

Academic Engagement Scale for Grade School Students

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An Academic Engagement Scale for Grade School Students (AES-GS) was constructed with 102 items. There are 34 items in each of the three subscales (Behavioral, Emotional and Cognitive). The AES-GS was administered to 250 sixth and seventh graders. Data was analyzed using Confirmatory Factor Analysis (CFA), Convergent Validity, and Cronbach's Alpha. Results indicate the reliability of the scale is high because it has a Cronbach's Alpha of .89. There were three models constructed using CFA. The second model showed to be the best fitting where the removal of Items 11-20 improved the results also indicating significant parameter estimates.

Keywords: Academic Engagement Scale, Grade School

Previous studies done on engagement in the classroom setting have explained two significant aspects, the indicators (inside the construct) and the facilitators or causal factors (Skinner, Furrer, Marchand and Kindermann, 2008). It is essential to distinguish such because it would help to determine which aspect effectively supports the student in an academic setting. This is essential in segregating facts that actually measure engagement not as a metaconstruct. Studies also indicate that student engagement changes with additional years in school. Years in school is a contributor to student achievement as well as has its possible negative effects (if low or absent within the learner) that results to dropping out of school and other teenage mishaps (Hughes, Luo, Kwok, & Loyd, 2008; Skinner, Furrer, Marchand and Kindermann 2008). There is also that issue of early engagement as predictors of achievement and engagement types as stable or continuously changing thru time (Ladd & Dinella, 2009). Therefore, it is necessary to measure academic engagement accurately.

There are many types of engagement such as interpersonal, community, and academic. Scales measuring all three levels of students' engagement

have also been made including items in an academic scenario such as “I would highly recommend that other students take this course.” and “I became more interested in the field represented by this course.” For community engagement, an example is “I learned about the community.” In the same scale, they measure interpersonal engagement as well. For instance, under such factor is “I have developed friendships with other students” (Gallini & Moely, 2003). In the Research Assessment Package for Schools (RAPS), the students, teachers, and parents’ perception of the child’s engagement is also measured. For the version made for the students (RAPS-S), sample items are “I work very hard on my school work” and “I pay attention in class”(Klem & Connell, 2004). In the scale devised by the researcher, only the academic aspect is measured. In order to construct accurate items under the subscales, literature on engagement in school was used. This basically explained the construct as “the intensity and emotional quality of children’s involvement in initiating and carrying out learning activities. Children who are engaged show sustained behavioral involvement in learning activities accompanied by a positive emotional tone. They select tasks at the border of their competencies, initiate action when given the opportunity, and exert intense effort and concentration in the implementation of learning tasks; they show generally positive emotions during ongoing action, including enthusiasm, optimism, curiosity, and interest” (Skinner & Belmont, 1993 as cited in Chapman, 2003). Using the definition of Chapman (2003), which states that “student engagement depict students’ willingness to participate in routine school activities, such as attending classes, submitting required work, and following teachers’ directions in class” (Chapman, 2003), it has made engagement for academic purposes easier to measure.

Academic engagement contains three subscales namely, behavioral, emotional and cognitive. Behavioral Engagement is “involvement in academic and social or extra-curricular activities” (Hughes, Luo, Kwok, & Loyd, 2008). Under this are three components: (1) Behavior related to learning which is “effort persistence, concentration, attention, asking questions, and contributing to class discussions”, (2) Compliance, which is shown in abiding by school rules and regulations, as well as misbehavior i.e. cutting class, frequent absences etc. (3) Participation in extracurricular activities. The second subscale is Emotional Engagement that involves the “positive and negative reactions to people and activities at school” (Hughes, Luo, Kwok and Loyd, 2008). In other words, it is also the “student’s feelings about school and to the degree to which they care about their school; belongingness, safety, comfort and pride in the institution; relationships with teachers and peers”. Lastly, Cognitive Engagement is associated with how much the student invests in his education and how much he motivates himself. This also includes the significance of academics to the student as well as getting good grades and the ability to finish tasks while going beyond what is expected. The three dimensions helps in the complete understanding “student’s relationships to their school” (Sciarra & Seirup, 2008).

There is a need to construct a scale that focuses on Academic Engagement alone using contemporary approaches. Scales devised measure classroom engagement but has rarely been focused and detailed the subscales proposed in past studies. It is also essential to measure the level of involvement of a student to allow educators to assess as well as improve the learning environment of the student. Furthermore, in

the academic scene, the teachers should determine what motivates the student, why they choose the tasks they do, etc. The issues presented by previous studies boil down to improvement in the social support aspect of the productive pedagogy (Gore, Griffiths, & Ladwig, 2004). By measuring academic engagement, educational institutions will have a clear view of how to better the learning experiences of each student.

Method

Sampling or Participants

The scale was administered to 250 sixth and seventh grade students from a private educational institution.

Search for Content Domain

Items constructed for the Academic Engagement Scale for Grade School Students (AES-GS) were based on the studies done by Chapman (2003), Hughes, Luo, Kwok and Loyd (2008) and Sciarra & Seirup (2008). These studies were able to define engagement extensively as well as enumerate significant factors under such construct including Behavioral Engagement, Emotional Engagement and Cognitive Engagement.

Table 1
Table of Specifications for the Preliminary Test Form

Factors	Item Number
Factor 1: Behavioral Engagement	1-34
Factor 2: Emotional Engagement	35-68
Factor 3: Cognitive Engagement	69-102

Item Review and Item Writing

The division of the latent variable was based on previous studies. To measure the Academic Engagement levels of the student, there are 34 items in each subscale. Necessary revisions were made after it was reviewed by an educational psychology major, and a professional.

Scaling Technique

The scale made use of a verbal frequency scale with five as always and one as never. For negative statements, the scores were reversed. The ratings are recorded as raw scores. Clear self-referenced statements were constructed. The participants are to indicate their responses using the 5-point scale.

Pilot Testing

With the use of the comments given during item review, the scale was revised then administered to 250 grade 6 and 7 students from random schools in Manila.

Data Analysis

Exploratory Factor Analysis was initially conducted to assess the correlation of the items that goes together to form factors. It was used before the CFA. Principal Component Analysis was used in the study to create parcels among the items that were used as indicators in the CFA.

The data was analyzed using Confirmatory Factor Analysis (CFA) that aims to determine how well the items fit in the factors or subscales used in the AES-GS. CFA is used to show how well the data fits the hypothesized structure. It is also used to assess the best subscale of a construct where the parameters of the model are projected, and evaluation is done in the goodness of fit of the solution to the data.

To describe the reliability and internal consistency of items, Cronbach's Alpha was used. This type of analysis can also be used for responses that are not binary such as the verbal frequency scale and other response formats that are expressed in numbers such as the usual Likert scales. In this case, affective scales and inventories, which do not have right or wrong answers, are considered non-binary.

Convergent validity was established to confirm the relationship of the variables. A scale or a test is valid when it correlates significantly from the variables it is related to (Magno & Ouano, 2008).

Results

Score Distribution of Preliminary Pilot Data

Using the data ($n=250$, items = 102) in the preliminary pilot testing, mean and standard deviation per subscale were determined as well as the total mean, standard deviation, variance, skewness and kurtosis. The total mean score of the 250 test takers is $M = 378.528$. The skewness is $-.370$, where the score distribution tends to be negatively skewed. The kurtosis is $.232$, where the peak of the normal curve distribution tends to be mesokurtic (close to normal).

Factor Analysis

When factor analysis was conducted, the eigenvalues indicate that three subscales can be produced which have values that are greater than 1.00 (See Table 1).

Table 1
Eigenvalues

Value	Eigenvalue	% Total Variance	Cumulative Eigenvalue	Cumulative Percent
1	13.79	13.51	13.79	13.51
2	12.51	12.26	26.30	25.78
3	11.81	11.58	38.12	37.36

Scale Reliability

The internal consistency of the scale using Cronbach's Alpha is .89, indicating high reliability. The reliabilities, means and standard deviations for each of the subscales using the inter-item correlation are shown in Table 2. The reliability levels of the items range from .68 to .97 which indicates high internal consistency of the items.

Table 2
Cronbach's Alpha

Variable	M if deleted	Var. if deleted	SD If deleted	Itm-totl Correl.	Alpha if deleted
Behavioral Engagement	245.53	1213.20	34.83	.70	.97
Emotional Engagement	254.85	621.83	24.94	.94	.68
Cognitive Engagement	256.68	592.75	24.35	.90	.74

To test the convergent validity of the scale, the factor scores are correlated. Table 3 shows the correlations of the variables in the scale. The magnitude of the correlations are all positive indicating convergence of the factor scores.

Table 3
Convergent Validity

	Behavioral Engagement	Emotional Engagement	Cognitive Engagement
Behavioral Engagement	---		
Emotional Engagement	.73*	---	
Cognitive Engagement	.65*	.94*	---

*p < .05

Confirmatory Factor Analysis

The preliminary scale with 102 items was administered to a sample of 250 participants. The three subscales or factors measuring Academic Engagement were tested (as a results of the exploratory factor analysis) using Confirmatory Factor Analysis. In Model 1, the three factors extracted were tested which included

Behavioral, Emotional and Cognitive (each was taken separately). In the model, the three latent factors of engagement were represented with artificial parcels. The parcels are basically the grouping of the intended items under each latent factor.

Artificial parceling was conducted for the original model. This was done by adding together items scores of 10 items for each parcel. For the second model after the removal of insignificant items in the CFA, a Principal Component Analysis was conducted for each of the latent variables. This technique determined the correlations between the factors and variables through the factor loadings. The grouping of items was formed by adding items with the highest and lowest factor loadings in consecutive order (see Little, Cunningham, Shahar, & Widaman, 2002).

Table 4
Artificial Parcels

Parcels used for Models 1 and 2		Parcels used for Model 3	
PARCELS	ITEMS	PARCELS	ITEMS
APARCELB1	1-10	BPARCELB1	2, 3, 17, 25, 26
APARCELB2	11-20	BPARCELB2	4, 5, 27, 28
APARCELB3	21-34	BPARCELB3	16, 19, 22
APARCELE1	35-45	BPARCELE1	36, 43, 52, 58, 64, 68
APARCELE2	46-55	BPARCELE2	27, 44, 53, 57, 65
APARCELE3	56-68	BPARCELE3	39, 46, 55, 61, 67
APARCELCL1	69-80	BPARCELCL1	70, 77, 83, 85, 88, 92, 101
APARCELCL2	81-90	BPARCELCL2	71, 73, 78, 80, 89, 96, 102
APARCELCL3	91-102	BPARCELCL3	69, 76, 82, 84, 87, 100

Model 1: Three Factors of Engagement Using Artificial Parcels. The factor structure of the model is shown in Figure 1. The CMNI (261.215), NFI (.879), RFI (.774), IFI (.889), TLI (.790), CFI (.888) and RMSEA (.198) show an adequate fit of the first model constructed. All the parameter estimates are significant excluding ParcelB2 (.042), which is comprised of items 11-20.

Model 2: Removal of ParcelB2. Using the results from the first Confirmatory Factor Analysis, the insignificant parameter (ParcelB2) was removed. Another CFA was conducted and successfully made an improvement in the model as seen in the values of the CMNI (242.249), NFI (.887), RFI (.761), IFI (.894), TLI (.774), CFI (.893) and RMSEA (.229).

Figure 1

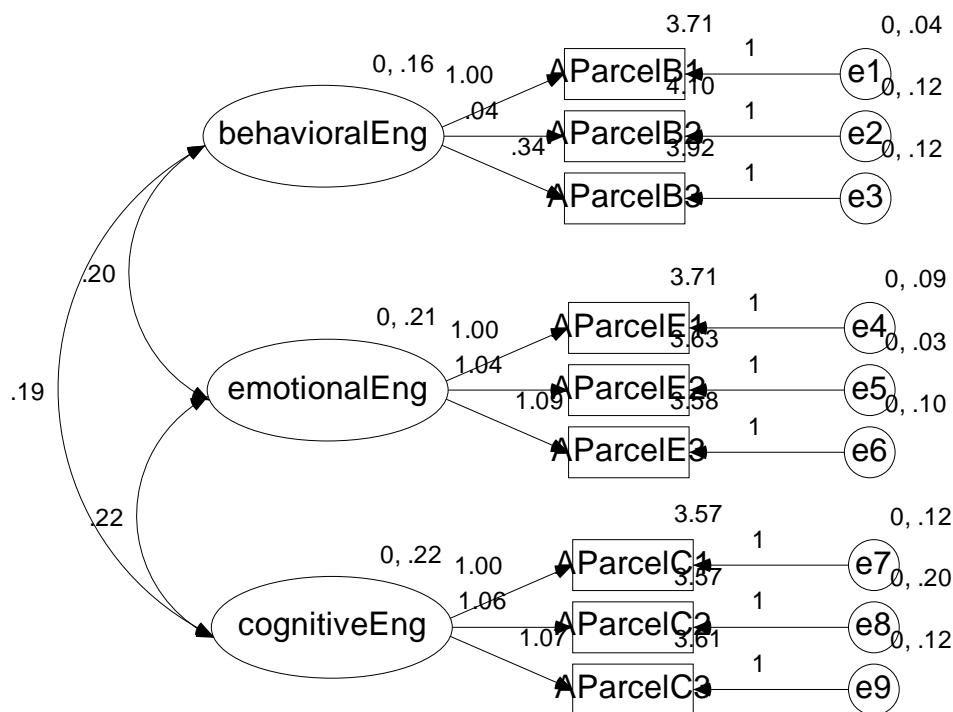
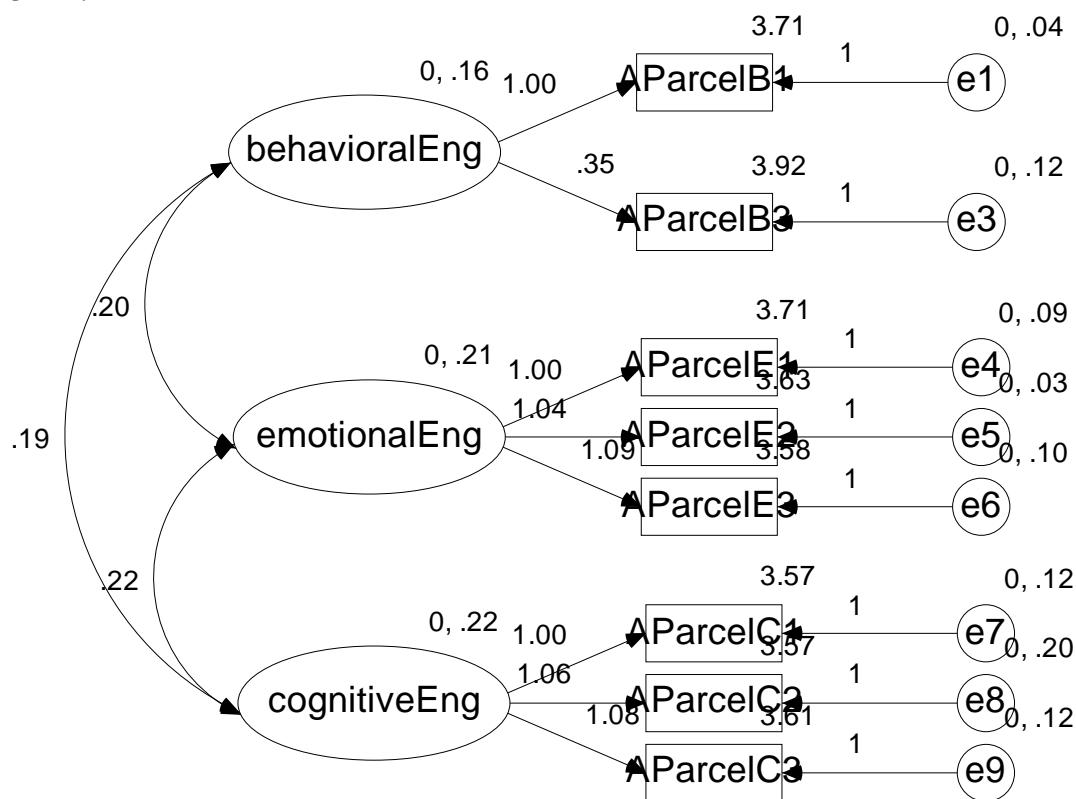
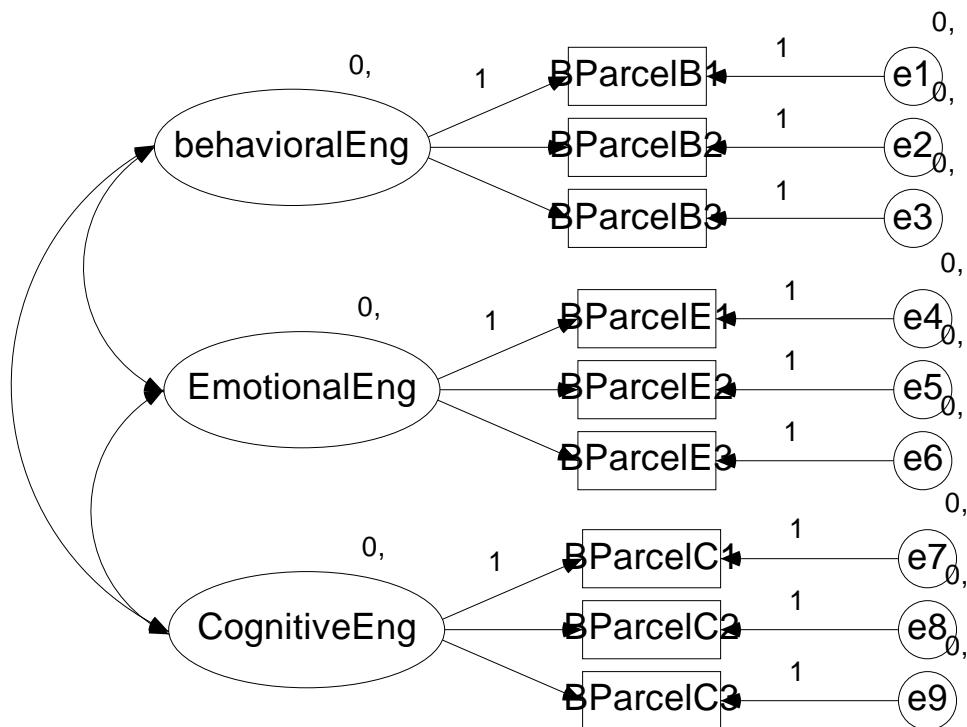
CFA Model 1

Figure 2
CFA Model 2



Model 3: Parceling Based on Principal Component Analysis. Before conducting another CFA in a new model, the Principal Component Analysis was used to classify items into new parcels for each of the latent variables (namely behavioral, emotional and cognitive). Only the items with high loadings were included when tested using CFA. However, this showed a bad fit compared to the previous two models that utilized artificial parcels. There was a CMNI of 1257.602, NFI of .336, RFI of -.246, IFI of .340, TLI of -.252, CFI of .332 and RMSEA of .451.

Figure 3
CFA Model 3



The correlation matrices indicate that the three subscales used are indeed significant. Therefore, all three subscales (behavioral, emotional and cognitive) are necessary to measure academic engagement. The reliability measures are also high because the Cronbach's alpha is .885.

Through the use of Confirmatory Factor Analysis, three different models were used to determine if the how well the items fit in the corresponding manifest factors of the main construct, which is academic engagement. The first model shows significant values excluding the chi-square value. This means that the items fit the model constructed. Because the parameter estimate of ParcelB2 is not significant, in model 2, it was simply removed before conducting another CFA. As a result, it made an improvement in the items of the scale. Therefore, it would be best if items 11-20 were removed from the scale because it improved the scale. To further determine the best factor structure, the third model was constructed which resulted to a bad fit. In this study, the best model to use is model 2.

Discussion

The Academic Engagement Scale for Grade School students was devised to measure the level of engagement of a student in his education. Here, there are three subscales used to assess the entirety of academic engagement including Behavioral Engagement, Emotional Engagement and Cognitive Engagement, which were patterned from the studies done by Chapman (2003), Hughes, Luo, Kwok, and Loyd (2008) and Sciarra and Seirup (2008). It is essential to construct such a scale because it could be an avenue of improving the education of a student. With this, it would also help teachers determine what aspects the student is not able to respond well. For instance, a student does not do his schoolwork because he simply wants to move to another school, where he will be accepted by his peers. By administering such a scale to the student, the teacher will address the issue before it can become even worse. Academic engagement, above all things, is what all educational institutions must focus on due to the fact that it can determine whether the problem is within the school or the student himself.

On a larger spectrum of measuring the indicated construct of academic engagement, the modern day productive pedagogy that aids in improving teacher effectiveness has also indicated that a socially supportive environment must be established regardless of the level the teacher is handling. Without measuring student engagement (i.e. academic engagement, student control, explicit criteria, self-regulation), creating a healthy learning atmosphere for the student would be difficult. It would also hamper the child's willingness to be part of the class. Only a part of the supportive classroom environment has been solved by the researcher and that is by constructing the scale and analyzing data to improve it. Although, there were changes based on the Confirmatory Factor Analysis (CFA), the scale is ready to be used in order to assess the involvement of the child in his education. Based on the results, it is best to remove some items that are not needed in the scale and that is parcelB2 (items 11-20). Further research focusing on engagement could possibly improve the scale specifically the items that fall under each factor.

The researcher recommends that not only scales for the grade school students must be constructed. There should also be ones especially made for the grade school parents and teachers. It would be best to pattern the items in such a way that each would assess the three different types of engagement (behavioral, emotional and cognitive) in the academic arena. This was seen in the Research Assessment Package for Schools (RAPS). However, as indicated in the scope of the present study, the specific subscales that measure academic engagement was self-assessment. In the future studies, the researcher could construct a Perceived Academic Engagement Scale of Students assessed by parents and teachers. This would really aid in assessing the involvement of the child through a triangulation of perspectives.

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Appendix

Academic Engagement Scale

1. I actively recite in class.
2. I completely do my homework.
3. I ask questions when I don't understand the lesson,.
4. I concentrate in class.
5. I take down notes.
6. I am involved in extra curricular activities.
7. I am attentive during class discussions.
8. I submit the requirements on time.
9. I actively participate in group activities.
10. I go to class.
11. I am an active member of my organization/s.

12. I go to class.
13. I follow the classroom rules.
14. I try to answer the questions of the teacher during discussions.
15. I give my personal insights during discussions.
16. I listen intensively to lectures.
17. I exert my best effort in all requirements.
18. I create a healthy learning environment for my peers.
19. I prepare for quizzes, tests etc.
20. I help my classmates who do not understand the lesson.
21. I correct the teacher when there is something wrong with the lecture.
22. I approach the teacher when I have to clarify something.
23. I listen to the suggestions of my group mates.
24. I leave the classroom when I do not like the subject.
25. I study in advance.
26. I give up when the task is hard.
27. I daydream while the teacher lectures.
28. I do not like working with a group when it comes to requirements,.
29. I am the free-loader in group projects.
30. I am usually distracted by my classmates.
31. I am physically in the classroom but not mentally.
32. The teacher sends me to the Discipline Office for not submitting requirements.
33. I answer back to the teacher.
34. I cut class.
35. I am happy when there are homeworks.
36. I love going to school.
37. I appreciate the hard work of the teachers.
38. I feel safe in school.
39. I feel that I belong when I am at school.
40. I am comfortable in my class.
41. I feel that I have good relationships with the teachers.
42. I feel that I have good relationships with my classmates.
43. I feel proud being a student at my school.
44. I feel confident that my school will help me have a bright future.
45. I am satisfied with the quality of education in my school.
46. I am interested in our school activities.
47. My peers make me enjoy going to class.
48. I feel that I have a good relationship with the maintenance (i.e. janitors, guards) in school.
49. I want other people to study in my school.
50. I am myself when I am in school.
51. I look forward to going to class.
52. I learn a lot from my school.
53. I share what I have learned in class to my friends from other schools.
54. I am satisfied with the activities offered to me.
55. I feel my school is a good learning environment.
56. I feel excited when we have activities in school.
57. My school is a safe place.
58. I feel that I am not safe in school.
59. I feel ignored by my classmates.
60. I have a bad relationship with my teachers.

61. I worry about being alone in school.
62. I feel frustrated when I have to go to school.
63. I feel that teachers are inconsiderate.
64. I feel that school is a waste of time.
65. I feel that I have no friends in class.
66. I feel that I should transfer to another school.
67. I do not like the teachers in school.
68. I feel bored during lectures.
69. I want to get good grades.
70. I believe that going to school is important.
71. I want to submit quality projects.
72. I give my best in all requirements.
73. I want to complete my homeworks in advance.
74. I make sure I work hard in school.
75. I exert good effort in my tests.
76. I want to correct the mistakes I made in the previous tests.
77. I want to go beyond what is expected of me.
78. I believe I surpass challenges in school.
79. I aim to be an achiever academically.
80. I want to attain the goals that I have made for myself.
81. I push myself to perform well in academic tasks.
82. I try to improve my grades every year.
83. I keep myself from being distracted in class.
84. I “cheer” for myself to perform my best.
85. I view hard requirements as a challenge.
86. I am disturbed when I get low grades.
87. School is my priority.
88. I want to devote my time studying for tests.
89. I choose to read in advance before class.
90. I reward myself for getting good grades.
91. I know good grades will get me far in the future.
92. I am determined to accomplish the tasks given.
93. Fortitude is a virtue I possess.
94. I strive to be an excellent student.
95. I keep myself focused when I have take an exam.
96. I choose to allot extra hours for studying.
97. I am open to failing subjects.
98. I submit mediocre papers.
99. I submit what I have even if it is incomplete.
100. I think that the easier the task, the better it is for me.
101. I pass projects just to get a passing grade.
102. I quit easily when given tasks.