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The Relationship of CASAS Scores to GED Results

Introduction

What is the relationship between learner abilities evidenced on standardized assessments of the Comprehensive Adult Student Assessment System (CASAS) and learner performance on the General Educational Development (GED) high school equivalency exam? This study utilizes data from Connecticut to analyze this relationship of CASAS scores to GED results and expand upon the findings from a prior research effort (CASAS, 2003).

CASAS standardized assessments measure an individual's general literacy ability in the skill areas of reading, writing, math, listening, and speaking. These skills are assessed through nationally validated competencies that youth and adults need to function effectively in society (CASAS, 2005). Results from CASAS assessments are reported in scaled scores on a continuum of difficulty from beginning literacy to adult secondary levels. Local adult education programs utilize the CASAS system as a curriculum and instructional standards framework and administer CASAS assessments to place learners and monitor their progress.

The GED tests certify a learner's high school level of academic knowledge and skills. The five tests in the 2002 Series GED battery are Language Arts-Reading, Language Arts-Writing, Social Studies, Science, and Mathematics. Every GED candidate must also satisfactorily complete a timed essay on an assigned topic in order to pass the GED exam. Individuals who pass the GED exam are awarded a high school diploma by the State Department of Education.

Attaining a high school diploma is an important goal for thousands of individuals who enroll each year in Connecticut's adult education programs. However, many learners lack the basic reading, writing, and math skills necessary to pass the GED exam. They may need weeks, months or even years of study to gain the necessary skills. Therefore, information about the relationship between CASAS scores and GED results can help practitioners to:

- present learners, especially those at lower ability levels, with demonstrable progress benchmarks toward GED readiness – such visible progress toward a goal can help motivate learners to persist longer in adult education (Comings, Parrella, and Soricone, 1999);
- be selective with the use of the Official GED Practice Test; and

- maximize the possibility of learner success on the GED exam by providing additional information (i.e. CASAS test scores) to consider when advising learners about their readiness to take the GED exam.

Methodology

Learners who were administered a CASAS level test (i.e. a pre or a post test) before July 2007 that was within 60 days of their last attempt of the 2002 Series GED exam were selected for this study. The last CASAS level test in each skill area was selected. The following paired data sets of CASAS and GED test results were identified:

1. CASAS Reading and GED Language Arts - Reading (N=679)
2. CASAS Reading and GED Social Studies (N=685)
3. CASAS Reading and GED Science (N=682)
4. CASAS Math and GED Mathematics (N=1,167)

In addition, 507 learner records were filtered from the above data for further analysis because they evidenced (i) a CASAS level test in *both* reading and math *and* (ii) an attempt of the 2002 Series GED exam within 60 days of both the CASAS tests. Only those learners who completed the entire GED exam at least once are included.

To administer CASAS assessments and ensure their incorporation into instruction, adult education providers maintain Program Facilitators with the appropriate training and certification. Because a trained Facilitator with updated certification was not maintained at the Department of Corrections, their records are not included in this study.

Results

The data were analyzed on two fronts:

1. By Individual Skill Area: Learners' scores on CASAS reading assessments were analyzed relative to their corresponding scores on the GED Language Arts-Reading, GED Social Studies and GED Science subtests; CASAS math scores were analyzed relative to GED Mathematics scores.
2. By Pass Rates on the Entire GED Exam: Learner scores on CASAS reading *and* math assessments were used to analyze pass rates on the GED exam.

Learners were grouped into reading and math ability ranges based on their CASAS scaled score (Table 1). The corresponding National Reporting System (NRS) level (Division of Adult Education and Literacy, 2005) is also presented.

Table 1: CASAS Scale Score Ranges and NRS Levels

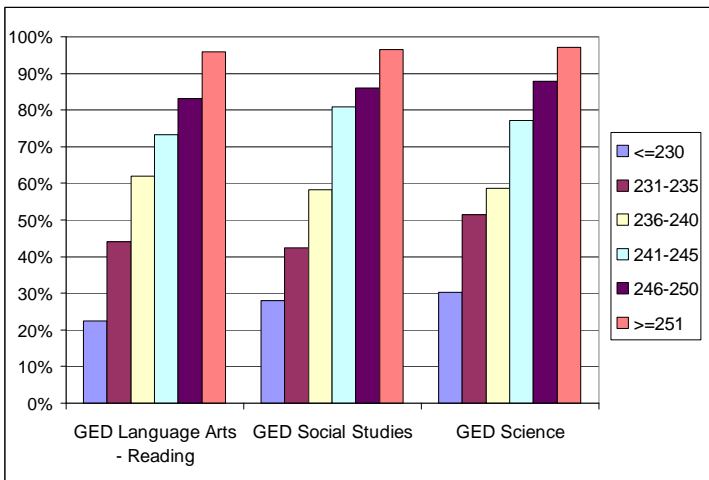
CASAS Reading Ranges	NRS Educational Functioning Level	CASAS Math Ranges
230 and lower	ABE High Intermediate and Below	225 and lower
231-235		226-230
236-240		231-235
241-245	Adult Secondary Education (ASE) Low	236-240
246-250		241-245
251 or greater	Adult Secondary Education (ASE) High	246 or greater

Individual Skill Area Analysis

The percent of learners who achieved a score of 450 or greater in each of the corresponding GED subtests was computed. Though a score of 410 is sufficient to pass an individual GED subtest, an average of 450 is required to pass the entire GED exam.

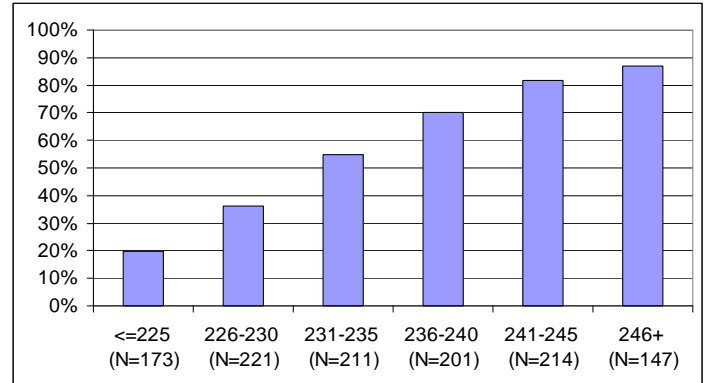
The percent of learners who achieved a score of 450 was progressively higher for each higher CASAS scaled score range. Over 80% of learners with CASAS reading scores that were 246 or greater achieved a score of 450 or greater on a GED subtest (Figure 1).

Figure 1: Percent of Learners Attaining a Score of 450 or Greater on the GED Subtests Based on their CASAS Reading Score Range



Over 80% of learners with CASAS math scores that were 241 or greater achieved a score of 450 or greater on the GED Mathematics subtest (Figure 2).

Figure 2: Percent of Learners Attaining a Score of 450 or Greater on the GED Mathematics Subtest Based on their CASAS Math Score Range



Moderate correlations of around 0.60 to 0.63 were evidenced between CASAS reading and math scores and their respective GED subtest scores.

The mean GED subtest scores were progressively greater for learners functioning at each higher CASAS scaled score range (Tables 2 and 3). In a vast majority of the instances, the mean GED subtest score at a CASAS range was significantly higher than that achieved at the prior CASAS range. The standards deviations indicate that there is overlap in the distribution of learners' GED scores among the CASAS score ranges.

Table 2: Mean and Standard Deviation (SD) of GED Subtest Scores Based on CASAS Reading Score Ranges

CASAS Reading Range	GED Language Arts - Reading		GED Social Studies		GED Science	
	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)
<=230	107	406 (71)	107	411 (71)	106	415 (67)
231-235	75	451* (72)	73	441* (65)	70	445* (71)
236-240	97	474+ (94)	98	466* (62)	99	461+ (74)
241-245	120	496+ (77)	125	495* (63)	123	490* (64)
246-250	113	524* (93)	114	505+ (62)	115	518* (73)
>=251	167	599* (108)	168	573* (83)	169	568* (72)

* significantly different from the prior range ($p < 0.05$)

+ significantly different from two ranges prior ($p < 0.01$)

Table 3: Mean and Standard Deviation (SD) of GED Math Scores Based on CASAS Math Score Ranges

CASAS Math Range	GED Mathematics	
	N	Mean (SD)
<=225	173	376 (70)
226-230	221	427* (61)
231-235	211	456* (60)
236-240	201	477* (63)
241-245	214	499* (69)
>=246	147	540* (87)

*significantly different from the prior level ($p < 0.01$)

Pass Rate Analysis

To pass the GED exam, an individual must achieve a total score of at least 2,250 from the five subtests where each individual subtest score is at least 410. To analyze the relationship between CASAS scores and pass rates on the GED exam, the 507 learners with both CASAS Reading and Math scores were sorted into groups based on *both* scores. Because each skill area had six ranges, this sorting process resulted in 36 groups. The pass rate for each group with at least 10 learners was computed. Based on those pass rates, the groups were combined into four clusters that are then represented using four colors (Table 4):

Table 4: Percent of Learners Passing the Entire GED Based on their CASAS Reading and Math Score Range

		CASAS Math Range					
		<=225	226-230	231-235	236-240	241-245	246+
CASAS Reading Range	<=230	12.8% (N=47)	29.4% (N=17)	(N=5)	(N=1)	(N=3)	(N=1)
	231-235	8.3% (N=12)	38.9% (N=18)	50% (N=12)	(N=3)	(N=4)	(N=1)
	236-240	16.7% (N=12)	54.2% (N=24)	53.8% (N=13)	(N=8)	(N=7)	(N=3)
	241-245	27.3% (N=11)	55.6% (N=18)	76% (N=25)	85% (N=20)	92.3% (N=13)	(N=4)
	246-250	(N=9)	42.9% (N=14)	84.2% (N=19)	100% (N=16)	93.8% (N=16)	93.3% (N=15)
	251+	(N=4)	76.5% (N=17)	95% (N=20)	91.7% (N=24)	90.5% (N=42)	100% (N=29)

- Red Cluster:** The learners in this cluster demonstrated the lowest abilities in reading and math. No group in this cluster had a pass rate above 30% while the overall pass rate for this cluster (N=99) was 17%. Approximately 90% of those who failed the GED exam in this cluster did not achieve a passing score of at least 410 on the GED Mathematics subtest; between 50% and 55% also failed the other subtests.
- Orange Cluster:** The learners in this cluster demonstrated low secondary level abilities in reading and intermediate level abilities in math. No group in this cluster had a pass rate above 56% while the overall pass rate for this cluster (N=99) was 49%. Approximately 76% of those who failed the GED exam did not pass the GED Mathematics subtest; between 22% and 36% also failed the other subtests.
- Yellow Cluster:** The learners in this cluster demonstrated secondary level abilities in reading and high intermediate to low secondary abilities in math. The pass rates for learners in the four groups in this cluster ranged between 76% and 85% while the overall pass rate for this cluster (N=81) was 80%. Approximately 81% of those who failed the GED exam did not pass the GED Mathematics subtest; 38% failed Language Arts - Writing.
- Green Cluster:** The learners in this cluster demonstrated high secondary level abilities in reading and low to high secondary level abilities in math. No group in this cluster had a pass rate below 90%; the overall pass rate for this cluster (N=175) was 94%. Seven (7) of the 10 learners who failed the GED exam failed Math and/or Language Arts – Writing.

In addition to this cluster analysis, a multiple regression was performed with the total GED score as the criterion (dependent) variable and the CASAS reading and math scores as the predictor (independent) variables. When evaluated separately, CASAS Reading scores ($r=0.707$, $p < 0.01$) and CASAS Math scores ($r=0.591$, $p < 0.01$) had significant effects on the total GED score. When taken together, CASAS reading and math scores accounted for more of the variance ($Multiple R=0.741$, $R^2 = 0.548$) in the total GED score than either did separately, and this relationship was significant, $F(2,504)=306.02$, $p < 0.01$.

The resulting regression equation is:

$$\text{Total GED Score} = (21.395 \times \text{CASAS Level Test Reading Score}) + (11.179 \times \text{CASAS Level Test Math Score}) - 5,389.665.$$

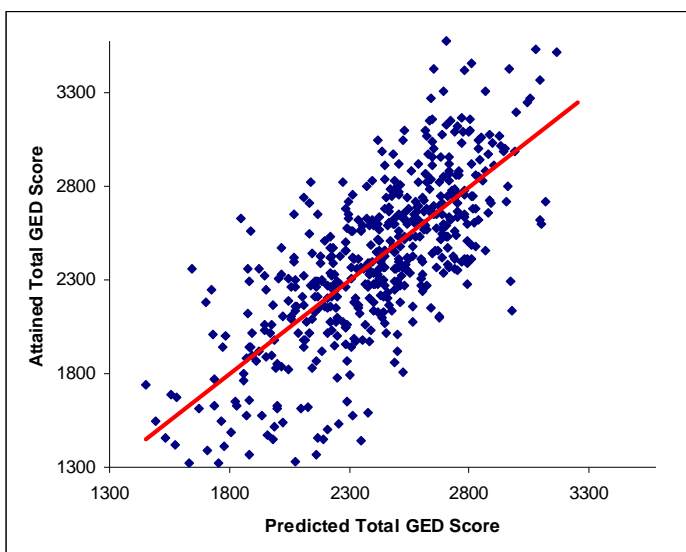
Learners' total GED score can be predicted by inserting their CASAS Reading and Math scores in the above

equation. For example, the “predicted” total GED score based on this equation for an individual with a CASAS Reading score of 236 and a CASAS Math score of 228 is computed as follows:

$$(21.395 \times 236) + (11.179 \times 228) - 5,389.665 = 2,208$$

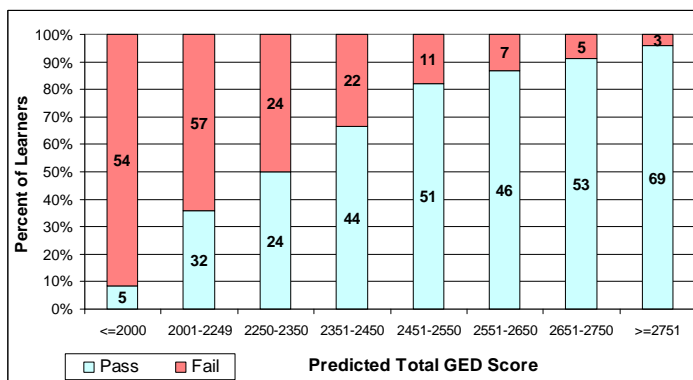
Figure 3 presents a scatterplot of the “predicted” total GED score using this regression equation and the actual attained total GED score. It demonstrates that the prediction made using this regression equation will be reasonably accurate but not exact in all cases because some of the data points are further away from the regression line.

Figure 3: Scatterplot of Predicted and Attained Values for Total GED Score



To represent the precision of this predictive equation differently, the pass rates of learners on the GED exam were analyzed for score ranges of the “predicted” total GED score (Figure 4).

Figure 4: Percent of Learners Passing the GED Exam Based on “Predicted” Total GED Score Ranges



The regression analysis complements the results from the cluster analysis presented earlier. It confirms that as the “predicted” total GED score increases, the pass rate on the GED exam increases substantially. Learners with “predicted” total GED scores that were greater than 2,550 achieved a pass rate of 92%; this success rate is similar to that achieved by learners in the Green cluster.

The percent of learners who fail the GED exam with a “predicted” score that is at least 2,250 or higher drops significantly for each higher range. It must be noted that even among learners who actually attained a total GED score between 2,250 and 2350 on the “real” GED exam, 37% failed the exam because they did not achieve a score of at least 410 in all the subtests.

The regression analysis also supplements the findings from the cluster analysis. It highlights that learners’ reading abilities contribute more to their total GED score than do their math abilities as evidenced by the larger unstandardized beta coefficient for the CASAS Reading score in the regression equation (i.e. 21.395 versus 11.179). This is not surprising considering that three of the GED subtests – Language Arts Reading, Social Studies, and Science – expect strong reading skills.

Discussion

Even though there are differences between CASAS assessments and the GED exam with regard to their purpose, content, and administration, the results from this study demonstrate that learner performance on CASAS reading and math assessments can help local programs to:

- place learners into GED preparation programs;
- select learners for the administration of the Official GED Practice Test; and
- identify learners with the greatest likelihood of passing the GED exam.

Based on the results of this study, programs should use minimum scores of 236 in reading *and* 226 in math on CASAS level tests for placement into a GED preparation program; scores of 241 in reading and 231 in math can serve as minimum thresholds for administration of the GED Practice Test. Across-the-board administration of the GED Practice Test to all new learners at entry, regardless of their basic reading and math abilities, is not recommended because it can lead to over-testing in the early weeks. Programs can also lessen the time needed for testing by using CASAS eTests. This computer-delivered assessment option combines the CASAS appraisal and pre-test into one testing event through a computer-adaptive locator test. An added benefit to this approach is that

programs can use the pre-test score, which is more reliable than the appraisal score, for making decisions relative to learner placement in the program.

Learners with “predicted” total GED scores that are less than 2,350 (i.e. those in the Red and many in the Orange clusters) should receive instruction in all the areas: reading, writing, and mathematics. Teachers in GED and Pre-GED classrooms can utilize the item results from the CASAS level tests – these include the competencies, the underlying content standards and the item task areas – as important complementary information for guiding classroom instruction. In the weeks and months that follow, teachers can gauge learner progress in class work and on CASAS post-tests to determine their readiness for the GED Practice Test and the GED exam.

Learners with high abilities in both reading and math on CASAS assessments (i.e. similar to learners in the Green cluster) were likely to achieve a score of 450 or greater on the various GED subtests, achieve a total score of at least 2,550, and pass the GED exam over 90% of the time. Therefore, it is highly recommended that learners perform at or above scores of 248 in reading *and* 236 in math on CASAS level tests prior to taking the GED exam in order to maximize the likelihood of their success.

Individuals who fail the GED exam in Connecticut are not permitted to retest for at least four months. Therefore, prior to registering for the exam, programs should encourage all learners (except perhaps those in the Green cluster) to improve their chances of passing the GED through intensive and targeted preparation.

In all the clusters and even among learners with secondary level reading abilities, a majority of those who failed the GED exam failed the GED Mathematics subtest. Of the learners who attained high total GED scores (i.e. greater than 2,750), a vast majority (75%) demonstrated math abilities below the high adult secondary level (i.e. CASAS score below 246). Their average GED Mathematics score was also about 100 points lower than their average GED Language Arts – Reading score. Therefore, GED preparation programs should consider the following:

- Increase the intensity and duration of mathematics instruction;
- Incorporate research-based adult numeracy concepts and strategies (Ginsburg, Manly, and Schmitt, 2006; Ginsburg and Gal, 1996) into the curriculum; and
- Ensure that staff has appropriate content knowledge and training for mathematics instruction that includes teaching with a scientific calculator.

Conclusion

This study examined the relationship of CASAS scores to GED results. It confirms that results from CASAS assessments can help programs to place learners into GED programs, present learners with progress benchmarks toward GED readiness, and recommend learners for the administration of the Official GED Practice Test and the “real” GED exam. Learners should be encouraged to utilize CASAS testing as an opportunity to measure their own progress (Comings et al, 1999) toward their goal of diploma attainment.

The skills required for higher education/training or future employment opportunities are constantly increasing. Minimum pass scores on the GED will be insufficient for these new demands. Therefore, the curriculum in GED preparation programs should incorporate broader life and work competencies that will prepare learners to succeed in the GED exam *and* beyond. This will require programs to strengthen the overall quality of instruction in reading, writing, and mathematics, while also integrating the problem-solving, critical thinking, and communication demands of the current and future workforce.

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