

The Role of College Students' College-attendance Value and Achievement Goals in Desired Learning Outcomes

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ABSTRACT

The purpose of this study is twofold, testing how hierarchical motivation modeling explains college students' academic performances over subsequent semesters; extending the motivation modeling on the university graduate attributes of another sample at a certain time point, by the regular, contextualized institutional-research (IR) practices. The hierarchical motivation modeling denotes that college-attendance values explain achievement goals, eliminating the effect of prior academic performance (i.e., the covariate). Participants were two cohorts of college sophomores with a 1-year gap in Taiwan who voluntarily responded to regular university-wide surveys. The path analysis results of Study 1 (N = 652, 39% female, 61% male) confirmed that the modeling explains the subsequent academic performance, and study hours. Those of Study 2 (N = 681, 43% female, 57% male) further confirmed that achievement goals mediate the values and the attributes. These IR findings indicate directions for college education innovation in boosting the motivated trajectory and the desired learning outcomes worldwide.

Keywords: achievement goals, college students, college-attendance values, institutional research (IR), university graduate attributes

INTRODUCTION

From a social-cognitive motivation perspective, motivation has long been recognized as being effective in terms of explaining desired learning outcomes when contextualized within an academic setting specifying the learning process and outcomes of the individuals (Eccles et al., 1983; Eccles, 2009; Schunk, Pintrich, & Meece, 2008). In this contextualization sense, motivation often initiates the specific process by which individuals are motivated to learn, endorse goals for achievement, and then approach and attain the achievements deemed essential to the education stakeholders (Liem et al., 2008; Michou et al., 2013; Michou et al., 2014; Senko, Hulleman, & Harackiewicz, 2011).

Contextualizing this theorized motivation effectiveness within a particular setting usually derives some educational values, such as advancing education stakeholders' understanding of how students are motivated to learn (e.g., personal value being more adaptive to autonomous learning) and then suggesting pedagogical practices better catering to the learning needs of most students (Battle & Wigfield, 2003; Chen & Lu, 2015; Harackiewicz, Barron, Tauer, & Elliot, 2002). In a similar logical vein, a common problem of less self-directed learning may be related to the fact that undergraduates in Taiwan often hold less personal interest in or reason to attend college (Chen & Lu, 2015). Instead, they often attempt to meet the normal expectation for students in Taiwanese society, attending college mainly out of social expectations. This relative lack of personal interest and reason for college attendance may not only inhibit the learning growth of individuals throughout their college education, but may also lower the institutional effectiveness of promoting optimal learning for each college student (Buckley, Bridges, & Hayek, 2006; Kuh, 2005). It is worth investigating the relative effect of contextualized college-attending motivation on desired learning outcomes.

Contribution of this paper to the literature

- Particularly excluding the prior academic-performance effect, undergraduates hold higher performance-approach goals, often with higher personal values or collective values of attending college, and subsequently achieve higher academic performance.
- Undergraduates hold higher mastery-approach goals, often with higher personal values, and then spend more hours studying.
- Undergraduates hold either higher performance-approach goals or higher mastery-avoidance goals, usually with higher personal values, and then develop more university graduate attributes (i.e., discipline-specific, generic, and socio-interpersonal competencies).
- Undergraduates hold higher performance-approach goals, usually with higher collective values, and then develop more attributes.
- The findings suggest a need for regular assessments of student-motivated learning paths, and for informed decisions, which prioritizes an inquiry on motivated learning in the hectic IR practices.

In modeling this process, motivation has been assessed by a construct specifying the participants' learning tasks (Liem et al., 2008; Michou et al., 2013) and by multiple achievement goals towards a given learning task (Liem et al., 2008; Liem, 2016; Michou et al., 2014), while the motivational outcomes have been assessed by the achievement outcomes relevant to both students' learning (Liem et al., 2008; Liem, 2016) and the fulfillment of school missions (Chen & Lu, 2015). The hierarchical modeling of motivation, such as including effects of motivational values and achievement goals, is often conducted to better explain the desired outcomes (Liem et al., 2008; Liem, 2016). Arguably, hierarchical motivation modeling can reveal the motivation functions that prompt desired outcomes in particular, and signal a learning-achievement path in general (Eccles, 2009; Schunk et al., 2008). By this reasoning, this study tests the degree to which hierarchical motivation modeling explains the desired learning outcomes of college students in Taiwan.

Alongside motivational values, achievement goals have been recognized as a pivotal motivational factor adjacent to intended learning achievements (i.e., high academic performance, high task-interest; Harackiewicz, Barron, Tauer, & Elliot, 2002; Liem et al., 2008). Achievement goals subsume four types (Elloit & Church, 1997; Senko et al., 2011): (1) mastery-approach goals (Map), stressing the development of competence/skills according to task-specific standards; (2) mastery-avoidance goals (Mav), stressing the avoidance of losing competence/skills as compared to prior experience; (3) performance-approach goals (Pap), stressing the demonstration of more competence according to normative standards; and (4) performance-avoidance goals (Pav), stressing the avoidance of being incompetent relative to others. The achievement goals have been increasingly confirmed as an effective mediator between the more distal motivational values and desired learning outcomes (Liem et al., 2008; Liem et al., 2012; Liem, 2016; Michou et al., 2014). Previous studies have not always considered prior learning experiences, but including them (e.g., by the indicator, prior academic performance) contribute to more complete motivation modeling (i.e., Eccles, 2009; Harackiewicz et al., 2002; Martin, Wilson, Liem, & Ginns, 2013). This study, therefore, includes prior academic performance.

Still, it remains less clear how the explaining effects of achievement goals on achievement can be further related to more distal but contextualized motivational factors. In an example of contextualizing motivation into schooling values, the values of receiving school education are stated as a major determinant for achievement goals, although they are not directly related to learning engagement and success (Eccles, 2009; Schunk et al., 2008). This contextualization helps to specify motivational values for the participants as well as making achievement goals more malleable in the motivational trajectory towards the more desired learning outcomes of local concerns. The literature thus led us to incorporate schooling value (i.e., common expectations for college education in Taiwan) with prior academic performance into the framework of achievement goals in our modeling.

When addressing motivational outcomes in higher education, it is highly necessary to include an array of competencies, skills, and values congruent with the educational objectives of the institution (e.g., university graduate attributes; Kuh, Buckley, Bridges, & Hayek, 2006; Oliver, 2013). These outcomes may provide empirical evidence for accountability of meeting public needs, various education stakeholders' expectations, and institutional educational missions (Kuh, 2005; Kuh et al., 2006) and signal the directions for curriculum and instruction innovation, which, in turn, will promote higher effectiveness of educational practices and perhaps more institutional improvements (Kuh, 2005). This attempt at learning and promoting the students' motivational outcomes clearly characterizes a key function of institutional research (IR; Volkwein, 2011). Recognizing this key function, Taiwan has been one of the most passionate IR practitioners at the government level as compared to other Asian countries. Thus, IR has become a prevalent practice to ensure better learning of each student by Taiwan's universities/colleges (Lin, Fu, & Ko, 2018).

In modeling two college-student hierarchical motivation models, this study mainly addresses two sets of desired learning outcomes: (1) academic performance (Harackiewicz et al., 2002) and engagement (i.e., learning hours; Kuh et al., 2008); (2) the university graduate attributes that were translated from the university mission into three major competencies of university graduates (Lin, Yu, & Lin, 2014).

The Relation between College-Attendance Values and Achievement Goals

When addressing college students' learning in general, motivational value can be specified as schooling value. For instance, schooling value was found to be an empirical predictor of college women's academic-related choices (e.g., graduate school attendance; Battle & Wigfield, 2003). Following this reasoning, schooling value, as a broader term of task value, may denote what reasons, benefits, and concerns one perceives for attending school, such as for job-seeking, self-realization, and identity-seeking in the motivational trajectory (Eccles, 2009). Schooling value, as a specific type of task value, may positively drive college students to approach and attain academic achievement throughout their college study (Battle & Wigfield, 2003). Recently, Eccles (2009) proposed that task value can be further categorized into the personal value of seeking one's interest or self-actualization, and the collective value of meeting social expectations or norms, along with the effects of prior academic performance. The expectancy-value framework led us to conceptualize college-attendance value into two sub-constructs: Taiwan undergraduates' personal and collective values (Lin & Lin, 2017). Over prior academic performance, the personal value denoting a need for self-actualization in college attendance was hypothesized as being related to mastery and Pap goals (Liem et al., 2012). Collective value denoting social expectations of college-attendance was hypothesized as being related to performance goals in schooling (Liem et al., 2008; Liem et al., 2012).

The Relation between Achievement Goals and Desired Learning Outcomes

To better identify the potential effects of each achievement goal, a multiple-goal perspective has been proposed (Liem et al., 2008; Liem et al., 2012; Liem, 2016; Senko et al., 2011). From this perspective, students may adopt both mastery and performance goals to obtain all of the desired outcomes (e.g., academic performance, cognitive and personal development) with which each goal is associated (Senko et al., 2011). First, Pap goals are commonly known as an effective predictor of academic performance. With this goal, individuals tend to assess their goal-attainment by the performance-norm criteria, making it exert high explaining power on academic performance (Liem et al., 2012; Liem, 2016). Thus, Pap goals were hypothesized to exert a direct effect on academic performance.

Second, achievement goals have been found to be highly related to learning engagement, such as learning strategies of making cognitive and affective efforts to learn (Elliot & Murayama, 2008; Liem et al., 2008; Senko et al., 2011). Learning engagement has been found to be a key aspect of motivated learning (Eccles, 2009). In higher education, Kuh (2001) proposed five key aspects for defining college student engagement, namely academic challenge, active and collaborative learning, student-faculty interaction, enriching educational experiences, and supportive campus environments. Rather than adopting this umbrella term of student engagement in college study, we adopted Kuh et al.'s (2008) more recent definition of the learning engagement of college students with a much narrower focus on study hours spent per week after class. This focus on study hours, clearly quantitative in nature, appears to be more measurable and extends the literature on the extent to which Map goals can explain college students' time investment choices (i.e., study hours spent). Thus, Map goals were hypothesized to exert a direct effect on study hours.

Finally, Pap and Map goals were documented as negative predictors of the cognitive, personal, and social competencies of college students in Taiwan without the effect of prior academic performance (Chen & Lu, 2015). In a similar logical vein, they were hypothesized to be related to the competencies in question, particularly over prior academic performance.

The Explanatory Role of Achievement Goals in the Relation between College-Attendance Value and Desired Learning Outcomes

Based on the two relations, it was hypothesized that achievement goals play an explanatory role in the relation between college-attendance value and desired learning outcomes. In the previous studies, for instance, Pap goals were found to be a mediator between individual-oriented motivation and academic performance and between social-oriented motivation and academic performance (Liem et al., 2012), while Map goals were found to be a mediator between personal need for achievement and use of learning strategies (Michou et al., 2013). Similarly, the mediating relations were hypothesized according to the direct relations between college-attendance values, achievement goals, and the desired learning outcomes.

The Relations between Personal Value and University Graduate Attributes

Personal and collective values are expected to have varying direct effects on learning outcomes. For instance, the more positive benefits or reasons that individuals identify and internalize into their motivation system, the higher development in personal competence they may achieve (Eccles, 2009). Empirically, Chen and Lu (2015) targeted Taiwanese college students in Years 1 to 3 ($N = 360$) at a public university in northern Taiwan, making their study findings comparable to those of the present study. They investigated the extent to which motivational beliefs (social-/individual-oriented motives, achievement goals) explain the students' development in cognitive (e.g., intellectual competence, academic performance), social (e.g., interpersonal relationship), and personal (e.g., identity construction) competencies. They indicated that an individual-oriented motive for attainment serves as a positive predictor for the cognitive, social, and personal competencies, while the social-oriented motive does not. Thus, personal values of college attendance were hypothesized to exert a direct effect on the university graduate attributes.

Purposes of the Study

The purposes of the study are twofold: testing how hierarchical motivation modeling (i.e., an antecedent of college-attendance value, achievement goals with a covariate of prior academic performance) explains college students' academic performance over the subsequent semesters, and extending the motivation modeling on the perceived university graduate attributes of another sample at a particular time-point. Academic performance and perceived attributes are often tested by different models in achievement-goal research (Chen & Lu, 2015; Michou et al., 2013). Thus, we tested the models on two cohorts of voluntary participants at a Taiwan university. These two cohorts had rather comparable sophomore college-learning experiences, given the fact that their experiences were simply 1-year apart, and that they voluntarily participated in the survey. These two cohorts make it possible to model both academic performances and perceived attributes as the desired outcomes of motivated learning for college sophomores.

Study 1 addressed the research questions below:

1. Do the college-attendance values explain the achievement goals?
2. Do mastery-approach (Map) goals mediate the relation between personal values and study hours?
3. Do performance-approach (Pap) goals mediate the relation between college-attendance values and academic performance?

Based on the premise of the hierarchical motivation effects and a covariate, Study 2 addressed the research questions below.

4. Do personal values explain the university graduate attributes?
5. Do mastery-avoidance (Mav) goals mediate the relation between personal values and the attributes?
6. Do performance-approach (Pap) goals mediate the relation between the college-attendance values and the attributes?

In answering these questions, the study may reveal how sophomores, at the critical transitional stage, stay motivated to approach and eventually attain desired outcomes (including academic performance and university graduate attributes) in college education (Tobolowsky, 2008). The motivation modeling may also substantiate the Asian evidence in educational psychology, particularly for Eccles et al.'s (1984) expectancy-value theory (i.e., the learning-motivation effect holds even when excluding prior academic performance) against a western-cultured backdrop. Finally, the study suggests that IR professionals regularly glean information on students' motivated learning.

Study Context

In northern Taiwan, the university under investigation is a leading institution for publishing innovative research, and educating quality intellectuals. It is a consistently ranked top-tier Science-Technology-Engineering-Mathematics University in Taiwan. In particular, it is greatly renowned for its three schools of electronic engineering and computer science, engineering, and science, accounting for around 55% of the undergraduate population in the two studies respectively (61.2% of the population in 2012, $n = 6,189$ for Study 1; 54.8% of the population in 2013, $n = 6,215$ for Study 2). Additionally, the university has schools of nuclear science, life science, humanities and social sciences, and technology management. Across these schools, the students of humanities and social sciences account for around 12% of the population, of which two-thirds is male and the remaining being female. With the abovementioned gender and school ratios, the demographic data results indicated that the ratios in the sampled participants corresponded well to those of the total student population.

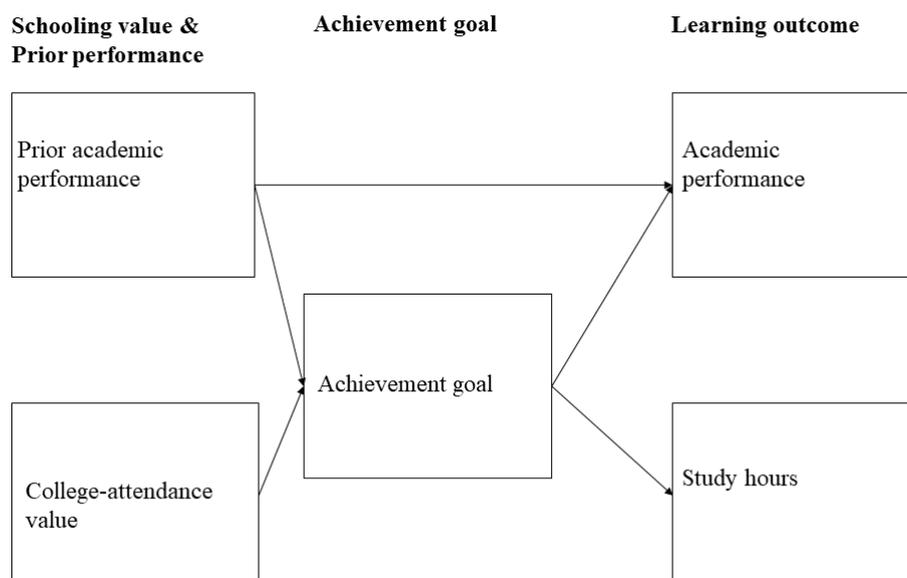


Figure 1. The Conceptual Framework of Study 1

With an emphasis on students learning assessment, the university is one of the pioneers in Taiwan in launching the IR on students' learning experiences. For example, the university has established an institutional database for collecting the responses to regular annual surveys on student learning experience or satisfaction. A university-wide sophomore-experience survey has been regularly administered at the end of the spring semester to volunteer sophomores (with chances to win small incentives) since 2012. The survey usually lasts for 3 months. The sophomore undergraduates were targeted for two main reasons. First, sophomores have greater familiarity with college life and may appraise their college experience more appropriately than first-year students (Lin & Lin, 2017). This familiarity is conducive to disclosing information on whether the university is held accountable for making an individual-environment fit (learning environment fits individuals' learning needs or concerns) for each student approaching effective learning. Second, as sophomores are at a transitional stage of becoming juniors, their motivational trajectory of learning provides greater insights into how college students' academic motivation affects engagement and achievement over time (Tobolowsky, 2008).

METHOD

The method section details Study 1 and Study 2 with respective descriptions of the hypothesis testing and participants, as well as joint descriptions for the remaining parts.

Hypothesis-testing of Study 1. With a covariate of prior academic performance, Study 1 tested a motivated learning model, as shown in [Figure 1](#).

Particularly, Study 1 tested the following hypotheses (H hereafter):

H1: Personal values explain Pap, Map, and Mav goals respectively.

H2: Collective values explain Pap and Pav goals respectively.

H3: Map goals mediate the relation between personal values and study hours.

H4: Pap goals mediate the relation between personal values and academic performance.

H5: Pap goals mediate the relation between collective values and academic performance.

Participants of Study 1. All sophomores ($N = 1,541$, 66.06% male [$n = 1,018$] and 33.94% female [$n = 523$]) were invited to respond to the survey in 2012. There were 729 complete responses (a response rate of 47.31%). These participants were continuously tracked for their third-year academic performance, generating a small decline in participant numbers from 731 to 652. Of the remaining participants ($N = 652$, Cohort 1), 61.0% were male ($n = 398$), and 39.0% were female ($n = 254$); 32.2% ($n = 210$) were Engineering majors, 19.8% ($n = 129$) were Electronic Engineering majors, 13.0% ($n = 85$) were Humanities & Social Sciences majors, 12.7% ($n = 83$) were Technology Management majors, 9.4% ($n = 61$) were Nuclear Science majors, 9.2% ($n = 60$) were Science majors, 2.5% ($n = 16$) were Life Science majors, and 1.2% ($n = 8$) had yet to choose their majors.

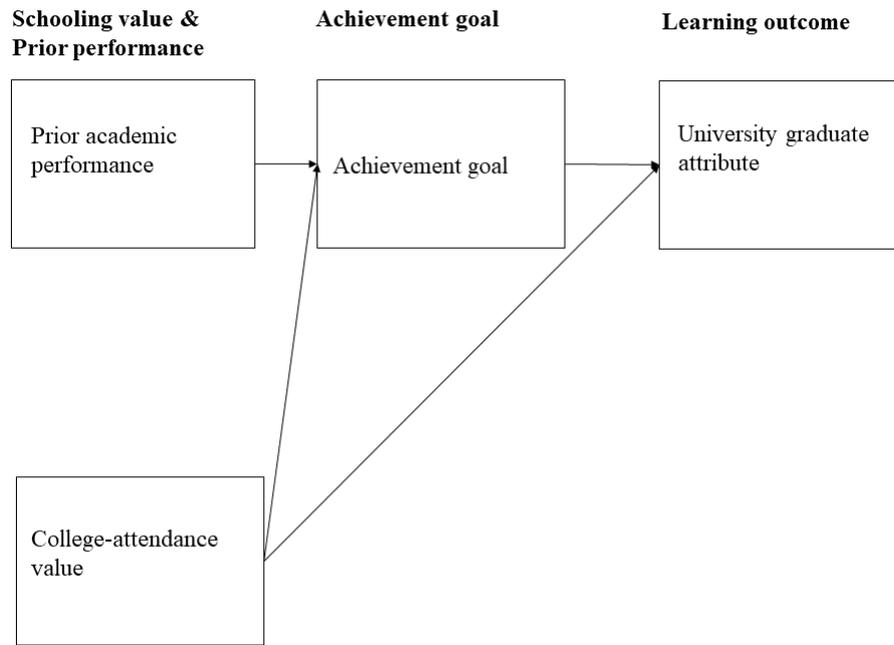


Figure 2. The Conceptual Framework of Study 2

Study 1 mainly examines the interrelations between the motivational factors and covariate. Once the interrelations were confirmed, they can be adopted to the various types of motivation-modeling that may address different outcome measures of additional research interests, as well as removing the limitations of participants' fatigue due to an over-long survey (King, 2015).

Hypothesis testing of Study 2. Study 2 further tested the extent to which hierarchical motivation modeling can explain the perceived university graduate attributes (i.e., discipline-specific competence, generic competence, and socio-interpersonal competence), as shown in **Figure 2**.

Based on the premise of the hierarchical motivation effects alongside a covariate of prior academic performance, Study 2 tested varying sets of hypotheses (abbreviated as HS hereafter):

- HS 6:** Personal values directly explain the university graduate attributes.
- HS 7:** Pap goals mediate the relation between personal values and the attributes.
- HS 8:** Mav goals mediate the relation between personal values and the attributes.
- HS 9:** Pap goals mediate the relation between collective values and the attributes.

Participants of Study 2. All the sophomores at the university in 2013 (Cohort 2) were invited to complete the university-wide survey in Study 2. As routine institutional-research practice, the survey was administered to volunteers (with chances to win small incentives) at the end of the spring semester in 2013, with 681 participants.

All sophomores in 2013 (N = 1,537, 63.0% male [n = 968], 37.0% female [n = 569]) were invited to participate in the university-wide survey administered at the end of the spring semester. There were 681 complete responses (44.3% response rate); 57.4% were male (n = 391), and 42.6% were female (n = 290); 21.1% (n = 144) were Engineering majors, 17.8% (n = 121) were Electronic Engineering majors, 10.0% (n = 68) were Humanities & Social Sciences majors, 13.8% (n = 94) were Technology Management majors, 12.8% (n = 87) were Nuclear Science majors, 15.9% (n = 108) were Science majors, and 8.7% (n = 59) were Life Science majors.

Instruments. Several measures were adopted in the two studies: the scales of college-attendance values and achievement goals, and the academic performance indicator.

The College-Attendance Value Scale. The study adopted the College-Attendance Value Scale (CAVS; Lin & Lin, 2017) which is a measure contextualized to the schooling value of college students in Taiwan. Using the current sample, the reliability of the CAVS was supported by Cronbach's alphas (α); the subscale collective value (with 4 items, $\alpha = .83, .84$), and personal value (with 3 items, $\alpha = .88, .89$) in Studies 1 and 2 respectively.

Achievement goal questionnaire. Elliot and Murayama's (2008) *Achievement Goal Questionnaire* (AGQ) consisting of four 3-item subscales on a 4-point Likert scale was adopted: Map ($\alpha = .78, .74$), Pap ($\alpha = .87, .87$), Mav ($\alpha = .70, .71$), and Pav ($\alpha = .86, .86$) in Studies 1 and 2.

Table 1. Correlations between the variables in Study 1

	1	2	3	4	5	6	7	8	9
1.pv	---								
2.cv	.241**	---							
3.rankrp	.117**	.022	---						
4.Map	.442**	.141**	.260**	---					
5.Pap	.183**	.219**	.323**	.504**	---				
6.Mav	.409**	.140**	.212**	.711**	.466**	---			
7.Pav	.055	.301**	.082*	.228**	.542**	.374**	---		
8.shour	.136**	.001	.186**	.248**	.162**	.220**	.089*	---	
9.rankr	.127**	.011	.779**	.293**	.361**	.247**	.091*	.158**	---
Cronbach's alpha	.88	.83	---	.78	.87	.70	.86	.70	---
M	3.24	3.18	0.58	2.95	2.70	2.84	2.64	1.29	0.56
SD	0.60	0.60	0.27	0.57	0.69	0.54	0.70	0.88	0.25

Notes: N=652; **, $p < 0.01$; *, $p < 0.05$. 1. pv, personal value; 2. cv, collective value; 3. rankrp, prior reversed academic ranking, i.e., prior academic performance; 4. Map, mastery-approach goal; 5. Pap, performance-approach goal; 6. Mav, mastery-avoidance goal; 7. Pav, performance-avoidance goal; 8. shour, study hours per week; 9. rankr, reversed academic ranking, i.e., academic performance. The numbers in grey are the variables under investigation

Academic performance indicator (reversed academic-ranking percentage). With the participants' consent, their academic performance was accessed from administration affairs. Their performance was computed by dividing class-rank by class-size and reversing the value where the higher the score, the better the performance. In Study 1, academic performance was collected over four consecutive semesters (over their sophomore and junior years). The first performance (at the end of the sophomore first semester) served as the covariate, while the second through fourth served as the academic performance measures. In Study 2, only the first performance of Cohort 2 was included as a covariate in the modeling.

The study-hour scale (specifically for Study 1). The students' study hours per week were assessed by a study-hour scale (SHS) taken from the Taiwan Higher Education database and validated in this study, serving as a locally-developed measure. The SHS with four items ($\alpha = .70$) used a response ranging from 0.50 to 8.50 (i.e., hours spent per week on coursework). The fit indices of CFA were $\chi^2 = 0.000$ (0), $p < 0.000$, CFI = 1.000, TLI = 1.000, RMSEA = 0.000 [0.000-0.000]. The factor loadings ranged from 0.64 to 0.72 ($p < 0.001$ for all loadings).

The University Graduate Attribute Scale (specifically for Study 2). The UGAS (discipline-specific competence by 3 items, $\alpha = .79$, generic competence 5 items, $\alpha = .78$, socio-interpersonal competence by 6 items, $\alpha = .88$). The UGAS served as a locally-developed measure in 2013, measuring the sophomores' perceived growth in attributes and knowledge (Lin, Yu, & Lin, 2014).

Analytical procedure. Studies 1 and 2 involved an identical analytical procedure consisting of three parts: (1) preliminary analysis of descriptive statistics and correlations between variables, (2) confirmatory factor analyses (CFA) testing the construct validity of the adopted scales, and (3) path analysis testing the hypothesized model. The preliminary analysis was computed by *SPSS Version 22.0*; CFA and path analysis by *Mplus 7.11*.

In the two studies, the path-analysis was computed by maximum likelihood estimation. The analysis results were examined by the fit indices: χ^2 (at a non-significant level; yet the sample size larger than 250 led us to expect a significant χ^2) (Hair, Black, Babin & Anderson, 2010), RMSEA (less than 0.08 alongside [confidence interval]), CFI (equal to 0.95 on the 0-1 scale), TLI (closer 1.00 on the 0-1 scale), and SRMR (less than 0.08) (Hair et al., 2010).

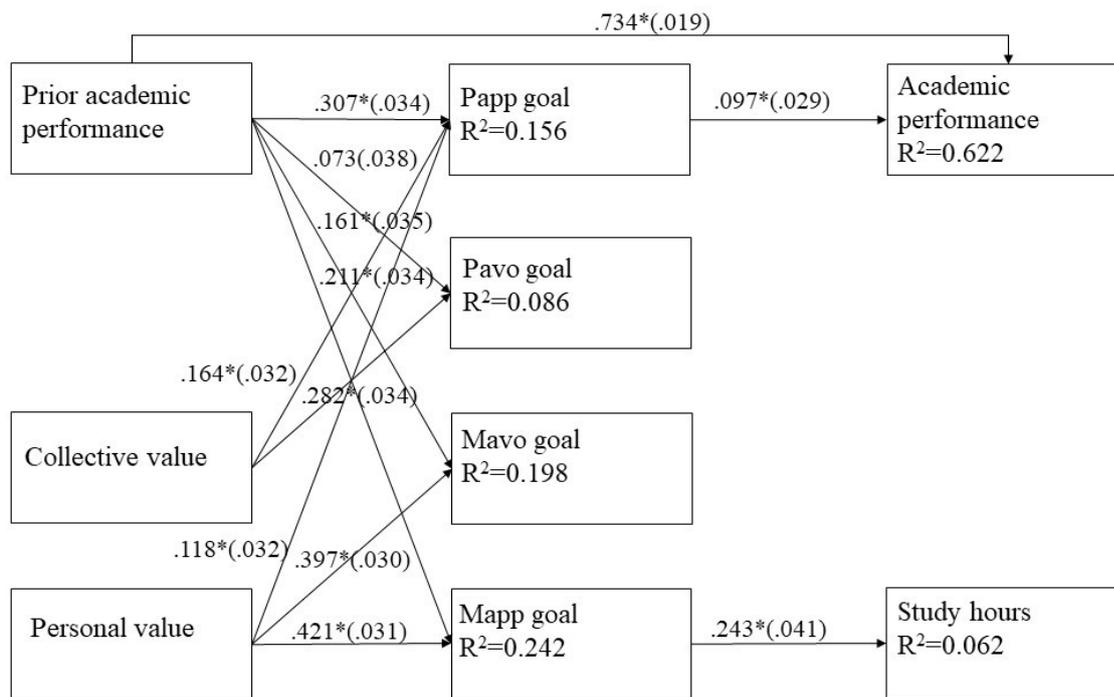
RESULTS AND DISCUSSION

Below are the results and brief discussion of Study 1, followed by those of Study 2.

Results of Study 1

Table 1 reports the descriptive statistics and inter-scale correlations of each subscale in Study 1. Each subscale was supported with internal consistency (i.e., a Cronbach's alpha equal to or higher than .70). Most of the hypothesized correlations between variables were confirmed, enabling path analysis.

Figure 3 illustrates the results of the path-analysis model in Study 1. This model allowed the correlations among all sub-constructs of the identical construct (e.g., the sub-constructs personal value and collective value on college-attendance value) but did not depict the correlations for a clearer presentation. The modeling results indicated a good data-model fit: χ^2 (7) = 16.262, $p < 0.05$, CFI = 0.995, TLI = 0.977, RMSEA = 0.045[0.016-0.074], SRMR = 0.025. The standardized path coefficients ranged from 0.097 to 0.734 at the significant level, in **Figure 3** (with the standard error of measurement in parenthesis).



* $p < .05$

Figure 3. The Results of the Hierarchical Motivation Modeling in Study 1

In Study 1, the four hypotheses were confirmed by the path-analysis results with a covariate of prior academic performance. For the direct effects, personal values explained Pap, Map, and Mav goals respectively (H1); collective values explained Pap and Pav goals (H2). These direct effects were also tested in Study 2.

Three indirect-effect paths were confirmed and reported by the standardized coefficients. One exerted from personal values, including via Map goals to study hours ($\beta = 0.102, t = 5.380$) (H3), and via Pap goals to academic performance ($\beta = 0.011, t = 2.509$) (H4). The remaining two exerted from the covariate of prior performance, including via Pap goals to academic performance ($\beta = 0.030, t = 3.164$) and via Map goals to study hours ($\beta = 0.051, t = 4.277$). There was an indirect path ($\beta = 0.016, t = 2.805$) from collective values via Pap goals to academic performance (H5).

Discussion of Study 1

The hierarchical motivation model is generally confirmed as being effective in terms of explaining study hours and academic performance over the effect of prior academic performance. Below are the interpretations.

Over prior academic performance, collective values are related to performance goals; personal values are related to mastery goals and Pap goals (i.e., H1 & H2). The relations between college-attendance values and achievement goals were confirmed over the effect of prior academic performance on achievement goals. In particular, collective values were found to be related to performance goals, while personal values related to mastery goals and Pap goals. The findings suggest that individuals hold higher collective values of college-attendance mainly out of social expectations (e.g., job-seeking term or parental expectations); they may be more concerned about others' perspectives on their academic performance and, thus, tend to hold higher performance goals assessing their academic performance relative to those of others. While individuals hold higher personal values for college attendance (e.g., knowledge pursuit, self-actualization), they may express greater interest in pursuing intrapersonal development. This interest may energize individuals to adopt multiple goals conducive to greater academic engagement and performance, and better competence development, such as mastery goals by the task-mastery criteria for achievement (Chen & Lu, 2015; Harackiewicz et al., 2002) and Pap goals by the performance-norm (Chen & Lu, 2015; Liem et al., 2008; Liem et al. 2012; Liem, 2016). Based on the premise of a need for personal development in college attendance, individuals appear to be more active in seeking achievement. Thus, they may not highly endorse Pav goals by the criteria of not being less competent than others. The findings support the explaining effect of contextualized motivation, namely college-attendance values, on Taiwan college students' achievement goals.

Pap goals are related to academic performance, while Map goals are related to study hours. The relations between achievement goals and desired learning outcomes were confirmed. Corresponding to the findings of previous studies, a higher Pap goal predicted better academic performance (Liem et al., 2008; Liem 2016), while a higher Map goal predicted more study hours (higher engagement in Liem et al., 2012) with the effect of prior academic performance. That is, individuals with a higher Pap goal tend to adopt normative criteria for assessing their performances relative to those of their class community and are thus more likely to have higher achievements, corresponding to the results for secondary-education students (Liem et al., 2008; Liem et al., 2012; Liem, 2016; Senko et al., 2011) and for college students (Harackiewicz et al., 2002). Individuals with a higher Map goal tend to adopt the task-mastery criteria for assessing their performance, which often leads to the pursuit of intrapersonal interest in task-mastery that is not always related to higher academic performance (Harackiewicz et al., 2002). Driven by Map goals, individuals are more willing to invest more learning hours in tasks that satisfy their personal needs rather than fulfilling their academic requirements. Finally, Pav and Mav goals were confirmed as being neither detrimental nor helpful to either more learning hours or higher academic performance. These links substantiate evidence for the relevance of achievement goal constructs to Taiwan college students (Chen & Lu, 2015) and evidence explaining the effect of achievement goals on higher academic engagement (Michou et al., 2014) and performance (Liem et al., 2008; Liem, 2016). The links confirmed in this study over the effect of prior academic performance may shed more theoretical light on such modeling, since previous studies have not always included prior academic performance.

Map goals play a mediating role in personal values and learning hours (H3). Individuals with a stronger Map goal may have a higher personal value of college attendance, and thus are more willing to spend more hours on their coursework. Consistent with the explanatory role of the Map goals in more learning regulation (Michou et al., 2014), the current study confirmed that learning regulation as learning hours appears to be a simple but direct indicator of a great investment by college students in learning by declining a variety of attractive extra-curricular activities (Kuh et al., 2008). Sophomores pursuing a higher Map goal of competence development are more willing to spend more study hours on their coursework after class. These findings may extend the literature by revealing a link between Map goals and study hours of learning engagement alongside the already-known link with learning strategies of all kinds, such as self-regulation in Michou et al. (2013, 2014) or surface/deep learning in Liem et al. (2008).

Pap goals play a mediating role in personal values/collective values and academic performance (H4 & H5). Corresponding to previous studies' findings (Liem et al., 2012), the explanatory role of achievement goals was confirmed in the relations between college-attendance values and learning outcomes. These roles include: (1) personal values on study hours via Map goals; (2) personal values/collective values on academic performance via Pap goals. Showing overall consistency with the findings of previous studies (Liem et al., 2008; Liem et al., 2012), individuals with a higher Pap goal may have social expectations or personal needs for college attendance and, thus, will strive to achieve higher academic performance and vice versa. In a nutshell, the findings generally support the interrelations between contextualized motivation, achievement goals, and academic performance over prior academic performance.

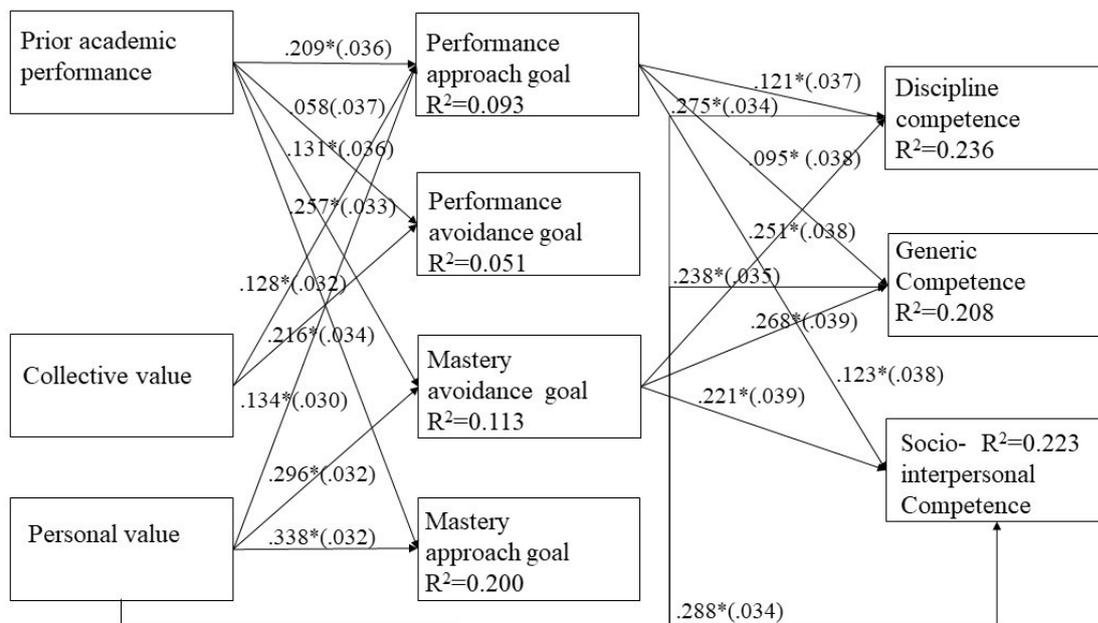
Results of Study 2

Table 2 reports the descriptive statistics and inter-scale correlations of each subscale in Study 2. Most of the inter-scale correlations were confirmed, enabling path analysis.

Table 2. Correlations between the variables in Study 2

	1.pv	2.cv	3.rankrp	4. Map	5.Pap	6. Mav	7. Pav	8.dc	9.gc	10.sc
1.	--	.199**	.110**	.361**	.165**	.299**	.018	.369**	.333**	.373**
2.		--	.029	.073	.163**	.093*	.239**	.113**	.167**	.201**
3.			--	.293**	.228**	.164**	.061	.117**	.043	.068
4.				--	.541**	.705**	.235**	.386**	.371**	.338**
5.					--	.451**	.589**	.279**	.254**	.269**
6.						--	.383**	.387**	.381**	.361**
7.							--	.201**	.218**	.247**
8.								--	.657**	.604**
9.									--	.739**
10.										--
Cronbach's Alpha	.89	.84	--	.74	.87	.71	.86	.79	.78	.88
M	3.30	3.22	0.56	2.94	2.70	2.85	2.66	2.78	2.89	2.92
SD	0.58	0.56	0.28	0.56	0.69	0.54	0.71	0.57	0.47	0.52

Notes: N=681; **, $p < 0.01$; *, $p < 0.05$. 1. pv, personal value; 2. cv, collective value; 3. rankrp, prior reversed academic ranking, i.e., prior academic performance; 4. Map, mastery-approach goal; 5. Pap, performance-approach goal; 6. Mav, mastery-avoidance goal; 7. Pav, performance-avoidance goal; 8. dc, discipline competence; 9. gc, generic competence; 10. sc, socio-interpersonal competence. The numbers in grey are the variables under investigation



* $p < .05$

Figure 4. The Results of the Hierarchical Motivation Modeling in Study 2

The modeling results indicated a data-model fit: $\chi^2(9) = 19.532, p < 0.05, CFI = 0.996, TLI = 0.980, RMSEA = 0.041[0.015-0.067], SRMR = 0.021$. The standardized path coefficients ranged from 0.095 to 0.338 at the significant level, as illustrated in **Figure 4** (with the standard error of measurement in parenthesis).

In Study 2, the four sets of hypotheses were all confirmed. The indirect-effect standardized paths are detailed below. Three exerted from collective values via Pap goals to DC ($\beta = 0.015, t = 2.519$), GC ($\beta = 0.012, t = 2.118$), and SC ($\beta = 0.016, t = 2.528$). Likewise, three exerted from personal values via Pap goals to DC ($\beta = 0.016, t = 2.620$), GC ($\beta = 0.013, t = 2.174$), and SC ($\beta = 0.016, t = 2.625$). Finally, the largest coefficients found were three exerting from personal values via Mav goals to DC ($\beta = 0.074, t = 5.330$), GC ($\beta = 0.079, t = 5.498$), and SC ($\beta = 0.065, t = 4.829$).

Discussion of Study 2

In Study 2, the hierarchical motivation model is confirmed as being effective in terms of explaining university graduate attributes over the effect of prior academic performance.

Over prior academic performance, collective values are related to performance goals; personal values are related to mastery goals and Pap goals (i.e., H1 & H2). First, based on Study 1, the relation between college-attendance values and achievement goals is quite consistent. Study 2 with another sample also found that collective value is related to performance goals while personal values are related to Pap and mastery goals but not to Pav goals, controlling for prior academic performances, which is generally consistent with previous studies (Eccles, 2009; Liem et al., 2012).

Personal value is related to university graduate attributes (HS6). Personal values can directly predict the university graduate attributes. Corresponding to previous studies (Chen & Lu, 2015; Eccles, 2009; Schunk et al., 2008), this finding suggests that individuals have a higher personal need for self-development in schooling, irrespective of their varying levels of achievement goals or motivational factors, and that they tend to engage more in formal and informal curricula and extra-curricular activities conducive to their competence development.

Pap goals play a mediating role in collective and personal values and university graduate attributes (HS7 & HS9); Mav goals mediate personal values and the attributes (HS8). The explanatory roles of Pap and Mav goals were confirmed in the relations between college-attendance values and university graduate attributes. Personal and collective values can indirectly predict the university graduate attributes via Pap goals while personal values can do so via Mav goals. Corresponding to the findings of previous studies (Chen & Lu, 2015), these findings suggest that college students who attempt to meet social expectations or personal needs for college attendance are more aware of adopting the goals for achievement, although they may define achievement either by outperforming the performance-norm criteria or by avoiding the non-achievement of task-mastery. With these two goals in mind, they are more committed to developing the competencies essential for college students, including discipline-specific competence subsuming disciplinary knowledge and skills; generic competence subsuming skills of critical-thinking, scientific reasoning, etc.; and socio-interpersonal competence comprising teamwork skills, interpersonal communication, etc. (Lin et al., 2014). If higher cognitive and socio-interpersonal competencies of college students are expected (e.g., higher university graduate attributes in the study) (Oliver, 2013), educators may consider promoting higher personal and collective values as distal motivational factors that can prompt higher achievement goals adaptive to the competence development over prior academic performance of college students.

GENERAL DISCUSSION

Drawing upon the findings of the two models, a discussion of the more generalizable implications follows.

The Hierarchical Motivation Modeling: A Lens on Contextualized Motivation

Based on the achievement-goal framework and contextualized motivation, the two hierarchical motivation models were confirmed by two different cohorts of college sophomores in Taiwan. With a covariate of prior academic performance, the findings of the modeling arguably support the multiple goal perspective, such that performance and mastery goals play an explanatory role in subsequent performance (Michou et al., 2013), and in the university graduate attributes (i.e., the study empirically supports the theoretical statements in the literature). The study provides novel but useful insights into the effect of hierarchical motivation modeling on the attributes, controlling for prior academic performance.

Overall, the findings support contextualized motivation constructs that specify the sophomores' collective and personal values for college attendance. The two values are found to be able to explain the students' adaptive achievement goals in triggering more desired outcomes. This effect of college-attendance value (i.e., a contextualized motivation) on achievement goals may actively respond to Eccles' (2009) call for situating motivation in a learning setting of high interest alongside prior learning experience. The effect signals possible motivation paths for attainment in college education.

A Need to Boost College Students' Contextualized Motivation

The results of this study may advance the field's understanding of the interrelations among contextualized motivation (i.e., college-attendance value), achievement goals, and university graduate attributes. In particular, the results indicated that Pap and Mav goals are effective mediators between college-attendance value (i.e., collective value and personal value) and university graduate attributes (discipline-specific, generic, and socio-interpersonal competencies). That is, individuals with a higher collective value may be more concerned about the social expectations regarding their college attendance and may tend to have a stronger Pap goal using the performance-norm criteria and then be more likely to attain higher university graduate attributes. Individuals with higher personal values are more concerned about their personal development in college study and appear to have stronger Pap and Mav goals and, thus, attain higher university graduate attributes. This finding suggests that, if educational purposeful tasks at the institution intend to promote higher university graduate attributes necessary for all college

students, the practices should boost students' higher schooling value, which will serve as a prerequisite for further development of the attributes. Instead of viewing schooling value (learning-task value in general) as an unchangeable trait, it is more likely to be depicted as a malleable state from the perspective of developmental educational psychologists (Eccles et al., 1983, 2009; Schunk et al., 2008). Therefore, educational practices at institutes should promote and sustain schooling value alongside college students' institution-wide academic performance over time to facilitate better development of each student.

CONCLUSION

Based on hierarchical motivation modeling, the results of this study confirm how motivated and goal-oriented college students later arrive at better desired learning outcomes (i.e., not only academic performance but university graduate attributes). These empirical findings reveal the degree to which the institute fulfills the duties of best facilitating the college students' development of the desired outcomes (including a wider range of competencies, attributes, values, etc.), partly supporting institutional accountability (Kuh, 2005; Kuh et al., 2006). The findings also support the value of institutional research (IR) uncovering the motivated learning path of undergraduates, and perhaps triggering subsequent decisions (Lin & Lin, 2017; Volkwein, 2011).

Also, the findings indicate that the hierarchical motivation modeling, mainly adopting the expectancy-value theory (particularly eliminating the effect of prior academic performance), and the achievement goal theory originating from western culture, has been confirmed by Taiwanese undergraduates' motivated learning trajectory in the eastern culture. This trajectory may be comparable to student participants of varying cultural backgrounds.

In particular, the finding may provide higher-education professionals around the world with fruitful insights into both the motivated learning trajectory of Taiwan undergraduates, and the regularly-scheduled IR practice that is highly valued at the university. This IR practice is worth spreading, particularly for those universities/colleges that intend to learn about and then foster the students' learning by any means possible. Despite the IR practices often being adopted within local contexts, strategic planning, problem-solving, and a need for student-learning information are deemed universal to the IR professionals and stakeholders around the globe (Lin et al., 2018). Thus, the meaning of the confirmed hierarchical motivation models may be justifiable to those IR professionals who hold a similar interest in the students' motivated learning for higher accountability.

There are two pedagogical implications. First, collegial governance may enhance learning and teaching effectiveness by boosting each college student's higher personal value of college attendance (i.e., of pursuing knowledge-acquisition or self-actualization) and multiple goals (i.e., Pap, Map, and Mav goals being more adaptive) (Lin & Lin, 2017). Additionally, collegial governance should try to ensure the congruence among academic performance, university graduate attributes (being university-specific), and educational purposeful tasks (Harackiewicz et al., 2002; Kuh et al., 2006; Oliver, 2013). Both college students and collegial educators should closely examine whether the educational purposeful tasks (i.e., structured and unstructured curricula, extracurricular activities, and a variety of learning and service opportunities) are closely related to academic performance (Harackiewicz et al., 2002), and the intended university graduate attributes (Oliver, 2013) are widely accessible at the institute. Furthermore, policy recommendations include the need for both continuous investigation and a culture of making more evidence-based and informed decisions. First, the institution—collegial governance in particular—should prioritize the tracking of the motivated learning trajectory in the perpetual tight schedule of the institution (Volkwein, 2011). Second, collegial governance should cultivate a culture of making more evidence-based and informed decisions (i.e., motivational trajectory in achieving desired learning outcomes). Particularly, the decisions should aim at launching college curriculum and instruction innovation for optimal development of each college student (Volkwein, 2011).

Some limitations are noteworthy. While the findings reveal a few effects of college-attendance values via achievement goals on university graduate attributes, we hesitate to interpret these effects as completely causal until more evidence from longitudinal data has been collected. Future studies should take a developmental psychology perspective (Eccles, 2009; Schunk et al., 2008) and launch longitudinal studies on contextualized motivation over time. Also, the study analyzed the datasets in 2012 and 2013, which may undermine the function of the study, particularly for the readers who sought an ongoing, up-to-date report. Future studies should address the status quo of the IR.

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