Academy for College Excellence

Measuring the Non-Cognitive

This document is comprised of excerpts from the longitudinal study of ACE student performance conducted by MPR Associates.[1] The focus of this document is the theoretical underpinning and research design of the ACE non-cognitive measurement tool the College Student Self-Assessment Survey (CSSAS). ACE's approach to the non-cognitive domain is one of intensity and composite measurement. The ACE intervention helps to shift students' relationship to self and relationship to others.

Theoretical Underpinnings of ACE Program and CSSAS Measuring Tool

A large body of research supports the theoretical architecture of the ACE program. Research has shown that factors within the affective dimension play an important role in the success of all students and, in fact, all individuals. This includes research on motivation, self-efficacy, socio-emotional learning, mindfulness and hope. Three decades have passed since Bandura (1977) first introduced the construct of self-efficacy, and more recently (1997) he published Self-efficacy: The Exercise of Control, in which he situates self-efficacy within a theory of personal and collective agency that operates in concert with other socio-cognitive factors in regulating human well being and attainment.

Self-efficacy beliefs have received increasing attention in educational research, primarily in studies of academic motivation and of self-regulation (Pintrich & Schunk, 1995). In this domain, self-efficacy researchers have focused on three areas: the link between efficacy beliefs and college major and career choices (Lent & Hackett, 1987); the efficacy beliefs of teachers related to their instructional practices and to various student outcomes (Ashton & Webb, 1986); and the correlation of students' self-efficacy beliefs with other motivation constructs and with students' academic performances and achievement. Much of this work has focused on clarifying the structure of the motivational system, although this work has also begun to examine the influence of motivation on preference, choice, and learning (Markman, Maddox, & Baldwin, 2005).

The influence of social and emotional factors on learning is confirmed by a large number of studies as well. Based on evidence from 61 educational researchers, 91 meta-analyses, and 179 handbook chapters, Wang, Haertel, and Wallberg (1997) found that social and emotional factors were among the most influential factors on student learning. Among those that were particularly high-ranking social and emotional components were classroom management, parental support, student-teacher social interactions, social-behavioral attributes, motivational-affective attributes, the peer group, school culture, and classroom climate. Through a review of these studies, the authors concluded that directly influencing the psychological components of learning is an effective way of changing how much and how well students learn.

The ACE model also focuses on the development of hope in its students. Recently, the construct of hope has been receiving increasing research attention and in one study, hope was shown to be more closely related to academic achievement than intelligence, personality, or previous academic achievement (Day, Hanson, Maltby, Proctor, & Wood, 2010).

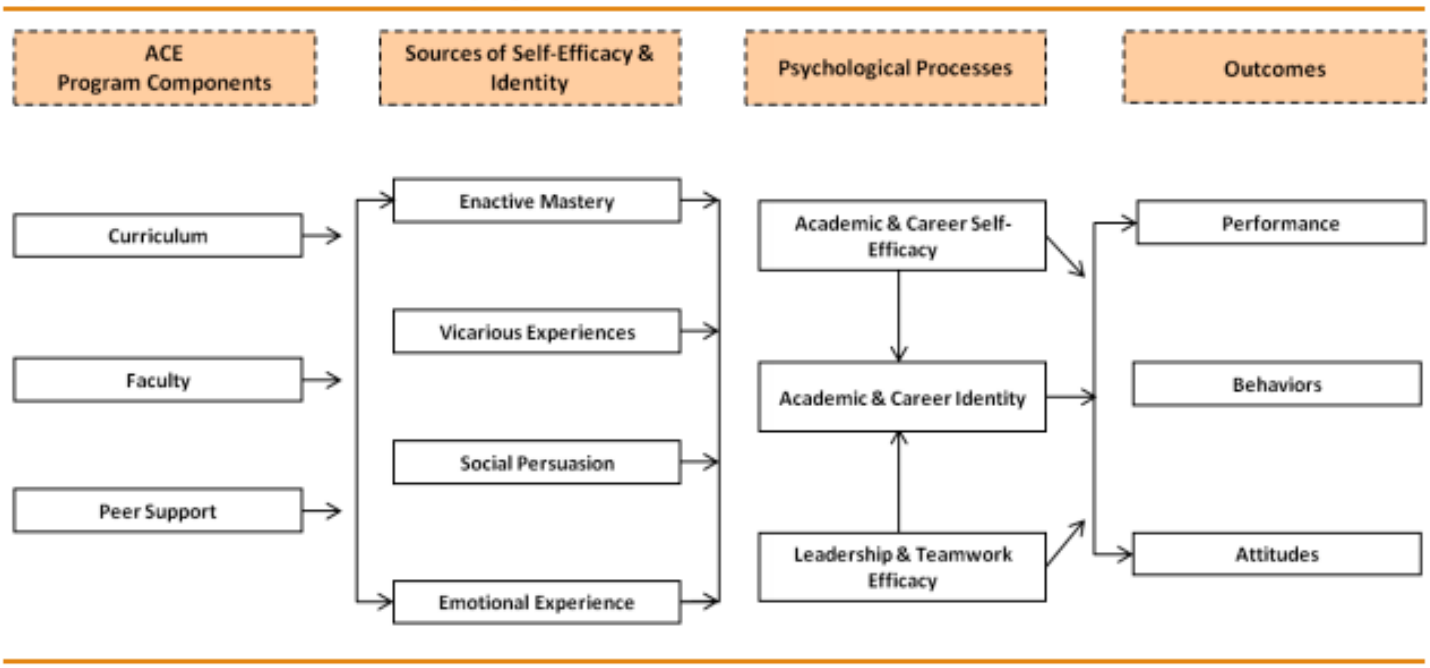
1 *Evaluation of the Academy for College Excellenc: Report on Academic Outcomes* by B. Farr, D. Radwin, & S. Rotermund of MPR Associates, Inc. (2012)

To develop a research framework for this study, it was essential to understand the theoretical underpinnings of the ACE model, or the theory of action, that we could take into account in developing data collection methods and instruments and in developing an analysis plan. In collaboration with Martin Chemers, professor emeritus of psychology at the University of California Santa Cruz and ACE staff, MPR developed an approach to an analysis and interpretation of the data related to self-efficacy and the use of educational practices that support development of self-efficacy. Chemers' research focuses specifically on psychological factors that affect the commitment and success of underrepresented students in science, technology, education, and mathematics (STEM) education. Early studies (Chemers, Hu, & Garcia, 2001) showed clearly that academic self-efficacy plays an important role in student success. Employing a longitudinal design with first-year students at UC Santa Cruz, one study conducted by Chemers indicated that measurements of academic self-efficacy taken in the first quarter of the school year predicted student outcomes eight months later, at the end of the year, including academic goals, grades, and adjustment and health. In subsequent studies, supported by the National Institutes of Health and the National Institute of General Medical Sciences, findings have replicated those results and demonstrated that "research selfefficacy" and "identity as a scientist" predicted commitment to a career in STEM and satisfaction with the educational experience. Research on self-efficacy and identity fully mediated the effects on commitment of student experiences with authentic research, positive mentoring, and networking with professional scientists and other science students.

The CSSAS is based on several validated survey instruments used in other research studies to measure factors related to the affective dimension that are addressed in the ACE program.

Chemers proposed a model (see *Figure 1*) for factors within the ACE model that would serve as a framework for understanding relationships between ACE program components, latent psychological mediators, and student outcomes. Based on this model, MPR researchers and ACE staff jointly designed and developed an instrument, the College Student Self Assessment Survey (CSSAS), which provides a measure of students' academic self-efficacy and hope, teamwork and leadership, college identity, interacting with others and four attributes related to mindfulness (focusing, accepting, describing and observing). The use of

Figure 1. Model of factors related to ACE program



this measure at various data points allows us to conduct analyses of growth in these attributes and ultimately will allow for correlational analyses of relationships between growth in these attributes and student outcomes.

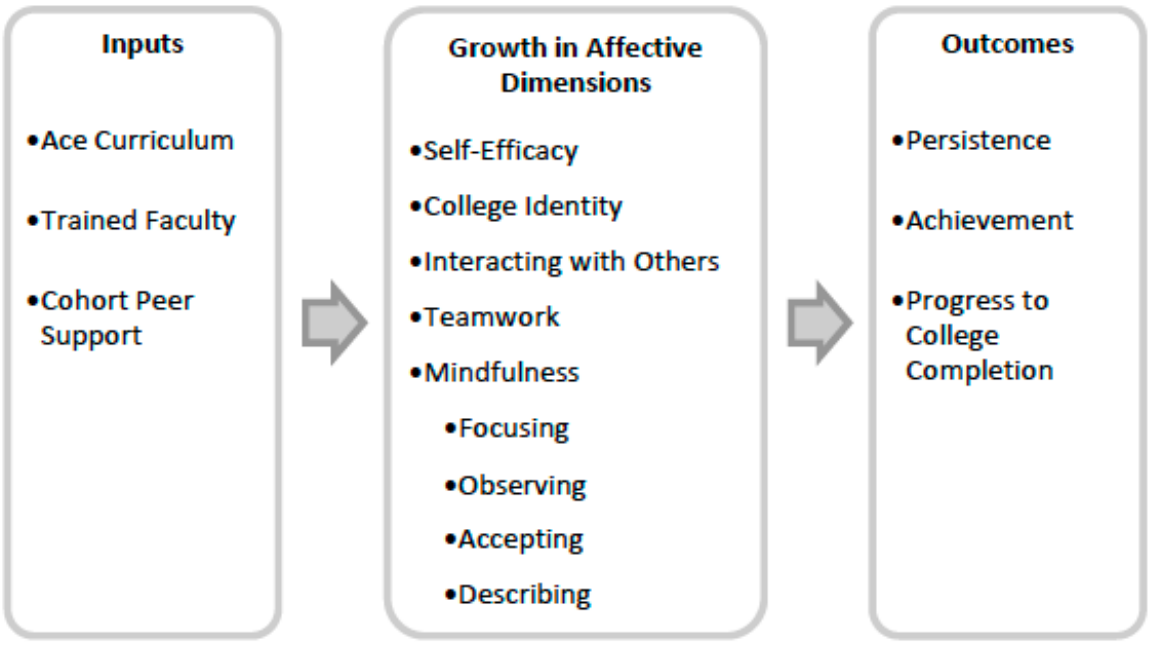
Going Beyond Student Academic Achievement Outcomes: the Collection and Analysis of Data from the College Student Self-Assessment Survey (CSSAS)

The collection and analysis of student achievement indicator data are of primary importance in describing the effects of participation in the ACE program on academic outcomes. However, achievement indicators do not tell the full story of ACE. ACE posits that its program leads to transformational changes in factors represented in the affective dimension and that it is these changes in students' increased understanding of themselves and others that leads to student success. The underlying theory that in large part prompted the design of the ACE model—as described by the founder, Diego Navarro—is that factors associated with the affective dimension are an instrumental part of being a success in school and life and that students who enroll in the ACE program typically have not developed these skills due to the negative circumstances of their lives and their prior negative experiences as students. To understand what effect the ACE program has on student growth in the affective dimension factors of self-efficacy, college identity, mindfulness, interaction with others, and teamwork, MPR designed, in collaboration with Martin Chemers and ACE Staff, a survey instrument called the College Student Self-Assessment Survey (CSSAS).[2] Figure 2 provides a conceptual model of the ACE process, illustrating how mediating factors related to affective dimensions emerging from the ACE curriculum contribute to specific student outcomes.

ACE posits that its program leads to transformational changes in factors represented in the affective dimension and that it is these changes in students' increased understanding of themselves and others that leads to student success.

2 Three factors are multi-dimensional, in that they measure more than one construct: Self-Efficacy which measures Self-Efficacy, Planning, Academic Behaviors and Hope (4 Constructs); Interacting with Others which measures Communication and Personal Responsibility (2 Constructs); and Teamwork which measures Teamwork and Leadership (2 constructs).

Figure 2. Conceptual model of how affective dimensions measured by CSSAS fit into the ACE process



The CSSAS is administered electronically to ACE students at three points in time: prior to the Foundation course, at the end of the Foundation course, and again at the end of the ACE semester four months after initial measurement. To date, it has been fully administered to four cohorts of ACE students at all of the colleges implementing the ACE model (including spring 2012). CSSAS data collected from the fall 2010, spring 2011, fall 2011, and spring 2012 cohorts are analyzed in this report. The CSSAS was designed to identify and measure growth in important psychological constructs that are theorized to be critical facets of college success for ACE students. The CSSAS is based on several validated survey instruments used in other research studies to measure factors related to the affective dimension that are addressed in the ACE program. Table 1 provides an overview of the factors measured by the CSSAS and the sources for the survey items. Appendix Table A1 provides a detailed list of research literature associated with each factor.

Validation of CSSAS Survey Instrument

To determine the validity of the CSSAS instrument, MPR used a multi-step process:

Table 1. CSSAS constructs and sources

Affective Dimension	Section and Description of Items	Sources[1]
Self-Efficacy	Items relating to one's confidence in successfully completing school-related tasks and in one's ability to regulate learning and study behaviors. Also includes items related to student's hope regarding their academic future. Respondents rate the extent of their agreement on each statement using a five-point scale (1 = Strongly disagree; 5 = Strongly agree).	Academic Self-Efficacy Scale by Chemers, Hu, & Garcia (2001); Efficacy for Self-Regulated Learning Scale by Zimmerman, Bandura, & Marinez-Pons (1992); Domain Specific Hope Scale by Shorey & Snyder (2004)
College-Identity, Teamwork, and Interacting with Others	Items relating to identifying as a college student, communication skills, and aspects of personal responsibility that affect interaction with others. Respondents rate the extent of their agreement on each statement using a five-point scale (1 = Strongly disagree; 5 = Strongly agree). Also includes two items on anticipated stress and ability to handle challenging stress levels, measured on a five-point scale.	Drafted by Dr. Martin Chemers based on previous survey research in each domain (2010); Personal Responsibility Questionnaire by Merger, Spencer, & Patton (2004)
Mindfulness, including Focusing, Accepting, Observing, and Describing	Items relating to being mindful of one's ability to focus on tasks, and one's inner state, through observing, describing, and accepting one's actions, thoughts, and behaviors. Respondents rate how true specific statements are about themselves on a five-point scale (1 = Never or rarely true; 5 = Very often or always true).	Kentucky Inventory of Mindfulness Skills by Baer (2004)

1. Piloted initial survey with sample of ACE students in spring 2010.

2. Used Exploratory Factor Analysis on pilot results to determine items to retain or drop from the survey.

3. Administered streamlined survey to all ACE students in fall 2010 and spring 2011. Additional items from a prior self-efficacy survey developed by Cabrillo College were added before the Time 3 administration in fall 2010 to broaden the self-efficacy measure.

4. Continued to check validity of survey and factors using Time 1 results from fall 2010 and spring 2011. No items were dropped from the survey.

5. In fall 2011, the CSSAS was administered during student assessment periods to all incoming students at Cabrillo College and Hartnell College in addition to all ACE students at the six participating colleges.

A final Exploratory and Confirmatory Factor Analysis was run on the entire sample of Time 1 surveys, including those from ACE and non-participants. The original 10-factor model was changed to the final 8-factor model based on the results of the Confirmatory Factor Analysis.

Analysis of Change in ACE Student Scores on the CSSAS

For this report, MPR used data collected from ACE students in fall 2010, spring 2011, fall 2011, and spring 2012. Because the study examines change over time, the sample is limited to ACE students who had survey results for all three CSSAS administrations, including Time 1 before beginning ACE, Time 2 after completing the Foundation course, and Time 3 after the end of the first ACE semester (four months from Time 1 measurement). It is necessary to have a matched sample of students if analysis of change over time is to be valid. The total N for this analysis is 535 students from six colleges participating in the ACE program. A breakdown of respondents by college is presented in Table 2. To measure change over time, we created a scale score for each of the affective dimension factors and then calculated the mean score for each factor at each time point. We used a matched-samples t-test to determine if the mean score changes were statistically significant between Time 1 and Time 2 and also between Time 1 and Time 3. In addition to mean scores, we also calculated the percentage of students scoring in the top quartile of each factor scale at each time point.[3] These findings provide a complement to the mean scores and are also presented in the Findings section.

The CSSAS results indicate that the ACE program leads to student growth in affective dimensions over the three time points.

3 The scale is based on the number of items contained within each factor. For example, self-efficacy consists of 11 items, for a total scale score of 55 (5-points per item). Students who scored 41 or above would be in the top quartile for self-efficacy. On the other hand, identity consists of 3 items, for a total scale score of 15. Students who scored 11 or above would be in the top quartile for identity.

Table 2. CSSAS respondents by college, F10-SP12 (N=535)

	N	%
Berkeley City College	57	11%
Cabrillo College	276	52%
Delaware County Community College	57	11%
Hartnell College	69	13%
Las Positas College	11	2%
Los Medanos College	65	12%
Total	535	100%

Limitations of CSSAS Results

The change-over-time survey results may not be representative of the change for all ACE students because of the limited sample size. The sample size for the change analysis is limited to 535 students, though the combined number of ACE students from fall 2010 to spring 2012 is much higher (N=894). This sample is 535 students because the analysis required a matched sample of students who had taken the CSSAS at all three time points during the ACE semester. ACE experienced challenges in ensuring that ACE students at six different campuses took the CSSAS at three time points each semester, leading to the reduced sample size.

Effects of ACE Program on Non-Cognitive Indicators

The CSSAS results indicate that the ACE program leads to student growth in affective dimensions over the three time points. Before discussing the specifics of these results, however, it is important to understand how the CSSAS was created and validated based on the research literature and the use of factor analysis.

Exploratory and Confirmatory Factor Analysis of CSSAS

The creation of the CSSAS was based on a pilot survey jointly designed and developed by MPR and ACE staff and given to a small sample of ACE students in the spring of 2010. The pilot survey measured factors within the affective dimension similar to those that appear in the CSSAS, but the survey was much longer and needed to be streamlined. Exploratory Factor Analysis (EFA) was used to determine which underlying constructs emerged from the survey data and which items could be dropped from the survey. Exploratory Factor Analysis reveals the number of factors produced by a survey and measures how well the items in the survey measure each of the factors. As expected, the EFA revealed the affective dimensions theorized to be measured by the survey, including self-efficacy, interaction with others, teamwork, college identity, and several aspects of mindfulness. Items with low factor loadings on a construct were eliminated because they did not provide a good measurement indicator for that construct. Also, items that cross-loaded on to more than one factor were eliminated because they did not do a good job of differentiating between multi-dimensional factors.

Items with the highest loadings on each factor were retained, while lower scoring items were dropped to decrease the length of the survey. EFA allows for parsimony in measurement of factors because items can be removed without sacrificing reliability or validity. Each identified factor was also subjected to a reliability test using Cronbach's Alpha, and scores for each factor were good, ranging from .71 to .92. After low-performing items were removed, the revised CSSAS was administered in fall 2010 to all ACE participants at the beginning of the ACE semester. It was administered again two weeks later and then again at the end of the ACE semester. Exploratory and Confirmatory Factor Analysis (CFA) of these administrations of the CSSAS confirmed the validity of the instrument. Confirmatory Factor Analysis revealed high overall measurement scores for each factor, plus high factor loadings for each measured item. Cronbach's alpha reliability scores also were good, in the .70 to .95 range for each dimension.

MPR and ACE staff continued to pilot the CSSAS instrument in spring 2011 with students participating in ACE. Exploratory and Confirmatory Factor Analysis were used after each administration to examine the validity of the instrument and determine if items were performing poorly. Confirmatory Factor Analysis follows Exploratory Factor Analysis in the research process. In CFA, the researcher specifies which items load on to identified factors, instead of allowing the computer software (Mplus 6.0) to determine which items hang together as factors based on statistical characteristics.

Final factor analyses of the CSSAS were conducted using the combined survey results from administration of the Time 1 Survey to ACE participants in fall 2011, as well as the schoolwide CSSAS administered to non-participants in fall 2011. Exploratory and Confirmatory Factor Analysis are large-sample techniques, so using all the survey results provided additional validity for the results. The final sample size was 1,369. Appropriate analysis techniques also require that the EFA and CFA be conducted on different random samples pulled from the entire dataset. Use of the same

data for both analyses may yield unreliable results. Having a large sample size allowed MPR to use a random sample of 40 percent of the survey takers for the EFA and 60 percent of the survey takers for the CFA. Items were dropped from the CSSAS model if the EFA or CFA revealed that items had low factor loadings or loaded on to more than one construct.

These results suggest that the CSSAS is a valid instrument. All fit statistics for the data tested here met the criteria required to claim that a survey is a valid and reliable instrument.

The results for the Confirmatory Factor Analysis of the model are shown in Appendix Figure A6. This model provides the factor loadings for each of the items on each affective dimension factor as well as the correlation between each factor. Ideally, in Confirmatory Factor Analysis, factor loadings will be above .40 and correlations of latent factors (the affective dimensions in the large circles) will be less than .70. The figure shows that the CSSAS meets both of these criteria. The factor loadings are all above .50 and the factor correlations are less than .70. The correlation between factors is used to determine if factors are measuring separate constructs or if they should be collapsed into one smaller factor (generally if the correlation is higher than .80). These results suggest that the CSSAS is a valid instrument.

Another way to measure the validity of an instrument is to use CFA to generate fit statistics for the model. These fit statistics measure the model as a whole, while the size of the factor loadings measure the validity of each individual construct and item. Standard fit statistics reported in the research literature include the Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), and the Standardized Root Mean Square Residual (SRMR). All fit statistics for the data tested here met the criteria required to claim that a survey is a valid and reliable instrument (see *Table 3*). A RMSEA score below .05 is considered necessary to indicate a well-fitting model. Scores between .05 and .07 are adequate, between .08 and .10 are poor, and any score above .10 indicates that the model is not acceptable. In addition, a 90 percent confidence interval for the RMSEA score should not exceed .10 on the upper-bound level. The model tested using the fall 2011 survey data had an excellent RMSEA score (.042), and the confidence interval had an upper-bound level below .05. Scores above .90 on the CFI indicate a good model, and scores above .95 indicate excellent model fit. The CFA of the model tested here and depicted in Appendix Figure A6 produced CFI results of .948, indicating that the model is very strong. The final fit statistic, the SRMR, should provide values as close to 0 as possible. The score for this analysis was .038, again indicating excellent fit of the model. Reliability scores are reported along with survey items and factor loadings in Appendix Table A2. Correlations among the latent factors are reported in Appendix Table A3.

To further confirm the validity of the instrument, Cronbach's Alpha reliability scores were calculated along with the EFA and CFA analyses. Cronbach's Alpha is widely used in the research community to determine the validity of survey instruments, with .90 indicating excellent fit and scores above .70 indicating adequate fit for a model to be accepted as a reliable indicator of the constructs being measured. The Cronbach's Alpha score for the overall instrument was .94, considered excellent. Individual reliability scores were also conducted on each construct and generated scores ranging from .66 to .95, again indicating that each construct is reliable in addition to the survey in its entirety being a reliable measure. Based on these findings, MPR determined that the CSSAS had high validity and reliability, and the instrument was considered final as of fall 2011. The final instrument consists of 41 items measuring affective dimension factors as well as two items measuring students' response to stress.

Table 3. Fit statistics for Confirmatory Factor Analysis of fall 2011 CSSAS (n=821)

	RMSEA	RMSEA 90% Confidence Interval	CFI	SRMR
School CSSAS (n = 821)	0.042	0.039 to 0.044	0.948	0.038

Findings from Analysis of CSSAS Scores over Time

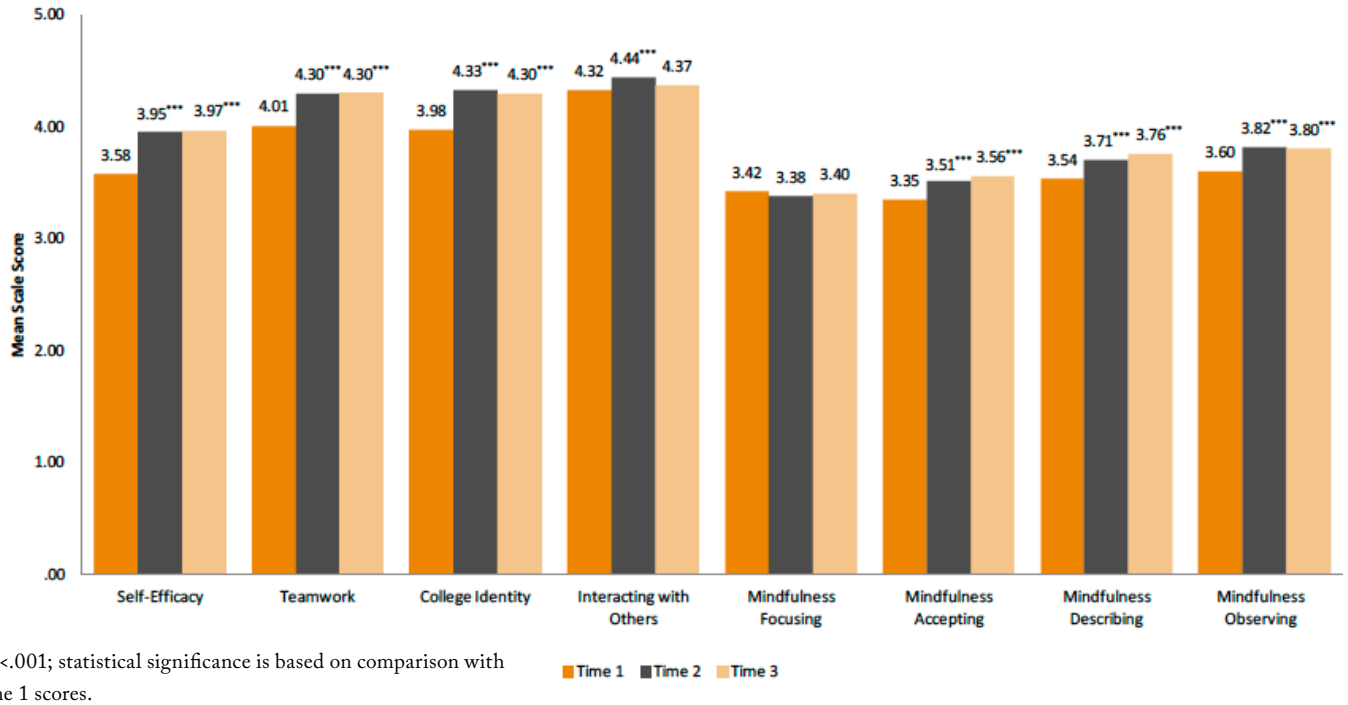
To analyze the CSSAS findings, scale scores were created for each factor. Each survey item consisted of a scale from 1 to 5. Items in each factor were added together and divided by the number of items to arrive at a standardized scale of 1 to 5 points for each factor, regardless of the number of items included. Mean scores were derived for each time point the CSSAS was administered: Time 1 before the Foundation course, Time 2 after the Foundation course, and Time 3 at the end of the ACE semester. Figure 4 shows the mean scores for each factor at each of the time points. Results were tested using a matched samples t-test to determine if the change over time from Time 1 to Time 2 and from Time 1 to Time 3 were statistically significant. Significance results are indicated by asterisks in Figure 4. Details of the t-test results are provided in Appendix Table A4.

Overall, students improved in their mean scores over the course of their ACE experience. The biggest growth is seen between Time 1 and Time 2, which makes sense given that the two-week Foundation course focuses on building students' capacity in each of the affective areas. The only factor that does not show a significant mean score increase over this time period is Mindfulness – Focusing. The change from Time 2 to Time 3 either remains consistent or improves slightly over the course of the ACE semester, with the exception of the Focusing factor, which is not significantly different from Time 1. This result indicates that students are maintaining the gains they made during the intensive Foundation course.

The differences indicate that the CSSAS is able to detect differences among varying student populations and suggests that the CSSAS could be a useful instrument for evaluating students' need for support programs based on their affective dimension profile.

Analysis of CSSAS change results among colleges participating in the study show that there is variation in school

Figure 4. Mean scores on CSSAS factor scales of ACE participants, by time: F10-SP12 (N=535)



***p<.001; statistical significance is based on comparison with Time 1 scores.

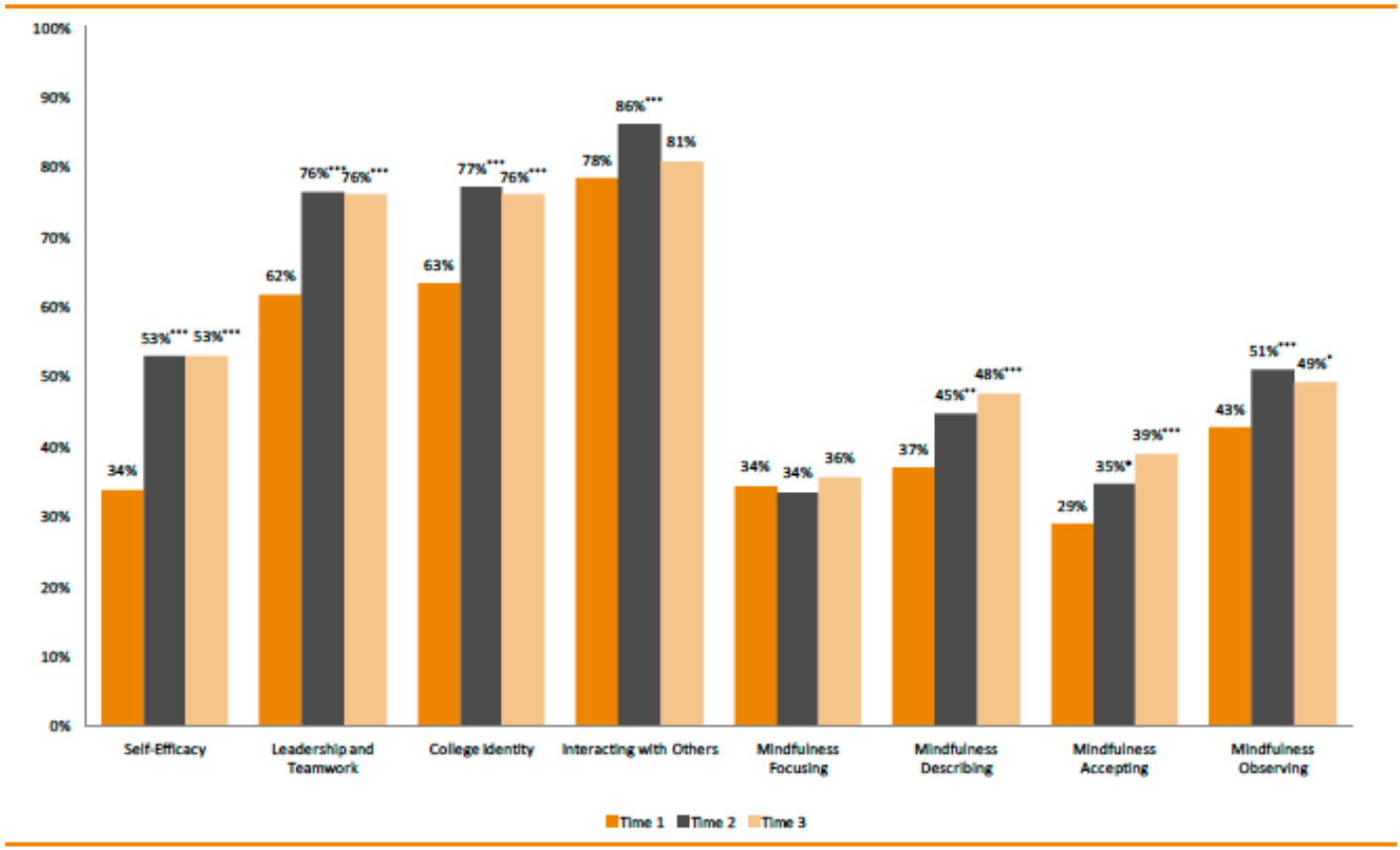
NOTE: Survey responses were based on a five-point scale, from "strongly disagree" to "strongly agree" for the non-mindfulness items and from "never or very rarely true" to "always or almost always true" for the mindfulness items. Each factor consisted of different numbers of items. Individual scores on each item in a factor were added together and divided by the number of items to arrive at a standardized scale of 1 to 5 points for each factor, regardless of the number of items included. The Y-axis represents the mean (average) score for each factor.

populations on the affective dimension factors measured by the CSSAS, even within the ACE program. Appendix Table A5 shows mean factor scores at each time point broken out by college. The differences indicate that the CSSAS is able to detect differences among varying student populations and suggests that the CSSAS could be a useful instrument for evaluating students' need for support programs based on their affective dimension profile. The colleges are not identified by name because the sample size for some of the colleges is very small and might compromise the personal privacy of students at those schools or create unfair comparisons between campuses. Also, these results are presented for illustrative purposes to indicate the ability of the CSSAS to distinguish between different student populations and should be taken in the context that some of the sample sizes are quite small and may not be representative of the college or the ACE program as a whole. Future analysis of these results will include correlations with student outcomes from the MIS data analysis of achievement indicators to explore the relationship between each of the affective dimensions and student outcomes.

To supplement the analysis of mean scores, MPR also calculated the percentage of students who scored in the top quartile of each factor scale for each of the time points. These percentages give an indication of the overall trend in student scores over the course of the ACE experience. Figure 5 shows the findings from this analysis. The trends mirror those shown by the mean scores analysis. Large gains occur between Time 1 and Time 2 in self-efficacy, teamwork, and college identity. These gains are maintained over the course of the ACE semester. Scores on the mindfulness dimensions are uniformly lower than the other four affective dimensions. Statistical significance test results are shown with asterisks and are also similar to those found in the analysis of mean factor scores.

For the full report, visit: http://www.rti.org/publications/abstract.cfm?pubid=21549

Figure 5. Percent of ACE students scoring in top quartile of CSSAS factor scales: F10-SP12 (N=535)



***$p < .001$; **$p < .01$; *$p < .05$.

NOTE: The Y-axis represents the percentage of students who scored in the top quartile of the CSSAS factor scale. The scale is based on the number of items contained within each factor. For example, self-efficacy consists of 11 items, for a total scale score of 55 (5-points per item). Students who scored 41 or above would be in the top quartile for self-efficacy. On the other hand, identity consists of 3 items, for a total scale score of 15. Students who scored 11 or above would be in the top quartile for identity.

Appendix

Table A1. Research literature for CSSAS, by factor

Belonging & Community

Berger, J. B., & Milem, J. F. (1999). The role of student involvement and perceptions of integration in a causal model of student persistence. Research in Higher Education, 40, 641–664.

Brown, S. D., Tramayne, S., Hoxha, D., Telander, K., Fan, X., & Lent, R. W. (2008). Social cognitive predictors of college students' academic performance and persistence: A meta-analytic path analysis. Journal of Vocational Behavior, 72(3), 298–308.

Napoli, A. R., & Wortman, P. M. (1998). Psychosocial factors related to retention and early departure of two-year community colleges students. Research in Higher Education, 39(4), 419–456.

Tinto, V. (1993). Leaving college: Rethinking the causes and cures of student attrition. (2nd ed.). Chicago: University of Chicago Press.

Emotional Regulation/ Social Interaction

Gratz, K. L., & Roemer, L. (2004). Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the Difficulties in Emotion Regulation Scale. Journal of Psychopathology and Behavioral Assessment, 26, 41–54.

Pearlin, L., & Schooler, C. (1978). The structure of coping. Journal of Health and Social Behavior, 19, 2–21.

Porchea, S F, Allen, J, Robbins, S, et al. (2010). Predictors of Long-Term Enrollment and Degree Outcomes for Community College Students: Integrating Academic, Psychosocial, Socio-demographic, and Situational Factors. The Journal of higher education, 81(6), 680-.

Hope /Goal Theory

Covington, M. V. (2000). Goal theory, motivation, and school achievement: An integrative view. Annual Review of Psychology, 51, 171–200.

Day, L., Hanson, K., Maltby, J., Proctor, C., & Wood, A. (2010). Hope uniquely predicts objective academic achievement above intelligence, personality, and previous academic achievement. Journal of Research in Personality, 44, 550–553.

Pintrich, P. R., & Schunk, D. H. (1995). Motivation in education: Theory, research, and applications. Englewood Cliffs, NJ: Prentice Hall.

Shorey, H. S., & Snyder, C. R. (2004). Development and validation of the domain hope scale revised. Unpublished manuscript, University of Kansas, Lawrence, KS.

Leadership/Teamwork Efficacy

Le, H., Casillas, A., Robbins, S., & Langley, R. (2005). Motivational and skills, social, and self-management predictors of college outcomes: Constructing the student readiness inventory. Educational and Psychological Measurement, 65(3), 482–508.

Peterson, C. H., Casillas, A., & Robbins, S. (2006). The student readiness inventory and the big five: Examining social desirability and college academic performance. Personality and Individual Differences, 41(4), 663–673.

Robbins, S., Allen, J., Casillas, A., Peterson, C. H., & Le, H. (2006). Unraveling the differential effects of motivational and skills, social, and self-management measures from traditional predictors of college outcomes. Journal of Educational Psychology, 98(3), 598–616.

Robbins, S., Lauver, K., Le, H., Davis, D., Langley, R., & Carlstrom, A. (2004). Do psychosocial and study skill factors predict college outcomes? A meta-analysis. Psychological Bulletin, 130(2), 261–288.

Mindfulness

Baer, R. A., G. T. Smith, & Allen, K. B. (2004). Assessment of mindfulness by self-report: The Kentucky inventory of mindfulness skills. Assessment, 11,(3), 191–206.

Caldwell, K, Harrison, M, Adams, M, et al. (2010). Developing mindfulness in college students through movement-based courses: effects on self-regulatory self-efficacy, mood, stress, and sleep quality. Journal of American College Health, 58(5), 433-42.

Sauer, S E, & Baer, R A. (2009). Responding to Negative Internal Experience: Relationships Between Acceptance and Change-Based Approaches and Psychological Adjustment. Journal of psychopathology and behavioral assessment, 31(4), 378-386.

Personal Responsibility/Self Determination

Mergler, A. G., Spencer, F. H., & Patton, W. (2007). Relationships between personal responsibility, emotional intelligence and self-esteem in adolescents and young adults. Australian Educational and Developmental Psychologist, 24(1), 5-18.

Pearlin, L., & Schooler, C. (1978). The structure of coping. Journal of Health and Social Behavior, 19, 2–21.

Self-Efficacy

Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, NJ: Prentice Hall.

Bandura. A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. Psychological Review, 84, 191–215.

Bandura, A. (1997). Self-efficacy: The exercise of control. New York: Freeman.

Chemers, M. M., Hu, L., & Garcia, B. (2001). Academic self-efficacy and first-year college student performance and adjustment. Journal of Educational Psychology, 93,(1), 55–65.

Gore, P. A., Leuwerke, W. C., & Turley, S. E. (2006). A psychometric study of the college self-efficacy inventory. Journal

Zimmerman, B. J., Bandura, A., & Martinez-Pons, M. (1992). Self-motivation for academic attainment: The role of self-efficacy beliefs and personal goal setting. American Educational Research Journal, 29(3), 663–676.

Self-Identity as College Student

Adams, G. R., & Marshall, S. K. (1996). A developmental social psychology of identity: Understanding person in context. Journal of Adolescence, 19, 429-442.

Kaufman, P., & Feldman, K. A. (2004). Forming identities in college: A sociological approach. Research in Higher Education, 45, 463-496.

Self-Regulation of Behavior

Guiffrida, D. (2009). Theories of human development that enhance an understanding of the college transition process. Teacher College Record, 111, 2419–2443.

Park, C L, Edmondson, D, & Lee, J. (2012). Development of Self-regulation Abilities as Predictors of Psychological Adjustment Across the First Year of College. Journal of adult development, 19(1), 40-49.

Table A2. Confirmatory Factor Analysis results and Cronbach's Alpha reliability scores for fall 2011 CSSAS (N = 821)

Factor	Survey Item	Factor Loadings	Reliability Scores
Overall Reliability Score			**0.94**
Mindfulness – Focusing/Doing			**0.89**
	DOING1	0.65	
	DOING2	0.80	
	DOING3	0.69	
Mindfulness – Accepting			**0.72**
	ACCEPT1	0.64	
	ACCEPT2	0.84	
	ACCEPT3	0.59	
Mindfulness – Describing			**0.77**
	DESC1	0.69	
	DESC2	0.78	
	DESC3	0.73	
College Identity			**0.88**
	IDENT1	0.79	
	IDENT2	0.82	
	IDENT3	0.82	
Self-Efficacy			**0.92**
	SE1	0.74	
	SE2	0.71	
	SE3	0.75	
	SE4	0.75	
	SE5	0.69	
	SE6	0.68	
	SE7	0.65	
	SE8	0.87	
	SE9	0.74	
	SE10	0.74	
	SE11	0.74	
Teamwork			**0.92**
	TEAM1	0.84	
	TEAM2	0.87	
	TEAM3	0.85	
	TEAM4	0.8	
	TEAM5	0.83	
Interacting with Others			**0.86**
	INTERACT1	0.73	
	INTERACT2	0.72	
	INTERACT3	0.68	
	INTERACT4	0.88	
	INTERACT5	0.56	
	INTERACT6	0.62	
	INTERACT7	0.59	
	INTERACT8	0.81	
	INTERACT9	0.55	
Observing			**0.66**
	OBSER1	0.73	
	OBSER2	0.62	
	OBSER3	0.54	

Table A3. Confirmatory Factor Analysis Factor Correlations

		1	2	3	4	5	6	7	8
1	Focusing	–							
2	Accepting	0.21							
3	Describing	0.24	0.49						
4	Identity	0.20	0.16	0.27					
5	Self-Efficacy	0.48	0.45	0.51	0.44				
6	Teamwork	0.35	0.39	0.58	0.39	0.60			
7	Interaction	0.33	0.45	0.65	0.39	0.57	0.68		
8	Observing	0.05	0.50	0.64	0.16	0.37	0.45	0.53	–

Table A4. T-tests for statistical significance of mean scores on CSSAS scales

Time 1 to Time 2

Factor	Mean Difference	Std. Deviation	Std. Error Mean	*t*-value	df	Sig. (2-tailed)
Focusing	.043	.936	.041	1.063	533	.288
Accepting	.166	.924	.040	4.148	534	.000
Describing	.170	.718	.031	5.482	534	.000
College Identity	.348	.759	.033	10.558	530	.000
Teamwork	.290	.738	.032	9.093	533	.000
Self-Efficacy	.371	.675	.034	10.870	391	.000
Interacting with others	.122	.480	.021	5.870	533	.000
Observing	.223	.877	.038	5.881	534	.000

Time 1 to Time 3

	Mean Difference	Std. Deviation	Std. Error Mean	*t*-value	df	Sig. (2-tailed)
Focusing	.018	1.005	.043	.419	536	.676
Accepting	.211	.968	.042	5.060	537	.000
Describing	.221	.826	.036	6.212	537	.000
College Identity	.311	.872	.038	8.251	533	.000
Teamwork	.294	.853	.037	7.983	536	.000
Self-Efficacy	.385	.752	.038	10.169	394	.000
Interacting with others	.044	.581	.025	1.766	536	.078
Observing	.206	.968	.042	4.931	537	.000

Table A5. Mean scores on CSSAS factors, by time point and college

		College 1	College 2	College 3	College 4	College 5	College 6
Self-Efficacy	Time 1	3.83	3.43	3.70	3.54	3.13	3.92
	Time 2	3.97	3.89	4.05	3.94	3.51	4.14
	Time 3	4.02	3.91	4.02	3.82	3.45	4.23
Teamwork	Time 1	4.19	3.90	4.21	3.97	3.64	4.21
	Time 2	4.42	4.25	4.47	4.23	3.89	4.37
	Time 3	4.39	4.26	4.36	4.13	4.05	4.54
College Identity	Time 1	4.25	3.82	4.22	4.03	3.88	4.16
	Time 2	4.54	4.24	4.39	4.39	4.06	4.49
	Time 3	4.44	4.25	4.30	4.19	3.52	4.58
Interacting with Others	Time 1	4.42	4.22	4.46	4.46	3.93	4.49
	Time 2	4.47	4.41	4.51	4.42	4.14	4.56
	Time 3	4.50	4.31	4.35	4.40	4.08	4.55
Mindfulness Focusing	Time 1	3.38	3.32	3.67	3.22	3.02	3.83
	Time 2	3.43	3.36	3.53	3.18	2.91	3.48
	Time 3	3.42	3.38	3.30	3.35	3.25	3.64
Mindfulness Accepting	Time 1	3.45	3.30	3.34	3.27	3.00	3.57
	Time 2	3.50	3.49	3.58	3.56	3.27	3.54
	Time 3	3.41	3.59	3.43	3.43	3.45	3.82
Mindfulness Describing	Time 1	3.70	3.47	3.64	3.55	3.27	3.68
	Time 2	3.74	3.69	3.84	3.57	3.36	3.82
	Time 3	3.73	3.77	3.71	3.58	3.42	4.02
Mindfulness Observing	Time 1	3.56	3.58	3.66	3.69	3.15	3.63
	Time 2	3.68	3.84	3.82	3.88	3.36	3.89
	Time 3	3.64	3.88	3.75	3.70	3.09	3.91

Figure A6. Confirmatory Factor Analysis Model of CSSAS