performed well on all three tests--the group mean placed at the 55th composite percentile for the two general exams outside the field. Information of a factor analytic nature to be discussed later also reflects the finding of high-order academic skills among the fledgling natural scientists.

Of immediate interest was the possibility that one would find a substantial relationship between scores on a CLEP general exam and the amount of course work taken in the related field. After all, the tests were designed to assess the acquisition of knowledge. The relationships found, however, ranged from moderate to insignificant. Scores on CLEP NS correlated .56 with earned natural sciences credits, with CLEP HU and humanities credits-earned the correlation was but .33, and with CLEP SSH and social sciences credit-earned the relationship dropped off to .14. Seemingly the building-block curriculum typical of the natural sciences, a curriculum which strives for a hierarchical ordering of scientific information through course arrangements, accounts for the positive relationship found. Amounts of study in the other curricular areas, however, are dim predictors of competence level as measured by CLEP. As one might guess the deans for curriculum have been less than enchanted with these findings.

Comparisons of UW performance with the national norms indicate higher performance levels for the former. Average performance on CLEP NS approximates the national 82nd percentile, on CLEP SSH it is the national 77th percentile, and on CLEP HU it is the 61st national percentile--substantial variations from national values. Despite the likely bias effects introduced from sampling volunteers only, we are convinced that UW student performance sampled at the time of completion of the sophomore year departs considerably from the national norms. I would presume this result to be just as true for other special purpose institutions, large and small, who exercise some form of selective admissions. Later description of CLEP general exam performance as a function of a number of scholastic predictor variables will further emphasize general education competencies as reflections of more basic cognitive skills, and college selection practices, whether intended or not, can easily lead to an aggregate student body atypical of the broad national sample upon which the norms are based.

Of further research interest to us was the question: "Just what is it that the CLEP general exams measure?" Do they sample raw accumulated educational experience, relatively independent of the academic "stuff" with which students begin college? Or are they more the indicators of educational adeptness which students have shown prior to a university experience? The Astin study reported in the August 1968 issue of *Science*, identifying pre-college National Merit scores as the only effective predictor of Graduate Record Exam performance for seniors in a whole host of colleges, leads one to suspect that Astin's "academic input" hypothesis might also explain certain of the CLEP outcomes. Also we have the Georgia results of Harris and Booth indicating that CLEP performance is related positively to college

grades. We know further that pre-college ability test scores usually are related to college grades, and it is not much of a leap to the implication that pre-college variables and CLEP should display some intertie. To test for this, we assembled considerable pre-college test results along with the CLEP scores of all students in the sample and tested for inter-relationships. Considerable intercorrelation was immediately evident. CLEP NS correlated .40 and above with all but one of the pre-college test variables, for example. The full score matrix was subjected first to a principal components factor analysis and then to an orthogonal varimax rotation following a procedure developed by Kaiser. The analysis isolated four dimensions from the larger correlation matrix of order 14x14. These dimensions, or factors, accounted for 72 percent of the total test variance. The factor pattern is quite clear with quantitative, verbal, language structure and problem-solving factors defining most of the test variation. Interestingly we find that both CLEP HU and CLEP SSH are almost totally described by the verbal component. Each test has but minimal loadings on any other factor. In the case of CLEP NS we find a more complex structure, and significant loadings in order of weight are evident on the problem-solving, verbal and quantitative factors in that order. This complexity, of course, jibes with the earlier finding that CLEP NS correlated substantially with many of the test variables. It appears that the well-rounded academic ability profile is prerequisite to good performance on CLEP NS. This portion of the study then would indicate that the three general exams have little within them that taps any new or unique abilities and performance on the exams generally reflects the application of traditional scholastic abilities which have been known for many years. This is not to suggest that the exams are trivial and

unimportant for educational use but rather to emphasize two points: (1) the general exams are tailored for traditional academic assessment and might have limited use with radically new curriculums stressing totally new educational objectives, (2) distinctions between aptitude measures and achievement measures need not be overdrawn. As pointed out by Ahman,[1] aptitude or ability tests often sample from the same kind of item pool as achievement tests though usually at a simpler level. It may be more the form than the substance which differentiates SAT-like pre-college tests from the general exams which we studied.

A related issue to the above is the extent to which one can predict later general exam performance from prior knowledge of student performance of pre-admission variables given a clear relationship between the two sets of data. This has some importance, I think, because of a common faculty expectation that it is the fine art of teaching which leads to superior acquisition of knowledge. But to what degree is the acquisition of general education already pre-ordained at time of college entrance? Prediction equations give us information on this score. Linear multiple correlation was employed to select efficient predictors of CLEP HU, SSH and NS performance from among the family of eleven pre-college test variables, six high school gpa's broken down by discipline, age and sex. Using the Horst-Smith[2] technique for predictor selection we find that (1) seven variables determine a corrected multiple correlation of .69 for CLEP HU. In order of variance contribution these are: Vocabulary, Reading Comprehension, English Usage,

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[1]J. S. Ahmann, *Testing Student Achievements and Aptitudes*. Washington, D. C.: The Center for Applied Research in Education, Inc., 1962.

[2]P. Horst and S. Smith, "The Discrimination of Two Racial Samples," *Psychometrika*, Volume 15 (1950), pp. 271-289.

Social Studies High School GPA, Sex, Age and Mathematics High School GPA; (2) six variables determine a similar multiple correlation of .69 with CLEP SSH and these are in order of variance contribution: Vocabulary, Reading Comprehension, Sex, Social Science High School GPA, Reading Speed and Electives High School GPA; (3) nine variables result in a multiple correlation of .80 with CLEP NS, and these are: Vocabulary, Mechanical Reasoning, Natural Science High School GPA, Reading Comprehension, Mathematics Achievement, Sex, Social Science High School GPA, Spelling and Electives High School GPA. Vocabulary and Reading Comprehension tests are main variance contributors to all three CLEP general exams but a test of Mechanical Reasoning and High School Natural Science GPA also adds significantly to prediction in the case of CLEP NS.

The predictive correlations are quite high and consistent with other research results, including Astin's findings mentioned earlier, in showing that information about academic input foretells much of later educational output. Such forecasting specifies nothing about the degree to which absolute increases in knowledge prerequisite to CLEP performance occurred for students over the course of lower-division study. The research design on predictor relationships was post hoc and did not take into account any gains in CLEP performance between college entrance and completion of the sophomore year. The Georgia study mentioned earlier noted such gains. Absolute increases almost certainly occurred but to what extent these were due to the impact of the curriculum is moot. Likely natural science academic skills, because of sequentialized curriculums, are more a function of accumulated course experience. Certainly the earlier reported correlation of .5 between accumulated natural science credits and CLEP NS scores would infer though not prove this. What makes suspect a generalized

relationship between CLEP general exam performance and curriculum experience is the fact that the sizable multiple correlations just reported--those between pre-college predictors and CLEP scores--were computed on all 333 students and without regard to the amount of course work taken in the various disciplines. If indeed the curriculum had sufficient impact upon student performance one would expect relative standings on test variables to shift as a direct consequence of differing amounts of course work taken. Such an effect should degrade the multiple correlations but this did not occur to any great extent in this particular study. If indeed the impact of curriculum upon academic achievement is considerably less than expected, it certainly suggests that the case for seeking recognition of academic skills through CLEP becomes a rather strong one. We surely must examine the rationale for the specification of generally four years of undergraduate instruction as the threshold for allowing students entry into other patterns of activity. If the "academic input" factor is the significant determiner of one's relative competence in some broad educational field, such input needs to be given greater weight in arranging curricular programs for students at the very outset of enrollment.

To the practical matter of exam use. As a result of this particular research study, two of our undergraduate colleges, Arts & Sciences and Education, agreed to waive certain of the general education requirements for students with satisfactory CLEP scores. Credit as such was not granted but 75 of 269 tested from these colleges received waivers ranging from two to fifty-quarter credit hours. But more significantly the study spurred the UW to consider more substantive action regarding CLEP. Two directions of

effort have been taken in this regard. With respect to the first, the University has deliberated at some length in its many councils about a program of credit for CLEP. The diffused nature of university governance, which I am sure is well understood by all here, can lead to interminable review of any program which suggests an altered pattern of academic activity. And CLEP has been no exception to this scrutiny. Recently, however, the University moved to the adoption of a blanket policy position certifying that, for a trial period of three years, students will be granted up to one year's credit for successful performance on the general exams though individual colleges may limit the total amount of credit applied to specific degree programs because of varying college requirements for general education study. The policy statement also authorizes credit for successful performance on those subject exams which meet the approval of individual academic departments.

The second effort has been directed at an attempt to achieve some common policy about CLEP on a state-wide basis. Varying policy arrangements about CLEP at the many State institutions could lead to a confusing and unrealistic array of credit options. Given the present considerable mobility of students among institutions within our State, it seems clear to me that, in the absence of compatible programs at the separate institutions, students will soon be crossing swords with the admissions people over the currency value of CLEP. To blunt such problems we have formed an intrastate committee whose mission it is to promote efforts at achieving a common state-wide policy towards CLEP which is applicable to all public institutions. In truth, the going has been very tough in reaching a consensus because of

different institutional views about the importance and utility of CLEP at this time. Possibly the lead taken by the University of Washington recently with respect to adopting its trial program will spur others to do similarly.

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