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A Validation of the Collaborative Alternative Magnet School for Leadership (CAMS) Student Survey

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Abstract

The Collaborative Alternative Magnet School for Leadership (CAMS) Student Survey is intended to assess students' leadership development and skills. The survey was originally adapted by the Area Cooperative Educational Services (ACES) from Connecticut's Common Core of Learning, and was recently revised and used by CAMS. There are four basic aspects in the CAMS Student Survey: *responsibility, persistence, respect for culture diversity,* and *sense of community.* In this paper, the authors write about the exploratory factor analysis (EFA) that was conducted to explore the factor structure of the survey, and also report the reliability analysis results. Recommendations are provided about further revisions of the CAMS Student Survey and its future applications.

Keywords: Survey, Magnet School, Factor Analysis, Reliability

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Introduction

The Area Cooperative Educational Services (ACES) is a regional educational center with a mission to improve public education through high quality, cost effective programs and services. ACES serves 25 school districts in South Central Connecticut and is designed to support school districts and to educate students. The districts that they assist are diverse, ranging from urban communities such as New Haven (student population of 20,004 with 76.9% on free/reduced lunch) to suburban areas such as North Branford (student population of 2,449 with 9.9% on free/reduced lunch). An initiative at ACES is to assist the state and districts with racial and socioeconomic isolation. This was accomplished by spearheading the implementation of interdistrict magnet schools, one of which is the Collaborative Alternative Magnet School for Leadership (CAMS).

Opened in 2000, CAMS serves students in grades 7-12 with a history of low achievement and/or at-risk of dropping out of school. By enrolling students from both urban and suburban school districts with varying degrees of racial, ethnic, and economic isolation, CAMS hopes to foster student leadership through challenging academic work. CAMS uses "adventure and experiential" learning activities to help build self-confidence, character, and to reconnect students with their school/community. A focus is placed on re-engaging students who have become disenfranchised from education. This re-engagement takes place through a focus on leadership. Students are challenged to become a LEADER = Loyal, Engaged, Accepting, Disciplined, Exceptional, Responsible and Respectful. CAMS targets in the following aspects:

- To promote student growth through theme based instruction;

- To develop competence in academic areas supported by technology;

- To foster community involvement through authentic learning tasks;

- To use theme based learning strategies to increase skill, understanding and motivation;

- To develop leaders with confidence and commitment to post-CAMS goals;

- To promote understanding and confidence in the values of diversity; and,

- To encouraged families to support academic and social goals for CAMS students.

CAMS provides a challenging academic environment in which students are guided as they actualize their potential as learners. The curriculum is delivered through the concepts of adventure learning, and classes are characterized by their small size and active learning. Students cite caring and supportive staff members and challenging work as reasons for their success. Recently, ACES received a federal grant to help CAMS expand and improve instruction and inclusion for students from different home districts. ACES offers CAMS staff intensive and ongoing professional development in the form of professional learning communities, instructional coaching, content support, and adventure learning activities. A qualified instructional coach works with teachers and the principal at CAMS to improve instructional strategies and student learning.

Some ACES specialists are currently working with CAMS students to expand their leadership skills, career awareness and experiences. It is the hope that these changes will equip CAMS students to make rapid gains in academic achievement and provide students with the supports they need to graduate and successfully transition to life after high school and the pursuit of careers, vocational training, or higher education.

Thus, CAMS is a school whose focus is on leadership; the school culture is developed and sustained through practices that bring the community together, promote shared understanding, and encourage all community members to become crews, not passengers. Teaching practices and school-wide structures ensure that all students are well known by adults and peers. The faculty articulates and promotes a set of LEADER character traits that are emphasized throughout the school. Teachers foster student character through challenging academic work and the expectations that students are courteous, respectful, and compassionate. Public and classroom spaces at CAMS reflect the value of LEADER expectations, showcase the work of students and facilitate collaboration.

Theoretical Framework

Connecticut's Common Core of Learning (1998) has been created as a set of high expectations for all of Connecticut's students with the understanding that students enter school at different levels of readiness, with different interests and with varying aspirations. The Common Core establishes a vision of what students in Connecticut should know and be able to do in preparing for employment and further education, and most importantly, for becoming a productive member of society. Students learn best when they are appropriately motivated and self-confident. Attitudes and the five aspects of character in the Common Core, along with many of the skills and competencies are all essential for mastering specific skills, and must be developed during instruction through understandings, applications and appropriate guidance in schools. The document emphasizes that all aspects of characters and necessary skills should be viewed as an integrated and interdependent set of expectations.

Purpose of the Study

How will the CAMS define leadership skills? How can we assess students' leadership skills and development? Can the instrument assess students' leadership skills and development in an appropriate and accurate way? The purpose of this study is to administer an ACES-developed survey, and examine the reliability and factor structure to see if the "leadership" at the school may be assessed as CAMS provides students opportunities to develop leadership skills through adventure learning, technology, art and creativity in a small alternative learning environment

Methodology

Sample

All students in grades 7-12 at CAMS were invited to fill out the survey, as it is a part of the CAMS school project funded by the federal government. Forty-three (35.85%) of total 120 students at CAMS were females, 49 (40.84%) of total students were from a minority population, and 48 (40%) of total students were offered free lunch or reduced lunch. Choices were given to students to decide whether they put on their names their survey responses or not. Students were asked to complete the survey during class at CAMS, and 93 students handed in their responses.

Instrument

In the 1998 edition of Connecticut's Common Core of Learning, an updated version of the Common Core adopted by the Connecticut State Board of Education in January 1987, standards of an educated citizen and the skills, knowledge and character were proposed for Connecticut's public secondary school graduates. The Common Core of Learning states what an effective young citizen needs to know and be able to do. It claims that students should meet the expectations of academic achievement and be well prepared for productive adult life, continuing education and responsible citizenship. The CAMS student survey was originally adapted by

ACES from Connecticut's Common Core of Learning (1998), and is currently used by CAMS to assess students' leadership skills and development at CAMS.

More specifically, CAMS takes the notions of LEADER from the Aspects of Character in the 1998 edition of Connecticut's Common Core of Learning, which includes *Responsibility, Persistence, Intellectual Curiosity, Respect* and *Sense of Community.*

There are four subscales with 44 items in the CAMS student survey: *Responsibility, Persistence, Respect*, and *Sense of Community*, and all items are answered on the four-point Likert scales (1= Strongly Agree; 2= Agree; 3 = Disagree; 4 = Strongly Disagree). According to Aspects of Character (1998), persistence and intellectual curiosity are determinants of effective goals-setting and achievement. Respect for one self and others from diverse cultural background have strong impact on social behaviors. Responsibility and sense of community are the foundations for constructive and productive participation in the society. Students needs to understand the necessity of moral, ethical and legal conduct, and strive to balance between the individual and society.

According to the Aspects of Character (1998), *Responsibility* is when "students demonstrate a sense of ethics and take responsibility for their commitments and actions." Student in grades K-12 should assume responsibility for their behavior, assume primary responsibility for learning, develop criteria for making informed judgments and decisions, and demonstrate honesty, dependability, and self control.

For *Persistence,* "students demonstrate the effort and persistence needed to be successful." Students should develop initiative to accept challenges and responsibilities, persist on their own (without the need of close supervision), persist until new materials is mastered or until a job is done, act through a desire to succeed, take the risks necessary for fulfilling their

ambitions, persevere in the face of challenge and obstacles, and respond constructively to criticism.

Students should be tolerant, appreciative and accepting of individual differences, should appreciate everybody's worth as unique and capable individuals, judge others on their merits, demonstrate sensitivity to, and respect for, the perspectives, opinions, needs and customs of others. In other words, *Respect* is when "students demonstrate respect for themselves and others" (Aspects of Character, 1998).

Students should develop a sense of belonging to a group to a group (larger than friends, family and co-workers), develop an understanding of the importance of each individual to the improvement of the quality of life for all in the community, understand and appreciate their historical and ethnic heritage as well as the heritage of others within the larger community, and stay informed about and participate in decisions regarding school, community, state, country and even world. Therefore, according to the Aspects of Character (1998), *Sense of Community* is when "students are active, constructive members of the larger community."

Content Validation

No previous statistical analysis was previously conducted, and no report existed on the content validation of this survey. Therefore, a group of six people, including the principal at CAMS, a project coordinator from ACES, a professor from the University of Connecticut, a professional development instructor, an in-service teacher, and the researcher in this study, examined the items in each subscale. Unanimity was reached in trimming down unnecessary items, revising the problematic items, and adding new items after this discussion. Finally, 44 items were retained and four hypothesized factors were defined for the specific uses at CAMS:

- *Responsibility* (12 items): students take responsibility for their commitments and

actions;

- *Persistence* (13 items): students demonstrate the effort and persistence needed to be successful;

- *Respect* (11 items): students demonstrate respect for cultural diversity; and,

- *Sense of Community* (8 items): students are active, constructive members of the larger community.

Construct Validity

Principal Component Analysis (CFA) and Principal Axis Factoring (PAF) are widely used factor analysis techniques in social and behavioral science. Since PCA analyzes all the variance in the items, we choose to run PAF to analyze only the variance in the items that is shared with other items, which can provide useful information about the factor extraction and the relationship among factors. Also, we chose to run the PAF with an oblique rotation for factor analysis, since four hypothesized factors were assumed to have certain degrees of correlations based on the statement in Common Core of Learning (1998). After running a factor analysis, the Cronbach's alpha statistics were examined for each subscale in the reliability analysis.

According to Thompson (2004), there are several methods for factor extractions, including Scree Plot and Parallel Analysis (PA). The Kaiser-Guttman rule suggests that factors with eigenvalues bigger than 1.0 should be extracted, while factors above the "elbow" in the scree plot are suggested to be extracted (Thompson, 2004). For Parallel Analysis (PA), we can determine the number of extracted factors if we compare the observed eigenvalues obtained from the correlation matrix to be analyzed by simulating the random samples with the mean of the eigenvalues obtained from the random uncorrelated data (Thompson, 2004).

In this study with 93 students, the Kaiser-Guttman rule (in PAF) suggests 12 factor extractions, the scree plot (in PAF) suggests five, and PA suggests three. Taking into consideration all the results from different factor extraction methods as well as the research purpose and literature review, we then opted to extract five factors.

In extracting the five factors in PAF with an oblique rotation, the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy yielded .72. According to Pett and his colleagues (2003), a value larger than .70 suggests that the patterns of correlations in the survey were relatively compact and factor analysis in this study should yield reliable factors. Bartlett's Test of Sphericity (approximate Chi-square) is 2106.52 and was statistically significant ($p < .001$) with the degrees of freedom of 946. This told us that there are some relationships between variables/items and factor analysis is appropriate in this survey research. A few of the item correlations were larger than .70 which may suggest the certain degree of redundancy in this survey, and most of the item correlations range from 0.2 to 0.6.

From Table1, communalities for most of the survey items, except for items 9, 20 and 37, range from .20 to .80 after five-factor extractions in PAF, which suggests that all the items were moderately correlated with other items and factors (Thompson, 2004). We identified the first factor as *Responsibility*, the second factor as *Respect*, and the third factor as *Sense of Community*. Some items, which were intended to represent in the factor "*Persistence,*" fell into the category of the factor *Responsibility*. For the items with the factor loadings higher than .30 on two or more factors, and the items with factor loadings less than .40, we went through each of these items, examined them with theoretical framework, and decided that it is appropriate to delete them. For the items with factor loadings greater than .40 but less than .50, it is suggested to revise or

Table 1

Items, Factor Loadings, and Communalities

Item	Factor (Pattern Matrix)					Factor (Structure Matrix)					Communalities	
	1	2	3	4	5	1	2	3	4	5	Initial	Extracted
1. I am honest.	.457	.180	.269	.154	.257	.620	.378	.449		.367	.837	.552
2. I am dependable.	.475		.369	-.155	-.229	.598	.219	.517		.333	.886	.542
3. I have self-control.	.290	.275	.134	.260	.262	.416	.355	.263		.323	.728	.350
4. I take responsibility for my behavior.	.160	.256			.575	.397	.390	.230	-.220	.640	.835	.553
5. I consider the consequences of my actions on all people before I act.		.303	.141	-.177	.237	.223	.396	.236	-.312	.298	.651	.273
6. I can make informed judgments and decisions.	.388	.102	.215	-.127	.221	.573	.344	.396	-.323	.344	.720	.460
7. I am a moral person.		.348		-.208	.356	.373	.496	.248	-.397	.445	.870	.470
8. I am an ethical person.		.245		-.342	.372	.349	.418	.173	-.492	.463	.824	.477
9. I abide by law.	.205			-.255	.151	.309	.216		-.341	.229	.562	.194
10. I assume primary responsibility for learning.	.545			-.308		.640	.291	.298	-.456	.105	.840	..506
11. I can identify my learning needs.	.733			-.141		.727	.239	.169	-.310	.156	.849	.551
12. I can set reasonable goals for my learning.	841	-.138		-.158		.816	.204	.247	-.331	.113	.847	.699
13. I accept challenges which will help me grow.	.460	.110	.353	-.169	-.129	.633	.382	.536	-.358		.756	.580
14. I accept responsibility which will help me grow.	.592	.185	.158	.133	.123	.699	.403	.375	-.119	.254	.816	.563
15. I am persistent.	.438	.277	.269	.124		.578	.444	.440	-.105		.717	.479
16. I do not need close supervision to complete my school work.	.703					.678	.181	.211	-.174	.137	.788	.464
17. I work on new information until the material is mastered or until the job is completed.	.517			-.201	.116	.641	.328	.301	-.383	.260	.762	.482
18. I feel pride when I work hard in completing a task.	.583	-.143	.304	-.139		.680	.174	.489	-.306	.214	.863	.577
19. I work hard because I want to succeed.	.773	-.119	.139			.786	.204	.371	-.256	.128	.846	.647
20. I work hard because I am afraid of failure.	.346		-.230			.322	.159		-.139	.143	.659	.161
21. I recognize failure is a part of everyone's experiences.		.115	.126	-.399		.226	.270	.218	-.460		.719	.250
22. I take risks in fulfilling my ambitions.	.196	.167		-.392		.356	.350	.130	-.492	.135	.761	.321
23. I persevere in the face of challenges and obstacles.	.655	.171	.108	-.171	-.254	.746	.455	.356	-.377		.810	.688
24. I respond constructively to criticism	.335	.361	-.145			.428	.453		-.156	.173	.731	.312
25. I am willing to incorporate suggestions from others into my work in an effort to grow.	.565			-.170		.642	.307	.240	-.343	.191	.793	.449
26. I am a unique and capable individual.	.533			-.266	-.178	.622	.347	.292	-.419		.744	.497
27. I exhibit self-esteem.	.440	.164		.143		.474	.288	.193			.778	.259
28. I believe I can shape my future.	.762			.126		.703	.239	.147		.101	.821	.517
29. I am sensitive to the perspectives of others from different racial, cultural, and socioeconomic background.		.725		.104		.284	.712	.117	-.126	.115	.721	.519
30. I am sensitive to the opinions of others from different racial, cultural, and socioeconomic background.		.809				.274	.814	.157	-.292		.899	.668
31. I am sensitive to the needs of others from different racial, cultural, and socioeconomic background.	-.134	.757		-.270		.216	.792	.167	-.460		.883	.698
32. I am sensitive to the customs of others from different racial, cultural, and socioeconomic background.	-.109	.814		-.208	-.131	.189	.807		-.390		.874	.719
33. I judge others from different racial, cultural, and socioeconomic backgrounds on their merits.	-.154	-.125			.477		-.129			.436	.591	.239
34. I am tolerant of individual differences	.236	.246	-.104	-.394	.201	.437	.448		-.542	.318	.802	.481
35. I appreciate individual differences.	.160		.131	-.682		.413	.356	.297	-.767	.163	.862	.656
36. I accept individual differences.		.116	.201	-.758		.398	.412	.362	-.846	.153	.907	.798
37. I belong to a group of friends.		.181	.363		-.183		.212	.366		-.147	.708	.193
38. I belong to a family group.			.688		.150	.235	.112	.696	-.196	.209	.808	.518
39. I belong to a group that includes more than friends and family.	1.98	.153	.477	.168	-.375	.287	.230	.516		-.305	.649	.461
40. I am informed about decisions regarding my school.	.378	-.173	.513		.172	.514		.614	-.143	.271	.837	.541
41. I am participating in decisions regarding my school.		-.129	.553			.150		.533		.126	.713	.312
42. Individuals are important to me.		.256	.370	-.161		.249	.373	.441	-.290		.743	.305
43. I understand my historical and ethnic heritage.			.568	-.232		.238	.209	.603	-.325	.141	.746	.427
44. I understand the historical and ethnic heritage of others within my community.	.133		.525	-.164		.345	.190	.591	-.275	.102	.752	.400

reword them based on appropriate theoretical framework. For the fourth factor, five items (items 21, 22, 34, 35 and 36) were loaded onto it. However, we cannot define these items as one factor in this study.

The factor correlation table (Table 2) points to the fourth factor was negatively correlated with other four factors. Only items 4 and 33 had moderate loadings on the fifth factor, but this did not make sense at all. It appeared that these two items could not fit under the same theoretical factor, which suggests that they are not good items and needed revisions and deletions in the future analyses. Furthermore, the correlations between the fifth factor and other four factors were very low.

Table 2

Factor Correlation Matrix

Factor	1	2	3	4	5
1	1.000				
2	.362	1.000			
3	.322	.193	1.000		
4	-.267	-.296	-.146	1.000	
5	.201	.099	.081	-.137	1.000

Therefore, the fourth and fifth factors were deleted and only the three factors shown in Table 3 were retained finally. In addition, for items from 13 to 25, which were originally developed for the hypothesized factor – *Persistence*, two items (items 20 and 24) were deleted based on appropriate statistical and theoretical reasons; for others, most of them were distributed to the factor *Responsibility*, while three (items 21, 22 and 24) were relocated within the unknown factor. The possible reason which led to the elimination and distribution of the planned items in

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the hypothesized factor was our interpretations and definitions for *Responsibility* and *Persistence*

needed greater clarity.

Reliability Analysis

According to Pett and his colleagues (2003, p.185), "… an important and widely used

measure for assessing the internal consistency of a set of items is Cronbach's alpha (α) (Pett,

Lackey, & Sullivan, 2003). This measure of reliability represents the proportion of total variance

in a given scale that can be attributed to a common source (Pett, Lackey, & Sullivan, 2003)…"

Therefore, reliability analyses for 3 subscales were performed and the result summaries are

shown in Table 3.

Table 3

Summary of Reliability Analyses

	Name	Item	Cronbach's Alpha	95% CI for Cronbach's Alpha	Average Inter-Item Correlation	SD for Average Inter-Item Correlation
Subscale 1	*Responsibility*	1 , 10, 11, 12, 14, 15, 16, 17, 18, 19, 23, 25, 26, 27, 28	.912	(.882, .939)	.412	.105
Subscale 2	*Respect*	29, 30, 31, 32	.878	(.830, .915)	.646	.063
Subscale 3	*Sense of Community*	38, 39, 40, 41, 42, 43, 44	.729	(.632, .808)	.285	.100

Subscale 1 includes 15 items and measured whether students at CAMS take responsibility for

their commitments and actions. The reliability analysis shows that the Cronbach's alpha was

0.912 with a 95% Confidence Interval range from .882 to .939, which indicating a high internal consistency. In the Inter-Item Correlation Matrix, the average correlation among the items in this subscale was .412, with a standard deviation of .105, which is a mediocre correlation statistic. A low score (within the range of 1.0 and 2.0) for a student in this subscale would show that responsibility is assumed for the behavior, assumes primary responsibility for learning, able to develop criteria for making informed judgments and decisions, and demonstrates honesty, dependability, and self control.

Subscale 2 includes four items and measures whether students at CAMS demonstrate respect for themselves and others students from diverse cultural backgrounds. The reliability analysis shows that the Cronbach's alpha is 0.878 with the 95% Confidence Interval range from .830 to .915, also indicting that internal consistency within the subscale is good. In the Inter-Item Correlation Matrix, the average correlation among the items in this subscale was .646 with the standard deviation of .06, a good correlation statistic. The low score (within the range of 1.0 and 2.0) for a student in this subscale would show that this person is tolerant, appreciative and accepting of individual differences; he/she judges others on their merits, demonstrates sensitivity to, and respects for, the perspectives, opinions, needs and customs of others.

Subscale 3 includes seven items, and measures whether students at CAMS are active, constructive members of the larger community or not. Reliability analysis showed that the Cronbach's alpha was 0.729 with the 95% Confidence Interval range from .632 to .808, which shows there's no high internal consistency within this subscale. The Cronbach's alpha statistics suggested that some items could be problematic and more items might be needed in this subscale. In the Inter-Item Correlation Matrix, the average correlation among the items in this subscale is .285 with the standard deviation of .10, a small correlation statistic. The low score

(within the range of 1.0 and 2.0) for a student in this subscale showed that the student appreciates their historical and ethnic heritage as well as the heritage of others within the larger community, and stays informed about and participates in decisions regarding the school, community, state, country and even world.

Based on the reliability analyses and previous factor analysis results, 26 items were suggested to be retained. It is suggested that more items should be added to the subscale of "Sense of Community" and that new items are needed for the hypothesized factor *Persistence*.

Discussion and Implications

With regards to implications of this study, the instrument is applied to measure students' leadership skills and development at CAMS. With the help of the Exploratory Factor analysis, the three-factor structure in this survey is determined. The mean score for the subscale of *Responsibility* was 1.86, which indicated that students at CAMS showed their responsibility and persistence to a certain degree. For the subscale of *Respect*, the mean score was 2.20, which indicated that students at CAMS currently show their respect for cultural diversity to a certain degree, but may need to develop more understanding and knowledge of cultural diversity. The mean score for the subscale of "Sense of Community" was 2.02, and showed that students at CAMS were participating somewhat in decisions regarding CAMS and enjoying the school community. The score in this subscale also demonstrated the unique characteristics of CAMS for leadership and helped in achieving school objectives to help students learn and practice their leadership skills.

There are some delimitations and limitations to this study.

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First, the sample size in this research is small and the sample-to-item ratio is less than 1:4. All of the students from CAMS took this survey. Second, the distinctions between the two hypothesized factors, *Responsibility* and *Persistence,* in this study may need more clarity given the factor loading results. Failure to define the factors in this study very well may also lead to the deletion of the originally hypothesized factor *Persistence* after further factor analysis. Third, the validation process in this study is not enough. It is suggested that formal content validation with ratings for each item and subscale be done.

In conclusion, through the processes of the exploratory factor and reliability analyses, some items were deleted and some need to be revised or reworded. After a clean copy of the revised survey is administered, another round of data collection is recommended. This new data collected can be used to perform Confirmatory Factor analysis in order to examine the factor structure of the updated instrument in a more stringent way. During the process of further validating the survey, researchers can compare the results from both pre- and post- survey response within an academic year for each student at CAMS to see how students develop their leadership skills each year with the assistance of the staff members at CAMS.

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Website of ACES: www.aces.org

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