

# How Educational Practices Affect the Development of Life-long Learning Orientations in Traditionally-aged Undergraduate Students

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**Abstract** We investigated curricular conditions and educational practices that influenced the development of life-long learning orientations among 405 undergraduate students. Results suggest that growth in life-long learning orientations was facilitated by instruction that included opportunities for reflection, active learning, and perspective-taking and that provided students with opportunities for positively interacting with diverse peers. Negative diverse peer interactions were found to stifle development. Implications for researchers and practitioners are discussed.

**Keywords** Motivation · Practice · Diverse peer interactions · Outcome

## Introduction

The Association of American Colleges and Universities (2002) charged institutions with providing educational environments that: "...foster a well-grounded intellectual resilience, a disposition toward life-long learning, and an acceptance of responsibility for the ethical consequences of our ideas and actions" (p. xii). Similar charges were heralded by life-long learning experts at an international conference entitled "Creating life-long learners: a new and inclusive vision;" one such expert, conference adviser, Dr. Ann Hodgson reports, "The goal must be to build learning strategies and assessment systems that will motivate young people to want to go on learning...Learners need to learn and achieve at their own pace so that they continue to feel motivated and believe that they can make progress" (as cited in Green 2000). Calls like these lay the foundation for improvements in educational practice

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and scholarship investigating how curricular-based contexts influence student outcomes related to life-long learning. Ironically, these outcomes and those college conditions and experiences that lead to their development have rarely, if ever, been examined as an area of research in its own right, leaving educators and administrators with little empirical direction as they make decisions about how to instill students with the motivation needed to practice life-long learning skills.

How do scholars within the field of higher education research understand what constitutes life-long learning? How do we move the construct from rhetoric to operation? A series of articles have addressed issues related to life-long learning, including how it is positioned as a goal of higher education (Abukari 2005; Toynton 2005), what constitutes a life-long learner (Gorard and Selwyn 2005; McCombs 1991; Tennant and Yates 2005), and even how to assess its related constructs (Crick et al. 2004; Tuijnman 2003; Wielkiewicz et al. 2005). However, few studies have investigated how educators can help traditionally-aged students develop their capacities for life-long learning. In fact, of the handful of studies attempting to operationalize life-long learning, most relate it to other collegiate outcomes and experiences (Hayek and Kuh 1998, 1999) without trying to uncover how it develops and what educators can do to influence its development.

Perhaps one reason for this lies in a lack of understanding of, and subsequent empirical approach to, the study of life-long learning and its constitutional psychological elements. Common to conceptual pieces addressing this area is the idea that motivation to learn is a key element to life-long learning. In their book, *Understanding Motivation for Life-long Learning*, Smith and Spurling (2001) provide an overview of the relationship between motivation and life-long learning by drawing together elements of psychology, economics, anthropology, sociology and the study of learning itself: they conclude,

This broad, mixed motivational strategy would support the emergence of a new culture of life-long learning, where individuals are constantly seeking to learn, and exhibit both individual commitment to learn for personal reasons, but also a social commitment towards mutual learning in the wider social context, including the world of work (p. 114).

McCombs (1991) argues for an even more symbiotic relationship between motivation and life-long learning, “How do we describe the relationship between motivation and life-long learning? In many ways these two constructs are indistinguishable. The motivated person is the life-long learner, and the life-long learner is the motivated person” (p.117). She further refines her definitions of each term:

*Motivation to learn* is an internal, naturally occurring capacity of human being that is enhanced and nurtured by supportive relationships, opportunities for personal choice and responsibility for learning, and personally relevant and meaningful tasks. *Life-long learning* is also a natural propensity of human beings to continue to learn, growth, and develop that is facilitated by ‘uncovering’ natural learning tendencies and enjoyment of learning and by reducing or eliminating negative, insecure thoughts and belief systems (p. 120).

These definitions serve as the rationale for using need for cognition as our conceptual proxy for life-long learning orientations. Need for cognition reflects an individual’s tendency “to engage in and enjoy effortful cognitive activity” (Cacioppo et al. 1996, p. 197) where high-need individuals enjoy thinking abstractly while low-need individuals tend to dislike thinking on an abstract level. Cacioppo et al. (1996) frame their understanding of engaging

in and enjoying effortful cognitive activity as integral parts of what they call “cognitive motivation” (p. 197). Here, at the nexus of motivation, life-long learning orientations meet need for cognition.

### Purpose Statement

The purpose of this study was to investigate curricular conditions and educational practices that influence the development of life-long learning orientations in traditionally-aged undergraduate students. We examined the development of need for cognition for students enrolled in one of five courses, a philosophy course, psychology course, service-learning course, intergroup dialogue course, and introduction to sociology course. We selected these courses based on the degree to which they varied regarding the educational practices their respective instructors used for delivering content. In tandem with this, we investigated how certain educational practices (activities designed for students to engage in reflection and spaces created for positive and negative interactions with diverse peers) influenced the development of need for cognition, a conceptual proxy related to life-long learning.

### Theoretical Overview

#### Need for Cognition

Since its inception, need for cognition has evolved as a construct of inquiry spanning many disciplines and many decades. With its mutual emphasis on engagement in and enjoyment of effortful, higher order thinking, need for cognition has been explained as one of many theoretical elements relating to, but not substituting for, cognitive motivation. Researchers interested in educational psychology have initiated most empirical investigations of this construct as they attempt to explain how need for cognition, its constitution, and its development relate to other psychological constructs.

So, what is need for cognition? The leading experts in the field, Cacioppo et al. (1996), refer to need for cognition as cognitive motivation, making sure to maintain the distinction between motivation and ability: they note, “Need for cognition is thought to reflect a cognitive motivation rather than an intellectual ability, however, it should be related to and non-redundant with intellectual ability” (p. 215). Framed as such, need for cognition takes root in motivation theory as an individual’s intrinsic motivation to perform a cognitively challenging task (Cacioppo et al. 1996); it reflects the student’s internal desire to perform on a cognitively effortful endeavor.

Does need for cognition share similar structural and developmental properties as other outcomes of interest? Scholars have argued over whether need for cognition is a stable trait (like personality, unsusceptible to change; see Cohen et al. 1955; Perse 1992) or a psychological state (cognitive outcome possible for change; see Coutinho et al. 2005). With regard to the former, one would suspect that need for cognition would not change as a result of student engagement in a particular collegiate condition or experience. As the latter, need for cognition reflects properties similar to other college outcomes: it can be developed and should be studied as it relates to the college student experience.

It is unclear where Cacioppo et al. (1996) stand on this issue. On one hand, they review two studies examining the test–retest reliability for the measure for need for cognition

(Need for Cognition Scale; NCS; Cacioppo and Petty 1982) and conclude that the data, “although limited, support the temporal stability of people’s scores on the NCS” (p. 213). On the other, they discuss the development of need for cognition, first in a discussion about learning environments most conducive to growth: “The development of need for cognition, therefore, may benefit from the construction of contingencies (e.g., educational settings) that foster both cognitive development and feelings of enjoyment, competence, and mastery in thinking” (p. 246) and second, in areas of future research that warrant further exploration: “A number of unanswered questions have also been identified for this review, including... the ontogeny of need for cognition” (p. 247). In an attempt to resolve this tension, they position their understanding of need for cognition as a psychological tendency, not an invariant trait or disposition, and as subject to situational circumstances such as time pressure (Cacioppo and Petty 1982). What remains problematic with this position is whether need for cognition can be studied from a developmental perspective. An ancillary purpose of this paper is to provide at least partial support for the developmental side of this debate: our assumption is that need for cognition can be developed and is subject to change based on student exposure to certain curricular conditions and educational practices.

## Literature Review

Over 100 studies (see Cacioppo et al. 1996) have investigated need for cognition, including how it relates to other constructs ranging from identity to scholastic aptitude, how it has been used to predict other outcomes of interest, how its operation has been validated, and how it relates to other personality and demographic variables. Rather than review these studies, we wanted to highlight those most germane to the purposes of this study. Moreover, despite this seeming large number of studies, there remains a paucity of research explaining how curricular content or educational practices influence the development of need for cognition. For this reason, we will draw on two other literature bases to justify those variables included in our model: those that have used other proxy measures for life-long learning not related to need for cognition and those that have examined curriculum and practice effects on similar outcomes of interest. We hope that this strategy will help readers understand how we selected variables for consideration in our final models investigating the effects of curricular environments and educational practices on the development of life-long learning orientations.

In a comprehensive literature review of studies that used the need for cognition scale, Cacioppo et al. (1996) cite four studies investigating the relationship between education level and need for cognition, and nine studies examining the relationship between gender and need for cognition. For the former set of studies, three of the four suggested that need for cognition was positively related to level of education; for this reason we included level of education in our final model. In the latter set, no studies suggested that need for cognition differed by gender; the authors concluded that “need for cognition is gender neutral” (p. 214). Despite the authors’ contention concerning the neutrality of gender, we chose to include it in our model for one main reason: we know that development in college differs for students from varying social identity groups (see Belenky et al. 1986; Josselson 1996; Helms 1990). As we are the first to adopt a developmental framework for understanding curricular effects on need for cognition, we must account for how development may differ by gender and by race.

Only one study investigated how need for cognition varied by race. Sanders et al. (1992) administered the need for cognition scale to a group of 555 students from a major western university. Of these students, 63.6% were Euro American, 15.7% were Hispanic American, 15.5% were Asian American, and 4.1% were African-American. (The authors note that African-American students were not considered in analyses due to inadequate sample sizes.) They found a significant difference between Asian Americans ( $M = 99.2$ ) and the other two ethnic groups: Euro Americans ( $M = 109.6$ ) and Hispanic Americans ( $M = 107.3$ ), respectively. They offer two explanations for this: “the instrument(s) may be ethnically biased” (p. 55) or “Asian Americans may be bicultural, but some retain influences of Asian cultures that may affect their preferred thinking patterns” (p. 55). Due to the scarcity of research examining need for cognition as it relates to race and our knowledge of differing developmental trajectories for varying social identity groups, we decided to include race for consideration in our model.

Two empirical efforts have attempted to uncover the relationship between political orientations and need for cognition. Mayhew (2005, Unpublished doctoral dissertation) reported a significant relationship between need for cognition and political identification ( $r = -.173, p < .0001$ ), suggesting that the more conservative the student, the less likely that student would be to engage in and enjoy effortful thinking. Similarly, Thompson (1995) explored the impact of need for cognition on political tolerance and found that students with higher needs for cognition were also more likely to “apply free speech principles in forming opinions in specific issue situations” (p. 934). In order to better isolate the effects of the curricular experience on the development of need for cognition, we included political orientation as a demographic control in our model.

Turning to curricular experiences, there were no studies that investigated the effects of course content or educational practices on need for cognition development, however, two articles addressed how certain curricular experiences influenced orientations toward life-long learning, not measured by the need for cognition scale. Hayek and Kuh (1999) administered the College Student Experiences Questionnaire (CSEQ) to 26,629 seniors from 173 four-year colleges and universities and used one of its subscales, the Capacity for Life-long Learning (CLLL index), to estimate the extent to which students acquire continuous life-long learning skills (Kuh et al. 1997). They found that seniors from selective liberal arts colleges demonstrated greater potential for life-long learning skills than did seniors at other types of colleges and universities; they attributed this finding to “student motivation and clarity of focus which may advantage SLAs [selective liberal arts colleges] in that they probably attract larger proportions of more highly motivated students than other types of institutions” (p. 10). Again, we see the need for understanding student motivation as it relates to life-long learning.

Building upon this work, the same authors designed another study (1998) investigating the life-long learning skills of 17,541 college seniors attending four-year institutions who completed the same measure between 1994 and 1997. They concluded that certain clusters of college activities and environmental factors appeared to be essential for the development of continuous life-long learning skills and competencies. Among those relevant for this study were practice-related effects (e.g., the amount of effort students devote to taking notes in class, participating in class discussion, thinking about practical applications of course materials, and trying to explain materials to other students), diverse peer interaction effects (e.g., engagement with diverse peers) and what the authors call the effects of “institutional environment” (p. 9) (e.g., learning environments that value critical, evaluative, and analytical performance). Based on the findings from these studies, we included variables that measured student enrollment in

curricular environments with instructors committed to help students adopt a critical approach to contemporary issues. Such a commitment was reflected in course content and in the educational practices adopted in the courses, namely, practices that involved reflection as well as those that provided intentional learning opportunities for students to interact with their diverse counterparts.

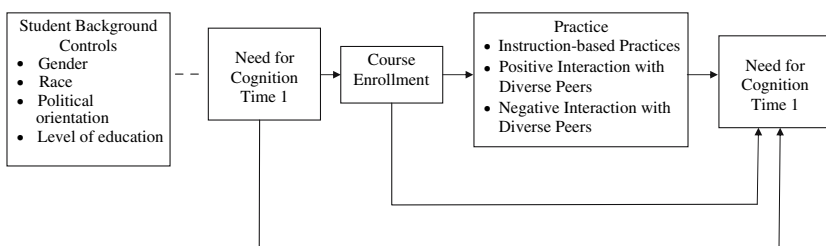
## Conceptual Framework

These studies provide the foundation for the current investigation of curricular content and educational practices and their role in helping students develop their life-long learning orientations. Figure 1 presents the conceptual framework used for this study. This framework accounts for student background controls (i.e., gender, race, political orientation, and education level), pretest measures (i.e., pretest need for cognition scores), curricular experiences (i.e., course enrollment), and pedagogical covariates (i.e., instruction-based practices, positive negative interactions with diverse peers). To isolate the effects of curricular content and practices on the development of life-long learning orientations, we included demographic variables such as gender, race, level of education, and political orientation in our causal diagram; however their inclusion is not intended to suggest a causal relationship between them and pretest need for cognition scores.

## Methods

### Course Selection

This study used a longitudinal comparative research design to assess the effects of enrollment in five selected undergraduate courses on college students' life-long learning skills. This study was an outgrowth of another study conducted by Mayhew (2005, Unpublished doctoral dissertation) who investigated how educational practices influenced the development of moral reasoning in undergraduate students. As such, the selection of the courses was based on a rubric intentionally designed to explore the effects of courses with different pedagogical approaches on outcomes related to moral reasoning. Given the established relationship between moral reasoning and need for cognition (Crowson 2004, Unpublished manuscript; Jenson 1998, Unpublished doctoral dissertation) and the varying pedagogies instructors used within these classrooms, we think that many of the experiences hypothesized to influence change in moral reasoning scores will also affect outcomes related to life-long learning.



**Fig. 1** Overview of the conceptual framework of the study

The selected courses differed in how instructors delivered their course content. The psychology course was jointly taught by a psychologist–playwright and a sociologist–political scientist, both of whom were faculty in a living–learning community at the institution where this study takes place; as such, this course provided students with the opportunity to engage in meaningful interactions with each other as well as with faculty members, both inside and outside of the classroom. The philosophy course was offered by a visiting instructor from a university in the northeastern United States and was taught in a large lecture hall with break-out discussion groups, facilitated by graduate student instructors who are currently enrolled as doctoral students in the department of philosophy. The intergroup dialogue course focused on social justice content including issues related to social identities, oppression, and discrimination and was distinctive, in terms of pedagogical practice, in that students participate in facilitated face-to-face dialogues with other college students who represent a social identity group different than their own. The service-learning course also addressed issues related to social justice but used a service-oriented pedagogy to present the information: students must have participated in a service project throughout the course and were expected to spend between 3 and 5 hours per week at their service sites (e.g., hospitals, soup kitchens). The survey course in introduction to sociology served as a comparison group for the study since its instructor delivered course content in a more traditional form through the use of lectures with break-out discussion groups.

## Data

The population for this study consisted of all students enrolled in one of five courses. Participation was voluntary and involved completing a multi-part survey at the beginning and end of one term of study. Only those who completed the short form of the need for cognition scale (NCS; Cacioppo et al. 1984) at both the pretest and posttest were included, yielding a longitudinal response rate of 55% ( $n = 423$ ). Eighteen additional students were dropped from the analytic sample due to missing data. Of the remaining 405 students included in analysis, the majority were female (59.8%), white (73.3%), and nearly equally distributed by class year in college (29.6% freshmen, 29.4% sophomore, 20.5% junior, and 20.5% senior). In terms of college major, nearly half (44.9%) majored in Social Sciences, 18.8% majored in Humanities, 15.3% majored in business, 14.1% majored in the natural or engineering sciences, 2.5% majored in “other” majors (including majors in general or independent studies), and 2.0% majored in the health sciences. Nearly 2.5% of students did not provide any information on their college major.

## Variables

The dependent variable used throughout this study is the posttest NCS (Cacioppo et al. 1984), administered at the end of the term of study. The NCS measures an individual’s tendency “to engage in and enjoy effortful cognitive activity” (Cacioppo et al. 1996, p. 197). Table 1 presents the 18 items that comprise this scale and indicates high internal consistency with an alpha level of .89 (and .88 for the parallel pretest).

The primary independent variables in the study were related to student course enrollment. Defined by five dummy variables, students were categorized according to their enrollment in one of the following courses: Introduction to Sociology, Psychology,

**Table 1** Constituent items and reliabilities for need for cognition scales

Scales and constituent items	Cronbach's alpha
Need for cognition pretest	.88
Need for cognition posttest	.89
I would prefer complex to simple problems	
I like to have the responsibility of handling a situation that requires a lot of thinking	
Thinking is not my idea of fun <sup>a</sup>	
I would rather do something that requires little thought than something that is sure to challenge my thinking abilities <sup>a</sup>	
I try to anticipate and avoid situations where there is likely chance I will have to think in depth about something <sup>a</sup>	
I find satisfaction in deliberating hard and for long hours	
I only think as hard as I have to <sup>a</sup>	
I prefer to think about small, daily projects to long-term ones <sup>a</sup>	
I like tasks that require little thought once I've learned them <sup>a</sup>	
The idea of relying on thought to make my way to the top appeals to me	
I really enjoy a task that involves coming up with new solutions to problems	
Learning new ways to think doesn't excite me very much <sup>a</sup>	
I prefer my life to be filled with puzzles that I must solve	
The notion of thinking abstractly is appealing to me	
I would prefer a task that is intellectual, difficult, and important to one that is somewhat important but does not require much thought	
I feel relief rather than satisfaction after completing a task that required a lot of mental effort <sup>a</sup>	
It's enough for me that something gets the job done; I don't care how or why it works <sup>a</sup>	
I usually end up deliberating about issues even when they do not affect me personally	

*Note.* All constituent items are based on a five-point Likert scale, from 1 = extremely uncharacteristic to 5 = extremely characteristic

<sup>a</sup> Item reverse coded

Philosophy, Intergroup Dialogue and Service Learning. In all analyses, the excluded (or comparison) group was comprised of students in Introduction to Sociology.

Additional independent variables consisted of three scales representing classroom-based practices related to students' need for cognition or orientation toward life-long learning. Based on the Measure of Classroom Moral Practices (MCMP; Mayhew, Unpublished doctoral dissertation) pilot tested in March of 2004, we created 11 scales representing classroom practices: positive interactions with diverse peers; negative interactions with diverse peers; engagement in active learning outside of classroom settings; engagement in active learning in classroom settings; encouraged to participate in classroom discussion; encouraged to engage in reflection; engaged in positive interactions with faculty; was led to rethink views of self and others; encouraged to consider different perspectives and points of view; had influential interactions with peers; encouraged to consider issues related to social justice and diversity. Initial correlation analyses of these scales showed high correlations (in some cases,  $r > .80$ ) between constructs. Therefore, we performed a second-order factor analysis on these scales to avoid violating assumptions of multicollinearity in our final models. Principle axis factoring and orthogonal rotation yielded the three meaningful components or dimensions of classroom practices related to the extent to which students reported having: positive interactions with diverse peers ( $\alpha = .77$ ), negative

interactions with diverse peers ( $\alpha = .73$ ), and a composite of nine other constructs representing overall instruction-based educational practices ( $\alpha = .90$ ). The negative interactions with diverse peers scale failed tests of normality, and was therefore dichotomized by performing a median split. In the original distribution of this variable very few students reported having experienced negative interactions with diverse peers, yielding an overall mean score of 1.32 on a five-point scale. To correct for this non-normal distribution, a series of transformations were performed, namely square root, log, and exponential; each still resulting in non-normal distributions. As a result, this variable was dichotomized, splitting the variable into two relatively equal groups. Table 2 shows constituent items and alpha reliabilities for each scaled variable.

To control for the confounding influences of differences in the background characteristics of students, all of our statistical models included discrete variables for sex (1 = male, 2 = female), and race (0 = White, 1 = Black, 1 = Asian, 1 = Hispanic, 1 = Biracial). Additionally, we controlled for students' education levels (coded 1 = freshman to 4 = senior) as well as political identification, assessed using a five-point Likert scale (where 1 = very conservative and 5 = very liberal). Based on this coding, political identification is hereafter referred to as political liberalism.

Importantly, our models additionally contained scores from the pretest NCS, administered at the beginning of the term of study. By controlling for students' entering levels of

**Table 2** Constituent items and reliabilities for classroom practice scales

Scales and constituent items	Cronbach's alpha
Instruction-based educational practices <sup>a</sup>	.90
Engaged in active learning outside of classroom settings	
Engaged in active learning in classroom settings	
Encouraged to participate in classroom discussions	
Encouraged to participate in self-reflection activities	
Engaged in positive interactions with faculty	
Was led to re-think my views of myself and others	
Encouraged to consider different perspectives and points of view	
Had influential interaction with peers	
Encouraged to consider issues related to social justice and diversity	
Positive interaction with diverse peers	.77
Had discussions regarding intergroup relations	
Had meaningful and honest discussions about issues related to social justice	
Shared personal feelings and problems	
Negative interaction with diverse peers <sup>b</sup>	.73
Had guarded, cautious interactions	
Felt silenced from sharing my own experiences with prejudice and discrimination	
Had hurtful, unresolved interactions	
Had tense, somewhat hostile interactions	

*Note.* All constituent items are based on five-point Likert scales

<sup>a</sup> Constituent items within *Instruction-based educational Practices* scale each represent scaled variables, with alpha reliabilities ranging from .67 to .87

<sup>b</sup> Negative interaction with diverse peers failed tests for normality and was therefore coded into a dichotomous variable around the sample median

need for cognition, any significant estimated effects we uncover related to course work or classroom practices represent the extent to which these variables contribute to student change in the NCS. As Pascarella et al. (2003) have documented, pretest–posttest designs not only tell us information on the experiences or interventions that account for variations in posttest scores, but also provide information on which educational experiences or interventions account for variations in pretest–posttest *gains*, above and beyond the influence of the pretest. However, it is important to note that participating students were not randomly assigned to the various courses or classroom contexts which introduced bias to our estimates and reduced the validity of causal inferences (e.g., Raudenbush 2004; Raudenbush and Willms 1995). The extent to which we control for variance in students' background characteristics, including political identification and education level, were intended to minimize these threats.

Table 3 describes the sample of 405 students and the variables contained in our analytic models. Table 4 presents bivariate correlations among all variables.

## Analysis

Reflecting the primary aims of this study, we conducted three stages of analysis. In the first stage, using linear regression techniques, we estimated the net effects of specific courses and specific classroom practices on student gains in need for cognition. Controlling for

**Table 3** Descriptive statistics ( $N = 405$ )

	Mean	SD	Minimum	Maximum
Background characteristics				
Sex (female = 2, male = 1)	1.598	.491	1.000	2.000
White	.733	.443	.000	1.000
African American/Black	.084	.278	.000	1.000
Asian/Pacific Islander	.096	.295	.000	1.000
Hispanic/Mexican American/Latino/Chicano	.040	.195	.000	1.000
Biracial	.046	.212	.000	1.000
Political liberalism	2.528	1.018	1.000	5.000
Education Level (freshman = 1, senior = 4)	2.319	1.106	1.000	4.000
Course enrollment				
Introduction to sociology	.217	.409	.000	1.000
Psychology	.037	.189	.000	1.000
Philosophy	.365	.482	.000	1.000
Intergroup dialogue	.212	.413	.000	1.000
Service learning	.168	.374	.000	1.000
Classroom practice scales				
Instruction-based educational practices	-.035	6.770	-25.440	14.273
Positive interactions with diverse peers	-.014	1.008	-2.123	1.734
Negative interactions with diverse peers	.499	.501	.000	1.000
Need for cognition scales				
Pretest	.020	1.002	-3.559	2.120
Posttest	.024	.989	-3.466	1.992

**Table 4** Bivariate correlations ( $N = 405$ )

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 NFC posttest	1.000	-0.045	0.097	0.095	-0.114	-0.032	-0.069	0.058	-0.143	0.712	0.108	0.170	-0.110	-0.163	0.027	0.201	0.118	-0.119
2 Sex		1.000	-0.073	-0.062	0.049	0.046	0.011	-0.008	-0.148	-0.114	0.108	-0.245	0.020	0.115	0.113	0.117	0.097	-0.076
3 Education level			1.000	-0.145	0.098	0.103	0.022	0.010	-0.055	0.129	-0.092	0.129	0.151	-0.537	0.307	0.196	0.240	0.114
4 White				1.000	-0.502	-0.541	-0.336	-0.368	0.110	0.028	0.089	-0.029	-0.042	0.088	-0.058	-0.033	-0.070	0.039
5 Black					1.000	-0.099	-0.061	-0.067	-0.070	-0.069	-0.059	-0.008	0.104	-0.073	0.007	0.025	0.126	-0.016
6 Asian						1.000	-0.066	-0.072	-0.096	0.010	-0.064	0.013	0.076	-0.071	0.010	0.048	-0.019	0.027
7 Hispanic							1.000	-0.045	0.019	-0.072	-0.040	0.030	-0.105	0.047	0.045	-0.039	0.034	-0.035
8 Biracial								1.000	-0.023	0.085	0.018	0.026	-0.058	-0.032	0.057	0.004	-0.024	-0.065
9 Political liberalism									1.000	-0.146	-0.166	0.105	-0.086	0.085	-0.052	-0.184	-0.147	-0.040
10 NFC pretest										1.000	0.130	0.234	-0.082	-0.278	0.029	0.147	0.057	-0.067
11 Moral psychology											1.000	-0.149	-0.102	-0.103	-0.088	0.077	0.024	-0.019
12 Moral philosophy												1.000	-0.394	-0.400	-0.341	-0.086	-0.240	-0.195
13 Intergroup dialogue													1.000	-0.274	-0.233	0.341	0.385	0.307
14 Intro to sociology														1.000	-0.237	-0.390	-0.266	-0.178
15 Service learning															1.000	0.128	0.169	0.122
16 Instruction-based practices																1.000	0.558	0.113
17 Pos div interactions																	1.000	0.254
18 Neg div interactions																		1.000

Correlations of .097 or larger are significant at  $p < .05$  and those of .127 or larger are significant at  $p < .01$

differences in sex, race, and initial levels of political liberalism, we incrementally added class enrollment and classroom practice variables to our model. By statistically holding constant potentially confounding variables, we isolated the variance in need for cognition that could be explained by class enrollment and classroom practices, independent of any covariance between need for cognition and students' background characteristics.

In the second stage of analysis, we tested the form of the effects of course enrollment, and the relative mediating influence of the scales reflecting classroom practices. Applying path decomposition techniques, we isolated the effects of course enrollment on need for cognition into total, direct, and indirect effects. Conceptually, a total effect represents the change in a dependent variable resulting from an incremental change in an independent variable, "irrespective of the mechanisms by which the change may occur" (Alwin and Hauser 1975, p. 39). Additionally, the direct effects of an independent variable on an outcome are assumed not mediated by any intervening variables, while indirect effects are the change in a dependent variable resulting from an incremental change in independent variables acting solely through an intervening, or mediating, variable (McClendon 1994). In each case where indirect effects were estimated, Preacher and Leonardelli's (2005) Sobel Test Application was used to identify statistical significance.

Finally, in the third stage of analysis we used the methods delineated by Pedhazur (1982) to test whether or not effects were general or conditional. Specifically, we tested if the effects of course enrollment and classroom practices found in stage one were the same for all students, or if they were different from students with different characteristics (such as sex, race, completed level of education, political orientation, and entering levels of need for cognition). To estimate conditional effects, we entered a set of cross-product variables into the direct effects models. A statistically significant increase in the explained variance (based on  $R^2$ ) associated with the entry of the set of cross-product terms indicated that estimated direct effects may differ for different students. Given a significant increase in the variance explained associated with a set of cross-products, *t*-tests were used to identify individually significant cross-products. If any specific student characteristics were associated with statistically significant individual cross-products, models were then re-estimated using a disaggregated sample by student characteristics (i.e., only males, only females, only students with need for cognition pretest scores below the sample mean, etc.). Individually significant conditional effects could then be interpreted by comparing estimates between samples.

## Results

In this study we sought to identify the curricular conditions and educational practices that influences students' change in need for cognition over the course of one semester. In three stages of analysis, we estimated the net effects of specific courses and specific classroom practices on students' gains in need for cognition, we estimated the mediating effects of classroom practices, and we tested if the effects were general for all students, or conditional on specific characteristics. Below we display our results according to each stage of analysis. We report unstandardized (Metric) effects, as well as fully standardized (Beta) coefficients. Metric coefficients are in terms of each variable's original metric, and are useful for comparing the effect sizes across different sample populations. Standardized regression coefficients are useful for comparing the relative magnitudes of effects of variables within a particular model when drawn from a specific sample, as well as for the decomposition of effects in direct, indirect, and total effects (Pedhazur 1982).

From the first stage of analysis, we estimated the effects of courses and classroom practices on the posttest need for cognition scores, net of the influences of sex, race, education level, political liberalism, and pretest need for cognition scores. As presented in Table 5, our results contained at least four main findings. First, by entering the course enrollment variables simultaneously, we only marginally improved the explanatory power of the model, as evident in the amount of overall variance in need for cognition scores explained by the model ( $\Delta R^2 = .004$ ). Second, among the five courses we studied, it appears that enrollment in Introduction to Sociology has the most positive impact on students' change in need for cognition. However, in only a couple of instances did we find statistically significant differences between courses. Specifically, the only strong evidence of differences was with respect to Introduction to Sociology and Intergroup Dialogue. It appears that attending an Intergroup Dialogue course may be detrimental to growth in need for cognition, particularly after controlling for the extent to which students reported experiencing instruction-based pedagogical practices and positive diversity interactions with peers (see the estimated effects of Intergroup Dialogue in Table 5, columns II and VI). The only other significant effects we found related to course enrollment was associated with attending a Service Learning course (vs. Introduction to Sociology). While we found only weak evidence of differences in need for cognition for students enrolled in these two courses, statistical significance was entirely dependent on controlling for the influence of pedagogical practices. Thus, it appears that the negative effect of participation in a Service Learning course (relative to Introduction to Sociology) negatively influences growth in need for cognition, but is somewhat offset by exposure to instruction-based educational practices.

Third, irrespective of the particular course in which students' were enrolled, our results indicated that classroom practices significantly contributed to change in need for cognition, though the magnitude and direction depend on the particular classroom practice variable. Specifically, we found that students who reported having positive diversity interactions with their peers demonstrated significantly positive change in their need for cognition over the course of a semester. Though smaller in magnitude than the effect of positive diversity interactions, our scale of overall instruction-based educational practices significantly and positively contributed to students' development in need for cognition, whereas negative experiences with diversity had a large and significantly negative impact.

Fourth, recognizing the likelihood that a variety of practices occur in any given classroom experience, we analyzed two additional models containing combinations of classroom practice variables. Our results (see Table 5, columns VI and VII) indicated that when considered in combination, classroom practices explained greater variance in students' change in need for cognition. Together, overall instruction-based practices and positive diversity experiences significantly improve the amount of variance explained of posttest need for cognition scores ( $\Delta R^2 = .020$ ). Furthermore, instruction-based practices and negative diversity experiences had significant but opposite net effects, but together explained an additional 2.4% ( $\Delta R^2 = .024$ ) of the variance in students' change in need for cognition. This result provides evidence of the complex influences that coexist in a given classroom, and the important but opposite impacts different experiences may have on students' growth and development.

To better understand the mechanisms by which course enrollment and classroom practices influence the development of need for cognition, in our second stage of analysis we estimated direct, indirect, and total effects of course enrollment. As shown in Table 6, our measure of instruction-based practices was the most consistent and statistically significant mediator of the effects of course enrollment on need for cognition. From the

**Table 5** Estimated metric (beta) effects predicting need for cognition posttest ( $N = 405$ )

Variables	I	II	III	IV	V	VI	VII
Sex	.075 (.037)	.077 (.038)	.041 (.021)	.061 (.030)	.061 (.030)	.040 (.020)	.028 (.014)
Education Level	.019 (.021)	.045 (.050)	.050 (.056)	.035 (.039)	.044 (.049)	.043 (.048)	.050 (.055)
Race (White = 0)							
Black	-.290* (-.081)	-.275* (-.077)	-.260* (-.073)	-.283* (-.079)	-.307* (-.086)	-.283* (-.079)	-.268* (-.075)
Asian	-.193 (-.058)	-.185 (-.055)	-.182 (-.054)	-.190 (-.057)	-.160 (-.048)	-.167 (-.050)	-.186 (-.056)
Hispanic	-.141 (-.028)	-.174 (-.034)	-.180 (-.036)	-.167 (-.033)	-.225 (-.044)	-.210 (-.041)	-.173 (-.034)
Biracial	-.064 (-.014)	-.070 (-.015)	-.066 (-.014)	-.087 (-.019)	-.059 (-.013)	-.060 (-.013)	-.081 (-.017)
Political liberalism	.043 (.044)	.049 (.051)	.036 (.037)	.041 (.042)	.052 (.053)	.034 (.035)	.038 (.039)
Need for cognition pretest	.693*** (.701)	.693*** (.702)	.680*** (.688)	.685*** (.693)	.695*** (.704)	.678*** (.686)	.682*** (.691)
Course enrollment (intro to soc = 0)							
Psychology		-.098 (-.019)	-.233 (-.045)	-.154 (-.030)	-.094 (-.018)	-.236 (-.045)	-.225 (-.043)
Philosophy		-.075 (-.037)	-.174 (-.085)	-.084 (-.041)	-.073 (-.035)	-.156 (-.076)	-.167 (-.082)
Intergroup dialogue		-.204* (-.085)	-.415** (-.172)	-.349** (-.144)	-.149 (-.062)	-.453** (-.188)	-.355** (-.147)
Service learning		-.123 (-.046)	-.273* (-.103)	-.210 (-.079)	-.071 (-.027)	-.291* (-.110)	-.219 (-.083)
Classroom practices							
Instruction-based practices			.022*** (.150)			.017* (.115)	.021*** (.144)
Positive diversity interactions				.129** (.131)		.079* (.080)	
Negative diversity interactions					-.190** (-.096)		-.174* (-.088)
$R^2$	.518***	.522***	.539***	.535***	.531***	.542***	.546***
$\Delta R^2$	.004*	.017***	.013***	.013***	.009***	.020***	.024***

Note. Sex (1 = male, 2 = female). Political liberalism is coded such that a high score indicates politically liberal views

\*  $p < .10$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$

**Table 6** Estimated total, direct, and indirect beta effects of coursework on need for cognition ( $N = 405$ )

Coursework (Introduction to Sociology = 0)	TE <sup>a</sup>	Mediating variable = Instruction-based practices		Mediating variable = Positive diversity interactions		Mediating variable = Negative diversity interactions	
		DE	IE <sup>b</sup>	DE	IE <sup>b</sup>	DE	IE <sup>b</sup>
		Psychology	-.019	-.045	.026*	-.030	.011
Philosophy	-.037	-.085	.048**	-.041	.004	-.035	-.001
Intergroup dialogue	-.085*	-.172**	.087***	-.144**	.060**	-.062	-.023*
Service learning	-.046	-.103*	.057**	-.079	.033*	-.027	-.019*

<sup>a</sup> In addition to the variables shown, the total effects model included the following: Sex, Education level, Race, Political Liberalism, and Need for Cognition Pretest. Total effects correspond to those shown in Table 5, column II. Direct effects for models containing Instruction-based Practices, Positive Diversity Interactions, and Negative Diversity Interactions correspond to Table 5, columns III, IV, and V, respectively

<sup>b</sup> Significance assigned using Preacher and Leonardelli's (2005) Sobel Test Application

\*  $p < .10$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$

previous stage of analysis we found students enrolled in the Intergroup dialogue course demonstrated significantly lower gains in need for cognition compared to Introduction to Sociology students. This effect existed without controlling for differences in classroom practices (i.e., total effect), but became a considerably more robust after controlling for differences in instruction-based pedagogical practices. Our estimated indirect effects clearly identified that instruction-based practices positively and significantly mediated this relationship. In other words, Intergroup dialogue (vs. Introduction to Sociology) students may experience smaller gains in need for cognition, but they experience significantly more instruction-based pedagogical practices which in turn, had significant and positive effects on need for cognition. Though not as strong of effects, we found similar results with respect to each of the other courses, relative to Introduction to Sociology. Our results additionally provide evidence that positive diversity interactions positively mediates the effect of both Intergroup dialogue and Service Learning (vs. Introduction to Sociology), while experiencing negative diversity interactions has the opposite mediating effect.

In our third and final stage of analysis, we tested whether our model was general for all students, or different depending on sex, race, level of education, political orientation, and entering levels of need for cognition. Including a series of cross-product (or interaction) terms to our model failed to improve the degree to which the model explained students' development of need for cognition. Interestingly, the lack of evidence of conditional effects indicates that the relationships we uncovered with respect to course enrollment and classroom practices were consistent across different students. Ultimately, the effects of course enrollment and classroom shown in Table 3 hold, regardless of sex, race, whether a student was a freshmen, sophomore, junior, or senior, students' political identification, or even students' pretest need for cognition scores. The lack of significant conditional effects we found may be partially due to small sample sizes of specific populations and relatively large standard errors on the estimated effects of cross-products. Nevertheless, our findings address criticisms concerning possible selection effects; course enrollment and educational practices had effects on gains in need for cognition regardless of the motivation level of entering students and regardless of demographic characteristics that may have influenced student selection into a particular course.

## Limitations

We wanted to be transparent about the many limitations of this study. First, this study is an outgrowth of another specifically designed to assess how moral education courses affect moral reasoning. Perhaps the findings would have differed had we investigated courses intended to teach life-long learning skills. Second, although we attempted to partially account for selection bias by examining conditional effects, we could not address this issue completely as students were not randomly assigned to courses, nor could we fully prevent the bias this causes in parameter estimates. Although we statistically controlled for many important student precollege variables, we still have the problem of the interaction of selection and change as a threat to internal validity. Third, we did not assess the extent to which the various skills of the different instructors in the courses may have confounded the results. Is it the particular pedagogical technique that is having the effect or is it differently skilled teachers? Finally, this study was conducted at one institution so findings should be interpreted with caution.

## Discussion

This quasi-experimental study estimated the net impact of specific curricular conditions and associated educational practices on the development of life-long learning orientations among 405 university students in five undergraduate courses. A measure of need for cognition, which reflects an individual's tendency "to engage in and enjoy effortful cognitive active" (Cacioppo et al. 1996, p. 197) was used as a conceptual proxy for orientations toward life-long learning.

The existing research on college impact suggests that simple exposure to postsecondary education tends to foster a positive orientation to life-long learning activities and interests (e.g., Hayek and Kuh 1998; Mentkowski and Associates 2000; Pascarella and Terenzini 1991, 2005). However, the specific postsecondary experiences that account for this impact have not been readily apparent. Our findings indicate that the development of orientations to life-long learning, as measured by need for cognition, can be significantly enhanced by exposure to explicit and purposeful pedagogical practices in undergraduate courses. Irrespective of student sex, race, year in college, level of political liberalism or pre-course levels of need for cognition, growth in need for cognition was facilitated by instruction that featured perspective taking, active learning, and reflection. Similarly, growth in need for cognition was fostered by positive interactions with diverse peers and inhibited by interactions with diverse peers that were perceived as negative. In short, a major finding of this investigation was that there appears to be specific, identifiable activities and experiences which, when emphasized in purposeful instructional settings, have the potential to significantly increase undergraduates' orientations toward life-long learning.

Perhaps an equally important finding of the study was that the estimated effects of these specific pedagogical practices on students' orientations toward life-long learning were general rather than conditional. That is, the estimated effects were essentially the same in magnitude and direction for men and women, for individuals of different races and different levels of exposure to college, and for individuals who began the study with different levels of need for cognition or different political orientations. This suggests that the positive impacts on orientation toward life-long learning of pedagogical practices such as perspective taking, active learning, and reflection are not circumscribed by student characteristics or restricted to specific subgroups of students. Rather the positive impacts of

such pedagogical practices may be achievable with a broad spectrum of undergraduate students.

## Implications

These findings raise provocative questions about the mission of colleges and universities: should institutional stakeholders be as interested in developing students' motivations for learning as they are in promoting learning itself? How would educators design curricula to meet this expanded objective?

Higher education researchers should be more cognizant of using theoretically-derived and empirically-validated measures of constructs related to student motivation, learning and development. Although often expensive and time-consuming to administer, these measures enable researchers to make conclusions based on theoretically-grounded constructs, rather than the self-reported single-item indicators often examined as outcomes for understanding student development and learning.

This study provides evidence concerning the theoretical constitution of need for cognition as a construct that can be developed. Findings from this study suggest that students' need for cognition can change over the course of a semester and that that change can be influenced by certain pedagogies, especially those that create intentional spaces for positive interactions with diverse peers and for reflection, active learning, and reflection. As such, perhaps the construct has evolved beyond a psychological tendency, subject to variance based on time pressure and decision importance (Cacioppo and Petty 1982) to a developmental construct, susceptible to change.

This effort positions motivation to learn as an outcome for researchers and educators interested in teaching and learning. We argue that motivation to learn is a critical component of what has been termed, "life-long learning" (American Association of Colleges and Universities 2002). Such an argument finds solace in the work of motivational theorists (see Csikszentmihalyi and Nakamura 1989; Pintrich et al. 1993) who suggest that constitutional parts of motivation reflect students' engagement in and enjoyment of effortful thinking, especially if this thinking is directly related to their learning goals. Despite the number of times higher education stakeholders invoke the term life-long learning to describe institutional mission, few studies have attempted to operationalize this concept in any meaningful way among undergraduate students. This study is the one of the first of its kind to do so; by using a theoretically-derived and empirically-validated measure as an operational proxy for life-long learning, we hope to initiate discussions of this important construct as a potential line of inquiry in its own right.

This study also serves to help professors and student affairs practitioners facilitate students' development of life-long learning orientations by giving them a roadmap for understanding what they can do in their classrooms and their programming efforts to increase student motivation. Based on our findings, efforts should be targeted at increasing student motivation, creating spaces for students to reflect, talking about issues related to social justice, engaging in discussions with each other and with faculty, and experiencing some cognitive dissonance.

Finally, results from this study echo those of other empirical efforts demonstrating the powerful impact of diverse peer interactions on student learning and development (see Hurtado 2003; Engberg 2004; Mayhew 2005, Unpublished doctoral dissertation; Mayhew and Engberg 2005; Chang 1996; Pascarella et al. 1996; Whitt et al. 2001; Pascarella et al. 2001; Antonio 2001; Hurtado et al. 2002; Gurin et al. 2002). Our findings are consistent

with these efforts, once again emphasizing the importance for educators to create opportunities for students to have positive interactions with diverse others and minimize the possibility of students having negative interactions with others from differing social identity groups.

In the 21st Century, motivation for life-long learning and the ability to responsibly and productively participate in a diverse society are critical components for achieving occupational success and personal fulfillment. It is our hope that this study not only extends the emergent literature on understanding how intentional learning environments promotes student motivation to learn, but that it provides educators information they can use as they prepare graduates with the skills necessary to work effectively as a responsible citizen in the 21st Century.

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