A Report of the Course-Embedded

Texas Assessment of Critical Thinking Skills (TACTS)

PHIL 2303

Fall 2024-Spring 2025

Description of Texas Assessment of Critical Thinking Skills (TACTS)

Each fall and spring semester, the Texas Assessment of Critical Thinking Skills (TACTS) is administered within sections of PHIL 2303: Critical Thinking. The TACTS is a locally developed, proprietary instrument designed to measure critical thinking skills and empirical and quantitative skills. The instrument consists of 20 multiple-choice questions and is administered to students enrolled in those courses at the start and end of each semester. Because the instrument was developed by faculty with expertise in teaching and assessing critical thinking, it is assumed to have content-related validity (Banta & Palomba, 2015). Additionally, as this test was embedded within normal sections of PHIL 2303, the student scores represent authentic student work (Banta & Palomba, 2015; Kuh et al., 2015).

The student data presented within this report reflect student performance regarding the Texas Higher Education Coordinating Board's Core Learning Objectives of Critical Thinking Skills and Empirical and Quantitative Skills (THECB, 2025). The THECB (2025) defines these concepts as follows:

- Critical Thinking Skills: creative thinking, innovation, inquiry, analysis, evaluation, and synthesis of information
- Empirical and Quantitative Skills: manipulation and analysis of numerical data or observable facts resulting in informed conclusions

Therefore, these data should be used in conjunction with other data to fully understand student knowledge and ability regarding these Core Learning Objectives.

Methodology

A total of 223 students took the pretest, and 118 students took the posttest for all sections of PHIL 2303: Critical Thinking for the 2024-2025 academic year; however, not all student test scores were used for analysis. To determine whether student performance increased from pre- to posttest, a dependent samples *t*-test was used for analysis. Student identification numbers were collected along with student scores to identify each student's score on both the pretest and posttest. A total of 85 students could be identified as taking both the pre- and posttests. All statistical analysis was therefore conducted on only those students for whom both pre- and posttest scores could be identified.

Before conducting inferential statistics to determine whether differences were present between the students' pre- and posttest scores, checks were conducted to determine the extent to which these data were normally distributed. All four standardized skewness and kurtosis coefficients were within the limits of normality of +/-3 (Onwuegbuzie & Daniel, 2002) for the face-to-face, online, and combined student population. Therefore, a parametric dependent samples *t*-test was used to analyze the student performance data for the combined populations. A complete breakdown of the standardized skewness and kurtosis coefficients is in Table 1.

Table 1

Standardized Skewness and Kurtosis Values for Student Pre- and Posttest Scores in PHIL 2303: Critical Thinking for 2024-2025

Student Population	Standardized Skewness Coefficient	Standardized Kurtosis Coefficient
Face-to-Face Students		
Pretest	-0.41	-0.89
Posttest	-0.14	-1.53
Online Students		
Pretest	0.31	-1.01
Posttest	-0.72	-1.43
All Students		
Pretest	0.23	-1.22
Posttest	-0.72	-1.59

Results

A parametric dependent samples *t*-test did not reveal a statistically significant difference between the pre- to posttest scores for students enrolled in face-to-face sections of PHIL 2303: Critical Thinking for the 2024-2025 academic year, $t(5) = 0.75$, $p = .490$. The average student score decreased from 40.83% to 38.33%, a decrease of 2.50%. This equated to an average decrease of 0.50 questions answered correctly from pre- to posttest. Readers are directed to Table 2 for a breakdown of these results.

Table 2

Descriptive Statistics for Student Pre- and Posttest Scores on Course-Embedded Test in PHIL 2303: Critical Thinking for 2024-2025 (Face-to-Face)

Test Version	*n*	*M*	*SD*	*M %*	*SD %*
Pretest Scores	6	8.17	3.13	40.83	15.62
Posttest Scores	6	7.67	3.01	38.33	15.05

A parametric dependent samples *t*-test did not reveal a statistically significant difference between the pre- to posttest scores for students enrolled in online sections of PHIL 2303: Critical Thinking for the 2024-2025 academic year, $t(78) = -0.35$, $p = .728$. The average student score increased from 38.35% to 38.99%, increasing 0.64%. This equated to an average increase of 0.13 questions answered correctly from pre- to posttest. Readers are directed to Table 3 for a breakdown of these results.

Table 3

Descriptive Statistics for Student Pre- and Posttest Scores on Course-Embedded Test in PHIL 2303: Critical Thinking for 2024-2025 (Online)

Test Version	*n*	*M*	*SD*	*M %*	*SD %*
Pretest Scores	79	7.67	2.73	38.35	13.65
Posttest Scores	79	7.80	2.97	38.99	14.86

A parametric dependent samples *t*-test did not reveal a statistically significant difference between the pre- to posttest scores for all students enrolled in sections of PHIL 2303: Critical Thinking for the 2024-2025 academic year, $t(84) = -0.24$, $p = .810$. The average student score increased from 38.53% to 38.94%, for an increase of 0.41%. This equated to an average increase of 0.08 questions answered correctly from pre- to posttest. Readers are directed to Table 4 for a breakdown of these results.

Table 4

Descriptive Statistics for Student Pre- and Posttest Scores on Course-Embedded Test in PHIL 2303: Critical Thinking for 2024-2025 (All Students)

Test Version	*n*	*M*	*SD*	*M %*	*SD %*
Pretest Scores	85	7.71	2.74	38.53	13.71
Posttest Scores	85	7.79	2.96	38.94	14.78

Additional important information regarding student performance can also be gained through an item analysis of student pre- and posttest performance on individual test questions for each of the examined student populations. This item analysis revealed no statistically significant differences from pre- to posttest in face-to-face sections. Readers are directed to Table 5 for a complete breakdown of item analysis data for face-to-face students.

Table 5

Percentage of Face-to-Face Students Correctly Answering Pre- and Posttest Questions for 2024-2025

	Pretest %	Posttest %	Mean Difference	*p*	Cohen's *d*
Question 1	33	50	17	.611	
Question 2	67	33	(34)	.363	
Question 3	33	17	(16)	.363	
Question 4	33	33	0	n/a	
Question 5	67	50	(17)	.611	
Question 6	0	17	17	.363	
Question 7	33	50	17	.363	
Question 8	33	50	17	.611	
Question 9	50	100	50	.076	
Question 10	17	33	16	.363	
Question 11	33	50	17	.611	
Question 12	33	0	(33)	.175	
Question 13	33	33	0	n/a	
Question 14	33	0	(33)	.175	
Question 15	0	17	17	.363	
Question 16	100	83	(17)	.363	
Question 17	67	50	(17)	.363	
Question 18	33	33	0	n/a	
Question 19	50	0	(50)	.076	
Question 20	67	67	0	n/a	

Note. $n = 6$. (Decrease in score from pretest to posttest)

Item analysis for students in online sections revealed they scored statistically significantly higher on 2 of the 20 test questions (Questions 7 and 9) and statistically significantly lower on Question 20 from pre- to posttest. Readers are directed to Table 6 for a complete breakdown of item analysis data for online students.

Table 6

Percentage of Online Students Correctly Answering Pre- and Posttest Questions for 2024-2025

	Pretest %	Posttest %	Mean Difference	*p*	Cohen's *d*
Question 1	29	42	13	.058	
Question 2	54	54	0	n/a	
Question 3	16	10	(6)	.228	
Question 4	38	25	(13)	.058	
Question 5	56	52	(4)	.516	
Question 6	6	11	5	.251	
Question 7	47	59	12	.049*	0.23
Question 8	38	49	11	.095	
Question 9	42	65	23	.002**	0.36
Question 10	15	13	(2)	.640	
Question 11	41	46	5	.531	
Question 12	28	32	4	.567	
Question 13	70	67	(3)	.717	
Question 14	15	15	0	n/a	
Question 15	19	16	(3)	.640	
Question 16	73	66	(7)	.223	
Question 17	34	33	(1)	.859	
Question 18	42	51	9	.265	
Question 19	33	27	(6)	.373	
Question 20	71	47	(24)	< .001***	0.40

Note. $n = 79$. (Decrease in score from pretest to posttest); * significant at $p < .05$; ** significant at $p < .01$; *** significant at $p < .001$. Cohen's d from 0.2 – 0.49 indicates a small effect size, 0.50-0.79 indicates a moderate effect size, and 0.80 and higher indicates a large effect size (Cohen, 1988).

An item analysis for students in all sections combined revealed that face-to-face and online students scored statistically significantly higher on 3 of the 20 questions (Questions 1, 7, and 9) and statistically significantly lower on Question 20 from pre- to posttest. Readers are directed to Table 7 for a complete breakdown of item analysis data for all students.

Table 7

Percentage of All Students Correctly Answering Pre- and Posttest Questions for 2024-2025

	Pretest %	Posttest %	Mean Difference	*p*	Cohen's *d*
Question 1	29	42	13	.048*	0.22
Question 2	55	53	(2)	.754	
Question 3	18	11	(7)	.159	
Question 4	38	26	(12)	.058	
Question 5	56	52	(4)	.417	
Question 6	6	12	6	.167	
Question 7	46	59	13	.033*	0.24
Question 8	38	49	11	.077	
Question 9	42	67	25	< .001***	0.39
Question 10	15	14	(1)	.820	
Question 11	40	46	6	.449	
Question 12	28	29	1	.854	
Question 13	67	65	(2)	.717	
Question 14	16	14	(2)	.657	
Question 15	18	16	(2)	.820	
Question 16	75	67	(8)	.163	
Question 17	36	34	(2)	.726	
Question 18	41	49	8	.265	
Question 19	34	25	(9)	.171	
Question 20	71	48	(23)	< .001***	0.38

Note. $n = 85$. (Decrease in score from pretest to posttest); * significant at $p < .05$; ** significant at $p < .01$; *** significant at $p < .001$. Cohen's d from 0.2 – 0.49 indicates a small effect size, 0.50-0.79 indicates a moderate effect size, and 0.80 and higher indicates a large effect size (Cohen, 1988).

References

Banta, T. W., & Palomba, C. A. (2015). *Assessment essentials: Planning, implementing, and improving assessment in higher education* (2nd ed.). Jossey-Bass.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Lawrence Erlbaum.

Kuh, G. D., Ikenberry, S. O., Jankowski, N. A., Cain, T. R., Ewell, P. T., Hutchings, P., & Kinzie, J. (2015). *Using evidence of student learning to improve higher education*. Jossey-Bass.

Onwuegbuzie, A. J., & Daniel, L. G. (2002). Uses and misuses of the correlation coefficient. *Research in the Schools, 9*(1), 73-90.

Texas Higher Education Coordinating Board. (2025). *Texas Core Curriculum*. https://www.highered.texas.gov/institutional-resources-programs/public-universities-health-related-institutions/transfer-resources/texas-core-curriculum-tcc/