Investigating the Effect of School Ability on Self-efficacy, Learning Approaches, and Metacognition

Carlo Magno
De La Salle University, Manila, Philippines
carlo.magno@dlsu.edu.ph

The relations among school ability, self-efficacy, learning approach, and metacognition were examined in a path model. Questionnaires measuring these constructs were administered to 194 Filipino college students. Path analysis was used to determine the effects of school ability on self-efficacy and learning approaches, and in turn, the effects of self-efficacy and learning approach on metacognition. The path model tested showed adequate goodness of fit ($\chi^2/df=2.77$, *GFI*=.98, *AGFI*=.92, *RMSEA*=.05). In previous studies, deep approach but not surface approach to learning facilitates performance as outcome variable. However, a different pattern emerged in the results of the present study. When school ability was used as a predictor, surface approach increased and deep approach decreased as outcomes. When they were used as predictors together with self-efficacy, both increased the use of metacognition. Surface approach among Asians is seen as a useful approach to learning that is facilitated by prior school ability, and results to awareness of one's learning. Further implications on surface and deep approach to learning are discussed.

Keywords: School ability, approach to learning, deep approach, surface approach, self-efficacy, metacognition

A learner becomes aware of their learning processes when they believe that they will be successful in the outcome and use effective approaches to their learning. Awareness of one's learning processes is referred to as metacognition, which involves knowledge about cognition in general, as well as awareness of the procedures to complete a given task (Flavell, 1979; Pintrich, 2002; Schraw & Dennison, 1994). Different studies commonly use metacognition as a predictor of different learning outcomes where students adopting this awareness tend to learn better (See Alexander & Schwanenflugel, 1994; Carr & Jessup, 1997; McInerney, McInerney, & Marsh, 1997).Noticeably, the number of the studies involving metacognition decreased after the 1990's because its effect on learning outcomes was already established (Bransford, Brown, & Cocking, 1999) and new learning processes (such as self-regulation, action control, study strategies) had come into existence. However, in the present study, metacognition was studied not as a predictor but as an outcome variable for self-efficacy and learning approaches.

Very few studies demonstrate how metacognition is affected by other factors because theoretical models in studies usually conceptualize it as a predictor. Some of these studies were conducted by Son (2004) and Berardi-Coletta, Buyer, Dominowski, and Rellinger (1995). Son (2004) allowed participants to space their study of items where they could study the pair of items again immediately (massed), study the pair of items again after the entire list had been presented (spaced), or choose not to restudy the items (done). The results showed that spacing facilitated better metacognition. In another study by Berardi-Coletta, Buyer, Dominowski, and Rellinger, (1995) categorized participants as being process-oriented, problem-oriented, or using "think aloud" verbalizations in solving a problem. They found that the process-oriented participants developed more metacognitive strategies than others.

Certain study procedures such as independent spacing of learning materials and focusing on processes are considered as an approach to learning. Kember, Biggs, and Leung (2004) explained that learning approaches include aspects of motives and strategies such as selective memorizing, seeking for meaning, and optimal time and space management. The concept of learning approaches was derived from the 3P model of student learning and achievement by Biggs (1987) where students study for specific reasons and their reasons determine how they approach tasks (Bernardo, 2003). Learning approach is composed of two general factors: Deep and surface approach. Deep approach (also labeled elaboration or critical thinking; e.g., Weinstein & Mayer, 1986) involves challenging the veracity of information encountered and attempting to integrate new information with prior knowledge and experience. A person who uses deep processing analyzes the deeper meaning of what is being studied. On the other hand, surface approach (also labeled rehearsal or memorization) involves the repetitive rehearsal and rote memorization of information (Entwistle & Ramsden, 1983). Several studies were consistent

in extracting these two components of approaches to learning (ex. Bernardo, 2003; Biggs, Kember, & Leung, 2001; Kember, Biggs, & Leung, 2004). Given that deeper approaches to learning involve a positive outcome for learning, studies do not seem to be consistent with this idea. For example, the study by Bernardo (2003) showed that the LPQ (a measure for learning approaches) is not a valid measure for low-achieving students because deep motive and deep strategy highly loaded as factors for low achieving students. Furthermore, Baumgart and Halse (1999) explained that rote memorization (such as in a surface approach) favors Asian learners. Asians outperform their western counterparts in school considering that they adopt a surface approach to learning (Neisser et al., 1996). Baumgart and Halse (1999) further explained that memorization can require careful reading, thought, and interpretation.

The use of a deep approach to learning includes strategies and motives that accompany metacognitive outcomes. As shown in the studies of Son (2004) and Berardi-Coletta, Buyer, Dominowski, and Rellinger (1995), when these strategies are integrated in instruction, students' metacognition are better facilitated. Evans, Kirby, and Fabrigar (2003) even argue that the learning approach model requires the addition of a variable that links stable individual differences to the learning task. The adoption of an approach to learning would result to the use of metacognitive strategies. It is hypothesized in the study that the use of the approaches to learning increases the likelihood that learners will become aware of their learning process. Evans, Kirby, and Fabrigar (2003) assert that strategies associated with the deep approach are "resource-intensive such as reading widely, thinking about what one has read, and making connections with prior knowledge which all require time and mental effort. If students using this approach are going to be successful, by implication they require the ability to monitor their own learning progress and allocate mental resources" (p. 508). Their explanations strongly suggest a relationship

between learning approach and metacognition. They supported this claim in the findings of their study where a strong relationship between components of metacognition and deep approach to learning was found. In the same way, August-Brady (2005) also found that nursing students who used concept-mapping as a metacognitive intervention increased the use of deep approach to learning. They further explained that due to the metacognitive nature of the intervention, students were able to gain greater insight into their understanding of, or clarifying their understanding of, the nursing process as it relates to the care of their clients.

The relationship of deep and surface approach to other variables such as performance, tasks, and other learning processes should be taken in the perspective of the nature of the learners and their contexts. This was evidenced in the study of Baumgart and Halse (1999) and Watkins and Biggs (1996) where Asian learners were found to approach learning differently in the way motives and strategies are perceived in the original theory which is in the context of Western samples. For example, Holloway (1998) found that "whereas Western cultures typically attribute success to ability, Asian cultures are far more likely to attribute success to effort" (p. 340). In the same way, Baumgart and Halse (1999) explained that "western learners are independent, favoring deep and conceptual learning, and encouraged to use constructivist approaches. In contrast, Asian learners have been sketched as docile, compliant, and favoring rote memorization associated with surface approaches to learning" (p. 338). Given such findings, the effects of deep and surface approach on other outcome and antecedent variables can have a different pattern for Asian learners.

Aside from the influence of learning approach, the role of self-efficacy on metacognition cannot be neglected. Self-efficacy refers to learners' belief in their ability to successfully complete some course of action in order to produce given attainments (Bandura, 1997). Individuals' belief in their ability has a central role in the exercise of personal agency by its high impact on cognition and action. Bandura (1991) explained that self-efficacy is an important proximal determinant of control variables such as metacognition. He further explains that self-efficacy beliefs "affect the self-monitoring and cognitive processing of different aspects of one's performances and outcomes that flow from them" (p. 258). A large body of evidence supports the contention that self-efficacy increases certain metacognitive components (Vancouver, Thompson, & Williams, 2001; Vancouver, Thompson, Tischner, & Putka, 2002). There are also several studies that are anchored on the social cognitive theory which explains the relationship between self-efficacy and metacognition (ex. Ford, Smith, Weissbein, Gully, & Salas, 1998; Horn, Bruning, Schraw, Curry, & Katkanan, 1993; Joo, Bong, & Choi, 2000; Schunk, 1990; Zimmerman & Bandura, 1994). There are also studies which show that the relationship between self-efficacy and metacognition is stronger under certain conditions. For example, Ford, Smith, Weissbein, Gully, and Salas (1998) found that self-efficacy still impacts metacognition even after undergoing a difficult cognitive training. In the same way, Joo, Bong, and Choi (2000) found that self-efficacy consistently predicted regulation of cognition under a web-based instruction.

Considering the established relationship between self-efficacy and metacognition as supported by the social cognitive theory, an important contribution to the theory is the existence of other variables that impact self-efficacy making it strongly linked with metacognition. In the study of Ford, Smith, Weissbein, Gully, and Salas (1998), mastery orientation was allowed to affect self-efficacy which in turn had a consistent effect on metacognition. The same was shown in the study of Joo, Bong, and Choi (2000) where prior achievement made the link between self-efficacy and regulation of cognition stronger. The same pattern was tested in the present study where the effect of self-efficacy on metacognition is assessed as a function of prior school ability.

The relationship of learning approaches and self-efficacy to metacognition was established in previous studies. These studies explain that the use of these variables becomes functional because they result to better performance. However, the present study integrates ability as a predictor of self-efficacy and learning approaches, as these two variables predict metacognition. School ability as a predictor is conceptualized as a prior ability that influences both self-efficacy and learning approaches. This direction where prior ability as a predictor is explained by the 3P model (Biggs, 1991) illustrating a Presage-Process-Product structure. The presage factors is explained as "what exist prior to engagement that affects learning" (p. 263). School ability is considered as a form of presage because Kember, Biggs, & Leung (2004) indicated that among students, presage can refer to factors such as prior knowledge and ability. Furthermore, these presage factors interact with the process that includes the learning approaches and product, which in the present study refers to metacognition.

In some studies prior school ability was used a predictor of learning approaches and self-efficacy. For example, the study of Al-Hilawani (2003) found that participants drew on their ability to apply problem solving and logical reasoning through visual analysis and discrimination of test materials (learning approach). Bell and Kozlowski (2002) found that self-efficacy and other social cognitive factors depend on a learner's cognitive ability. Chemers, Hu, and Garcia (2001), Colquit, LePine, and Noe (2000), Lopez, Lent, Brown, and Gore (1997), Philipps and Gully (1997), Seeman, McAvay, Merrill, Albert, and Rodin (1996), and Wolters and Daugherty (2007) all found that students ability significantly predicts their self-efficacy.

The present study investigates the effect of school ability on self-efficacy and learning approaches (deep and surface). At the same time, the effects of self-efficacy and learning approaches on metacognition are assessed.

METHOD

Participants

The participants were 194 Filipino college students from a university in Manila. The sample consists of 76 (39.18%) males and 118 (60.82%) females with a mean age of 17.35. The participants were taking different courses within one college the duration of the study and the classes to which they belonged were randomly selected.

Instruments

Revised Learning Process Questionnaire (R-LPQ-2F). The R-LPQ-2F developed by Biggs, Kember, and Leung (2001) was used to measure approaches to learning. This questionnaire consists of twenty-two (22) items concerning one's learning approach. It is provided with two-approach scores: (1) surface and (2) deep. The test is equally divided into eleven (11) surface (SA) and deep approach (DA) items. It uses a 5-point Likert scale ranging from "always or almost always true of me" to "never or only rarely true of me." According to Kember, Biggs and Leung (2004), the result of the twenty-two (22) item test is attributed to the significant and appreciable standard coefficients indicating that all of the questions in the test make a significant and useful contribution with goodness of fit values of CFI=0.804 and SRMR=0.049, and which shows good psychometric properties (Biggs, Kember, & Leung, 2001). The multi-dimensionality of the two factors having motive and strategy elements both show positive correlation (deep motive and deep strategy are positively correlated while surface motive and surface strategy are also positively correlated) with values of CFI=0.968 and SRMR=0.056 which shows a good fit to the data (Biggs, Kember, & Leung, 2001).

Metacognitive Assessment Inventory (MAI). The Metacognitive Assessment Inventory by Schraw and Dennison (1994) was used to measure metacognition. The test is composed of 52 items, 17 of them assess knowledge of cognition (KC) and 35 assess regulation of cognition (RC). The self-regulation part includes a number of

subprocesses that facilitate the control aspect of learning like planning, information management strategies, comprehension monitoring, debugging strategies, and evaluation. The items depict academic situations in which awareness of one's knowledge and awareness of skills are assumed to be related to effective monitoring. It also includes subprocesses that facilitate the reflective aspect of metacognition. The survey has a response format of a bipolar scale, with the right end of each scale indicating the statement that is "Always false" (1) to "Always true" (100) about the participant. The response is recorded by drawing a slash across the rating scale at a point that best corresponds to how true or false the statement is about the participant. Schraw and Dennison (1994) report that in a factor replication analysis, the coefficient alpha derived reached .88.

Morgan and Jinks Self-Efficacy Scale (MJSES). The MJSES measured the students' self-efficacy. It is intended to determine information about the student efficacy beliefs that might relate to school success (Jinks & Morgan, 1999). The scale originally consists of thirty-four (34) items. The items were modified in the present study because the last four questions were inappropriate for the participants. The factor analysis conducted by Jinks and Morgan (1999) uncovered three major factors: The (1) talent items, (2) context items and (3) effort items. All of the items used a four-interval Likert scale response (really agree, kind of agree, kind of disagree, and really disagree). The test has undergone extensive development to guarantee its reliability and validity. The items that revealed item-total correlation of below 0.30 was dropped. This resulted to a thirty-item scale having an overall reliability coefficient of 0.82. The subscale alphas were 0.78 for talent, 0.70 for context and 0.66 for effort. A global score was obtained in the study representing an index of self-efficacy.

Otis Lenon School Ability Test (OLSAT). The OLSAT was used to determine the school ability of the participants. The OLSAT assesses the verbal and non-verbal skills that are associated with school. Also, the test is a valid measure of an individual's ability to reason logically. It is one of the most widely used general intelligence tests with levels for primary through college. The reliability of the OLSAT was determined on the basis of three procedures. The internal consistency using the Kuder-Richardson gained coefficients between 0.90 and 0.94. The alternate-form reliability was also used to verify the reliability of the OLSAT. The two forms of the test were created and then equated in a research study with correlations that range from 0.82 - 0.92. The correlations fall within a range of 0.40 - 0.60. Comparing the OLSAT scores and achievement or scholastic aptitude scores also indicated the validity.

Procedure

The participants in the present study were scheduled to take the OLSAT and also scheduled to take the R-LPQ-2F, MJSES, and MAI at another time. They were tested in groups per class and the students were scheduled to answer the OLSAT first for 40 minutes. This test was administered in one class session. Included in the OLSAT was a practice set. This was done with the class so that the students would know how to answer the test effectively. Before the students began answering, they were encouraged to answer to the best of their ability and they were informed that their scores will not affect their grades.

After the OLSAT, the students were informed that they will be answering a series of questionnaires at another time. During the administration, they were told to read carefully and follow the written instructions and to answer as truthfully as possible. The participants were debriefed about the purpose of the study after completing the questionnaires.

The variables in the study (deep approach, surface approach, metacognition, self-efficacy, and school ability) were intercorrelated using Pearson r. The estimates and goodness of fit of the proposed model showing the effect of school ability on self-efficacy and learning approaches (deep and surface) at the same time their effects on metacognition was tested using path analysis. The goodness of fit of the model was indicated

Table 1

Mean and Standard Deviation

	M	SD	N	Cronbach's Alpha
OLSAT	48.25	15.22	194	.90
Self-efficacy	86.82	8.10	194	.83
Deep Approach	37.03	8.78	194	.81
Surface Approach	30.23	7.65	194	.83
Metacognition	71.01	11.85	194	.97

using the chi-square (χ^2), discrepancy function (χ^2/df), Root Mean Square Error Approximation (*RMSEA*), Goodness of Fit Index (*GFI*), and Adjust GFI (*AGFI*).

RESULTS

In the analysis, the means and standard deviations are reported for each factor. Correlations were conducted among school ability, self-efficacy, learning approaches, and metacognition. Then, a path model was tested where the effect of school ability on self-efficacy and learning approaches (deep and surface) was tested. In turn, the effects of learning approach and self-efficacy on metacognition was assessed.

Table 1 shows the mean scores, standard deviation, and Cronbach's alpha for OLSAT, MJSES, DA, and SA of the R-LPQ-2F, and MAI.

In assessing the students' ability using the OLSAT, the mean score of 48.25 showed that the students are in the high average region based on the norm. The participants also showed high levels of self-efficacy (*M*=86.82) when compared to the mean on the preliminary data of Jinks and Morgan (1999). The reported use of the deep approach (*M*=37.03) was considerably high and use of surface approach (*M*=30.23) was marginal when compared with the cohorts used by Gordon and Debus (2002). The use of metacognitive regulation was high and knowledge of cognition was low when compared to the standard mean by Schraw and Dennison (1994). All of the scales showed high internal consistencies among the items.

To establish the relationship among the variables involved in the model, a zero-order correlation was conducted to determine the pair of variables that are significantly related.

Table 2

Intercorrelations of OLSAT, MJSES, RLPQ, and MAI

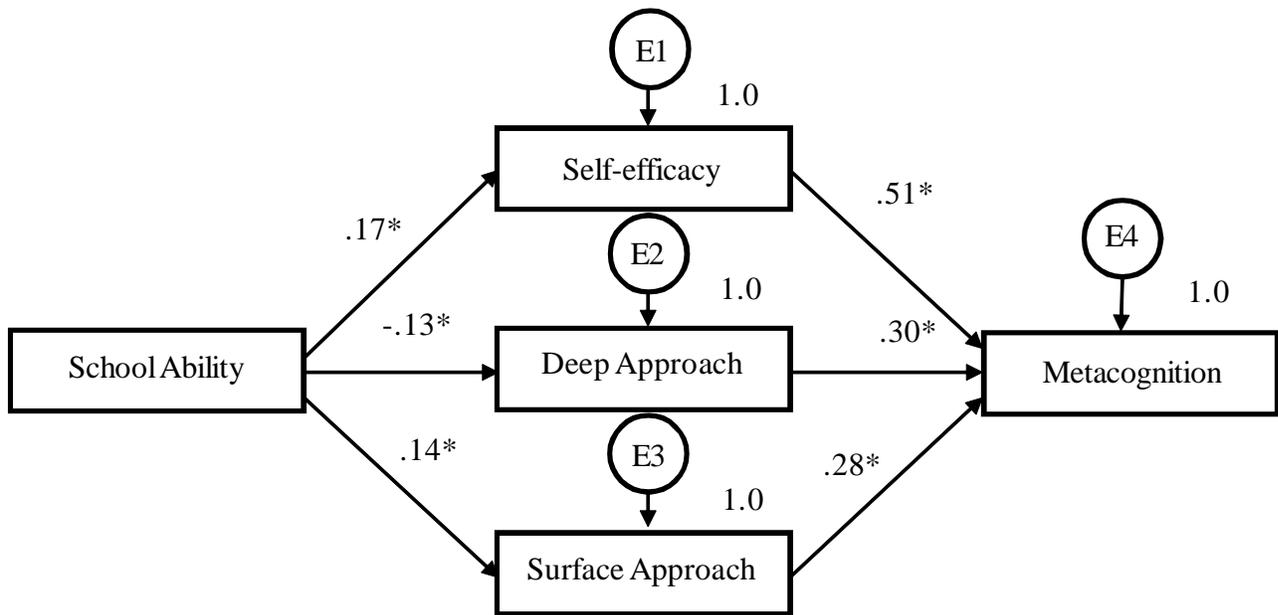|	OLSAT	Self-efficacy	DA	SA	Metacognition
OLSAT	—				
Self-efficacy	.33*	—			
Deep Approach (DA)	-.05	.16*	—		
Surface Approach (SA)	.08	.15*	-.02	—	
Metacognition	.08	.38*	.26*	.17*	—

*p<.05

Figure 1. *Effect of School ability on self-efficacy, learning approach, and metacognition*

Self-efficacy is significantly related to all factors and it is the only variable that is significantly related with OLSAT. The correlation coefficient for OLSAT is highest for self-efficacy and very low for the other factors. A pattern is apparent in the correlation coefficient for self-efficacy where it is significantly related with all the factors, but the strength is low for both DA and SA (learning approaches) and moderate for metacognition. The pattern shows that there is a stronger link between metacognition and self-efficacy than for the learning approaches, although they are significant, $p<.05$. Deep approach, surface approach, and metacognition are all significantly correlated with each other, $p<.05$. Deep approach is negatively correlated with surface approach indicating that the use of the two approaches is reversed.

Path analysis was used to test a model showing (1) the effect of school ability on self-efficacy and learning approaches, and (2) the effect of self-efficacy and learning approaches (deep and surface) on metacognition. The model is tested for goodness of fit using the chi-square (χ^2), Goodness of Fit Index (*GFI*), Adjusted GFI, and Root Mean Square Error Approximation (*RMSEA*).

The effect of school ability on self-efficacy, deep, and surface approach are all significant, $p<.05$. However, an increase in school ability decreases deep approach by 0.13. The effect of self-efficacy, deep, and surface approach on metacognition are also significant, $p<.05$. It can also be noted that surface approach increases metacognition by .28 having almost equal effects with the deep approach to learning (.30). The model showed adequate goodness of fit, as indicated by the low chi-square and discrepancy function values ($\chi^2=11.11$, *df*=4, $\chi^2/df=2.77$). The *GFI* (.98) and adjusted *GFI* (.92) were high, and the *RMSEA* is satisfactory (.05). These indicate that the sample of 280 represents the path model well.

DISCUSSION

The results of the present study are consistent with previous studies where self-efficacy and learning approaches significantly increases the use of metacognition (Berardi-Coletta, Buyer, Dominowski, & Rellinger, 1995; Evans, Kirby, & Fabrigar, 2003; August-Brady (2005); Ford,

Smith, Weissbein, Gully, & Salas, 1998; Horn, Bruning, Schraw, Curry, & Katkanan, 1993; Joo, Bong, & Choi, 2000; Schunk, 1990; Son, 2004; Zimmerman & Bandura, 1994). The study further showed that school ability as an antecedent variable can be used to increase self-efficacy and surface approach to learning. This further supports the notion of Zimmerman (2002) that learners transform their ability into academic skills such as effective consequences of self-efficacy and approaches to learning. These results show that given the ability of learners, they are able to effectively translate their self-efficacy beliefs and learning approaches to implement metacognition successfully. This result further extends existing theories on the transfer of learning where ability plays a central part on how successful learners translate their skills into different contexts. However, the findings also show that the skills are not the only constructs that are transferred within contexts, but that transfer occurs from one skill to another skill, or use a skill successfully to be successful in another skill. For example, if learners posses high ability, their beliefs would enable them to use metacognition effectively. More specifically, students possessing high ability in school are more confident (self-efficacy) in their ability and are successful in monitoring and implementing their goals (metacognition).

The effect of school ability on self-efficacy and learning approaches is also significant. The expected effects of school ability on deep and surface approach were not consistent with the conceptualization of Biggs (1987), Entwistle and Ramsden (1983), and Watkins (1996) where deep approaches to learning should result to increased ability and the opposite is expected for surface approach. The findings in the study showed that prior ability decreased deep approach and increased surface approach to learning. However, these findings are consistent with studies employing Asian samples (Baumgart & Halse, 1999; Bernardo, 2003; Purdie & Hattie, 1996). These results showing a reversed effect of ability on deep and surface approach describe how Asians approach their learning. Among Asians, the surface

approaches that include rote memorization, fear of failure, and minimizing scope of study are valued and can be effective and may actually result to better outcomes. Also among Asians, memorization is encouraged starting from the basic years of studying where teachers use expository teaching and memorization in tests. These approaches are found by Asian students to be effective because it eventually leads to higher order thinking skills. Anderson et al. (2001) further explained that memorization and recall of facts, concepts, and processes are platforms to higher levels of thinking. A different view on rote learning and memorization should be conceptualized among Asian students where these strategies can be beneficial. It is also customary for students to achieve given that they fear failure. Asian students highly value success in education and failure is viewed as undesirable. It can also be noted in the results of the present study that the use of surface approach increases the use of metacognition. These findings further support that Asians' approach to learning is different as compared to their western counterparts considering that surface approach would require increased ability and result to increased metacognition. They see surface approach as an important skill that helps them become aware of their learning.

The specific approaches included in surface approach are also helpful as in the case of using deep approach to achieve metacognition. It is not only deep approach that affects metacognition which is consistent with the position of Baumgart and Halse (1999), but the surface approach also accounts for increased use of metacognition. The results challenges such popular (Western) views about learning with respect to the use of surface approach. In another perspective, when both deep and surface approach increases with metacognition, this result suggests a process of selection of the strategies and motives for the individual. Different context in learning may require a learner to use a deep or a surface approach since both of them increases with metacognition. This means that certain metacognitive processes work better with the adoption of a deep or surface approach to learning. For example, when studying for a test, it

would be best to memorize important concepts from a book if the test is anticipated to be heavy on factual information.

It was also found in the study that deep approach to learning is not significantly related to school ability and that school ability has a significant negative effect on deep approach (path model). Given the findings that Asians view surface approach as functional, the effect of ability on deep approach is just the opposite. Prior ability is used more for a surface approach than for a deep approach to learning. This result points to the perspective of how Asians attribute consequences of their ability (Kim, Triandis, Kagitcibasi, Choi, & Yoon, 1994). Consequences of performance among Asians are attributed not to their ability but to their efforts and to an external locus of control. Asian students who become successful on tasks do not see their ability as an immediate explanation for the outcome. The most common attribution for their success is associated with values relating to others such as hard work, gratitude to authority, and family where humility is the focal characteristic (Kim, Yang, Atkinson, Wolfe, & Hong, 2001). This shows that their focus is more values-oriented as attribution of success in performance rather than specific strategies and approaches that leads to success.

Another perspective indicated by the findings that ability decreases the use of deep approach is the kind of learning that is valued by Asians. Efforts on ability are concentrated on immediate goals such as memorization, aim for qualification, fear of failure, and minimizing the scope of the study because these approaches are valued in the Asian setting while conceptualization on the deep motives and strategies are interpreted differently. For example, in deep motive, individuals will work hard on their studies if they find it interesting. But among Asians, working hard for their studies is part of their motive even without setting any conditions (Hau & Salili, 1991). For commitment to work, it is conceptualized that students come to class with questions in mind that need answers. For Asians, commitment does not start with questions but rather acceptance of knowledge (Lee, 1996; Wong,

1996). The same approach is applied to understanding material. Asians receive information first when reading before responding, rather than knowing what the author means.

These findings suggest a different way of looking at the antecedents (presage) and consequences (product) of approaches to learning especially among Asian learners. The approach to learning among Asian and Western students should not be simplified as to what characteristic is dominant for each group (ex. Asian favoring rote memorization and Westerners being more independent thinkers). The perspective should be explained as to what is valued and functional for a learner given their context of learning. If surface approach (that includes memorization, fear of failure, minimizing scope of study, and aim for qualification) is functional for Asians, it does not follow that they do not engage in higher order forms of skills and thinking. Rather, these approaches are adapted to performing well in executive skills such as metacognition. Both deep and surface approaches including the learner's confidence in their performance enables them to be in control and become aware of their learning in the end.

AUTHOR NOTES

Further correspondence can be addressed to Dr. Carlo Magno at the Andrew Gonzalez Hall, Counseling and Educational Psychology Department, De La Salle University, 2401 Taft Ave., Manila, Philippines. e-mail: carlo.magno@dlsu.edu.ph.

REFERENCES

Alexander, J. A., & Schwanenflugel, P. J. (1994). Strategy regulation: The role of intelligence, metacognitive attributions, and knowledge base. *Developmental Psychology, 30*, 709-723.

Al-Hilawani, Y. A. (2003). Measuring students' metacognition in real-life situations. *American Annals of the Deaf, 148*, 233.

Anderson, L. W. Krathwohl, D. R., Airsian, P. W., Cruikshank, K. A. Mayer, R. E., Pintrich, P.

R., Raths, J., & Wittrock, M. C. (2001). *A taxonomy, for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives*. New York: Longman.

August-Brady, M. M. (2005). The effect of a metacognitive intervention on approach to and self-regulation of learning in baccalaureate nursing students. *Journal of Nursing Education, 44*, 297-205.

Bandura, A. (1991). Social cognitive theory of self-regulation. *Organizational Behavior and Human Decision Processes, 50*, 248-287.

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

Baumgart, N., & Halse, C. (1999). Approaches to learning across cultures: The role of assessment. *Assessment in Education, 6*, 321-340.

Bell, B. S., & Kozlowski, S. W. (2002). Goal orientation and ability: Interactive effects on self-efficacy, performance, and knowledge. *Journal of Applied Psychology, 87*, 497-505.

Berardi-Coletta, B., Buyer, L., Dominowski, R. L., & Rellinger, E. R. (1995). Metacognition and problem solving: A process-oriented approach. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 21*, 205-223.

Bernardo, A. B. I. (2003). Approaches to learning and academic achievement of Filipino students. *The Journal of Genetic Psychology, 164*, 101-114.

Biggs, J. (1987). *Student approaches to learning and studying*. Camberwell, Victoria: Australian Council for Educational Research.

Biggs, J. (1991). Approaches to learning in secondary and tertiary students in Hong Kong: Some comparative studies. *Educational Research Journal, 6*, 27-39.

Biggs, J., Kember, D., & Leung, D.Y.P. (2001). The revised two factor study process questionnaire: R-SPQ-2F. *British Journal of Educational Psychology, 71*, 133-149.

Bransford, J., Brown, A., & Cocking, R. (1999). *How people learn: Brain, mind, experience, and school*. Washington, DC: National Academy Press.

Carr, M., &. Jessup, D. L. (1997). Gender Differences in first-grade mathematics strategy use: Social and metacogntive influences. *Journal of Educational Psychology, 89*, 318-328.

Chemers. M. M., Hu, L., & Garcia, B. F. (2001). Academic self-efficacy and first-year college student performance and adjustment. *Journal of Educational Psychology, 93*, 55–64.

Colquitt, J. A., LePine, J. A., & Noe, R. A. (2000). Toward an integrative theory of training motivation: A meta-analytic path analysis of 20 years of research. *Journal of Applied Psychology, 5*, 678-707.

Entwistle, N.J., & Ramsden, P. (1983). *Understanding student learning*. London: Croom Helm.

Evans, C. J., Kirby, J. R., & Fabrigar, L. J. (2003). Approaches to learning, need for cognition, and strategic flexibility among university students. *British Journal of Educational Psychology, 73,* 507-529.

Flavell, J. (1979). Metacognition and cognitive monitoring: A new area of cognitive-developmental inquiry. *American Psychologist, 34*, 906-911.

Ford, J.K., Smith, E.M., Weissbein, D.A., Gully, S.M., & Salas, E. (1998). Relationships of goal orientation, metacognitive activity, and practice strategies with learning outcomes and transfer. *Journal of Applied Psychology, 83*, 218-233.

Gordon, C., & Debus, R. (2002). Developing deep learning approaches and personal teaching efficacy within a preservice teacher education context. *British Journal of Educational Psychology, 72*, 483-511.

Hau, K.T., & Salili, F. (1991). Structure and semantic differential placement of specific causes: Academic causal attributions by Chinese students in Hong Kong. *International Journal of Psychology, 26*, 175-193.

Horn, C., Bruning, R., Schraw, G., Curry, E., & Katkanan, C. (1993). Paths to success in the

college classroom. *Contemporary Educational Psychology, 18*, 464-478.

Holloway, S. D. (1998). Conceptions of ability and effort in Japan and the United States. *Review of Educational Research, 58*, 327-345.

Jinks, J., & Morgan V. (1999). Children's perceived academic self-efficacy: An inventory scale. *Teacher Journals, 72*, 224-230.

Joo, Y., Bong, M., & Choi, H. (2000). Self-efficacy for self-regulated learning, academic self-efficacy, and Internet self-efficacy in Web-based instruction. *Educational Technology, Research and Development, 48*, 5-18.

Kim, B. S. K., Yang, P. H., Atkinson, D. R., Wolfe, M. M., & Hong, S. (2001). Cultural value similarities and differences among Asian American ethnic groups. *Cultural Diversity and Ethnic Minority Psychology, 7*, 343-361.

Kim, U., Triandis, H.C., Kagitcibasi, C., Choi, S.C., & Yoon, G. (1994). *Individualism and collectivism: Theory, method and application*. Thousand Oaks, CA: Sage.

Kember, D., Biggs, J., & Leung, D. (2004). Examining the multidimensionality of approaches to learning through the development of a revised version of the learning process questionnaire. *British Journal of Educational Psychology, 74*, 261-279.

Lee, W.O. (1996). The cultural context for Chinese learners: Conceptions of learning in the Confucian tradition. In D.A. Watkins & J.B. Biggs, J.B. (Eds.), *The Chinese Learner: Cultural, psychological and contextual influences* (pp. 25-41). Hong Kong: Comparative Education Research Centre.

Lopez, F. G., Lent, R. W., Brown, S. D., & Gore, P. A. (1997). Role of social–cognitive expectations in high school students' Mathematics-related interest and performance. *Journal of Counseling Psychology, 44*, 44-52.

McInerney, V., McInerney, D. M., & Marsh, H. W. (1997). Effects of metacognitive strategy training within a cooperative group learning context on computer achievement and anxiety: An aptitude–treatment interaction study.

Journal of Educational Psychology, 89, 686-695.

Neisser et al. (1996). Intelligence: Knowns and unknowns. *American Psychologist, 51*, 77-101.

Phillips, J. M., & Gully, M. S. (1997). Role of orientation, ability, need for achievement, and locus of control in the self-efficacy and goal-setting process. *Journal of Applied Psychology, 82*, 792-802.

Pintrich, P. (2002). The role of metacognitive knowledge in learning, teaching, and assessing. *Theory into Practice, 41*, 219-225.

Purdie, N., & Hatie, J. (1996) Cultural differences in the use of strategies for self-regulated learning. *American Educational Research Journal, 33*, 845-871.

Schraw, G., & Dennison, R. S. (1994). Assessing metacognitive awareness. *Contemporary Educational Psychology, 19*, 460-475.

Schunk, D. H. (1990). Self-efficacy and academic motivation. *Educational Psychologist, 26*, 207-231.

Seeman, T., McAvay, G., Merrill, S., Albert, M., & Rodin, J. (1996). Self-efficacy beliefs and change in cognitive performance: MacArthur studies of successful aging. *Psychology and Aging, 11*, 538-551.

Son, S. K. (2004). Spacing one's study: evidence for a metacognitive control strategy. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 30*, 601-604.

Vancouver, J. B., Thompson, C. M., & Williams, A. A. (2001). The changing signs in the relationships between self-efficacy, personal goals, and performance. *Journal of Applied Psychology, 86*, 605–620.

Vancouver, J. B., Thompson, C. M., Tischner, E. C., & Putka, D. J. (2002). Two studies examining the negative effect of self-efficacy on performance. *Journal of Applied Psychology, 87*, 506–516.

Watkins, D. A. (1996). Learning theories and approaches to research: A cross-cultural perspective. In: D. A. Watkins & J. B. Biggs (Eds.). *The Chinese Learner: cultural,*

psychological and contextual influences (pp. 3-34). Hong Kong and Melbourne: CERC and Australian Council for Educational Research.

Watkins, D. A., & Biggs, J. B. (Eds.) (1996). *The Chinese learner: Cultural, psychological and contextual influences*. Hong Kong and Melbourne: CERC and Australian Council for Educational Research.

Weinstein, C.E., & Mayer, R. (1986). The teaching of learning strategies. In M.C. Wittrock (Ed.), *Hand- book of research on teaching* (pp. 315-327). New York: Macmillan.

Wolters, C. A., & Daugherty, S. G. (2007). Goal structures and teachers' sense of efficacy: Their relation and association to teaching experience and academic level. *Journal of Educational Psychology, 99*, 181–193.

Wong, N.Y. (1996). *Asian learner: Smarter or just works harder?*. Paper presented at the 8th International Congress on Mathematical Education, Seville, Spain.

Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory into Practice, 41*, 64-72.

Zimmerman, B.J., & Bandura, A. (1994). Impact of self-regulatory influences on writing course attainment. *American Educational Research Journal, 31*, 845-862.