

# The Assessment Handbook

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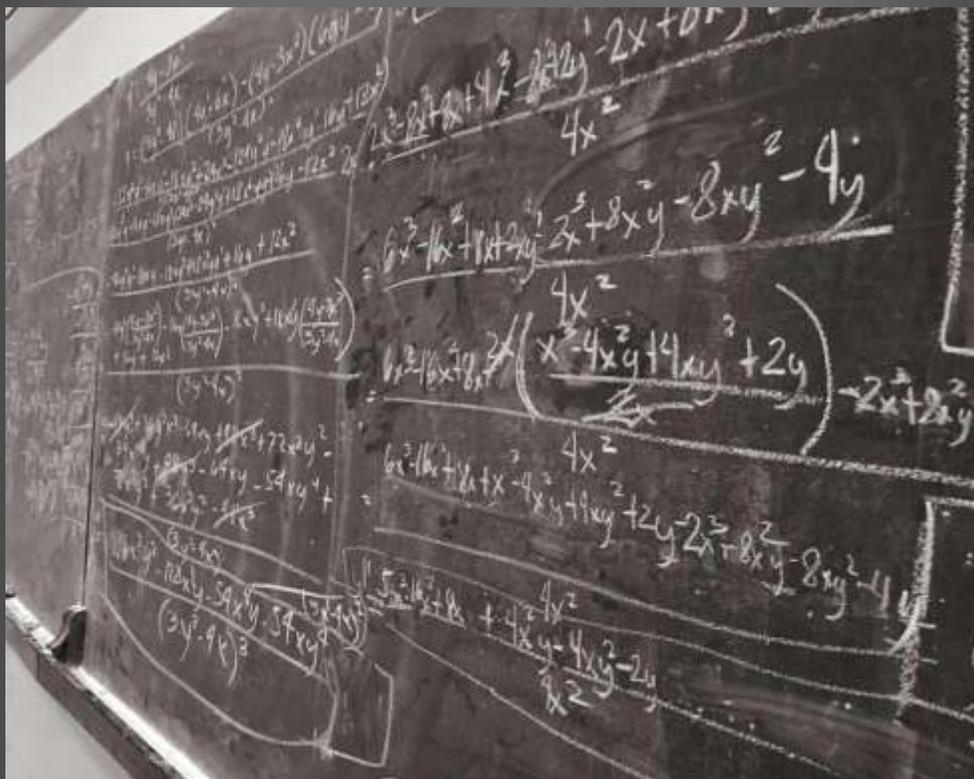


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# THE ASSESSMENT HANDBOOK

Volume 12, July 2016

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## The Development of College Students' Conceptions of Assessment in Mathematics

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The purpose of the study is to develop items on a scale for higher education students' conception of assessment in Mathematics having four domains namely: (1) assessment as improvement, (2) student accountability, (3) school accountability, and (4) irrelevance. These factors are anchored in the model of Brown (2008). The scale was administered to 300 college students, public and private school in the National Capital Region in the Philippines. Coefficient alpha for the whole scale is 0.88 and 0.89, 0.89, 0.05, and 0.94 for the factors improvement, student accountability, school accountability, and irrelevance, respectively. The scale's convergent validity was analyzed and it showed that the four factors were significantly inter-correlated. Factors had gone through factorial validity and supported a four factor model with adequate fit using Confirmatory Factor Analysis (GFI = .783, AGFI = .758, BCFI = 0.851).

**Keywords:** *Mathematics, Improvement, Accountability, Irrelevance, Conception, Assessment*

**C**onception contains the views, attitudes, or understanding on a particular phenomenon which leads to begin a plan. Understanding what conception means to students is of great importance because it explains difficult categories of experience (White, 1994). People's purposes towards occurrences are expressed in their conceptions of the phenomena (Fodor, 1998). Students' conception was studied by Brown (2008) for the purpose of analyzing the conceptions of the students when it comes to assessment. In their study, conception was framed for students' conception of assessment. Students' conceptions of assessment are significant because assessment has a substantial effect on the quality of learning (Entwistle & Entwistle, 1991; Marton & Säljö, 1997; Ramsden, 1997).

There have been quite a number of studies in developing a scale to measure student conceptions. Brown (2008) conducted a study using interactive informal assessment practices among secondary students' conceptions of assessment. The opportunity of knowing and understanding the conception of the students about assessment is important. When he asked the students about how they perceive assessment, their answer has been the basis for the construction of the items. This triggered him to do a research and it was found that there are four factors that affect the conception of the students towards assessment. These four factors include: (1) assessment improves learning, (2) assessment makes students accountable, (3) assessment is negative because it is unfair or bad, and (4) assessment is liked because it is fun or beneficial. According to Brown, student's behavior, norms beliefs etc. are substantial to distinguish and understand people's conception of assessment.

In another study, Brown (2010) looked at Queensland teachers' conceptions of assessment and its impact on policy priorities on teacher attitudes has a purpose of amplifying the teacher's conceptions about their practices of assessment. In this study it is evident that teachers' conceptions of different aspects of the education process firmly influence how they teach and what students learn or accomplish (Calderhead, 1996; Clark & Peterson, 1986; Thompson, 1992). It is specified that teachers' beliefs about students, learning, teaching, and subjects influence assessment techniques and usefulness (Asch, 1976; Cizek, Fitzgerald, Shawn, & Rachor, 1995; Kahn, 2000; Tittle, 1994). This is dependable with Ajzen's (2005) model of arranged or reasoned behavior which proposes that teachers' motives, beliefs about what others think, and sense of authority to comply with their intentions determine their behavior within the school. Teacher belief systems appear to increase from their early experiences of educational processes (Pajares, 1992).

In another study, Brown (2011) looked at teachers' conceptions of assessment in Chinese contexts texting tripartite model of accountability, improvement, and irrelevance. The educational policy reform movements attempt to reduce the negative consequences of selective educational assessments by amplifying the use of assessment to inform teaching and learning progresses through an active involvement of learners in leading learning development (i.e., assessment for learning—Assessment Reform Group, 1999).

Brown (2012) further investigated teachers' beliefs about feedback within an assessment for learning environment. Brown justified that feedback is considered to be an essential element of Assessment for Learning

Review of the empirical literature on students' conceptions about the purposes of assessment has identified four major purposes, some of which can be matched to teachers' conceptions of assessment. Students are reported as conceiving of assessment as (a) improving achievement, (b) a means for making them accountable, (c) making school accountable, and (d) being irrelevant. However, the previous studies of Brown indicates that these are only applicable for primary, high school students, and teachers' conceptions of assessment. His studies are domain-general which needs specific context and subject areas. Thus, the present study made conception on assessment more specific, focusing in Mathematics and also on the need to determine conceptions of assessment for college students.

### **Assessment improves the achievement of learning**

Brown (2010), stated that assessment is a means of improving the quality of students' learning and teachers' instruction. A variety of assessment techniques are used to progress the student's learning, and to deliver excellent instructions of the teachers. The goal is for the teachers to answer the two key questions: "Who among the students have learned?" and "Who among them needs to be taught again?". According to Peterson and Irving (2008), students conceived assessment as a method of receiving feedback to help expand their knowledge. It needs to be focused, straightforward, based on formal assessment, and provided by educators.

### **Assessment makes students accountable**

Zeidner (1987) reported that the students perceived assessment as increasing their achievements. McMillan (2001) stated that students are accountable for their learning because it is expected to them by the society; it is through their performance on examinations or tests. This requires grading, scoring, or evaluating their performance against standards, objectives, targets, or expectations. Students experience positive or negative consequences (e.g., placement into classes or groups, selection for special programs, or awarding of certificates) depending on their performances.

### **Assessment makes school accountable**

The outcomes on assessment is being practiced by the conception of school accountability to publicly demonstrate that educators or schools are executing an excellent work (Butterfield, Williams, & Marr, 1999; Mehrens & Lehmann, 1984; Smith, Heinecke, & Noble, 1999). However, according to Firestone et al., (1998) and Guthrie, (2002), there are certain consequences whether the schools or instructors have attained or not the required standards.

### **Assessment is irrelevant**

As stated by Moni, Van Kraayenoord and Baker, (2002), proofs showed that learners differ on how negatively they perceive assessment. Maximum number of students becomes gradually negative towards assessment throughout the educational system because the students cannot relate to the specific topic. Assessment may be considered irrelevant to students if it is thought of as being bad or unfair. Students are most likely to consider irrelevant assessment practices such as group projects that do not give credit to individual effort (Hoffman & Rogelberg 2001), those that lack explicit criteria for assessment (MacLellan 2001), and end-of-year examinations (Kniveton 1996). Students have treated assessment as irrelevant tasks because they perceive as making high marks more difficult to obtain.

## Mathematics Context in the Philippines

There are some bases on making conception of assessment domain specific for mathematics. Brown and Hirschfeld (2007) explained that the strength of students' agreement with different purposes of assessment links their conceptions of assessment to achievement outcomes on standardized national assessments of Mathematics for high school students.

With regards to the status of Mathematics in the Philippines, Crisostomo (2000) stated that Filipino students are still weak in Mathematics and Science. This is supported by the results of the Third International Mathematics and Science Study-Repeat (TIMSS-R). Similarly, a report of the Department of Science and Technology (DOST) said that 6,601 Filipino students who took the TIMSS last 1999 ranked 36th in both Science and Mathematics tests out of a field of 38 countries. The Philippines also placed 41st in Science and 42nd in Mathematics among 45 countries in the 2003 Trends in International Mathematics and Science Study. The Philippines ranked low on the said standardized tests; this is the reason why it is needed to have a quadrennial international assessment of Mathematics and Science skills among primary and secondary schools (Torregoza, 2014). The present study focused on Mathematics to determine if conceptions of assessment have an impact on Mathematics performance of college students.

The goal of the present study is to determine the conception of assessment whether college students improves and makes the students and school accountable in learning or if it is irrelevant. Given the studies by Brown and Hirschfeld (2009), the validity of conceptions of assessment in Mathematics is further supported if it can predict students' performance in Mathematics. The present study aims to determine if the same perception of assessment in Mathematics is applicable to college students and if it predicts students' grade in mathematics. Also, one of the purposes of the study is to determine if conceptions of assessment can be tried to other field of discipline aside from Mathematics.

In the present study, a new set of items on students' conceptions in Mathematics were anchored in the research model of Brown (2008). This provides further understanding on college students' views on assessment in Mathematics. The present study also confirms if the factors matched the data and contextualize students' conception of assessment in Mathematics in the Philippines.

## Method

### Participants

The participants in the study are 300 college students in universities of National Capital Region, Philippines. The participants are from ages 16-25 years old, 103 are males and 197 are females. Most of the respondents answered the scale inside their schools and some are while they are at home.

## **Instrument**

The developed scale consists of 40 items conferred in a response-type format with five options. The 40 items were generated based on the four domains of conceptions of assessment, namely: (1) Improvement, (2) Student Accountability, (3) School Accountability and (4) Irrelevance. These four domains were introduced in Brown's study. There are 10 items created from each domain based on the definition provided by Brown (2010).

The development of the scale was initiated by determining the concept, framework or theory. The items had gone through content validity which is conducted through consultation with experts (Magno, 2012). The expert checked whether the items were enough to cover the content of the instruction provided and if items were appropriate for the definitions intended. The process also involved correcting the items if they were appropriately phrased and whether the items were relevant to the subject area tested. The respondents rated the items by selecting the options if they (5) strongly agree, (4) agree, (3) neutral, (2) disagree and (1) strongly disagree on each item presented on the scale.

## **Procedure**

The researchers randomly selected students in Manila to answer the scale. Initially, respondents were asked if they are willing to answer the scale. Secondly, they were informed that they will be rating items on a scale about their conception of assessment in Mathematics. Then, questionnaires were distributed to each of the respondents. The questionnaire also determines the respondents' information such as name, course, gender, school, year level, and GPA (last semester). The instruction in answering was clearly indicated on the scale and it was also explained to them verbally before answering. They were also advised that if they have any clarification, they can raise it before answering. All the inquiries was acknowledged and answered by the researchers. The respondents rated the items by putting a check mark to the appropriate box depending on how they conclude assessment based on their experiences as students taking or have taken Mathematics subjects. All of the items were answered appropriately. The respondents answered the scale for no more than 30 minutes.

## **Data Analysis**

The responses of the respondents were input into a spreadsheet. The data gathered were used to determine the validity and reliability of the scale or new set of items of conceptions of assessment in Mathematics. For the descriptive statistics, means, standard deviation, kurtosis, skewness, and confidence interval were obtained.

To test the reliability of the scale, the researchers computed the Cronbach's alpha.

To test the validity of the scale, the items had gone through content validity where it was examined and revised with the help of an expert. Convergent validity in which the four sub-constructs of the scale were correlated to each other and the researchers did factorial validity using Confirmatory Factor Analysis to confirm whether the factors are valid when contextualized in the Philippines. The researchers were able to determine if the items were in good fit using the fit indices Joreskog GFI, Joreskog AGFI, Akaike Information Criterion, Schwarz Bayesian Criterion, Browne-Cudeck Cross Validation Index, Independence Model Chi-Square, Independence Model df, Bentler- Bonett Normed Fit Index, Bentler - Bonett Non - Normed Fit Index, Bentler Comparative Fit Index, James Mulaik-Brett Parsimonious Fit Index, Bollen Rho, and Bollen Delta.

## Results

This part presents the results obtained from pre-testing the scale of conceptions of assessment to 300 college students in National Capital Region (NCR). The reliability of the scale was assessed using the Cronbach's alpha. The coefficient alpha determined the internal consistency of the 40 items as a whole and for each factor (10 items each). Presented also in this part is the descriptive statistics that consists of means, standard deviation, and confidence intervals. The construct validity of the scale was first assessed using convergent validity by inter-correlating the four domains. The factor structure of the scale was also tested by comparing the four-factor model with a one-factor model.

Table 1

*Descriptive Statistics: Means, Standard Deviation, Cronbach's Alpha, CI+, and CI-*

Domains	M	SD	Kurtosis	Skewness	Cronbach's Alpha	CI+	CI-
Whole Scale	3.64	0.56	0.6	-0.19	0.88	3.83	3.45
Improvement	3.88	0.64	1.85	-0.85	0.89	4.09	3.67
School Accountability	3.81	0.64	1.62	0.75	0.5	4.26	3.36
Student Accountability	3.86	0.65	1.13	-0.72	0.89	4.08	3.64
Irrelevance	3.00	1.00	-0.87	-0.02	0.94	3.24	2.76

The means of the whole scale 3.64 which indicate that the average score of the respondents is near 3 to 4. Standard Deviation or SD was used to determine the heterogeneity or unevenness of the scores. In this table, SD is 0.56 which means that

some scores are one unit away from the average score of 3.64. In Kurtosis, we noticed on table 1 that the value of the whole test is 0.6 which means that the distribution is more likely platykurtic since the kurtosis exceeds the normal distribution, that is approximately 0.263. Similarly, in Improvement, School Accountability, Student Accountability, Irrelevance, it is platykurtic because the value obtain is 1.85, 1.62, 1.13, and 0.87 which absolute values are greater than 0.263. The whole scale and all of the factors are skewed to the right because the value is positive.

For the whole scale, the Cronbach's alpha of the 40 items is 0.88. This indicates high internal consistency since the value is greater than 0.4.

For each subtest, we can see on the table that the Cronbach's alpha of each factor attained internal consistency except for school accountability. The Cronbach's alpha of the four sub-factors are 0.89, 0.05, 0.89 and 0.94 which indicates adequate internal consistency because the obtained values were greater than 0.4.

*Table 2*  
*Convergent Validity*

Domains	Improvement	Student Accountability	School Accountability	Irrelevance
Improvement	-----			
Student Accountability	.76 *	-----		
School Accountability	.80 *	.84 *	-----	
Irrelevance	.08	.27*	.23*	-----

\* $p < 0.05$

When the subscales of the conceptions of assessment were inter-correlated, significant correlation coefficients were obtained ( $p < .05$ ). The four factors are significantly correlated at confidence level of 95 % ( $\alpha = 0.05$ ). However, Improvement and Irrelevance are not significant at ( $\alpha = 0.05$ ).

The factor structure of the whole scale was tested using the Confirmatory Factor Analysis. A four-factor structure was compared to a one-factor structure measurement model was done to determine which factor structure best fits the data. A four-factor structure is composed of four domains name improvement, school accountability, school accountability, and irrelevance. The items were used as indicators for the domains. There were 10 items on each latent factor. In the one-factor model, all indicators were combined in one latent variable. To determine which solution explains best the factors of the scale, the goodness of fit indices were compared. The four-factor structure of the scale turned out to have the best fit as opposed to a one-factor structure. The fit indices of the four-factor structure where the subscales are treated in separate latent variables had the best fit across several

indices. The proposed model had the highest GFI, AGFI, NFI, NNFI, CFI, PFI, Bollen's rho, and Bollen's delta (see Table 3).

**Table 3**  
*Fit Indices of the Different Measure Model*

Fit Indices	Values (Four Factor Model)	Values (One Factor Model)
Joreskog GFI	0.783	0.468
Joreskog AGFI	0.758	0.410
Akaike Information Criterion	63.40	13.468
Schwarz Bayesian Criterion	7.405	14.459
Browne-Cudeck Cross Validation Index	6.431	13.553
Independence Model Chi- Square	7858.094	7858.094
Independence Model df	780.000	780.000
Bentler- Bonett Normed Fit Index	0.781	0.508
Bentler - Bonett Non - Normed Fit Index	0.851	0.534
Bentler Comparative Fit Index	0.860	0.558
James Mulaik-Brett Parsimonious Fit Index	0.735	0.482
Bollen's Rho	0.767	0.481
Bollen's Delta	0.861	0.561

*Note.* Four-Factor Model = Improvement, Student Accountability, School Accountability, and Irrelevance  
One-Factor Model = Whole Scale

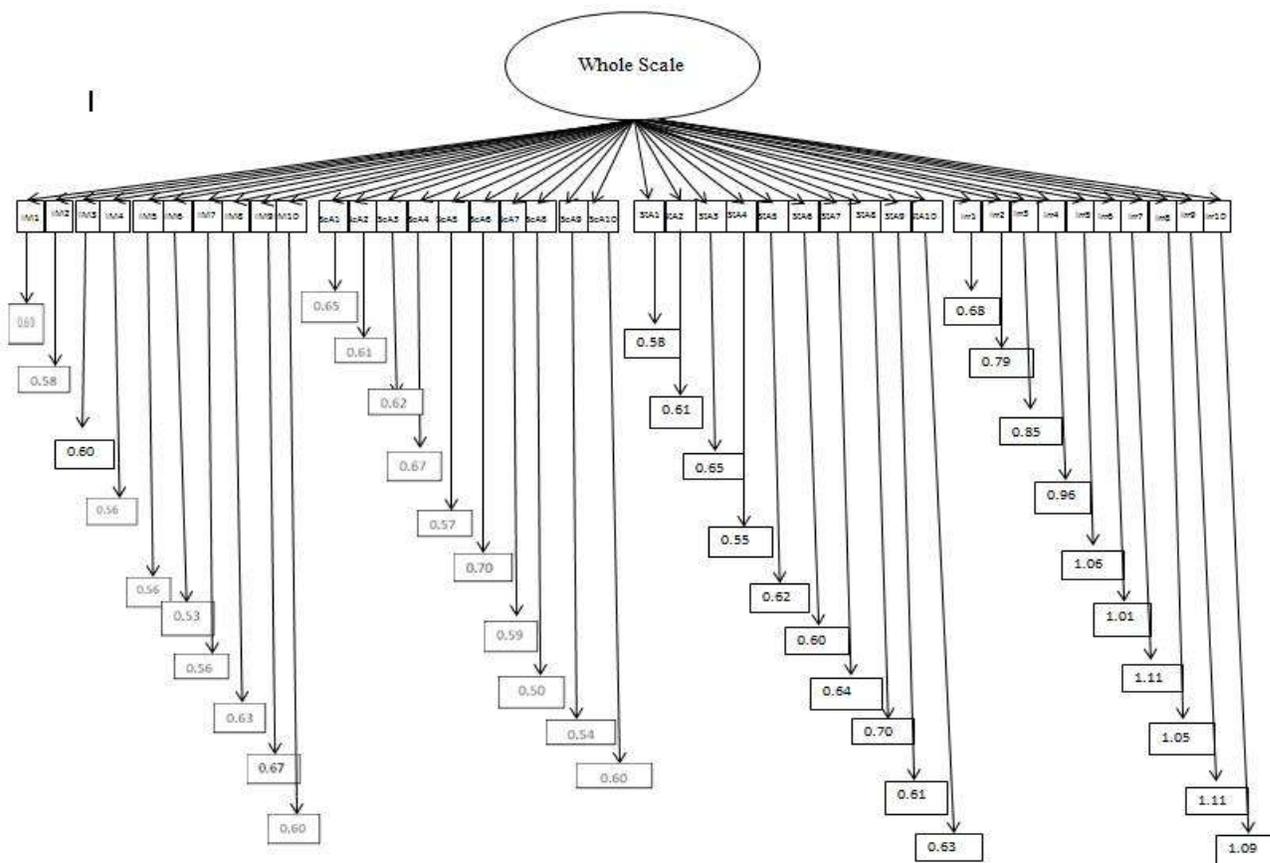


Fig.1. One-factor Model of a Scale

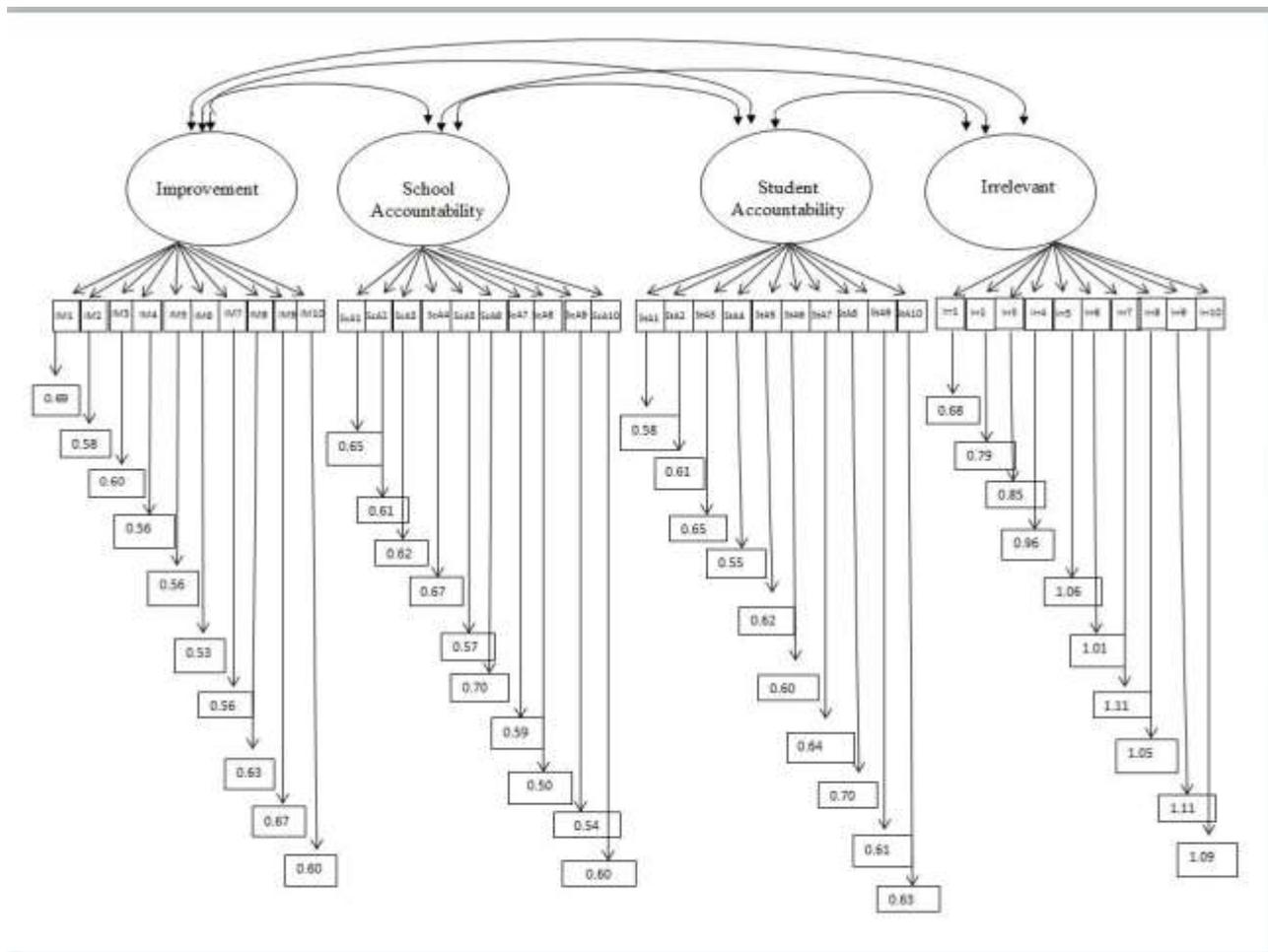


Fig.2. Four-factor Model of Whole Scale

Table 3  
Predictive Validity

Domain	Beta	SE	B	SE	t(295)	p
Intercept			1.26	0.29	4.39	0.00
Improvement	0.02	0.10	0.03	0.12	0.23	0.81
School Accountability	-0.03	0.11	-0.03	0.13	-0.25	0.80
Student Accountability	0.20	0.12	0.23	0.14	1.70	0.09
Irrelevance	0.18	0.06	0.12	0.04	3.16	0.00*

\*p<0.05

Multiple regressions were conducted to establish the predictive validity of the factors of conception of assessment on students' grades in mathematics. For the four factors, Irrelevance is the only factor that is predicted by the grades which is significant at  $\alpha = 0.05$ . The rest of the factors namely improvement, school accountability, and student accountability are not significantly predicted by the grades.

### Discussion

The main purpose of the study is to develop a new set of items on conceptions of assessment in Mathematics applicable for college students. Four factors were proven where items are created to determine and analyze the conceptions of college students when it comes to assessment in Mathematics. The instrument constructed turned out to have adequate evidence of reliability and validity. The instrument is reliable where the items are internally consistent based on high values of the Cronbach's alpha. The scale was also proved to be valid based on the convergence of the four factors. Factorial validity was established where a four factor-structure explained the most adequate solution to fit the data supporting the characteristics identified by Brown (2008). Fit between the domains of the conceptions of assessment and the items are very much evident in the four factors. Theoretical implications and new findings of the study discusses in this section.

The researchers used Cronbach's alpha to determine if the items were internally consistent. The values obtained using Cronbach's alpha of the whole scale and the four domains namely: (1) improvement, (2) student accountability, (3) school accountability, and (4) irrelevance indicate high internal consistency of items. Having achieved internal consistency among the items indicates that there is similarity how the respondents answer each items within a subscale. The items are the same in reference to the construct being measured. The participants while answering the scale have in mind that their conceptions of assessment as taking any Mathematics subjects are being measured. This evidence of internal consistency implies that there is a marked coherence among the items for a given factor. This coherence served as basis for considering the reliability of the items. The internal consistencies of the factors from the study of Brown (2008) has values of 0.71, 0.63, 0.88, and 0.77 using Cronbach's alpha for the factors improvement, school accountability, student accountability and irrelevance. The present study shows higher internal consistency using Cronbach's alpha obtaining values of 0.89, 0.5, 0.89 and 0.94 for the factors improvement, school accountability, student accountability and irrelevance respectively. This means that in the present study, the new develop set of items are more internally consistent as compared to the set of items on the previous study made by Brown (2008). This is because the previous study has items that are domain-general as compared to the items of the present study that specifies in Mathematics when it comes to conceptions of assessment.

The significant inter-correlation among the factors showed that as one subscale increases, the others also increase. The four domains converge well. This evidence of convergent validity showed that the four factors have a commonality and refer to a

general conception of assessment of the respondents. The convergence of the factors is consistent the CFA as well. This shows that the four domains have potential to be developed even if one is weak in one area. In the study of Brown (2008), there was a tendency for students to respond to each conception in the same way. While improvement and accountability may be seen as antagonistic purposes, certainly for the students the correlations suggest that these conceptions have between half and one-third of the variance between them in common (0.59, 0.41, and 0.36, respectively). In contrast, the present study indicates that improvement, school accountability, and student accountability are conceived by the respondents as relevant and protagonistic purposes that are significantly correlated which values are 0.76, 0.80, 84. There is a same result in the previous study which indicates that the factor irrelevance of assessment is most associated with it not providing improvement -- oriented information to either the student or the teacher. There is a high significant inter-correlation of factors school accountability and student accountability. This means that the students' responses on items which belong to these two factors are relatively the same. The two factors are both accountability. The non-significant correlation of factors assessment as improvement and assessment as irrelevant means that the students' responses on the items which belong to this factors are relatively different. This is because the items in the factor improvement elicit positive conception on assessment while the factor irrelevant has items which are negative direction. Negatively-keyed items elicit negative conception on assessment in Mathematics. The results therefore show that the respondents have positive conceptions of assessment in Mathematics since in the items for the factor irrelevant is negative and the responses on the two factors are relatively different which means to say that there is a positive conception of assessment. For instance, the student responded strongly disagree in one of the items in the factor irrelevant, it means to say that he conceived that particular item as relevant because of the negative factor responded negatively.

Factorial validity was established where a four factor-structure explained the most adequate solution to fit the data supporting the characteristics identified by Brown (2008). The four factors that include improvement, school accountability, student accountability, and irrelevance were confirmed using a sample of 300 college students. Confirming a four-factor model as compared to fewer factors means that there are several characteristics considered in determining the sub-factors of the construct. This provides a multidimensional perspective focus on the conception of assessment in multiple factors. The four domains were proven where items created accurately depict what the learners conceive about assessment. The items of the four factors also showed fit using several fit indices. This means that the items constructed in the scale are appropriate given the range of characteristics and attitudes of the respondents. For improvement and irrelevance, only one item is not significant. This indicates that all items are appropriate measures given the college students' conception of assessment. In the previous study, it appeared that secondary students conceived assessment as first being about improvement, second about accountability while not being irrelevant, and only a little being a positive social or personal experience. In other words, students appeared to be thinking: "Assessment helps

improve my learning and it holds me accountable but it doesn't feel good. However, it is a bad thing when it doesn't help me or my teacher to improve my learning''. This interpretation has a similarity in the present study in a way that it makes the student more focusing on being accountable than improvement in learning. The interpretation of conception of assessment indicates that the respondents conceived assessment in Mathematics as irrelevant if it does not help them improve learning most especially if they cannot relate the topic to real life situations.

There are five major theoretical implications of the present study. (1) The findings validate the studies of Brown (2008) that theorized; (a) assessment as improvement, (b) school accountability, (c) student reliability, and (d) irrelevance as valid factors of conceptions on assessment, (2) The translation of conceptions of assessment of college students in Mathematics is that the model combines a holistic perspective in assessing the conception of the college students such that represents different broad domains such as the cognitive, social, and affective. How the students conceive assessment based on their prior knowledge is the cognitive aspect. For social aspect, their conception is based on their experiences in life (Quizzes). For affective, the respondents conceived assessment based on their eagerness to learn where they visualize assessment as helpful or not in their learning. These facets are considered important in the improvement of learning that helps the students attained the learning. The four factors confirmed shows that learners who conceived assessment is helpful in learning are important as in the case of thinking positively for the factors improvement, school accountability, and student accountability will result to positive output. Similarly, college students who conceived assessment as harmful or irrelevant will result more likely to a low academic performance and the possibility of non-participation. This supports the explanation of Brown and Hirschfeld (2007) that higher overall mathematics achievement was found among students who conceived that assessment makes students themselves accountable for learning and who conceived of assessment as good for them. In contrast, the more students agreed that assessment interferes with learning or assessment is ignored, the lower their mathematics achievement is. The results calls for higher education institutions to strengthen the conceptions of assessment to students as the teachers need to instill in the minds of the students that assessment is beneficial and relate it in classrooms especially in the field of mathematics in the Philippines in real-life applications. (3) The study in conceptions of assessment can be tried to other field of discipline aside from Mathematics such as Science, Mathematics, and English and so on since the "domain-general" conceptions of assessment and its factors were already validated as factors specified in Mathematics. (4) The study indicates that conceptions of assessment and its factors can be contextualized into other countries aside from the Philippines. (5) In the study of Brown (2008), the original conception of assessment as irrelevant indicates that students are quite sensitive to assessment which they perceive to be unfair, bad, or irrelevant to them. This depicts negative conception of assessment. However, based on the results in the present study, the factor irrelevance appears to be in need of further classification of items loaded to it. The mean of the responses of the respondents in the factor irrelevance is exactly 3.00 which indicate neutrality of the responses. The responses depict that the respondents

do not view assessment as harmful but rather no effects in learning. This means that several sub-factors could be produced out of the factor irrelevance. This can be done by future researchers by utilizing Principal Components and Classification Analysis. The future researchers should look into whether it could either be harmful in the learning of the students or there are no effects in learning at all.

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## The Development of College Academic Volition Scale (CAVS)

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The present study developed a College Academic Volition Scale (CAVS) based on the model by Mccan and Garcia (2000). The CAVS consists of three factors, namely: (1) self-efficacy enhancement, (2) stress reducing actions and (3) negative-based incentive. The CAVS was correlated with the Inventory of School Motivation (ISM) (McInerney, 2004) to provide support for its concurrent validity. Both scales were pretested to 300 college students. Confirmatory Factor Analysis (CFA) was used to establish factor structure of the CAVS and the results showed that the three-factor model is the ideal model for the volition scale since the obtained value on Bollen's Rho, Bentler Comparative Fit Index, Joreskog AGFI and Joreskog GFI are greater than .90. The scale's internal consistency using Cronbach's alpha showed that all the factors of the volition scale are internally consistent. Concurrent validity for the CAVS was conducted with the ISM and the two scales are correlated ( $p < .05$ ).

**Keywords:** *Volition, Self-efficacy Enhancement, Negative-based Incentives, Stress-reducing Actions, Motivation, Volitional Strategies*

**W**hen students are confronted by difficult situation in academic context, they use different strategic methods like listening to music, thinking of a reward for themselves once they finish an assignment, or reminding themselves. These strategies help them become motivated and eager to finish a specific task. These methods that the students use are called academic volition. The concept of academic volition deals with how students maintain their motivation in studying and how to regulate their emotion when dealing with difficult situation (Corno, 1993; Corno&Kanfer, 1993; Heckhausen&Kuhl, 1985; Kuhl, 1985).

Academic Volitional Strategies were first developed by Kuhl (1985). He gathered different strategies and administered the scale to college students to examine if they use any of the proposed strategies. The scale is also intended to discover new possible strategies of college students in managing their motivation and emotion in academic situation. In the scale, the students will first indicate whether they used any of the listed strategies by checking “yes” or “no”. If they check “yes”, the students will have to rate the strategies on a five-point scale (*1-I almost never do this and 5-I almost always do this*). In case there are strategies that are not included, at the end of the scale, the students are obliged to list down all the strategies that they use to combat distractions while doing academic tasks. After administering the 22-item scale, 12 additional strategies are discovered and the term Academic Volitional Strategy Inventory (AVSI) was coined.

The study of Academic Volitional Strategies took different paths. The initial version was developed by Corno and Kanfer (1993). In their study of AVSI, two subconstructs were developed namely *Motivation Regulation* and *Emotion Regulation*. However, Bembenutty and Wolters (2000) noticed that having two subconstructs are not sufficient to show the distinctiveness of the 30 strategies. That observation gave Bembenutty and Wolters (2000) the idea of dividing the 30 strategies into eight subconstructs namely *self-talk*, *negative consequences*, *concentration strategies*, *socializing strategies*, *self-reinforcement*, and *self-encouragement*, *taking breaks*, and *relaxing music*. They used Exploratory Factor Analysis (EFA) in grouping the 30 strategies into eight subconstructs.

Mccan and Garcia (2000) studied the eight subconstructs and they spotted strong similarities across the eight. This paved the way for the development of the latest version of the AVSI. The eight subconstructs were narrowed down into three succinct subconstructs namely *self-efficacy enhancement*, *stress reducing actions*, and *negative-based incentives*. Same with what Bembenutty and Kanfer (2000), they also utilized Exploratory Factor Analysis (EFA) to narrow down the eight subconstructs into three. Self-efficacy Enhancement consists of items that will motivate the students by reminding oneself about the goal that they have set for themselves. Stress Reducing Actions is about how students alleviate or eradicate the stress that they are experiencing. Lastly, Negative-based Incentives is made up of consequences that the students think to maintain their motivation to study (Mccan& Garcia, 2000).

There are subsequent studies that measured volition across different areas. In the study of Dewitte (2000), he discovered that not all students need to use volitional control in order to perform well. The types students who do not need volitional strategy are as follows: First, students who enjoyed solving word anagrams have a longer persistence when they utilize no volitional strategy. Second, students who are naturally gifted will continue studying for a while without having to exert volitional control. Lastly, students who are conscientious and have a strong study habits will still perform satisfactorily even without the use of volitional control. To encapsulate Dewitte`s (2000) study, he argued that a low volitional scores do not constitute to bad academic habits. There are some students who do not need frequent use of volitional control because they are either gifted, interested, or have established the right study habits.

On the other hand, Elbe (2004) applied Volitional Components Questionnaire (VCQ II; Kuhl&Fuhrmann, 1998) to measure the development of volitional skills among young elite athlete students. In her study, she argued that volition is especially important for surviving long and intense training loads during the course of an athletic career or for keeping up regular exercising. Therefore, volition does not only deal with academic tasks. It is also applicable to other aspects such as athletics.

In the study of Novak (2014), volition was integrated with motivation to examine the factors that affect human performance in a simulation-based learning environment. Since digital learning is now one of the emerging trends in education, Novak studied how students utilize volition and motivation to improve their performance in a digital learning environment.

The study of Mccan and Garcia (2000) developed the AVSI for high school students. Items of the three factors of volition scale are made applicable for college students in the present study. The first goal of the study is to determine whether the aforementioned three-factor model of volition is suitable for Filipino college students after more than a decade after it was developed.

The previous study by Mccan and Garcia (2000) utilized Exploratory Factor Analysis to determine the number of subconstructsin academic volition. There were three subconstructs that were determined using EFA in the most recent development of the model. In this present study, Confirmatory Factor Analysis was used to verify if the factors proposed by Mccan and Garcia (2000) are supported and applicable in the Philippine educational setting.

The volition scale has been correlated with other constructs such as Action-Control (Kuhl, 1986), the Negative Mood Regulation Scale (Catanzaro &Mearns, 1990), the Rosenberg Self-Esteem Scale (1965), and the effort subscale of the MSLQ (Pintrich, et al., 1991) to establish its concurrent validity. These other constructs are theoretically consistent with the framework articulated by Kuhl (1986). However, the nature of volitional strategies is to maintain the learners' motivation in doing tasks even when confronted by difficulty (Corno & Kanfer, 1993), thus, the present study establishes further the concurrent validity of volition by correlating it with motivation. There is evidence in previous studies on the theoretical consistency between volition and motivation. There are myriad of studies that can prove that volition can be correlated with motivation. One of the studies was conducted by Nagelsmith, Bryer, and Yan (2012). They identified the interrelationships between motivation, volition, and academic success for adult nursing students learning outside of the traditional classroom environment. Furthermore, the validity of Motivated Strategies for Learning Questionnaire (MSLQ) and Academic Volitional Strategies Inventory (AVSI) was examined in their study. Another study that established the correlation between motivation and volition was that of Reid (2005) where she measures the two major constructs in the context of children that suffer from cerebral palsy. Reid utilized Pediatric Volitional Questionnaire (PVQ) and Test of Playfulness (TOP) to examine 16 children.

The motivational framework used in the present study is by Mclnerney (2004). His study of motivation focuses on how the construct works in academic context specifically on the motivated behaviors that the students possess. In a similar way volition is also used in an academic context. The Inventory of School Motivation

(McInerney, 2004) has eight subconstructs namely: *Task, Effort, Competition, Social Power, Affiliation, Social Concern, Praise, and Token*. He gives emphasis to these subconstructs because McInerney argues that motivation should not be viewed as unidimensional but rather as multidimensional (McInerney, Marsh, & Yeung, 2003).

One of the goals of the present study is to determine whether volition increases with motivation to establish its concurrent validity. Also, the researchers are aiming to determine the reliability of items through its internal consistency. Lastly, the factorial validity of the volition will be established against a one factor model using Confirmatory Factor Analysis.

## Method

### Participants

The participants in the study are 300 college students in a private university in Manila. The students belong in Sports and Wellness Management, Accountancy, Education, Engineering, Information and Technology, and Pharmacy program. There are 150 males and 150 females ranging from 16 to 25 years old. They were chosen using a random sampling technique.

### Instrument

A scale was constructed to measure the volitional strategies of Filipino college students. The factors of the scale were anchored on Mccan and Garcia's (2000) latest version of Academic Volitional Strategy Inventory (AVSI). The model is composed of three subconstructs namely *self-efficacy enhancement, stress reducing actions, and negative-based incentives*.

The 30 items in this scale were written based on the definitions of the subconstructs. The first 10 items were under self-efficacy enhancement. These items are about how students use positive thoughts to motivate themselves do a specific task (e. g. *I tell myself that I can do any school work, I think about the goals that I have set for myself*). The second 10 items were anchored on stress reducing actions. It is about the techniques that the students perform to eradicate the stress that they have in academic context (e.g. *I count one to ten when I cannot get myself to study, I play music to relax myself when studying*). The last 10 items were based on negative-based incentives. These are items that deal with how students think of negative consequences in order to come up with a positive outcome (e.g. *I think about how disappointed others will be if I do poorly in school, I think about the kinds of job I may end up if I flunk a specific subject*).

Each factor of the volition scale is composed of 10 items that exemplify different techniques that the students perform to maintain their vigor in doing their academic tasks. The volition scale made use of five-point Lickert scale (1-never, 2-seldom, 3-sometimes, 4-often, 5-always) to answer each item. The items were reviewed and were given feedback by an expert in assessment of student learning and that was our basis in revising the items that are included in the volition scale.

## Procedure

The volition scale that the researchers developed and the Inventory of School Motivation by McInerney (2004) were administered to the students of National University-Manila. Before administering the scales, the researchers informed the students about the nature of the study and the areas that the items intend to measure. The researchers also asked for the respondent's consent if they are willing to participate in the study.

The proctors of the examination are three of the six researchers. The scales were distributed to each of the respondents. The instruction in answering the scales was indicated on the scales and was explained verbally to the participants. They were also informed to provide response on all items of the two scales. They took the scale for 45 minutes in National University-main building, Room 302. The respondents entered the room by batch, 50 respondents per batch. They were reminded that the two scales was administered to know the volitional and motivational strategies that college students use while they are studying and the degree of frequency of their usage.

## Data Analysis

The responses on the two scales were tabulated using a spreadsheet. The data collected were used to determine the descriptive statistics and to determine the validity and reliability of the volition scale. For the descriptive statistics, means, standard deviation, kurtosis, skewness, confidence interval were obtained.

For the test of reliability, the Cronbach's alpha was obtained to establish the internal consistency of the items.

To test the validity of the scale, the researchers utilized content validity in which items were examined and revised with the help of an expert; Convergent validity was conducted in which the three factors of the scale were correlated to each other; Concurrent validity was tested by intercorrelating the factors of the scale and the factors of ISM; Factorial validity of the scale was determined using Confirmatory Factor Analysis (CFA). The researchers were able to prove the factor structure of volition in the CFA using Joreskog GFI, Bentler-Bonett Normed Fit Index, Bentler-Bonett Non-Normed Fit Index, Bentler Comparative Fit Index, James-Mulaik-Brett Parsimonious Fit Index, Bollen's Rho and Bollen's Delta as fit indices.

## Results

To test the reliability of the volition scale the Cronbach's alpha of the whole scale and its factors were obtained. The value of the coefficient alpha indicated the internal consistency of the volition items. The concurrent and convergent validity of the scale was assessed by intercorrelating volition factors to itself and to the factors of ISM. The factorial validity was established by testing two measurement models using CFA.

Table 1  
*Descriptive Statistics for Volition and Motivation*

Domain	M	SD	Kurtosis	Skewness	C+	C-
<b>CAVS</b>						
Self-efficacy	3.84	0.38	0.78	0.54	3.89	3.80
Negative-based incentives	3.92	0.38	0.6	-0.1	3.96	3.87
Stress-reducing actions	3.83	0.43	2.2	-1.1	3.88	3.78
<b>ISM</b>						
Task	4.23	0.44	0.2	-0.75	4.28	4.18
Effort	4.23	0.43	0.5	-0.8	4.28	4.18
Competition	3.94	0.51	0.3	-0.4	4.00	3.88
Social power	3.93	0.59	-0.12	-0.39	4.00	3.86
Affiliation	3.7	0.78	-0.63	-0.33	3.78	3.60
Social concern	3.95	0.52	0.12	-0.53	4.01	3.89
Praise	4.02	0.51	-0.62	-0.38	4.08	3.97
Token	3.6	0.6	0.1	0.0006	3.66	3.52

The means of the factors of the volition scale are 3.84, 3.92, and 3.83 which means that most of the respondents close to 4.00 on the three subscales. On the motivation scale the means of the factors are 4.23, 4.23, 3.94, 3.93, 3.7, 3.95, 4.02 and 3.6 which is an indication that most of the respondents answered close to 5 on the eight subscales. Among all the factors of the volition and motivation scale's standard deviation, only *affiliation* got a value greater than 0.70 which means that the scores of the respondents on that factor are widely dispersed. All the factors are close to normal distribution.

Table 2  
*Internal Consistency of Items (CAVS)*

Domain	Cronbach's Alpha
Whole Scale	0.41
Self-efficacy Enhancement	0.45
Stress-reducing Actions	0.45
Negative-based Incentives	0.46

The reliability of the scale was determined by obtaining the Cronbach's alpha values of the whole scale and its three factors. The obtained value of 0.41 for the whole scale indicated adequate internal consistency which means that there is a consistency of responses on the items of CAVSI. The alpha value of 0.45 for self-efficacy, 0.46 for stress-reducing actions and 0.45 for negative-based actions also indicated internal consistency.

Table 3  
*Intercorrelation of Subconstructs(CAVS and ISM)*

Domain	Task	Effort	Competition	Social power	Affiliation	Social concern	Praise	Token
Self-efficacy Enhancement	.09	.15*	.13*	.01	-.17*	-.02	-.25*	.04
Stress-reducing actions	-.12*	.02	-.12*	.18*	.11*	.01	.24*	.05
Negative-based Actions	.14*	-.07	.19*	.16*	.02	.02	.00	-.05

\*p<.05

Using zero-order correlations, the factors of CAVS and ISM were intercorrelated at 95% confidence interval and the results indicated the significant correlation between some factors. The volition factor self-efficacy enhancement are significantly correlated with effort, competition, affiliation and praise; stress-reducing actions are significantly correlated with task, social power, affiliation and praise; and negative-based incentives are correlated with task, competition and social power. All the correlations are positive except the correlation between self-efficacy and affiliation; self-efficacy and praise; and stress-reducing actions and tasks.

Table 4  
*Intercorrelation of Subconstructs (CAVS)*

Domain	Self-efficacy	Stress-reducing Actions	Negative-based Actions
Self-efficacy			
Stress-reducing Actions	-0.06		
Negative-based actions	0.04	-0.00	

\*p<.05

For the test of convergence on the factors of CAVSI at confidence interval of 95%, all the three factors: self-efficacy, stress-reducing actions and negative-based incentives obtained p values greater than 0.05 which means that there is no correlation among all the three factors. However, their convergence will be further tested as latent variables in the Confirmatory Factor Analysis.

Table 7  
*Fit indices of the Different Measurement Models*

Goodness of fit indices	3-factor model	1-factor model
Joreskog GFI	0.930	0.836
Joreskog AGFI	0.879	0.812
Bentler-Bonett (1980) Normed Fit Index	0.707	0.317
Bentler-Bonett Non-Normed Fit Index	0.804	0.405
Bentler Comparative Fit Index	0.879	0.446
James-Mulaik-Brett Parsimonious Fit Index	0.439	0.295
Bollen's Rho	0.528	0.266
Bollen's Delta	0.899	0.465

To test the factorial validity of the College Academic Volition Scale three-factor model and one-factor model was tested using CFA. The Ordinary Least Square approach was used. The usual General Linear Model is not applicable since the covariance matrix was singular. Ordinary Least Square is one of the method used in making prediction and estimation. It can be used to analyze the relationships among factors in a CFA approach. Researchers usually use OLS in correlation analysis in which also can be performed using SEM (Hair et al., 2006). The OLS has minimum demands in fitting the three factor model as compared to the SEM approach in the CFA.

For the three-factor model using the OLS approach, the obtained values on the four fit indices Bollen's data, Bentler Comparative Fit Index, Joreskog AGFI and Joreskog GFI are greater than 0.90 which is an indication that the three-factor model is in good fit. On the other hand, all the obtained values of the one-factor model on all fit indices are below 0.90 which means that the two factor model is not in good fit.

A two factor model was also tested using the General Linear Model. The measurement model utilized volition and motivation as its latent factors to determine the theoretical consistency of the two factors. The manifest variables used here are their respective subfactors. After using CFA, the obtained values are: 0.923 for Joreskog GFI, 0.95 for Population Gamma Index, 0.08 for RMS, 0.85 for McDonald's Index of Noncentrality, 0.58 for Bentler-Bonett Normed Fit Index, 0.36 for Bollen's Rho, 0.59 for Bollens' Delta and 0.09 for RMSEA. Among all the obtained values three passed the estimate required; both the obtained value on Joreskog GFI and Population gamma Index are greater than 0.90 and the obtained value on RMS is part of the interval 0.80 and below, which is an indication that the two-factor measure model is in good fit.

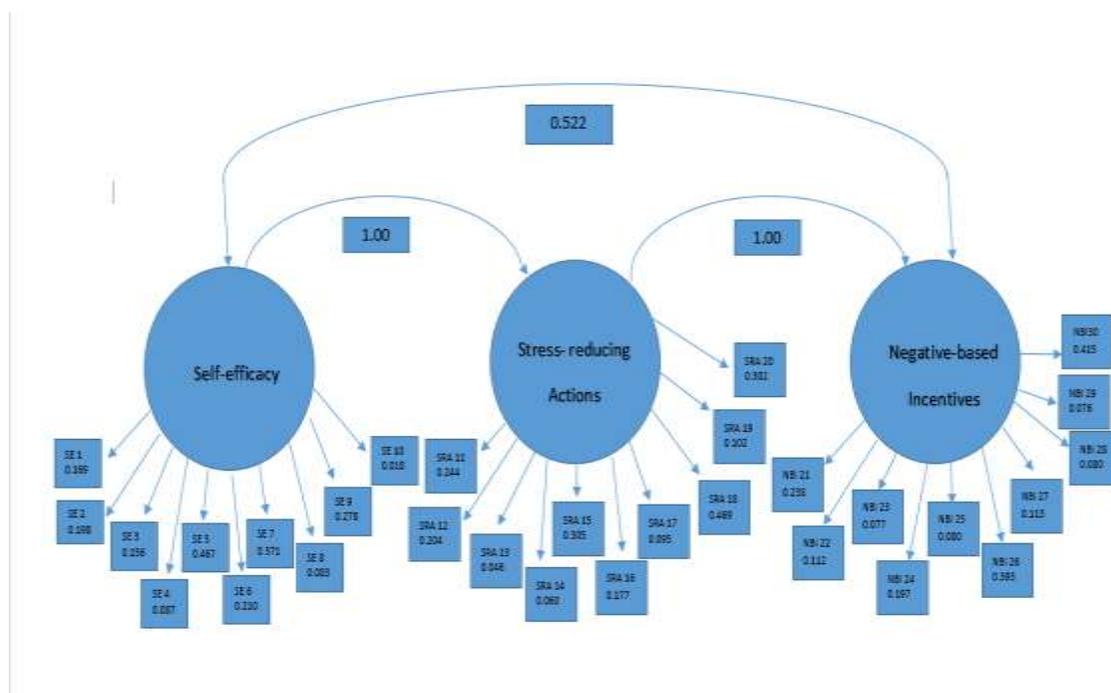


Figure 1. Three-factor Model

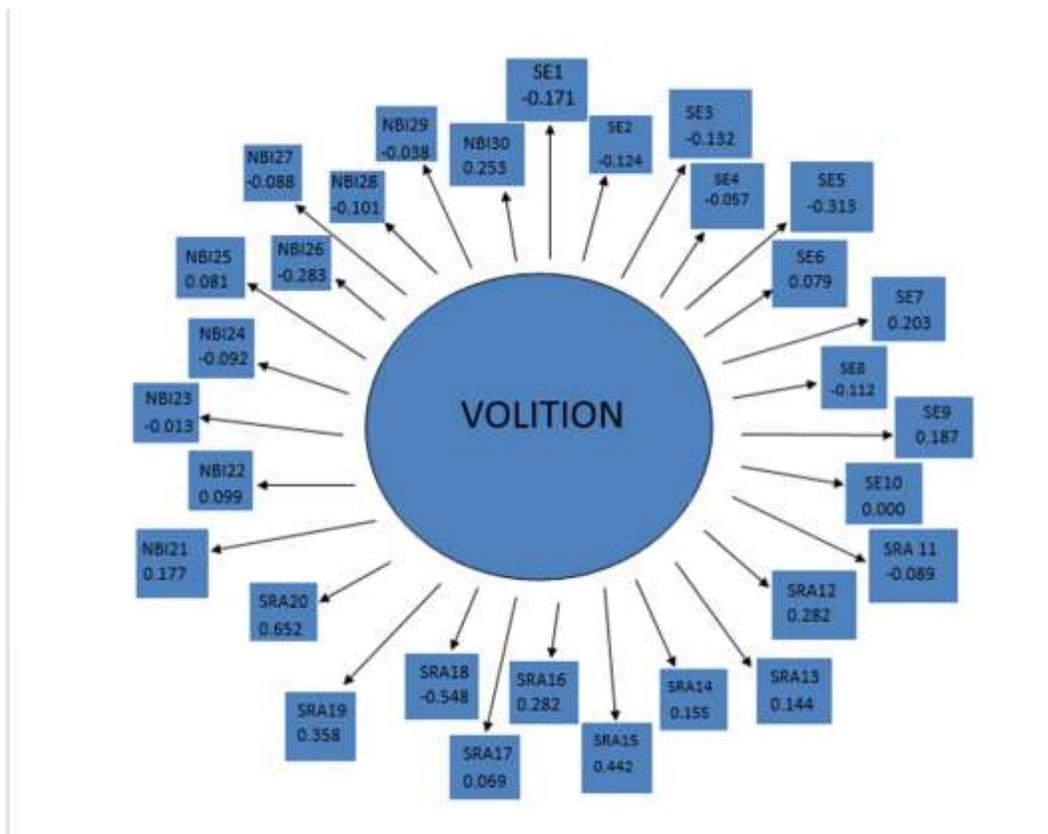


Figure 2. One-factor Model

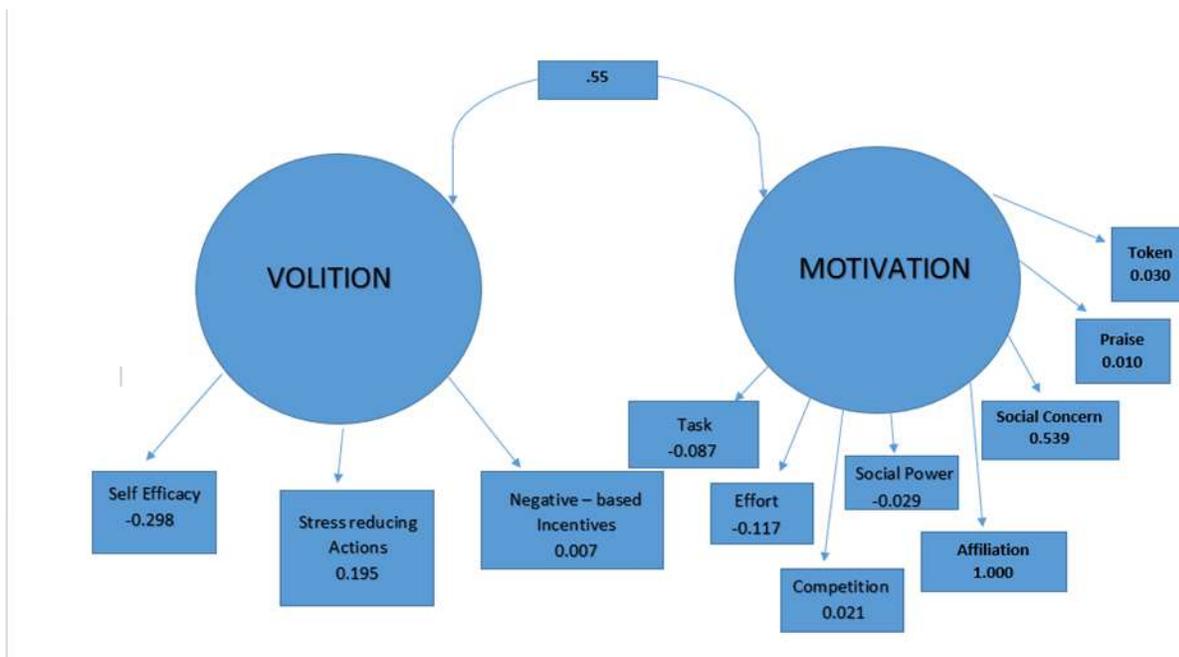


Figure 3. Two-factor Model

## Discussion

The main purpose of the study is to develop a scale that will determine the volitional strategies that Filipino college students utilize to combat distractions, demotivation, and disinterest in academic context. Using the Cronbach's alpha, the researchers tested the reliability of CAVS; it was shown that the items of the scale and its subscales are internally consistent. It has also been found that the three factors of the scale are not correlated to each other but significantly correlated with some of the factors of the ISM. The Confirmatory Factor Analysis solidified the claim that the three-factor model is the best model for the scale.

The study found that the volition scale is reliable. The internal consistency of the whole scale and all its subscales is a good indication that there is homogeneity on the items of the whole scale and each subscale. Compared to the Cronbach's alphas on the present study, the values obtained in the previous study by Mccan and Garcia (2000) are much greater. For factor self-efficacy enhancement, the alpha 0.82 is greater than 0.45; for factor stress-reducing actions, the alpha 0.69 is greater than 0.45; and for factor negative-based incentives the alpha 0.73 is greater than 0.46. The discrepancy between the alpha values on the two studies is can be explained due to the fact that the participants in the present study came from six different programs: 256 from BS Sports and Wellness Management, 26 from BS Accountancy, nine from BS Education, five from BS Civil Engineering; 2 from BS Information Technology and two from BS Pharmacy; as compared to the previous study where all respondents are from the same program of studies. The discrepancy accounts to the difference in methodology that the two study used. In terms of the sampling technique, both studies used random sampling, however, the samples gathered on the previous study belongs to only one strata which indicates that the previous study used sample from one subpopulation while the present study used samples from different subpopulations. Also, the sample on the previous study were controlled with variable course research requirement and that might affected the similarity on the way they answer the items on AVSI.

The concurrent validity of the volition factors with the factors of ISM was partially established. Results showed that the volition factor self-efficacy enhancement has a negligible relationship with effort and competition; the volition factor stress-reducing actions has a negligible to low relationship with social power, affiliation and praise; and the volition factor negative-based incentives has a negligible relationship with task, competition and social power. The present study implies that when students use strategies that enhances their esteem towards productivity (*self-efficacy enhancement*), the willingness to expend effort (*effort*) and the competitiveness in learning (*competition*) are maintained; when students make efforts to relax or take breaks (*stress-reducing actions*), the seeking status for leadership (*social power*), the feeling of belongingness to a group (*affiliation*) and seeking for social recognition (*praise*) will be preserved; and when students think of the negative consequences of failing (*negative-based incentives*), the interest in the task (*task*), the competitiveness in learning (*competition*) and the seeking status for leadership will remain. Meanwhile, the r values obtained on the previous study by Mccan et al (1998) where volition control was correlated with four motivation factors:

intrinsic goal orientation, task value, self-efficacy and test anxiety are greater than the  $r$  values on the present values. The  $r$  values of the factors of volition with motivation are 0.48 with intrinsic goal orientation, 0.44 with task value; .54 with self-efficacy and -0.19 with test anxiety. The substantial relationship among the volition factors and motivation factors supports the claim in the present study that volition and motivation are two correlated subconstructs. No explanation

The validity of the volition scale was further established by comparing the three-factor model with the one-factor model of the volition scale. Results showed that the three-factor model is the best model for the volition scale since it passed on more than three fit indices, compared to the one-factor model which did not pass any fit index. Even if the factors are not significantly correlated in the zero-order correlation, the CFA showed that each of the factor of volition accounts for each other and the three factors showed acceptable fit. On the current version of AVSI, Mccan and Garcia (2000) used Exploratory Factor Analysis to prove that factors self-efficacy enhancement, stress-reducing actions and negative-based incentives clearly divides the 30 strategies, and since the present study have proven the validity of the model, the three-factor solution that was offered as the empirically-based taxonomy of the volition scale was accepted. The study implies that three factors is enough to establish the distinctiveness of the 30 strategies of the scale.

With the use of CFA, it was shown that two-factor model which utilized motivation and volition as its latent factors is in good fit. This means that the items on each scales do not overlap, indicating that the items of CAVS do not measure factors and subfactors of ISM. This concurrent validity was expected due to the fact that Mccan and Garcia (2000) devised AVSI to assess how college students manage emotion and motivation during the goal striving process. Moreover, the goodness of fit of the two-factor model affirms the ideas of Zhu (2004) who asserted about the distinction between volition and motivation and the linear relationship that the two have. The present study provides a proof to the theoretical idea by Kuhl (1987) who purported that motivation only impacts the intention to act, whereas volition keeps one focused with intentions, through the correlation established using the two-factor model. Generally, the present study do not only prove that volition and motivation are two different constructs but also affirms the relationship that they have.

The theoretical contribution of the study is focused on the significant relationship between volition and motivation which was established for the volition scale's concurrent validity. One of the purpose of this paper is to give a theoretical proof on the claim that volition maintains motivation during the goal-striving process; and it was successfully done through the correlations found among the factors of the volition and motivation scale. The goodness of fit of the two-factor model is also a manifestation that the study of Garcia et al (1998) which said that volitional strategies support the impact of motivational processes is true since it indicates that the two constructs are not just distinct but also correlated to each other. Furthermore, the present study from affirming the relationship between the two also supports the ideas proposed on the studies (Corno&Kanfer, 1993; Heckhausen&Kuhl, 1985; Kuhl, 1985) about the influential role volition when motivation have decreased when students are confronted with frustrations with course work requirements, disinterest or personal problems. Generally, the present study suggests volitional

strategies are used to maintain motivation and without volition the pursuit to fulfill an academic task would be difficult for students.

The present study was successful in creating a volition scale that is applicable for Filipino college students. Since the scale is reliable, it means that there is a similarity on how students answer the items of the whole scale and the items of each of the three subscale which is a good indication that the scale is applicable to Filipino college students. The scale is also valid which means that the whole scale really measures volitional strategies and the three subscale measures the subconstruct that it purports to measure.

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## The Development of Academic Buoyancy Scale for Accountancy Students (ABS-AS)

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The present study developed new items of Academic Buoyancy specifically for accounting students. This is called the Academic Buoyancy Scale for Accounting students (ABS-AS). The ABS-AS consists of five factors, namely: (1) Self-efficacy, (2) Uncertain Control, (3) Academic Engagement, (4) Anxiety, and (5) Teacher-Student Relationship based on the model by Martin and Marsh (2007). The scale was pretested to 300 Accountancy students of random year in one university in Manila. The scale's Cronbach's alpha obtained were .81 for the whole scale, .75 for Anxiety, .92 for Uncertain Control, .59 for Academic Engagement, .94 for Anxiety, and .79 for Teacher-Student relationship which indicate moderate to high internal consistency. Convergent validity was also attained where the four factors were all significantly correlated ( $p < .05$ ). Construct Validity using the Confirmatory Factor Analysis (CFA) was conducted and showed that the data fit the hypothesized five-factor measurement model. The items also indicate good fit in 13 fit indices measured.

**Keywords:** *Accountancy; Academic Buoyancy; Self-Efficacy; Uncertain Control; Academic Engagement; Anxiety; Teacher-Student Relationship*

**S**tudents do not only experience 'acute' and 'chronic' life problems that affect their academic lives (Marsh & Martin, 2007; Garmezy, 1981; Lindstroem, 2001; Masten, 2001). Students also confronts academic setbacks and challenges that are typical of their daily lives in the school (Marsh & Martin, 2007). This concept has been termed as Academic Buoyancy.

Any study of academic buoyancy should include a sufficient discussion on how and in what sense does academic resilience is distinct from buoyancy. This is because buoyancy is a product of a long list of studies on resilience (Egeland & Farber, 1987; Luthar, 1991; Luthar, Doernberger, & Zigler, 1993; Sandler, Wolchik, Davis, Haine, & Ayers, 2003; Fergus & Zimmerman, 2005; Perez, Espinoza, Ramos, Coronado & Cortes, 2009). Resilience subsumes buoyancy (Martin & Marsh, 2007). That is why in most cases the former is confused with the latter precisely because they attempt to measure the same ability - the ability to successfully deal with academic setbacks and challenges. In this case, there is a need to tap on the distinction between the two. Martin and Marsh (2007) proposes that in terms of difference in definitional terms, resilience is characterized in terms of ‘acute’ and ‘chronic’ adversities “that are seen as ‘major assaults’ on the developmental processes” (p. 54), i.e. poverty (Overstreet & Braun, 1999), learning disabilities (Margalit, 2004; Meltzer, 2004; Miller, 2002), and the interaction of ethnicity and underachievement (Gonzalez & Padilla, 1997) to name a few. On the other hand, buoyancy deals with the academic setbacks and challenges that are typical of the ordinary course of school life (e.g., poor grades, competing deadlines, exam pressure, difficult school work). With this distinction, it can be inferred that buoyancy is experienced by more students than resilience because of the very fact that the academic setbacks and challenges here is ‘typical’. And because resilience deals with ‘extreme’ setbacks and challenges, it is confined to the relative few who experience such (Martin & Marsh, 2007).

The present study adapted academic buoyancy which was proposed by Martin and Marsh (2007) where it is defined as “the ability to successfully deal with academic setbacks and challenges that are typical of the ordinary course of school life” (p. 54).

The study of Marsh et al. (2010) investigated whether or not the 5Cs-confidence (assessed via self-efficacy), coordination (planning), commitment (persistence), composure (low anxiety), and control (low uncertain control) - persist over time. These are the tentatively identified five motivational predictors of academic buoyancy. The Martin et al. (2010) study investigated 1,866 high school students from six Australian high schools in two years. Almost one-third (29%) of the respondents were in Grade 7 at Time 1 and Grade 8 at Time 2. There were 24% in Grade 8 at Time 1 and Grade 9 at Time 2; 23% were in Grade 9 at Time 1 and Grade 10 at Time 2; 18% were in Grade 10 at Time 1 and Grade 11 at Time 2; and 6% were in Grade 11 at Time 1 and Grade 12 at Time 2. The students came from families within a range of middle-class (predominantly) to upper- middleclass to high social economic status. Structural Equations Model (SEM) tested the hypothesized model confirmed that 5Cs were significant predictors of subsequent academic buoyancy of the high school students. Also, the findings revealed that across a larger number of students, year levels and schools, and after controlling for prior variance in academic buoyancy, motivation factors seem to play a significant role in students’ capacity to effectively deal with academic challenges and setbacks (Barnett, 2012). Results yielded that the 5Cs were significant predictors of academic buoyancy.

Another study was conducted by Marsh and Martin (2007) where 598 students in Years 8 and 10 from five Australian high schools were asked to rate their academic buoyancy in the area of Mathematics half-way through the school year and at the end of the school year (two times). There were five hypothesized predictors, namely: (1)

Self-Efficacy, (2) Uncertain Control, (3) Academic Engagement, (4) Anxiety, and (5) Teacher-Student Relationship. (These factors were adapted by the present study.) This study's most striking feature is the relative salience of anxiety in the model - explaining by far the bulk of variance in the context of the other predictor factors. Marsh and Martin notes that "this is something of a new finding in that it does not appear that anxiety has been considered in previous resilience-related research and suggests a powerful factor in explaining students' academic buoyancy" (p. 72).

Lastly, the study of Barnett (2012) investigated how profiles of buoyancy in the domains of English and Mathematics changed over the course of an academic year, and how they ultimately affect students' academic achievement in those domains. There were a total of 153 ninth and tenth grade female high school students attending an urban, private, high school in the metropolitan New York City area which were asked to answer a web-based survey four times during the 2009-2010 academic year. Students were asked to complete the measures twice, once in reference to their English class and once in reference to their Mathematics class, four times. The study revealed that students considered to be the most academically buoyant obtained the highest grades.

From these studies of Martin et al. (2010), Marsh and Martin (2007), and Barnett (2012), we could draw pertinent conclusions on the basis of the present study: (1) They measure the academic buoyancy of the students of developed countries, i.e. United States and Australia, and (2) the measurement of buoyancy is either generalized (or that which broadly apply to all academic subjects) or domain-specific (or that which apply for a specified subject, e.g. English, Mathematics, etc., and (3) the respondents in all of these studies are students from basic education programs. Taking into consideration these two, it could further be inferred that (1) there appears to be no scale that measures the academic buoyancy appropriate in the context of Filipino students (or students from a developing country). Furthermore, (2) there is no scale that is program-specific or a scale that measures the academic buoyancy of students which are enrolled to specific higher education program.

Therefore, this study developed an academic buoyancy scale that is (higher education) program-specific. This is for the reason that in the previous studies on academic buoyancy was limited for higher education students given the fact that they too experience academic setbacks and challenges. Educational researchers have demonstrated the need to differentiate between math and verbal domains (Marsh & Martin, 2007).

### Selecting the Program

The higher education program was selected based on the population statistics available from the Commission on Higher Education (CHED). The CHED reports that in A.Y. 2011-2012 (latest available statistic), the program/ discipline/ field of study that gets the highest share in the 3,033,967 population of higher education students in the country is Business and Accountancy (and other related programs) programs. A total of 840,192 or 27.69% of the bulk was enrolled in Business and Accountancy programs. (It should be noted that either of the two contains accounting courses/subjects.) This is to say the present study attempts to investigate the academic buoyancy of the

higher education students who constitute the biggest percentage in the total population of higher education students in the country. Several studies have shown that students are less-motivated or display anxiety in mathematics-related subjects (Bong, 1996; Marsh, Martin & Debus, 2002; Pintrich, 2003; Zimmerman, 2001). Hence, students who major in accountancy much likely are less-motivated, display anxiety, and suffer from academic challenges akin to these ones. Accountancy seems to be a program in which a number of students experience these kinds of academic setbacks and challenges which would bring into consideration the issue of academic buoyancy. This study will therefore focus on accountancy.

There have been studies that showed how accounting students cope up with stress and academic setbacks. Endler and Parker (1990) theorized three coping strategies, where one has two subordinate factors: (1) task-oriented coping, (2) emotion-oriented coping, (3) and avoidance-oriented coping which can also be further split into (a) social diversion avoidance-oriented coping and (b) distraction avoidance-oriented coping. In the same way, in the study of Lim, Tam, and Lee (2013) found that that university (accounting) students, regardless of gender, ethnicity and nationality may encounter numerous stressors in their student life. They further found out that (Lim, Tam, & Lee, 2013, p. 03)

“The perceived stress may vary from meeting deadlines to reaching expectations and coping in a new environment. Research of present study proved that perceived stress, coping capability and general health are interrelated. Hence, it is essential to raise awareness among parents, educators and people from all walks of life to provide constructive strategies to ensure that the needs of these students are met. In addition, as coping capability are important in moderating stress and general health, every possible action should be taken to enhance the coping strategy of students.”

Redwan et al. (2009) suggested that universities should provide students with programs that help them to identify effective stress management strategies. Time management seminars, counseling services and healthy co-curricular activities can well be implemented in the university to help students reduce their stress. Lim, Tam, and Lee, (2013) proposed that a well-organised buddy system could also be implemented whereby each student is assigned a mentor to guide and advise them when they face stressful problems. In addition, lecturers in the university can also help students reduce their stress by providing them with additional coaching in their studies.

The present study uses the factors of buoyancy proposed in the study of Marsh and Martin (2007) to develop items, namely: (1) Self efficacy (students' belief and confidence in their ability to understand or to do well in their schoolwork, to meet challenges they face, and to perform to the best of their ability); (2) Uncertain control (students' uncertainty about how to do well); (3) Anxiety (pertains to both feeling nervous or the uneasiness students get when they think about their schoolwork or exams, and feeling worried or the fear to not doing very well in their schoolwork or exams); (4) Academic engagement (includes persistence, enjoyment of school, class participation, educational aspirations, and valuing of school); and (5) Teacher-student

relationships (pertains to students' perceptions of how they get on with their teacher and their teacher's regard for them).

The purpose of the study is to (1) develop new items of academic buoyancy which measure the academic buoyancy of accounting students (2) determine the internal consistency of these items using Cronbach's alpha., (3) prove the four factors of bouyancyfor accounting students using Confirmatory Factor Analysis (CFA).

## **Methods**

### **Participants**

The Accountancy Academic Buoyancy Scale was administered to 300 Accountancy students from one university in Manila, Philippines. The participants were randomly selected male and female whose ages range from 17 to 22 years old.

### **Instrument**

There are a total of fifty items which were developed based on the factors set in the model of Martin and Marsh (2007), namely: (1) Self-efficacy, (2) Uncertain control, (3) Academic Engagement, (4) Anxiety and (5) Teacher-Student relationship. There were 10 items that were developed in each factors.

The development of the items started with the determination of conceptual framework or theory. After which, the factors were determined and adopted from an existing study. Then, a table of specifications which is the blue print of the scale was designed as a basis for the distribution of items to the specific factors. After which, the type of response format was determined, (5-point Lickert scale).Then, the items were constructed; and, after the test was completed it was pre-tested for gathering of data to establish its validity and reliability.

The item review process or the content validity started with the submission of the constructed items to the item reviewer. The item reviewer who is an expert on scaling theory accepted some items, rejected a few, and suggested many revisions to the rest of the items. After which, the items were reviewed by the researchers and made the revisions. Then it was submitted again to the item reviewer for final revisions.

### **Procedure**

The researchers have given first the letter to the Dean of the College of Accountancy of one university in Manila. There were 300 Accountancy students in random year levels from these universities who answered the scale. At first, respondents were informed that they will be answering a scale that corresponds to their ability to successfully deal with academic setback and challenges and it was been said to them that the test items were taken from the five factors of academic buoyancy namely: (1) Self-Efficacy, (2) Uncertain Control, (3) Academic Engagement (4) Anxiety and (5)Teacher-student relationship. Afterwards, the copies of the scale were distributed to the respondents. The instruction in answering the test was indicated on the top part of the copies of the scale and it was also explained to them

verbally before answering. The respondents were asked to fill in necessary information which are asked in the copies. Students were asked if they have some clarification. They answered the scale for 30 minutes. When everybody was through with answering the scale, the purpose of the pretesting will be reiterated to them.

### Data Analysis

After pretesting, the data gathered were subjected to two major statistical treatment, namely: reliability and validity analysis. Under reliability, to establish the internal consistency of the items, the Cronbach's alpha was obtained. Under validity, at least three validity measures were considered. First is the content validity. This happened when an expert on the subject of the study was consulted to review the items that were constructed. The expert suggested revisions on some items and accepted some items as well. The second is convergent validity were each of the factors were correlated to each other. The last validity measure is the construct validity specifically the Confirmatory Factor Analysis (CFA). This is intended to measure the goodness of fit of the items vis-à-vis the factors from which these items were drawn.

### Results

The reliability of the scale was assessed using Cronbach's alpha. The coefficient alpha determined the internal consistency of the 50 items as a whole and for each items (60 items each). The construct validity of the scale was first assessed using convergent validity by intercorrelating the five-factor model with the one-factor model.

Table 1  
*Means, Standard Deviation, Kurtosis, Skewness, Variance, CI+, and CI-*

Factors	M	SD	Kurtosis	Skewness	CI+	CI-	Cronbach's Alpha
Whole Scale	3.21	0.29	-0.23	0.23	3.24	3.17	.81
Self-Efficacy	4.02	0.41	-0.31	-0.01	4.07	3.98	.75
Uncertain Control	3.20	0.75	-0.26	0.25	3.30	3.12	.92
Anxiety	4.03	0.41	1.18	-0.70	4.08	3.98	.59
Academic Engagement	2.68	0.90	-0.46	0.11	2.80	2.59	.94
Teacher-Student relationship	2.10	0.54	-0.49	0.014	2.16	2.40	.79

The descriptive statistics of the five subscales of the ABS-A was determined. The mean values are within a moderate range except for Self-Efficacy and Anxiety which are high (a total of 5-point scale). Standard deviations of the scores were minimal except for Academic Engagement which is 0.90 indicating wide dispersion of the scores.

The overall internal consistency of the scale using the Cronbach's alpha is .81 indicating high internal consistency of the items. With regard to the subscales, Uncertain Control and Academic Engagement indicated high internal consistency with values of .92 and .94 respectively. While Self-Efficacy, Anxiety, and Teacher-Student Relationship indicated moderate internal consistency with values of .75, .59, and .79 respectively.

Table 2  
*Intercorrelations of the Factors of the A-ABS*

Factors	1	2	3	4	5
(1)Self-Efficacy	---				
(2)Uncertain Control	.97*	---			
(3)Anxiety	.88*	.96*	---		
(4) Academic Engagement	.75*	.87*	.95*	---	
(5)Teacher-Student Relationship	.61*	.75*	.87*	.96*	---

\* $p < .05$  \*\* $p < .01$

When the subscales of the ABS-A were intercorrelated, significant correlations and positive magnitude indicates the convergence of the subscales. A high score in one subscale increases the scores in the other subscales.

The factor structure of the ABS-A was tested using the Confirmatory Factor Analysis (CFA). The five-factor structure proposed by Martin and Marsh (2007) was compared to a one-factor structure. This was done to determine which factor structure best fits the data. The five-factor structure was composed of five factors, namely: (1) Self-Efficacy, (2) Uncertain Control, (3) Academic Engagement, (4) Anxiety, and (5) Teacher-Student Relationship. In the one-factor model, all items were combined in one latent variable.

To determine which solution explains best the factors of the ABS-A, the goodness of fit indices were compared. The five-factor model structure of the ABS-A turned out to have the best fit compared to the one-factor model. The fit indices of the five-factor structure where the subscales are treated in separate latent variables had the best fit across several indices. The model proposed in the paper had the highest GFI with 0.616 compared to 0.391 of the one factor model; highest AGFI with 0.579 compared to 0.321. The fit indices Independence Model Chi Square, Independence Model df, Bentler-Bonett Normed Fit Index, Bentler-Bonett Non-Normed Fit Index, Bentler Comparative Fit Index, James-Mulaik-Brett Parsimonious Fit, Bollen's Rho, and Bollen's Delta have values that indicate that the items are good fit for the five-factor model. The proposed model also indicated the lowest RMSEA (see Table 3).

The five-factor structure explained the most adequate solution to fit the data supporting the factors proposed by Martin and Marsh (2007) where the Akaike Information Criterion, in particular, yielded 13.433 in the five-factor model was comparably lower than 23.65 of the one-factor model; the Schwarz's Bayesian Criterion with 14.796 as opposed to 24.89 of the one-factor model; and with Browne-Cudeck Cross Validation Index, 13.58 was yielded in five-factor model as opposed to 23.79 in the one factor model. These fit indices indicate goodfit of items in the five-factor model.

**Table 3***Fit Indices of the Different Measurement Model for A-ABS*

	Five Factor Model	One Factor Model
JoreskogGFI	0.616	0.381
JoreskogAGFI	0.579	0.328
Akaike Information Criterion	13.433	23.65
Schwarz's Bayesian Criterion	14.796	24.89
Browne-Cudeck Cross Validation Index	13.585	23.79
Independence Model Chi Square	9343.87	9343.87
Independence Model df	1225.00	1225.00
Bentler-Bonett Normed Fit Index	0.594	0.265
Bentler-Bonett Non-Normed Fit Index	0.659	0.268
Bentler Comparative Fit Index	0.676	0.298
James-Mulaik-Brett Parsimonious Fit	0.565	0.254
Bollen's Rho	0.573	0.233
Bollen's Delta	0.678	0.303
Population Gamma Index	0.681	0.177
RMSEA	0.100	0.405

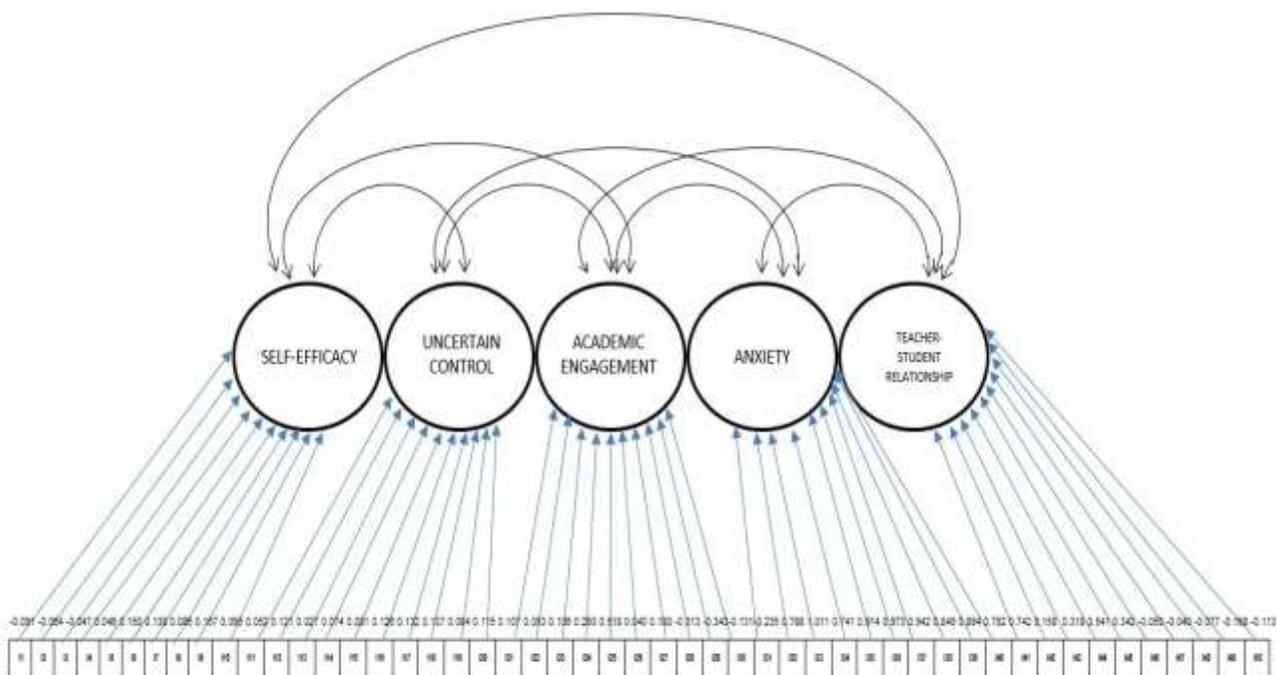


Figure 1. Five-factor model of A-ABS

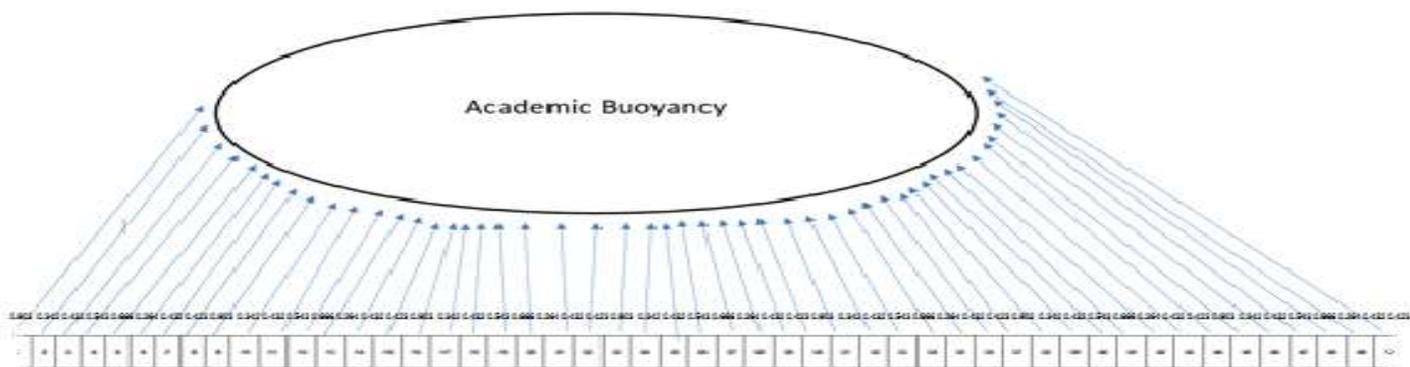


Figure 2. One-factor model of A-ABS

## Discussion

The main purpose of the study is to develop items that would measure the academic buoyancy of accounting students where the items are based on the factors of academic buoyancy proposed by Martin and Marsh (2007). The items have yielded adequate evidence of reliability and validity. The instruments are reliable where the items are internally consistent based on high values of the Cronbach's alpha. The items were also evidenced to be valid having attained convergence of the five factors. Factorial validity was established where a five-factor structure was compared with a one-factor structure. The five-factor structure explained the most adequate solution to fit the data supporting the factors proposed by Martin and Marsh (2007) where the Akaike Information Criterion, in particular, yielded 13.433 in the five-factor model was comparably lower than 23.65 of the one-factor model; the Schwarz's Bayesian Criterion with 14.796 as opposed to 24.89 of the one-factor model; and with Browne-Cudeck Cross Validation Index, 13.58 was yielded in five-factor model as opposed to 23.79 in the one factor model. These fit indices indicate goodfit of items in the five-factor model.

The high internal consistency with the Cronbach's alpha of .81 among the items indicates that there is a similarity how the respondents answer each items within each subscales. The items are the same in reference to academic buoyancy. The participants while answering each item have in mind that their academic buoyancy as accounting students is what is being measured. This evidence of internal consistency implies that there is a marked coherence among the items for a given factor. This coherence served a basis for considering the reliability of the items. In Martin and Marsh's study, high internal consistency was also achieved with .89 which is a little higher than .81 which was achieved in the present study. When it comes to respective factors, Martin and Marsh's study achieved higher Cronbach's alpha than the present study with .83 for self-efficacy, .80 for uncertain control, .84 for anxiety, .87 for academic engagement, and .88 for teacher-student relationship. All of these values signify high internal consistencies while the values achieved in the present study signify moderate to high internal consistency with Cronbach's alpha of .59 for anxiety. (no explanation on why the differences occurred)

The significant intercorrelation among the factors showed that as one subscale increases, the others also increases. This evidence of convergent validity showed that the five factors have a commonality and that they actually measure the academic buoyancy of accounting students. The convergence of the factors was further proven in the results of the Confirmatory Factor Analysis (CFA). This means that factors proposed by Martin and Marsh (2007) which were adapted in this study are valid factors and not as predictors of academic buoyancy. These results were consistent with the prior studies on academic buoyancy by Martin et al. (2010), Marsh and Martin (2007), and Barnett (2012). The results show that academic engagement increases with self-efficacy which means that the one necessary predicts the other. This means that when the academic engagement of the student is high, it goes to say that his self-efficacy is high too.

Having established the reliability and the validity of the items of ABS-A, it is therefore warranted to conclude that when, after answering the scale, an accounting

student made low ratings (<3 means) on the items which are loaded in the self-efficacy, academic engagement, and teacher-student relationship; and made high ratings (>3 means) on the items which are loaded in uncertain control and anxiety, the student is likely to have low academic buoyancy. That means that they tend to have difficulty in overcoming well the academic challenges and setbacks that are typical of his life as an accounting student. On the other hand, if an accounting student obtained high ratings (>3 means) on the items which are loaded in the self-efficacy, academic engagement, and teacher-student relationship; and made low ratings (<3 means) on the items which are loaded in uncertain control and anxiety, the student tends to have high academic buoyancy. That means that they tend to overcome well the academic challenges and setbacks that are typical of his life as an accounting student.

It is noteworthy that the present study yielded reliable and valid set of accounting specific items. The selection of accountancy as the specific program whose students' academic buoyancy was measured is in line with the several studies that suggested the need to separate language from mathematical domains in educational research (Martin & Marsh, 2007). Research have shown that the students who study mathematics-based domains or fields of study like accounting students are less-motivated or most often display anxiety (Bong, 1996; Marsh, Martin & Debus, 2002; Pintrich, 2003; Zimmerman, 2001). The present study filled this gap by constructing items that are reliable and valid which measure the academic buoyancy of accounting students.

Since the researches in academic resilience - from which buoyancy was derived - has been domain-general, most of academic buoyancy researches has followed such approach. Until Martin and Marsh (2007) shifted from domain-general to subject-specific. Martin and Marsh (2007) has their study on buoyancy specific to Mathematics subject of basic education students. The present study, on the other hand, introduced a new concept in the academic buoyancy research. This new concept is called program-specific approach. This study successfully tested items which measures the academic buoyancy of students of a specific tertiary program, which is accountancy, using the same factors used by Martin and Marsh (2007) in their subject-specific study.

Future researchers in academic buoyancy can test models following program-specific domains. They are encouraged to develop items which will specifically measure the academic buoyancy of other disciplines such as for law students, engineering students, medicine students, etc.

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## The Development of Motivation and Engagement Scale for College Students

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The purpose of the study is to develop items for the Motivation and Engagement Scale for college students based on Andrew Martin's model (2007). The Motivation and Engagement Wheel categorized 11 factors into four factors which are Adaptive Behavioral, Maladaptive Behavioral, Adaptive Cognitive, and Maladaptive Cognitive. Each factor has its own subfactors. These subfactors are 11 in total namely: (1) Persistence, (2) Planning, (3) Study Management, (4) Anxiety, (5) Failure Avoidance, (6) Uncertain Control, (7) Self-Handicapping, (8) Disengagement, (9) Self efficacy, (10) Mastery Orientation, and (11) Valuing of School. The scale was pretested to 300 college students from different universities in Manila. The scale's reliability using Cronbach's alpha are: .87 for the whole scale, .74 for Persistence, .84 for Planning, .74 for Study Management, .88 for Anxiety, .69 for Failure Avoidance, .89 for Uncertain control, .90 for Self-Handicapping, .88 for Disengagement, .86 for Self-Efficacy, .78 for Mastery Orientation and .84 for Valuing of School which indicate a moderate to high internal consistency. Convergent validity was also attained where the eleven factors were all significantly correlated. Construct Validity using the Confirmatory Factor Analysis (CFA) was conducted and showed that the data fit the hypothesized measurement model. The items also indicate good fit in 12 fit indices measured.

**Keywords:** *Motivation, Engagement*

# M

otivation and engagement are crucial in the learning process. Motivation and engagement can be respectively conceptualized as individuals' energy and drive to achieve to their potential and the behaviors that follow from this energy and drive (Martin, 2008). Motivation has been shown consistently to strengthen the ability of students to concentrate on school work and consequently with achievement, while its absence is associated with disengagement from learning behaviors and failure in school.

According to the psychological perspective of student engagement, motivation and engagement are closely intertwined. The former comprises private, psychological and unobservable factors, and the latter comprises publicly observable behavior (Reeve, 2012). Martin (2007) argued that although ideas may differ as to which factors are deemed motivation factors as opposed to engagement factors, there appears to be broad agreement that motivation is a basis for subsequent engagement. For this reason, Martin (2012) suggested using the Motivation and Engagement Wheel as an integrative and parsimonious approach to conceptualizing student engagement. The wheel aims to bridge the gap between diverse theoretical perspectives about motivation and engagement, such as expectancy-value, attribution and goal orientation theory. It also provides practitioners (e. g., educators, counselors and psychologists) with a parsimonious framework that they can apply to their practice and clearly communicate to students.

Student performance is greatly influenced by their motivation and engagement in the learning process. There is a wide range of theories that focus on specific motivational constructs, such as, self-efficacy (Bandura, 1997), need for achievement and self-worth (Atkinson, 1964), attribution and control (Skinner, Wellborn, & Connell, 1990; Weiner, 1985), expectancies and values (Ryan & Deci, 2000; Wifield & Eccles, 2000) and achievement goals (Ames, 1992). Martin recognized this limitation and developed his model (2001, 2003). He argued that students exhibit many attitudes and behaviors toward learning and that simply assessing one of the motivational constructs does not necessarily reflect their overall style or level of motivation. He developed the Student Motivation and Engagement Wheel which incorporates the core themes of the major theories to capture the complexity of academic motivation more adequately. His model reflects the significant commonalities across various theories and models of motivation that include: (a) cognitive and behavioral components (Pintrich & DeGroot, 1990), (b) strategies and behaviors driven by individuals' characteristics orientations and cognitions (Buss & Cantor, 1989), (c) approaches to engagement emphasizing the effects of cognitive change on behavioral change (Beck, 1995), (d) categorization of engagement into cognitive, affective, and behavioral dimensions (Miller et al., 1996; Miserandino, 1996) and (e) assessments of differential effects and strength of distinct aspects of motivation and engagement, such as, self-efficacy reflecting highly adaptive motivation (Bandura, 1997) anxiety impeding students' engagement (Sarason & Sarason, 1990) and self-handicapping reflecting maladaptive engagement (Martin, Marsh, & Debus, 2001). The wheel is conceptualized into two levels: The integrative higher-order level comprising four factors (Adaptive cognitive dimensions, Adaptive behavioral dimensions, Maladaptive behavioral dimensions, Impeding/maladaptive cognitive dimensions); and the lower-order comprising 11 factors (self-efficacy, valuing, mastery orientation, planning, study management, persistence, anxiety, failure avoidance, uncertain control, self-handicapping, and disengagement).

Martin (2007) argued that the eleven subfactors provide an adequate basis that are required to assess the complexity of motivation and engagement in educational practice, he also claimed that the second-order conceptualization with four dimensions of motivation and engagement aims at enhancing parsimony, providing a unifying approach to educational and psychological theory and increasing the

prospects of understanding the basic structure of students' motivation and engagement from an applied perspective. Martin proposed that the four second-order groups include adaptive cognitions (self-efficacy, value on school and mastery orientation), adaptive behaviors (planning, study management and persistence), impeding cognitions (anxiety, failure avoidance and uncertain control) and maladaptive behaviors (self-handicapping and disengagement). The factor analysis of responses of 12,237 high school students from 38 Australian high schools provided empirical support for this two level model (Martin, 2007) suggesting a clear picture of how and why students think and behave in particular ways towards school and learning.

A study by Lu et al. (2013) explored the motivation and engagement of undergraduate Chinese students. They found that students' academic engagement significantly facilitated their development of intellectual skills. Moreover, in a 2015 study in China conducted with a sample of 1,131 Chinese students from 10 full-time universities in Beijing, it shows that the Motivation and Engagement Scale for university/college students is a promising and valid instrument for assessing student engagement in Chinese universities. The study explored the issue of Chinese undergraduate student engagement through the use of the Motivation and Engagement Scale for University/College Students (MES-UC). In Martin's (2007, 2012a) Motivation and Engagement Wheel, the ideal engaged student is expected to score high on the six adaptive factors and low on the five maladaptive factors. The MES profile for the Chinese undergraduate students revealed in the 2015 Chinese study was generally consistent with this expectation, seemingly echoing the finding of Lu et al. (2013) that a 'lack of engagement' hardly exists for Chinese undergraduates. The details of the MES profile showed that although Chinese undergraduates achieved higher scores for the six adaptive factors, their performance on the maladaptive motivation and engagement factors was not as low as expected. Moreover, the study's results revealed some characteristics and individual differences in students' motivation and engagement, and should help develop an understanding of the quality of teaching of learning in Chinese higher education institutions (Yin, 2015). The results of the said study showed that both first-order models (i. e., the 4- and 11-factor models) fit the data well, and that nine of the eleven first-order factors had acceptable reliabilities. These results supported the psychometric qualities of the MES-UC, indicating that it could be useful to incorporate the MES-UC into research related to student engagement in higher education.

Engagement is a complex and multifaceted construct comprising three dimensions, including behavioral, emotional and cognitive engagement (Fredricks, Blumenfeld, & Paris, 2004; Hagel, Carr, & Delvin, 2012). Behavioral engagement focuses on the extent to which students become involved in academic, social and extracurricular activities. Emotional engagement refers to students' affective responses to their teachers, classmates, academics and institutions. Cognitive engagement relates to students' mental investment, which incorporates thoughtfulness and a willingness to exert the effort necessary to comprehend complex ideas and master difficult skills. In this sense, engagement can be seen as an overarching meta-construct that attempts to integrate the diverse lines of research that help explain student success (Kahu, 2013).

Students must be involved in useful and productive activities determined by educators and guided by governmental policy or societal expectations. Results of empirical studies have repeatedly shown that students' engagement in educationally purposeful activities is positively related to their grades, critical thinking skills and persistence between the first and second year of college (Carini, Kuh, & Klein, 2006; Kuh et al., 2008). So, to help shape policy and practice, student engagement research must explore how engagement varies across student group demographics and how it changes over time.

Psychological theories and research on motivation and learning suggest that motivation does not only refer to student attributes such as attitudes and effort. Instead, differences in motivation may arise from different sets of experiences. This study, therefore, aims to identify these experiences and tell whether such (e. g. learning environment and influences) will help students in their motivation and engagement aspects in learning and schooling. This can be proved through the data gathered such as the College Grade Point Average (CGPA). The study is to prove whether factors of engagement and motivation can predict the students' attainment of good grades and affect the students' motivation and engagement in achieving quality performances in school.

The present study developed new items for the Motivation and Engagement Scale for college students using Andrew Martin's model. This study seeks to examine a multidimensional model of student motivation and engagement using the same lower order constructs from Martin's model, and data derived from an additional source which is the individual respondents' CGPA for the measure of their achievement on the previous semester they took. Educational researchers have demonstrated the need to conduct research that examines the same constructs using data derived from additional 'objective' sources such as achievement measures. Importantly, Martin (2003) has previously shown among high school students, using a subset of the Wheel's scales and items, that key dimensions are significantly related to grade point average. With an increase in the range of associated data, the researchers may fully and confidently understand individual's motivation.

## **Method**

### **Participants**

The Motivation and Engagement Scale was administered for pre-testing to 300 college students from different universities and colleges in the National Capital Region. The participants were 152 male and 148 female whose ages range from 16 to 28 years old.

### **Instrument**

The Motivation and Engagement Scale of the present study used the conceptual definitions of the different factors and constructs anchored on the Motivation and Engagement Wheel by Martin (2007). This scale is an instrument that measures college students' motivation and engagement. The scale developed consisting of 55 items.

The developed items were distributed to 11 factors, namely: (1) Valuing of School, (2) Mastery Orientation, (3) Self-efficacy, (4) Disengagement, (5) Self-handicapping, (6) Uncertain Control, (7) Failure Avoidance, (8) Anxiety, (9) Study Management, (10) Planning, (11) Persistence, as indicated in the Motivation and Engagement Wheel by Martin (2007). Items were distributed to the specific factors. Each of the 11 factors comprises five items, hence it is a 55-item instrument. For each item, the students rate themselves on a scale either 1 (Never), 2 (Seldom), 3 (Sometimes), 4 (Often), and 5 (Always). The items constructed were reviewed by an expert in the field of Educational Psychology. After which, the researchers revised the poorly constructed-items based on the revision suggestion to develop appropriate items for the scale. After the scale was completed, it was pre-tested to establish its validity and reliability.

### **Procedure**

The respondents who answered the Scale are college students from different universities in the National Capital Region. First, the respondents were informed that they will be given a questionnaire on motivation and engagement adapted from Martin's model of Motivation and Engagement. Then, the scale was distributed to each of the respondents. The instruction in answering the scale was indicated and it was also explained to them verbally before answering. The instruction included that answers will be written on the answer sheet and the respondents are prohibited to write anything on the questionnaires. Students who have questions for clarifications must raise their hand and one member from the group of researchers will answer the inquiry. The participants answered the scale for 45 minutes. When everybody completed answering the scale, the purpose of the pretesting was reiterated to them.

### **Data Analysis**

After the pretesting, the responses of the participants on the scale were tabulated using a spreadsheet. The data collected were used to determine the validity and reliability analysis for the motivation and engagement scale. For the descriptive statistics, the means, standard deviation, kurtosis, skewness, class interval was obtained. To test the reliability of the scale, the researchers established the internal consistency of the items using the Cronbach's alpha. To test the validity of the scale, the researchers utilized four validity measure: (1) Content validity in which items were examined and revised with the help of an expert; (2) Convergent validity in which the three eleven-factor of the scale were correlated to each other. (3) To establish the Construct validity, the researchers have used Confirmatory Factor Analysis with RMS, RMSEA, McDonald, Population Gamma Index, CFI and GFI as the fit indices to determine if the scale were able to attain its goodness of it. (4) Predictive Validity was used to where the motivation and engagement factors were used to predict CGPA.

## Results

The reliability of the scale was assessed using the Cronbach's alpha. The coefficient alpha determined the internal consistency of the 55 items as a whole and for each factor (5 items each). The construct validity of the scale was first assessed using convergent validity by intercorrelating the eleven proposed factor. All the factors have been correlated with the CGPA to determine the predictive validity. The factor structure of the scale was also tested by comparing the four-factor model with a one-factor model.

Table 1  
*Descriptive Statistics*

Domain	Total #	M	SD	Kurtosis	Skewness	CI+	CI-	Cronbach's Alpha
Persistence	5	4.13	0.63	-0.92	-0.33	4.25	4.06	.74
Planning	5	4.15	0.67	0.06	-0.84	4.23	4.15	.84
Study	5	4.10	0.62	0.06	-0.70	4.17	4.03	.74
Management								
Anxiety	5	3.25	1.00	-0.51	-0.50	3.36	3.13	.88
Failure	5	3.14	0.89	-0.70	-0.44	3.24	3.04	.69
Avoidance								
Uncertain control	5	2.94	0.96	-0.86	-0.20	3.04	2.83	.89
Self-handicapping	5	2.42	1.05	-0.60	0.55	2.54	2.30	.90
Disengagement	5	2.34	1.04	-0.56	0.56	2.46	2.22	.88
Self-efficacy	5	4.05	0.73	-0.51	-0.40	4.13	3.97	.86
Mastery	5	3.90	0.67	-0.20	-0.34	3.96	3.82	.78
Orientation								
Valuing of School	5	4.46	0.58	1.52	-1.20	4.53	4.40	.84

The descriptive statistics of the 11 subfactors of the Motivation and Engagement was determined. The mean values are within a moderate range (a total of 5-point scale). Standard deviations of the scores were minimal except for Self-handicapping which is 1.05 indicating wide dispersion of the scores.

The overall internal consistency of the scale using the Cronbach's alpha is .87 indicating high internal consistency of the items. With regard to the factors, all of the items have high internal consistency value. An item lower than .6 has low internal consistency.

Table 2  
*Intercorrelation of Subfactors for Motivation and Engagement*

Variables	PR	PL	SM	A	FA	UC	SH	D	SE	MO	VS
Persistence	---										
Planning	.51*	---									
Study Management	.50*	.69*	---								
Anxiety	-.02	-.12*	-.11	---							
Failure Avoidance	-.01	-.20*	-.13*	.53*	---						
Uncertain control	-.10	-.29*	.20*	.61*	.49*	---					
Self-handicapping	-.06	-.28*	-.16*	.31*	.37*	.63*	---				
Disengagement	-.05	-.28*	-.15*	.44*	.40*	.63*	.74*	---			
Self-efficacy	.23*	.51*	.49*	.14*	-.04	-.31*	-.27*	-.29*	---		
Mastery Orientation	.55*	.62*	.53*	-.07	-.10	-.19*	-.11	-.12*	.62*	---	
Valuing of School	.15*	.37*	.31*	-.09	-.09	-.36*	-.40*	-.33*	.49*	.45*	---

Zero order correlations were conducted among the 11 factors of motivation and engagement. Convergence was expected among the subfactors of adaptive behavioral, among the subfactors of adaptive cognitive, among the subfactors of maladaptive behavioral, and among the subfactors of maladaptive cognitive. This was fully supported in the results of the correlations where the coefficient values are all significant and the directions are all positive. Divergence was expected between the subfactors of maladaptive behavioral and cognitive with the subfactors of adaptive behavioural and cognitive. This was partly proven in the results of the correlations. When the subfactor planning was correlated with the subfactors of maladaptive cognitive and behavioral, the divergence was proven because all the correlation values are significant with negative directions. In the study management, however, its correlations between the maladaptive cognitive and maladaptive behavioral prove the divergence except between study management and anxiety with an insignificant value; and between study management and uncertain control with a positive direction. In the correlations between uncertain control and the subfactors of adaptive cognitive, the divergence was also proven because of the significant values attained with negative directions. When self-handicapping was correlated between the subfactors of adaptive cognitive, it was proven that there is divergence except with the subfactor mastery orientation because of the insignificant value obtained. Disengagement, when correlated to the subfactors of adaptive cognitive, with all the significant values attained with negative directions, the divergence was proven. However, in the correlations between persistence and the subfactors maladaptive cognitive and behavioral, as well as failure avoidance between the subfactors of adaptive cognitive, there was no any correlation that can prove divergence because all the values obtained were not significant with negative directions.

The factor structure of the Motivation and Engagement was tested using the Confirmatory Factor Analysis (CFA). The four-factor structure was compared to a one-factor structure. This was done to determine which factor structure best fits the data. The four-factor structure was composed of (1) Adaptive Behavioral, (2) Maladaptive Cognitive, (3) Maladaptive Behavioral, and (4) Adaptive Cognitive. In the one-factor model, all indicators were combined in one latent variable.

The four-factor model of the Motivation and Engagement turned out to have the best fit compared to the one-factor model. The fit indices of the four-factor model for the AIC=0.878, SBC=1.225, BCCVI=0.886, RMS=0.075, and RMSEA=0.122 had attained lower values than the one-factor model.

The four-factor model was further supported with adequate fit indices for GFI=0.888, AGFI=0.806, IMCS=1608.041, IMdf=55.0, BNFI=0.872, BNF=0.843, BCFI=0.892, JMPBFI=0.602, Bollen's Rho=0.814, Bollen's delta=0.892, and PGI=0.907.

The subfactors under the latent factors: Adaptive Behavioral, Adaptive Cognitive, Maladaptive Behavioral and Maladaptive Cognitive are all significant. The relationship of these four latent factors are also significant.

Table 3

*Fit Indices of the Different Measurement Model for Motivation and Engagement*

	Four Factor Model	One Factor Model
Joreskog GFI	0.888	0.609
Joreskog AGFI	0.806	0.413
Akaike Information Criterion (AIC)	0.878	2.882
Schwarz's Bayesian Criterion (SBC)	1.225	3.154
Browne-Cudeck Cross validation Index (BCCVI)	0.886	2.888
Independence Model Chi-Square (IMCS)	1608.041	1608.041
Independence Model df (IMdf)	55.000	55.000
Bentler-bonett Normed Fit Index (BNFI)	0.872	0.493
Bentler-bonett Normed Fit (BNF)	0.843	0.377
Bentler Comparative Fit Index (BCFI)	0.892	0.502
James-Mulaik-Brett Parsimonious Fit Index (JMPBFI)	0.602	0.393
Bollen's Rho	0.814	0.364
Bollen's Delta	0.892	0.505
RMS	0.075	0.180
Population Gamma Index (PGI)	0.907	0.619
RMSEA	0.122	0.277

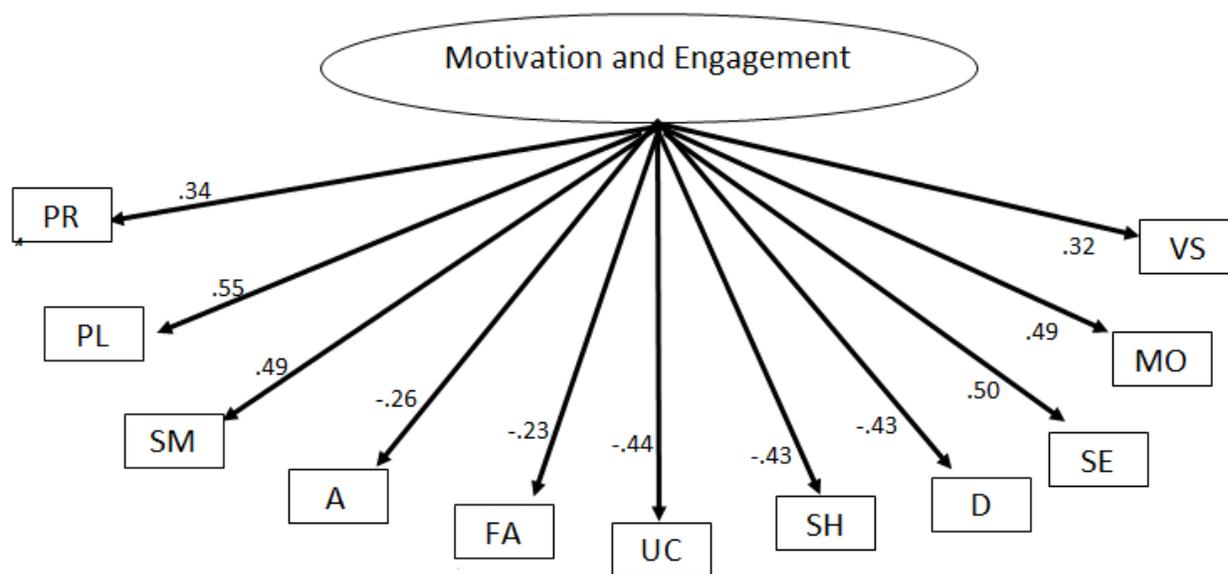


Figure 1. Four-Factor Model of Motivation and Engagement

Table 4  
Predictive Validity

N=300	Beta	Std. Err. Of Beta	B	Std. Err. of B	T(288)	p-level
Intercept			2.50	0.38	6.63	0.00
Persistence	0.53	0.07	-0.05	0.06	-0.73	0.46
Planning	0.19	0.09	0.16	0.07	2.19	0.03
Study Management	-0.00	0.08	-0.00	0.07	-0.08	1.00
Anxiety	-0.23	0.08	-0.13	0.04	-3.03	0.00
Failure Avoidance	-0.07	0.07	-0.04	0.04	-0.93	0.35
Uncertain control	0.10	0.09	0.05	0.05	1.08	0.28
Self-handicapping	0.20	0.09	-0.10	0.05	-2.26	0.02
Disengagement	0.21	0.08	0.11	0.05	2.41	0.02
Self-efficacy	-0.10	0.08	-0.07	0.06	-1.20	0.23
Mastery Orientation	0.28	0.09	0.24	0.07	3.20	0.00
Valuing of School	-0.08	0.07	-0.07	0.06	-1.10	0.27

Predictive validity was determined by calculating the contribution of the factors of the motivation and engagement items on the College Grade Point Average (CGPA). Each beta has a corresponding p-value. If p-value is less than .05, the

predictor is significant. The factors Planning, Anxiety, Self-Handicapping, Disengagement, and Mastery Orientation significantly predict CGPA.

### Discussion

The main purpose of the study is to develop items that would measure the motivation and engagement of college students where the items are based on the factors of motivation and engagement wheel proposed by Martin (2007). It includes determining the role of motivation and engagement scale administered by the researchers for college students to the attainment of the learners' good grades and exemplary student performance at school. The four factors namely Adaptive Cognitive, Adaptive Behavioral, Maladaptive Cognitive and Maladaptive Cognitive were proven where the items constructed proved to adequately measure the motivation and engagement of college students.

The instrument is reliable where the items are internally consistent based on high values of the Cronbach's alpha. Nunnally (1978) has indicated 0.7 to be an acceptable reliability coefficient. The high internal consistency in the study with the Cronbach's alpha of .87 among the items indicates that there are similarities how the respondents answer each items within each factors. This evidence of internal consistency implies that there is congruency among each item for a given factor. This congruence served as a basis for considering the reliability of the items. The study obtained values of Cronbach's alpha of the 11 subfactors having 7 of which has good internal consistency namely Self-efficacy (.86), Valuing School (.84), Planning (.84), Anxiety (.88), Uncertain Control (.89), Self-handicapping (.90), and Disengagement (.88) while the other 3 subfactors of which were regarded as acceptable internal consistency: Mastery Orientation (.78), Study Management (.74), and Persistence (.74). The remaining subfactor of Failure Avoidance (.69) is marginal. In the previous study of Martin (2007), the obtained values of Cronbach's Alpha of each subfactor from the scale is to be generally concluded lower than our present study on Motivation and Engagement. For the Adaptive Cognitive, the value of Self-efficacy was .77, Mastery Orientation was .76 and Valuing of school was .81 which were all lower than the values obtained from the present study. The values of Cronbach's alpha of the two subfactors namely Disengagement and Self-handicapping was both .81 which are lower than our study. However, for the Adaptive Behavioral, two subfactors from Martin's study in 2007 obtained higher value of Cronbach's alpha: Persistence was .80 and Study Management was .82. Lastly, for Maladaptive Cognitive, only the subfactor Failure Avoidance from Martin's study obtained a higher value of Cronbach's alpha of .79 while the remaining subfactors Anxiety and Uncertain Control obtained .78 and .77, respectively, which are lower than the values obtained in the present study. Comparing the present study to Martin's in 2008, the previous study obtained values of Cronbach's alpha having 7 subfactors: Self-efficacy, Mastery Orientation, Planning, Persistence, Anxiety, Failure Avoidance and Uncertain Control which has acceptable internal consistency while four subfactors: Valuing of School, Study Management, Self-handicapping and Disengagement has good internal consistency. Martin's Cronbach's alpha results show higher internal consistency in two subfactors of Adaptive Behavioral namely Persistence and Study Management because of the difference in

terms of behavior between the Australian students and Filipino students. The year level also accounts for the given dissimilarity. Marvin's study used samples of students from the high school level—junior, middle and senior—while the present study had college students as participants. This was explained in the study by Martin (2009) revealing that high school students were generally more motivated and engaged than university students. There are also changes that can be drawn in terms of a range of institutional practices and student behavior related to learning and development, such as the time spent on tasks, teaching practices, student-faculty interactions and institutional requirements or services. Moreover, the subfactor Failure Avoidance from Maladaptive Cognitive also shows higher consistency compared to the results from the present study because as proven by the study of Martin (2010), the university students tended to score lower in terms of adaptive behavior and maladaptive motivation justifying the results given that the previous study—which made use of high school students who attained higher internal consistency in the subfactors Persistence, Study Management and Failure Avoidance from the factors Adaptive Behavioral and Maladaptive Cognition. Engagement varies across student group demographics and changes over time.

The items were regarded to be valid attaining convergence among the Adaptive Cognitive subfactors, among the Adaptive Behavioral, among Maladaptive Cognitive and among Maladaptive Behavioral. The convergence was proven by the results of the correlations where the coefficient values are all significant and the directions are all positive. Researchers also found that the subfactor persistence is not significantly related to most of the factors. In the other hand, divergence was only partly proven in the results of the correlations when the subfactors of maladaptive behavioral and cognitive; and the subfactors of adaptive behavioral and cognitive were correlated to one another. In the previous study, Martin (2008) found that all adaptive dimensions were significantly positively correlated and correlated markedly negatively with maladaptive dimensions and slightly negatively or at near-zero with impeding dimensions. Maladaptive dimensions were significantly positively correlated as were impeding dimensions.

Factorial validity was established where a four-factor structure was compared with a one-factor structure. The four-factor structure explained the most adequate solution to fit the data supporting the factors proposed by Martin (2007). Predictive validity was established by correlating student CGPA with the eleven factors in Motivation and Engagement Wheel by Martin (2007).

The present study's factor structure was tested using Confirmatory Factor Analysis (CFA). The four-factor structure obtained the best fit of data when compared to a one-factor structure proving that the four latent factors (Adaptive Behavioral, Adaptive Cognitive, Maladaptive Behavioral and Maladaptive Cognitive). The 11 latent subfactors (Self-efficacy, Mastery Orientation, Valuing of School, Persistence, Planning, Study Management, Disengagement, Self-handicapping, Uncertain Control, Failure Avoidance and Anxiety) has significant relationship among each other and subfactors. From this result, it is proven that it is the four-factor model which accounts for a type of model used that fit the data very well. However, when compared to the previous study by Martin (2008), the two models used—invariance across boys and girls; and invariance across junior, middle and senior high—also

yielded an excellent fit to the data. When successive elements of the factor structure were held invariant across year groupings, as well as invariant across boys and girls, the fit indices (Chi square, DF, CFI, NNFI, RMSEA) were quite comparable. This result indicates that there is relative invariance across all models suggesting that factor structure, factor loadings, uniqueness and factor correlations are much the same across the three year groupings and the gender groupings. Taken together, these data suggest in terms of underlying motivational factors and the composition of and relationships amongst these factors, junior, middle, and senior high school students, as well as, boys and girls, are not substantially different.

The present study has addressed the research gaps seen in the study of Martin (2008) where less than 5% of the data were missing in each sample leading to the implementation of the Expectation Maximization (EM) Algorithm, the most widely recommended approach to imputation for missing data. There were no any missing data based on the results gathered from the present study. Moreover, the items were proven having good and acceptable internal consistency and reliabilities fitting the respective factor and subfactor they belong to.

The present study had constructed items that measure and examine the same multidimensional model of students' motivation and engagement from the lower construct on Martin's model. All factors were given justification through the equally distributed good and acceptable items composed of 11 subfactors. Then, the researchers derived data on students' College Grade Point Average (CGPA) as a measure for their achievement based on previous semester. The gathering of the students' CGPA serves as the main data and basis of the researchers for the students' evidence of academic performance. The study wants to prove whether factors of motivation and engagement can predict the students' attainment of good grades and affect the students' motivation and engagement in achieving quality performances in school. Doing so, we will be able to identify the various needed adjustments to be done in terms of time spent on tasks, teaching practices, student-faculty interactions, institutional requirements or services and other purposive academic activities essential to students' learning and development.

The wheel was treated as a multidimensional construct which lead the researchers to an appropriate scale with good items for Filipino college students which will determine the students' level of motivation, engagement and performance at school. Viewing engagement as a complex and multifaceted construct comprising three dimensions, including behavioral, emotional and cognitive engagement, the scale itself was then characterized by its hierarchical dimensionality. The wheel aims to bridge the gap between diverse theoretical perspectives about motivation and engagement, such as expectancy-value, attribution and goal orientation theory. It also provides practitioners (e. g., educators, counselors and psychologists) with a parsimonious framework that they can apply to their practice and clearly communicate to students.

The contribution that this study is that the constructed scale is applicable to college or university students measuring their motivation and engagement. Since the results revealed some characteristics and individual differences in students' motivation and engagement, it addresses further understanding of motivation and engagement. From a sociocultural perspective, student motivation and engagement

are highly influenced by broader social and cultural contexts (Kahu, 2013; Martin, Yu, & Hau, 2014). From this perspective, students' motivation and engagement greatly emanate from the goals and norms presented in their broader social contexts. Moreover, motivation and engagement may be functions of practices in different educational contexts, even for students who share an ethnicity. Although some studies have considered the individual differences in student motivation and engagement, little consensus has been achieved. The possible differences caused by students' demographic and contextual backgrounds must be examined further.

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