

A scale was constructed to measure Achievement Goal Orientation of college students in mathematics. A sample size of 119 college students was asked to complete the scale. The scale made use of a five-point Likert scale with 80 items. The data was analyzed using Confirmatory Factor Analysis (CFA). Results showed the the hypothesized subscales to have significant parameter estimates. The obtained goodness of fit was adequate. Furthermore, the use of the Cronbach's Alpha showed that the attained values were reliable.

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Achievement Goals in Mathematics

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One of the most useful scales to measure the involvement of the students inside the classroom as well as their participation and motivation is the achievement goals. Elliot and Murayama (2008) describe the achievement goals as a cognitive dynamic wherein the primary focus is the competence of the students. However, in the study conducted by Cury, Da Fonseca, Elliot, and Moller (2006) they stated that the achievement goals are simply the “individuals representations of competence-based outcomes that they strive to attain or avoid” (as cited in Cury, Da Fonseca, Elliot, & Moller, 2006). Achievement goals are used to see how engaged the students are inside the classroom. How much attention they give in learning something new, or even to see if the students are willing or not through their competence level. The use of the achievement goals can also further address the relationship of the students with each other as well as its perseverance.

There are two kinds of achievement goal structures, namely the mastery goal and the performance goal. The mastery goal structure focused on describing the students wherein they believe that there is importance in learning. In the study made by Wolters (2004), it mention about the mastery goal structure which stated that it is

“an environment in which the instructional practices, policies, and norms convey to students that learning is important, that all students are valued, that trying hard is important, and that all students be successful if they work hard to learn” (Midgley et al., 1998). Mastery goal are shown by individuals who value learning something as well as understanding and their mastery of the task. Another kind of achievement goal structure is the performance goal which shows the ability and capacity of the students. This kind of structure is based on the different level of performance of the students. Wolters (2004) again made mention of the performance goal structure as “an environment that communicates to students that being successful means getting extrinsic rewards demonstrating high ability, and doing better than others” (Midgley et al., 1998 as cited in Wolters, 2004). It shows how the students present themselves and also how they compare themselves with other students. This structure brings up the demonstrating ability of the students through their performance inside the classroom.

Certain points have been raised in the achievement goal orientation. As cited by Nicholls (1989, 1992) in the article of Kaplan et al, Nicholls pointed out that “success in a task is defined by deep understanding and that success in school can be achieved through strategies such as working hard, cooperating with others, helping others, and trying to understand ” fall under the mastery goal. However, if the student “believed that success in a task is defined by demonstrating high ability and endorsed strategies for success such as trying to do better than others, impressing others, and behaving as if you like the teacher this shows that the student possesses the performance goal (Nicholls, 1989; 1992 as cited in Kaplan, Lichtinger & Gorodetsky, 2009).

In the study of Daron et al, they stated that the mastery goals is the “desire to acquire knowledge” while performance goals is the “desire to perform well compared with others” (as cited in Daron, Pulfrey, Butera, Dompnier, and Delmas, 2009).

There are two types of achievement goal orientation, the approach orientation and the avoidance orientation. The two types are used to classify the success and failure of an individual when it comes to achieving ones goal. The approach orientation refers to the “possibility of success while the avoidance orientation refers to the possibility of failure based on the performance being shown by the students” (Elliot, 1999 as cited in Kaplan, Lichtinger, & Gorodetsky, 2009).

Both the mastery and performance goal structure are considered as the competence of the students. Mastery as the intrapersonal standard focuses only on the learning of an individual and performance as the normative standard which focuses on an individual’s performance (Elliot & Maruyama, 2008). In the study of Elliot and Maruyama (2008), they raised the valence dimension of competence which talked about the distinction between the approach and avoidance orientation. That the “competence may be valenced in terms of whether it is focused on a positive possibility to approach (i.e., success) or a negative possibility to avoid (i.e., failure)” (as cited in Elliot and Maruyama, 2008). This gave rise to the revised achievement goal wherein they integrated the achievement goal structure with the achievement goal orientation. There are now four possible factors such as the *mastery-approach* which focused on students who are attaining task-based or the intrapersonal competence, the *performance-approach* which focused on students who are after the

normative competence, the *mastery-avoidance* which focused on the students who are avoiding task-based or the intrapersonal incompetence, and lastly, *performance-avoidance* which focused on the students who are avoiding normative incompetence (Elliot & Maruyama, 2008). Daron et al, mentioned that the division of the performance goals lead to performance approach goals which means that students are “trying to outperform others”, while the performance avoidance goals means that students are “trying to not perform more poorly than others” (as cited in Daron, Pulfrey, Butera, Dompnier, and Delmas, 2009).

Kaplan, Lichtinger, and Gorodetsky (2009) as well made use of the achievement goal orientation in line with student’s engagement in the classroom. The achievement goal orientation showed the different scenarios in which the student’s engagement can be measured. Kaplan et al used the mastery approach goal as “engagement with the orientation towards increasing competence” mastery avoidance goal as “engagement with the orientation towards avoiding deterioration of competence or of missing opportunities for learning” performance approach goals as “engagement with the orientation toward demonstration of high ability” performance avoidance goal as “engagement with the orientation to avoid demonstration of low ability” (as cited in Kaplan, Lichtinger, & Gorodetsky, 2009).

In another study, Wolters (2008) explained the four achievement goals explicitly. Students who manifest the *Mastery Approach* are said to be focused on “learning as much as possible, overcoming a challenge, or increasing their level of competence” while students who manifest the *Mastery Avoidance*, are described as “students who work in order to avoid a lack of mastery or a failure to learn as much as possible” on the other hand, students who are said to manifest the *Performance Approach*, are said to be focused on students who “demonstrate their ability relative to others or want to prove their self-worth publicly” and lastly, students who manifest the *Performance Avoidance*, are described as “students who wish to avoid looking incompetent, lacking in ability, or less able than their peers” (as cited in Wolters, 2004).

Achievement Goal Theory

Achievement goal theory propose that students’ motivation and achievement-related behaviors can be understood by considering the reasons or purposes they adopt while engaged in academic work (Ames, 1992; Dweck & Legget, 1988; Urdan, 1997 as cited in Wolters, 2004). It talks about the different responses of the students or reasons whenever they are engaged in academic work. The achievement goal theory shows the relationship of the students’ competence, participation and engagement whenever they are inside the classroom.

The achievement goal theory “also proposes that the goal structure of an environment might affect students’ motivation, cognitive engagement, and achievement within that setting” (Ames & Archer, 1988 as cited in Wolters, 2004).

The main factor measured in the preset study is the achievement goals which points out to four subscales namely: the mastery approach goal orientation, the mastery avoidance goal orientation, the performance approach goal orientation and the performance avoidance goal orientation.

Method

Test Design

The test was designed using a five point Lickert scale. The scale was from “strongly agree” to “strongly disagree,” making “5” as the highest and “1” as the lowest. Self-made statements were constructed and given to the participants asking them to check whether they agree or not in the items.

Participants

A number of one hundred nineteen (119) students from a private college participated in the study. The researcher made sure that the students who answered the scale have a math subject or had taken a math before for reference. The sample participants have an age range from 17 years of age to 21.

Item Writing and Review

There are four subscales, therefore there are 20 items given for each subscales having a total of 80 items. The test items were reviewed by a professor from with a doctorate degree. Some items were accepted but most of the items needed revisions. Comments had also been given to better improve the items. After the item review, the comments and suggestions were taken into consideration and revisions to the scale has been made.

Procedure

The researcher asked the students if they have time to answer the scale, and if they are taking or at least were able to have taken a math subject in their school. The researcher explained to the students the use and purpose of the study. The students who participated in answering the scale were provided with a short introduction before they started answering. The researcher let the students read on the instructions given in the scale and stayed put if ever they would ask certain questions about the scale that they are to answer.

After answering the scale, the researcher thanked the students for their cooperation in taking time in answering the scale. The researcher then added that their answer in the scale will remain confidential and if ever there are still certain questions about the scale that are in need further explanations, the researcher would gladly answer them.

Data Analysis

The data gathered from the 119 participants was analyzed using the use of the Confirmatory Factor Analysis. The use of the Confirmatory Factor Analysis allowed the researcher to interpret the significance of the factors as well as the goodness of fit. The Goodness of Fit Indices was also needed in the data analysis, to compare the data and see if the given results were of good fit or not. And the Cronbach's alpha was used to test the reliability of the scale.

Results

The achievement goal scale was administered to 119 participants. The proposed model was tested using Confirmatory Factor Analysis or the CFA. The CFA also allowed to test the Goodness of Fit of the model. However, the results also showed some non-significant values and bad fit of the factors.

Table 1
Distribution of Scores

Factors	<i>M</i>	<i>SD</i>	Min	Max	95%CI(-)	95%CI(+)	Skewness	Kurtosis
Mastery Approach	3.60	.36	1.75	4.30	3.45	3.85	-1.98	7.52
Mastery Avoidance	3.22	.40	2.15	4.50	3.00	3.45	.05	.85
Performance Approach	3.14	.54	1.60	4.65	2.80	3.50	-0.27	.69
Performance Avoidance	3.22	.55	1.30	4.40	2.90	3.65	-0.85	1.04

Among the subscales, the Mastery Approach or the MAP showed the highest mean (3.60) followed by the Mastery Avoidance and Performance Avoidance which got the same value of 3.22 and the lowest was the Performance Approach (3.14). The lowest for the SD is the Mastery Approach (.36), followed by the Mastery Avoidance (.40), Performance Approach (.54) and the highest Performance Avoidance (.55). Furthermore, the highest in Kurtosis was the Mastery Approach (7.52) while the lowest value was the Performance Approach (.69).

Table 2
Convergent Validity

	MAP	MAV	PAPA	PAV
MAP	---			
MAV	.24*	---		
PAP	.01	.13	---	
PAV	-.02	.03	.46*	---

Note. MAP= Mastery Approach; MAV=Mastery Avoidance; PAP=Performance Approach; PAV=Performance Avoidance. *p<0.05

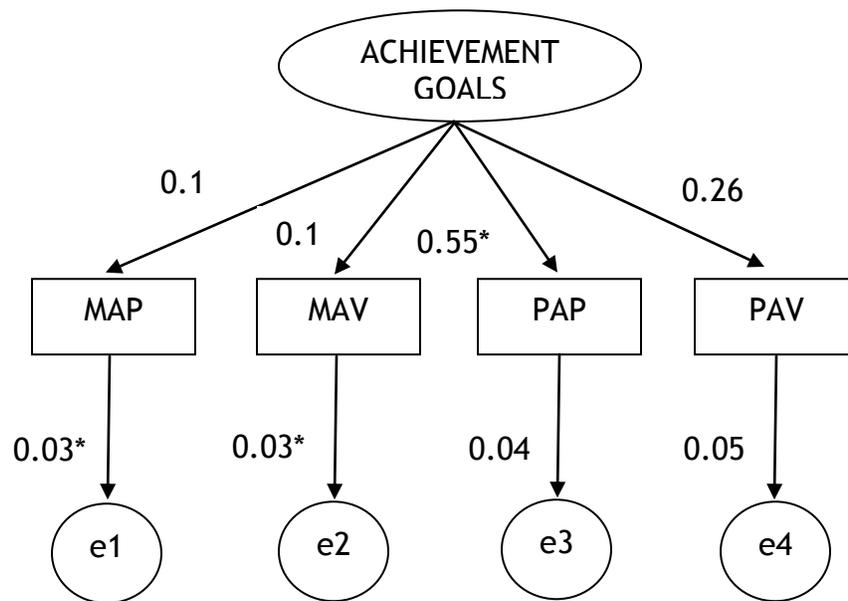
Convergent validity was conducted by correlating the factor scores of the subscales. The results showed significant correlation of the MAP and MAV (.24*) as well as PAP and PAV (0.46*).

Table 3
Cronbach's Alpha Reliability

	Cronbach's Alpha
Mastery Approach (MAP)	.81
Mastery Avoidance (MAV)	.73
Performance Approach (PAP)	.87
Performance Avoidance (PAV)	.87

The items per subscale showed high reliability by means of the Cronbach's Alpha. The Performance Approach (.87) as well as the Performance Avoidance (.87) was able to have the highest value than the rest of the Achievement Goal subscales. However, the Mastery Avoidance (.73) attained the lowest value.

Figure 1
Measurement of Achievement Goals Subscales using Confirmatory Factor Analysis



Note. MAP=Mastery approach, MAV=Mastery avoidance, PAP=Performance approach, PAV=performance avoidance.

Results from the Confirmatory Factor Analysis showed that all the subscales of of the achievement goal in mathematics have a significant value.

The Goodness of Fit shows the support of the hypothesized structure. Adequate fit was obtained for the model. The Discrepancy Function 0.002 as well as the Maximum Likelihood or the Chi Square (0.23) and Root Mean Square or the Standardized Residual (0.015) all showed goodness of fit. For the Advanced Non Centrality Based Indices, the Steinger-Lind RMSEA Index (0.000), McDonald Noncentrality Index (0.98) and the Population Gamma Index (0.98) that also showed goodness of fit. A number of Single Sample Fit Indices also showed goodness of the items such as the Joreskog GFI (0.99), Joreskog AGFI (0.99), Akaike Information Critereon (AIC) which had 0.15, and Bentler-Bonett Normed Fit Index which had 0.99 which all showed goodness of fit.

Other simple sample indices were also measured such as the Schwarz's Bayesian Criterion which had a value of (0.37), Browne-Cudeck Cross Validation Index (0.16), Independence Model Chi-Square (37.87), Independence Model df (6.00), Bentler-Bonette Non-Normed Fit Index (1.15), Bentler Comparative Fit Index (1.00), James-Mulaik-Brett Parsimonious Fit Index (0.17), Bollen's Rho (0.97) and Bollen's Delta (1.02).

Discussion

The use of the Confirmatory Factor Analysis shows the number of common factors and if those factors fit the model to the observed data. It also shows support

to the hypothesized structure such as the achievement goals are said to measure four subscales. Furthermore, it also measures the participation and motivation of the students. Under this factor are four subscales that further support achievement goal which are the mastery approach, mastery avoidance, performance approach and performance avoidance. The items in the mastery approach show the focus of the students on intrapersonal competence. For the mastery avoidance, it shows the intrapersonal incompetence, where the students try to avoid the task. For the performance approach, the focus of the items is on the students' normative competence, while the performance avoidance focused on the students' avoidance in normative incompetence. In this study, it showed in the results that the items formed under their respective factors turned to be significant. Such as in the use of the CFA, it showed that only all of the subscales attained the significant value. Also, to further support the factor structure of achievement goals, the models' goodness of fit indices were also tested. It showed that the model with four subscales attained an adequate fit. The goodness of fit was measured among the basic indices, non-centrality Indices and the single sample indices. Most of the values acquired shows that the scale is in good fit.

The reliability of the scale was further determined using Cronbach's alpha. The mastery approach had a value of .81, the mastery avoidance had a value of .73, the performance approach had a value of .87 which is also the same with the performance avoidance. All of the subscale showed scores that are close to 1.

The sample size affected by the results of the present study. There was only 119 students as participants who answered the scale. And since the data made use of the CFA, it is in need of a larger sample size. It is suggested that future studies have at last a sample size with high statistical power (N=380) students to be part of the study to achieve the significant results. However, even if there was a lack of participants in the study, some of the results showed significance. But of course, to have a better understanding and interpretation of the study, the need for a larger range of data is needed.

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Appendix Revised Items

1. I try to memorize the formulas needed for problem solving.
2. I strive to understand the content of the whole lesson as carefully as possible.
3. I enjoy learning new topics.
4. I study hard for exams.
5. I enjoy memorizing formulas.
6. I actively participate in class.
7. I do not chat with my seatmate especially when there is a new topic being taught.
8. I go to school everyday.
9. I listen to the lessons attentively.
10. I learn so many things whenever I go to school.
11. Learning is fun.
12. Learning something new from the lesson makes me happy.
13. I try to familiarize myself with the computations for each formula.
14. I copy notes during discussions.
15. I avoid cutting classes.
16. I stay up all night to study for the test the next day.
17. Whenever I get home, I immediately go to my room and study.
18. I spend more time studying than watching television.
19. I'd rather listen to my teacher rather than my seatmate.
20. After classes, I usually go to the library to study.
21. It makes me worry that I am not learning enough of the topic given.
22. I strive to avoid having an incomplete understanding of the lesson.
23. I think I learn less of the topic.
24. Whenever there is a new topic, I feel that I learned only few from it.
25. I am scared whenever I cannot understand the computations.
26. Sometimes, I am terrified that I am the only one in class who doesn't have a full understanding of the lesson.
27. I strive to at least learn something rather than nothing.
28. I feel that I am not learning from my past lessons.
29. I feel that I have a less awareness of what is needed to do whenever we have problem solving.
30. I feel that I always have an incomplete understanding when it comes to computations.
31. I am satisfied even if I just have a little understanding of the lesson.

32. I feel worried whenever I cannot understand the steps in problem solving.
33. After attending classes, I feel like I did not learn much of everything that was discussed.
34. Every time we would have a quiz on computations I always forget the next step.
35. I am striving to avoid an insufficient memory of the formulas needed for the tests.
36. During tests, I feel like I could not answer half of it.
37. It is hard for me to remember the step by step computations.
38. During problem solving, I usually forget the formula that is needed.
39. At the start of the period, I already have a feeling that I will not learn much from it.
40. When it comes to numbers, I usually have mental blocks.
41. My goal is to have higher grades than the other students.
42. I love competition.
43. My goal is to make sure that I do better than the other students.
44. It is important for me to perform better than other students.
45. I ask for bonus points to make my grade higher.
46. I make sure that my grades will all be 4.0.
47. It is important for me to excel especially during periodical tests.
48. To become first in class is my top goal.
49. During exams, I make sure that I get the highest score.
50. I make sure that my grades are higher than my classmates at all times.
51. My goal is to pass the test.
52. I strive to be the top 1 in the class.
53. I try my best in beating my classmates in by having the highest score especially in math.
54. Being on top of everyone is one of my priorities.
55. My goal is to have a grade that will stand out of the whole class.
56. Every time we would have a quiz, I compete with my friends on whose going to get the highest grade.
57. During recitations, I make sure that the teacher calls me more than my classmates.
58. I do not help my classmates during problem solving activities in the classroom so that I'll be the only one to get the highest grade.
59. I do my best to excel in class.
60. I make sure that the teacher would give me more compliments than my classmates.
61. My aim is to at least have a passing grade rather than a failing mark.
62. I strive to avoid performing worse than my classmates during exams.
63. My goal is to avoid having the lowest grade in problem solving compared to others.
64. I try my best to avoid having the lowest score in seat works.
65. During graded recitations, I feel embarrassed whenever I give out wrong answer.
66. I am worried whenever I feel than I have the lowest rank in class.

67. My goal is to maintain a grade not lower than my classmates.
68. During exams, I make sure that I don't get the lowest score.
69. To perform poorly than my other classmates is what I strive to avoid.
70. I am scared whenever my classmates perform better than me.
71. I try to maintain an average grade.
72. During problems solving I try to not finish last.
73. Whenever I get a low grade, I ask my classmates their grades to see if anyone got a grade lower than mine.
74. Being the slowest learner in class makes me feel embarrassed.
75. I strive to avoid being the lowest in the class rank during card distribution.
76. During quizzes, I make sure that I am not the last person to leave the room.
77. I feel ashamed whenever I get the lowest score in the test.
78. During group works, I make sure I don't get the hardest part.
79. I avoid trying to do things I know I cannot do.
80. During graded recitations, I try to perform an equation that is not worst than the answer of my classmates.