



Strategies to boost international student success in US higher education: an analysis of direct and indirect effects of learning communities

Esen Gokpinar-Shelton¹ · Gary R. Pike¹

Accepted: 13 September 2021 / Published online: 22 September 2021
© The Author(s), under exclusive licence to Springer Nature B.V. 2021

Abstract

Learning communities are often associated with higher student engagement and academic achievement. Few studies to date, however, have examined the impacts of these practices among international students. To address this gap, the following questions led the current study: “To what degree is participation in learning communities associated with international students’ (1) engagement in educationally beneficial activities, (2) learning outcomes (e.g., general, practical, and professional development), and (3) overall satisfaction with their institutional environment and educational experience?” Drawing on student development theory, we designed a path analysis using a structural equation modelling to assess both the direct and the indirect effects. The results suggest that while students’ participation in learning communities positively correlates to student learning gains and satisfaction, the student engagement indicators are the significant mediating predictors for both outcomes, thus recommending that institutions interested in assessing the impacts of learning communities should determine not only the direct effects but also the indirect effects of these practices. Our results also show differences in participation patterns among international student subgroups. Institutions should be aware of such differences and make efforts to scale high impact practices like learning communities to provide opportunities for more students to become involved in these educationally purposeful activities. The findings call for future research aimed at identifying the environmental and individual conditions that are most conducive to the cultivation of these practices for international students.

Keywords Learning communities · High impact practices · Institutional internationalization · International student success · Student engagement · Learning outcomes

Learning communities (LCs) are one of ten high-impact practices (HIPs) the Association of American Colleges and Universities (AAC&U) suggests institutional leaders adopt to promote students’ academic, extracurricular, and interdisciplinary engagement in

✉ Esen Gokpinar-Shelton
egokpina@iu.edu

¹ School of Education, Indiana University Bloomington, Wendell Wright Building, 201 N. Rose Ave, Bloomington, IN 47405-1006, USA

undergraduate education (Kuh, 2008). Defined as a shared learning pedagogy that brings together students who share similar characteristics, thematic interests, or curricular goals (Andrade, 2007; Tinto, 2003), LCs aim to improve coordination and collaboration among students and faculty, thereby enhancing engagement and outcomes (Kuh, 2008). A myriad of studies have examined the association between LCs participation and student learning outcomes and success. While not all studies demonstrated a positive effect (Holt & Nielson, 2019), many have shown that students participating in LCs are more involved in their learning process and demonstrate higher academic performances (Fosnacht & Graham, 2016; Inkelas et al., 2018).

As findings regarding the positive effects of LCs continue to expand (Henscheid, 2015), an analysis of the literature reveals that international student experiences within these practices have been largely missing. Given that participation in, and effects of, LCs may vary based upon different student groups (McCormick et al., 2017), the experiences of international students, a significantly growing student population in US higher education, should be studied to create targeted programs that produce optimal results. Currently, more than one million international students live in the USA, contributing to a rich diversity of thought and skills in learning environments, the workforce, and the economy. The same students, however, frequently experience unique barriers to their learning and engagement. Cultural, language, communication, and personal connection problems can persist throughout their studies, leading to stress and feelings of isolation, or worse, academic dissatisfaction and dropout (Glass, 2015; Selvadurai, 1992). While the extant research suggests that LCs built around student needs and characteristics can eliminate these concerns, resulting in a compensatory effect for historically underrepresented students on US campuses (Kuh et al., 2017), there is little evidence as to how or whether these practices can improve the quality of international students' educational experiences.

The National Association of Foreign Student Advisers (NAFSA) has long recommended that institutions develop pedagogical practices where international student engagement and social adaptation are supported both within the context of formal teaching and learning and in a broader setting on campus, taking into account of these students' dynamic and diverse characteristics, identity, and needs. Current research substantiates the factors contributing to international student adjustment, acculturation, language barriers, motivation, and general engagement patterns (Cho et al., 2020; Lee, 2014; Wang & Brckalorenz, 2017; Zhao et al., 2005). Considering the association between HIPs and students' academic achievement and social adaptation, analyzing international student experiences with LCs will provide institutional leaders with key insights about how these practices can be utilized as an effective methodology to enhance international student success. By evaluating the indirect effects of LCs, we will determine the ways in which student engagement indicators can be used to mediate the improved outcomes.

Literature review

Learning communities

The origins of LCs can be traced back to the Experimental College at the University of Wisconsin, where core tenets were shaped by several student engagement and development theories (Smith et al., 2004). Centered around developmental, cognitive, and social constructivism in which students' intellectual and psychological development are seen

as dependent on students' involvement in purposefully structured activities (Astin, 1984; Chickering & Gamson, 1987; Pace, 1980), LCs are constructed as interventions to engage students as active learners on campus. With paired courses and intentionally designed curricular and extracurricular activities, LCs aim to increase students' sense of belonging while supporting the practice of critical pedagogy, wherein students cocreate knowledge through partnerships (Otto et al., 2015).

Due to varying definitions, LCs come in many types (Tinto, 2003). After studying numerous universities and colleges, Price (2005) concluded that the linked/clustered course model, or a cohort of students connected by two to three content-and-skills-based courses, is the most prevalent form of LCs. Price's (2005) claim may still hold today as this type of course arrangement requires much less coordination of curriculum compared to more complicated LCs such as team-taught coordinated studies or residence-based programs (Otto et al., 2015; Smith, 1991; Tinto, 2003). Coordinated studies are complex because they entail extensive efforts on faculty's end to coordinate the curriculum across many courses and instructors, which sometimes means streamlining assignments and projects for up to 32 credit hours of interdisciplinary classwork toward general education (Smith, 1991). Likewise, the residence-based LCs, or communities where students with similar interests live together, necessitate a day-to-day partnership and communication between academic and student affairs' staff for institutions to intentionally structure students' in and out of classroom experiences (Brower & Inkelas, 2010; Tinto, 2003). Regardless of the complexity of the model, LCs have been proven to be successful and sustainable when they match institutional goals with student needs (Inkelas et al., 2018; Smith, 1991; Zhao & Kuh, 2004).

Effects of learning communities

The general assumption in existing research is that LCs positively impact students and are worth institutional investment. When these practices are well designed, they result in significant gains in students' persistence, grades, and intellectual and academic development (Andrade, 2007; Baker & Pomerantz, 2001; Hill & Woodward, 2013; Inkelas et al., 2007; Pike, 1999; Pike et al., 2008; Soria & Mitchell, 2015; Tinto & Goodsell-Love, 1995; Zhao & Kuh, 2004). Several authors also claimed that students gain greater social development and intercultural competence and are more satisfied with their educational experience because of LCs participation (Kilgo et al., 2015; Soria & Mitchell, 2015).

While this broad literature base supports the effects of LCs, studies differ in their methodology, signaling differences in what makes LCs effective for student success. Most research to date has examined the direct relationship between LCs participation and educational outcomes. Studies like Soria & Mitchell (2015) reported a significant direct and positive relationship between participation in LCs and development of self-confidence, leadership, and multicultural competence among students from six public research universities. Similarly, studying 365 four-year post-secondary institutions, Zhao & Kuh (2004) found that students involved in LCs, especially in their freshmen year, show "enhanced academic performances, gains in multiple areas of skill, competence, and knowledge, and overall satisfaction with their college experience" (p. 14–15).

Although few, some researchers examined the indirect effects of LCs participation as mediated through student engagement (Pike, 1999; Pike et al., 2008). The concept of student engagement has its origins in the work of Tyler (1932), Pace (1980), Astin (1984), and Kuh et al. (1991), and is defined in the most basic form as the time and energy students devote to educationally purposeful activities inside and outside the classroom (Kuh,

2009). There are four main engagement categories—(1) academic challenge, (2) learning with peers, (3) experiences with faculty, and (4) campus environment—with ten subsequent indicators argued to complement one another and be associated with high levels of learning outcomes and student satisfaction (Kuh, 2009).

To delve a little deeper, the concept of academic challenge is an engagement category conceptualized with the measurement of students' higher order learning, reflective and integrative learning, learning strategies, and quantitative reasoning abilities. This category emphasizes that student development requires not only content knowledge transfer but also activities and application beyond facts, theories, and information that enhance student learning (Kuh, 2009). Institutions that effectively apply the concept of academic challenge have shown to increase students' deep learning, transdisciplinary knowledge, critical thinking, sense of belonging to campus, and ultimately satisfaction with the overall educational experience (Kuh, 2009).

The other engagement categories—collaboration with peers and faculty, and campus environment—have also been effective in enhancing learning, cognition, and satisfaction (NSSE, n.d.b). When interaction between students and faculty has clear expectations and effective feedback measures, students' knowledge, skills, and abilities have shown enhancement. Evidence suggests that such collaboration deepens students' understanding of topics from a diverse and interdependent perspective (Kuh, 2009; NSSE, n.d.b). In addition, students having more constructive relationships with faculty, advisors, and peers are more likely to report feeling supported than their counterparts (Kuh, 2009). The comfort of a supportive system and campus environment leads to higher student performance and satisfaction scores—all important factors for student development and success (for an elaborated discussion of engagement indicators' effects, see Kuh, 2009 and NSSE n.d.b).

Recognizing this positive association between student engagement and various learning outcomes, Pike (1999) and Pike et al. (2008) studied the mediating role student engagement plays in the effects of LCs. According to the authors, when individual differences were considered, significant direct effects of LCs on educational gains disappear. Instead, LCs participation enhances student engagement, such as improved interaction with faculty, peers, and perception of the campus environment. This engagement then facilitates the relationships between LCs participation and students' learning outcomes (Pike, 1999; Pike et al., 2008). Most recently, Rocconi (2011), Hill & Woodward (2013), and Fosnacht & Graham (2016) also concluded that LCs participation has more direct ties to increased student engagement and that overall student engagement is a more robust factor in outcomes.

Making the case for the current study

While the discussion continues regarding whether the effect of LCs on student outcomes is direct or indirect through engagement indicators, gaps exist in the student populations studied in the current literature. Kuh & Kinzie (2018) cautioned institutions to consider differing student characteristics before developing HIPs. There are several key components for LCs' success, including leadership, attendees, administration, and assessment of program structure and ability to respond to student needs. However, most of the research has analyzed the impact of LCs on domestic students, with a few exceptions focusing on the success of underrepresented and low-income students. Engstrom & Tinto (2008), for example, reported significant increases in persistence rates among racially underrepresented students who participated in LCs along with increased engagement with coursework, faculty, and fellow students. Supporting these results, Price (2005) also found that first-time freshmen

students who participated in LCs in Kingsborough College achieved higher course pass rates and were more likely to complete their developmental English course requirements. Although these studies highlight the growing interest in analyzing the effects of LCs for differing student groups, no studies to date focused on international students as their main unit of analysis. This is concerning as evidence suggests that the benefits of LCs may not extend to international students. In a study conducted by Heaney & Fisher (2011), domestic students who struggled with social adaptation and homesickness did not take part in and experience the positive effects of LCs at the same rates as their peers. Issues such as social adaptation are compounded for international students, who must navigate differing and dynamic contexts of country, culture, educational programs, policies, and systems.

Furthermore, international students are usually treated as a homogenous group in HIPs research in spite of the differences in their educational experience and activity participation patterns. Most recently, the WES Research Report which surveys thousands of international students across the USA documented that when compared to students from other regions, students from the Middle East and Northern Africa report feeling relatively unsatisfied with campus support services, having distinct needs and expectations than the other student groups (Roy et al., 2016). These students suffer increased homesickness, loneliness, and stereotyping and discrimination based on their nationality when compared to peers. The authors pointed to substantial cultural differences and lower English language proficiency as key reasons these students struggle developing social connections with other students and faculty, which sometimes lead to self-preservation. Domestic student literature indicates that when students feel marginalized, discriminated, or invisible on campus, they are more likely to perceive isolation (Villalpando, 2003) which may refrain them from participating in HIPs (e.g., first-generation, transfer or racially underrepresented students are less likely to participate in HIPs) (Kinzie, 2012). Now examining differences in international students' participation patterns in LCs will be an important contribution to this line of research in determining the potential inequities that may exist in these practices, which can help institutions take actions to address such shortcomings.

The study and conceptual framework

In light of the literature reviewed, this research examined the direct and indirect effects of LCs participation on international students. Using a dataset from the National Survey of Student Engagement (NSSE), we asked the following questions: To what degree is participation in LCs associated with international students' (1) engagement in educationally beneficial activities, (2) learning outcomes, and (3) overall satisfaction with their institutional environment and educational experience? Centering the study around the understanding that the greater the engagement of students in these indicators, the better the students' learning experience (Kuh, 2009), we hypothesized that LCs participation among international students will directly increase students' engagement in various educationally meaningful activities. As a result, students' learning outcomes and satisfaction would increase. Figure 1 represents the conceptual model. Not shown in the model are students' background characteristics, which are presumed to influence all elements in the model.

The engagement indicators used in the study have been previously examined with international students. Zhao et al. (2005) compared international student engagement patterns to those of domestic students at four-year institutions in the USA and found that international students had higher participation rates on most engagement indicators, except in

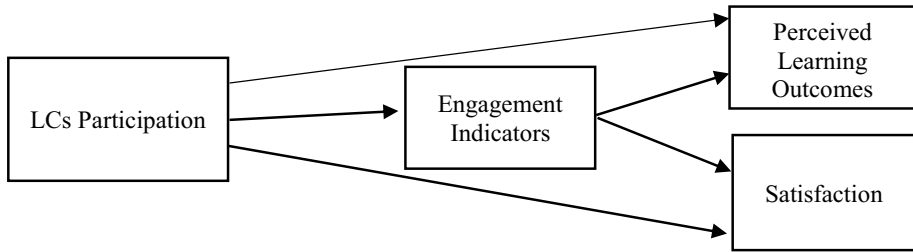


Fig. 1 Conceptual framework

community service and socializing on campus. The students' racial and ethnic backgrounds as well as the presence of other international students on a campus made difference in their engagement patterns. Also, when examining the impacts of three engagement indicators, Wang & Brckalorenz (2017) found that international students especially benefitted from strong student-faculty bonds, improving their sense of belonging and satisfaction with their overall educational experience. Studying ten engagement indicators will help understand their unique contribution in mediating outcomes associated with LCs for international students.

Methodology

Sample

Data were collected from the 2015 administration of NSSE. NSSE is an assessment tool administered every year to both first- and senior-year students to demonstrate student behaviors associated with desired outcomes of college, pointing to areas where institutions are performing well and aspects that could be improved based on self-reported data (Kuh et al., 2007). NSSE's self-estimation is a considerable outcome assessment approach whereby students make judgments about their own achievement (Kuh, 2009). Pike (1995) observed that the result of this kind of self-assessment is in line with the result of the direct measurement of learning, such as a test score (For more information and the ethics of data collection, see NSSE, n.d.b).

The initial data included a sample of 4,304 freshmen international students at four-year institutions in the USA. However, to avoid fluctuation of missing responses given all the variables, a multiple imputations method is utilized, and the final sample size was determined as 4,234. Within the sample, LCs participants consisted of 628 students and non-participants contained 3,606 students. The participants and non-participants were very similar in terms of gender, country of origin, enrollment status, and major. Female student participation in LCs was slightly higher than males (54% vs 46%), while the non-participant group had approximately equal percentages among sexes. Within LCs participants, most international students were from Asia (49%) followed by Latin America (16%), Europe (14%), African Sub-Saharan (10%), and the Middle East (6%). Most students who attended LCs had a full-time enrollment status (97%) and lived on or near campus (80%). The most frequently selected majors were Business (29%), Engineering (13%), and Social Sciences (12%), while the least frequently selected majors were Communication (%),

Media and Public Relations (3%), and Education (2%). In terms of institutional characteristics, LCs participants attended public schools more than private schools (55% versus 45%). Also, doctoral and the masters-focused universities had larger percentages of LCs participants than Bachelaurate institutions (46%, 34%, and 20%, respectively).

Measures and data analyses

All measures were taken directly from NSSE. First, a variety of student and institutional characteristics were gathered to conduct a binary logistic regression analysis to obtain the odds ratio of the variables that would help identify the students with higher LCs participation probability. The dichotomous variables used for this analysis were coded as the following: gender (0=female; 1=male); living on campus (0=no; 1=yes); country of origin (“Canada” was selected as the reference category of country due to the assumption of their similarity to American students in terms of the academic culture); major of field (the “Business” major is selected as the reference category); institutional control (1=public; 0=private); and Carnegie classification (1=doctorate/research university; 0=other; 1=masters university; 0=other; 1=baccalaureate university; 0=other).

Also, employed in the study was a general latent variable model to assess both direct and indirect relationships among the variables. Students’ LCs participation served as the only exogenous variable. NSSE’s conceptualization of LCs does not differentiate between linked, coordinated, or residential types. Building on seminal work around student success (Kuh et al., 2006), NSSE defines LCs as “programs where groups of students take two or more classes together on any topic or discipline” (NSSE, n.d.b, p.1). This broad definition fits well with the purpose of the study, as we aim to understand the impacts of the overall concept of LCs on international students, regardless of type. Based on this definition, the student responses for the analysis were coded as 1=in progress or done (participated) or 0=not done (did not participate). Because LCs are commonly offered during the first year of college, only freshmen students’ responses were considered for analysis ($N=4,234$).

In addition, the model included ten endogenous latent variables for student engagement: higher-order learning (HO): 4 items; reflective and integrative learning (RI): 7 items; learning strategies (LS): 3 items; quantitative reasoning (QR): 3 items; collaborative learning (CL): 4 items; discussions with diverse others (DD): 4 items; student–faculty interaction (SF): 4 items; effective teaching practices (EP): 5 items; quality of interactions (QI): 5 items; and supportive environment (SE): 8 items. The last endogenous latent variables were perceived gains which is comprised of ten items and satisfaction which is comprised of two items.

The variable, perceived gains, is defined as the accumulation of students’ general academic, practical, and personal learning outcomes. The NSSE team developed these learning outcome categories “based on the Degree Qualifications Profile created by the Lumina Foundation for Education, which specifies what undergraduate level students should be able to achieve in primary areas of competence regardless of their major or field of study” (NSSE, n.d.c). The other outcome, satisfaction, is defined by NSSE as students’ overall evaluation of their educational experience, including whether they would attend the same institution if given the chance. Satisfaction represents students’ perceptions of their first college year as laying the foundation for future success and graduation. As such, it serves as one of the most critical dimensions for the assessment of first-year experiences of international students (Bryant & Bodfish, 2014) (all survey items are available in NSSE, n.d.a).

All endogenous variables were measured using a Likert scale (e.g., never, sometimes, often, and very often), and the response options were recoded with ordinal values of 0, 20, 40, or 60, with a score of 0 meaning a student chose the lowest response option for every item in that indicator while a score of 60 means that a student chose the highest response to every item (NSSE, n.d.d). Data cleaning and model estimating were performed using R version 3.6.2 (RStudio Team, 2015).

Model identification and fit

Because a general latent variable model is used, the two-step rule was employed for model identification (Bollen, 1989). Each of the ten endogenous engagement latent variables has a direct relationship with the endogenous latent variables—perceived gains and satisfaction. The relationships between each of the latent variables are one way and do not have a feedback loop; therefore, the relationships between all endogenous latent variables are recursive, which is important for identification of the structural part of the model. Also, the t rule is met, and because the indicators in the model are unifactorial (no cross-loadings), the error terms are uncorrelated, each latent variable is scaled (factor complexity = 1), and each row of latent covariance has at least one off-diagonal, the two-indicator rule is met, providing a sufficient identifiability for the measurement part. As a result, the total model was identified.

The model fit was evaluated using the chi-square test of exact fit, the comparative fit index (CFI), Tucker–Lewis index (TLI), and the root mean square error of approximation (RMSEA). At first, the fit was inadequate; therefore, we examined the modification indices to determine if any model changes could result in a better fit. The modification indices provided evidence to account for the correlation of errors within the observed variables of the same latent variable, which is also a theoretically practical approach (Bollen, 1989). As a result, the improved model has an acceptable fit $\chi^2 = 9011.394$, $p < 0.05$; CFI = 0.94; TLI = 0.93; and RMSEA = 0.04. A significant χ^2 indicates poor fit but is susceptible to large sample sizes, and because all other measures of fit suggested that the model has an acceptable fit—Hu & Bentler (1999) identified acceptable levels for CFI ≥ 0.90 ; TLI close to 0.95, and RMSEA ≤ 0.06 —the final model can account for the direct and indirect associations between LCs participation, student engagement, and perceived gains and satisfaction.

Results

Binary logistic regression

The logistic regression model produced a statistically significant result, $\chi^2(20) = 32.145$, $p < 0.05$, with a predictive ability of 85.2% in the outcome of the LCs participation. The odds ratios for student and institutional characteristics are presented in Table 1. Based on the results, there were three predictors found to be statistically significant in the regression equation model estimated by 1 df and the Wald statistics. These predictors included (1) on-campus living; (2) country of origin (Middle East and North Africa); and (3) institutional status (private). In the context of other variables, these three variables were significantly and negatively associated with the probability of participating in LCs. Those living on campus have a 21% reduction in their participation probability compared to those

Table 1 Logistic regression for LCs participation

Predictors	International students (freshmen)			
	B	S.E	Sig	Exp(B)
Male	−0.079	.093		.924
On campus living	−0.236	.112	*	.790
Arts & Humanities	−0.014	.180		.986
Biological Sciences	−0.035	.165		.966
Physical Sciences	−0.099	.162		.905
Social Sciences	0.201	.148		1.223
Comm. & Media	−0.328	.262		.721
Education	−0.394	.363		.674
Engineering	−0.079	.148		.924
Health Professions	−0.088	.193		.916
Social Service Professions	−0.053	.323		.948
Africa Sub-Saharan	−0.136	.215		.873
Asia	−0.175	.174		.839
Europe	−0.334	.201		.716
Latin America	−0.229	.195		.795
Middle East and North Africa	−0.587	.242	*	.556
Private	−0.222	.101	*	.801
Masters Colleges and Universities	−0.081	.105		.922
BA Institutions	0.045	.135		1.046
Constant	−1.046	.235	*	.351

not-living on campus; Middle Eastern and North African students compared to Canadian counterparts showed 44% lower probability; and finally, students from private institutions had 20% decrease in their probability of participating in LCs compared to those in public institutions. To avoid receiving a suppressor effect and better understand which variables could be considered as good predictors of LCs participation, the correlation among variables is also considered. As a result, students' country of origin found to be a slightly more important detractor compared to the other predictors in the model.

Direct and indirect effects

The results of the direct effects analysis demonstrated that approximately 49% of the variability in students' perceived learning gains and 27% of the variability in their satisfaction outcome can be explained by the variables used in the model. As shown in Table 2, all freely estimated factor loadings were positive and statistically significant, confirming that the latent variables adequately explain the observed variables chosen for those factors.

Based on the results (the model was estimated using the means, standard deviations, and correlations given in Table 3), a positive relationship was found between participation in LCs and perceived gains. When international students participate in LCs, we expect students' perceived gains to increase by 0.6 points; however, this relationship was not statistically significant. Perhaps of more importance, seven engagement indicators were directly and significantly correlated with international students' perceived gains. Specifically, as international students' perception of SE engagement indicator goes up by 1 point,

Table 2 Latent variables: factor loadings

	Estimate	SE	Z-value	P(> z)
Factor loadings				
HO = ~				
HOapply	1.000+			
HOanalyze	1.109	0.025	45.271	0.000
HOevaluat	1.111	0.025	44.067	0.000
HOforms	1.083	0.025	42.850	0.000
RI = ~				
RIintegrt	1.000+			
RIsocietl	1.023	0.025	40.515	0.000
RIdiverse	1.045	0.030	34.337	0.000
RIownview	1.031	0.028	36.511	0.000
RIperspct	0.985	0.028	34.823	0.000
RInewview	1.003	0.028	36.463	0.000
RIconnect	1.010	0.027	37.146	0.000
QR = ~				
QRconclud	1.000+			
QRproblem	1.219	0.025	48.629	0.000
QRevaluat	1.158	0.024	47.749	0.000
LS = ~				
LSreading	1.000+			
LSnotes	1.422	0.043	33.068	0.000
LSsummary	1.536	0.046	33.322	0.000
DD = ~				
DDrace	1.000+			
DDeconomc	1.033	0.016	65.849	0.000
DDreligin	1.037	0.017	59.783	0.000
DDpolitcl	1.023	0.018	56.316	0.000
ET = ~				
ETgoals	1.000+			
ETorganiz	1.068	0.021	50.035	0.000
ETexample	1.063	0.022	47.893	0.000
ETfeedbcks	1.029	0.024	42.014	0.000
QI = ~				
QIstudent	1.000+			
QIadvisor	1.108	0.091	12.178	0.000
QIfaculty	1.214	0.098	12.443	0.000
QIstaff	1.470	0.112	13.140	0.000
QIadmin	1.527	0.111	13.716	0.000
CL = ~				
CLaskhelp	1.000+			
CLexplain	1.023	0.030	34.668	0.000
CLstudy	1.337	0.036	37.364	0.000
CLproject	1.095	0.032	34.481	0.000
SF = ~				
SFcareer	1.000+			
SFothrwrk	1.064	0.025	43.334	0.000

Table 2 (continued)

	Estimate	SE	Z-value	P(> z)
SFdiscuss	1.099	0.024	44.861	0.000
SFperform	1.045	0.024	44.137	0.000
SE = ~				
SEacademic	1.000 +			
SEdiverse	1.269	0.030	41.624	0.000
SEsocial	1.335	0.030	44.134	0.000
SEwellness	1.277	0.030	43.044	0.000
SEnonacad	1.145	0.031	36.480	0.000
SEactvts	1.197	0.030	39.585	0.000
PG				
PGwrite	1.000 +			
PGspeak	1.189	0.028	41.899	0.000
PGthink	1.208	0.030	40.520	0.000
PGanalyze	1.248	0.039	31.924	0.000
PGwork	1.369	0.041	33.550	0.000
PGothers	1.442	0.040	36.327	0.000
PGvalues	1.500	0.041	36.559	0.000
PGdiverse	1.350	0.039	34.185	0.000
PGprobsolv	1.480	0.041	35.941	0.000
PGcitizen	1.449	0.042	34.776	0.000
Satisfaction				
evaluation	1.000 +			
sameinst	0.823	0.111	7.450	0.000

+ Fixed parameter

their perceived gains are also expected to go up by 0.4 points. Similarly, a 1 point increase in international students' HO and LS engagement indicators is expected to result in 0.10 points increase in students' perceived gains. A 1 point increase in other engagement indicators, including QR, ET, CL, and SF, is also expected to increase students' perceived gains by 0.08 and 0.05 points, subsequently.

Regarding satisfaction, while students' LCs participation was positively correlated with higher student satisfaction rates, the relationship was not statistically significant. Instead, satisfaction had a direct and significant relationship with five student engagement indicators, including QR, ET, QI, CL, and SE. Every time international students' perception of SE and ET engagement increases by 1 unit, their satisfaction is also expected to increase by 0.3 units. Similarly, a 1 unit increase in students' QI and CL engagement indicators is expected to result in a positive increase in students' satisfaction by 0.1 and 0.06 units. Students' QR engagement had a negative relation to students' satisfaction with a -0.05 -unit correlation.

Additionally, LCs participation was directly and significantly associated with all engagement indicators, except for ET. When international students participate in LCs, we expect that their perception of HO increase by 4.9 units, RI increase by 5.2 units, QR increase by 5.7 units, LS increase by 4.2 units, DD increase by 6.7 units, CL increase by 5.731 units, SF increase by 8.994 units, and SE increase by 2.6 units. Table 4 presents the direct and indirect effects for the model.

Table 3 Correlations, means, and standard deviations of variables*

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. LcSParticipation	1												
2. HO	.138	1											
3. RI	.166	.558	1										
4. QR	.150	.419	.453	1									
5. LS	.146	.459	.430	.390	1								
6. CL	.170	.319	.430	.365	.282	1							
7. DD	.142	.281	.344	.211	.215	.232	1						
8. SF	.225	.331	.445	.416	.319	.436	.216	1					
9. ET	.111	.506	.388	.340	.405	.223	.233	.274	1				
10. QI	.080	.240	.201	.194	.220	.188	.147	.257	.305	1			
11. SE	.160	.439	.396	.326	.358	.284	.278	.341	.481	.316	1		
12. PG	.171	.492	.430	.411	.420	.322	.239	.374	.483	.340	.605	1	
13. Satisfaction	.086	.288	.237	.176	.235	.184	.139	.189	.367	.393	.398	.454	1
Mean	0.14	40.32	36.73	31.64	39.83	32.45	38.28	23.79	42.72	41.01	37.15	37.26	42.14
SD	0.355	13.565	11.839	15.622	13.533	13.628	17.310	15.245	13.402	12.853	14.113	13.211	.643

*For sake of clarity and space, this table has been simplified. Full version will be available upon request

Table 4 Direct and indirect effects

		Estimate	SE	Z-value	P(> z)
	Regression Slopes				
PG	LCsparticipation	0.574	0.334	1.718	0.086
	HO	0.101	0.023	4.455	0.000*
	RI	−0.008	0.022	−0.367	0.714
	QR	0.077	0.014	5.420	0.000*
	LS	0.106	0.020	5.349	0.000*
	DD	−0.004	0.008	−0.518	0.604
	ET	0.088	0.015	5.818	0.000*
	QI	0.029	0.017	1.670	0.095
	CL	0.054	0.015	3.522	0.000*
	SF	0.053	0.012	4.281	0.000*
	SE	0.361	0.018	20.509	0.000*
Satisfaction	LCsparticipation	0.341	0.534	0.639	0.523
	HO	0.015	0.035	0.434	0.665
	RI	0.029	0.034	0.844	0.399
	QR	−0.052	0.022	−2.333	0.020*
	LS	0.042	0.031	1.351	0.177
	DD	−0.020	0.013	−1.557	0.119
	ET	0.260	0.024	10.953	0.000*
	QI	0.154	0.028	5.478	0.000*
	CL	0.060	0.024	2.528	0.011*
	SF	0.014	0.019	0.733	0.464
	SE	0.305	0.023	13.221	0.000*
HO	LCsparticipation	4.857	0.543	8.944	0.000*
RI	LCsparticipation	5.231	0.508	10.292	0.000*
QR	LCsparticipation	5.699	0.597	9.544	0.000*
LS	LCsparticipation	4.144	0.451	9.195	0.000*
DD	LCsparticipation	6.710	0.727	9.227	0.000*
ET	LCsparticipation	0.516	0.482	1.070	0.284
QI	LCsparticipation	−1.661	0.808	−2.056	0.040*
CL	LCsparticipation	3.209	0.486	6.603	0.000*
SF	LCsparticipation	6.002	0.572	10.488	0.000*
SE	LCsparticipation	6.002	0.572	10.488	0.000*

Table 4 (continued)

		Estimate	SE	Z-value	P(> z)
	LCsparticipation	2.586	0.465	5.561	0.000*
Constructed (bootstrapping is used for SE)					
Indirect effect of LCs on PG	HO	1.723	2.064	0.835	0.404
	RI	−0.693	1.534	−0.452	0.652
	QR	2.405	1.887	1.275	0.202
	LS	−0.423	1.090	−0.388	0.698
	DD	−0.179	0.922	−0.194	0.846
	ET	−0.025	0.236	−0.106	0.916
	QI	−0.137	0.259	−0.528	0.598
	CL	1.378	0.903	1.527	0.127
	SF	0.331	0.506	0.653	0.513
	SE	2.909	1.259	2.311	0.021*
Indirect effect of LCs on satisfac- tion	HO	−0.243	2.126	−0.114	0.909
	RI	0.498	1.662	0.300	0.764
	QR	0.539	2.393	0.225	0.822
	LS	0.041	1.413	0.029	0.977
	DD	0.403	1.102	0.366	0.714
	ET	−0.380	0.802	−0.473	0.636
	QI	−0.650	0.527	−1.233	0.217
	CL	−0.591	0.988	−0.598	0.550
	SF	1.5051	0.634	2.374	0.008*
	SE	2.285	1.150	1.987	0.023*
Fit indices					
χ^2		9011.394 (1380)			0.000
CFI		0.94			
TLI		0.93			
RMSEA		0.04			

$p > 0.05$

The indirect model parameter shows the effect of participating in LCs on students' perceived gains and satisfaction passing through various engagement indicator routes. Specifically, the pathways that show a small p value with less than 0.05 indicate that the null hypothesis is rejected, and the pathways are predictive of the effect of LCs on students' perceived gains and satisfaction. Based on the results, SE significantly mediated the impacts of LCs participation ($B = 2.9$; $SE: 1.25$; $p > 0.05$) on students' perceived gains. Similarly, both SE ($B = 2.3$; $SE: 1.15$; $p > 0.05$) and SF ($B = 1.5$; $SE: 0.64$; $p > 0.05$) significantly and positively predicted the effects of LCs participation on students' satisfaction. Additionally, a Wald test is conducted to test whether the effect of LCs is the same through each intervening engagement indicators and whether the direct effect of LCs has the same magnitude with that of LC's indirect effects. The results indicated that the effect of LCs is not the same through the intervening variables and the indirect effects of LCs participation do not have the same magnitude as the direct effects from the statistical standpoint.

Discussion

The study reveals that international students who participated in LCs outperform non-participating students with engagement in educationally productive areas, learning gains, and satisfaction with their college experience. While the results are generally supportive of the positive effects of LCs (Baker & Pomerantz, 2001; Zhao & Kuh, 2004), some divergence also exists related to direct and indirect effects. When analyzing learning gains, while LCs participation was positively related to international students' perceived gains, it was not statistically significant if the effects were analyzed directly. This is in line with similar studies which report that LCs do not directly affect students' perceived gains and the effect of LCs participation on students is mainly through student engagement.

Most of the student engagement indicators were found significantly and positively related to both LCs participation and students' perceived gains. Among these indicators, students' perception of supportive environment had the most significant influence on mediating effects of LCs participation on international students' perceived gains. After accounting for covariates in the model, international students who participated in LCs perceived that their institutions are supportive and provide services, campus activities, and events that help them with their academic and non-academic responsibilities. These students reported that their institutions make available well-organized courses with clear goals and requirements, and they receive timely feedback. This supportive environment, in turn, had them feel not only academically and intellectually challenged but also motivated to enhance their learning by being actively engaged on campus. To put simply, international students' LCs participation help these students perceive their institution as supportive, and the more international students perceived their institution as supportive, academically challenging, and intellectually stimulating, the greater their learning gains are.

Previous research also exhibited mixed results regarding whether LCs participation foster collaborative behaviors. Although most studies confirmed that LCs participation is positively, and in some cases, most strongly related to interactions with peers and faculty members (Andrade, 2007; Baker & Pomerantz, 2001; Fosnacht & Graham, 2016; Pike et al., 1997, 2008; Rocconi, 2011), studies like Holt & Nielson (2019) did not find positively influenced student-faculty or peer-to-peer interactions because of LCs. In this study, there was a significant direct relationship between LCs participation and these two indicators. Although they did not significantly mediate the relationship between LCs participation and student learning gains, they were overall significantly and positively related to the outcomes. Additionally, while LCs participation significantly and directly affected students' discussion with diverse others, this relationship did not result in a significant mediating effect on international students' learning gains. Perhaps this is because international students interact with diverse others daily, so this may not be specific to their LCs participation.

Unlike previous studies which found positive links between LCs participation and students' satisfaction with college (Inkelas et al., 2007; Pike et al., 2008; Zhao & Kuh, 2004), LCs participation did not lead to direct significant positive effects for international students. There were, however, significant indirect relationships between LCs participation and satisfaction mediated through students' perceptions of supportive environments and their interactions with faculty. As a result, international students reported that they would have chosen the same institution if given the chance and rated their educational experience significantly higher than those who did not participate in LCs. These findings confirmed Rocconi's (2011) conclusion that participation in LCs does not directly affect students'

satisfaction and that the examinations of the direct effects of LCs should be undertaken with caution.

Another important finding is that a student's country of origin impacts their participation in LCs. In most education research, a student's country of origin or the impact of a student's culture is considered prescribed and is not taken into consideration to avoid possible stereotypes. Instead, small cultures (e.g., family culture, school culture, students' major, and other small group memberships) are assumed to be better indicators of behavior (Holliday, 1999). While small cultures may make the most significant difference, it is important not to completely ignore an international student's region or country of origin. Supporting the WES research report where Middle Eastern and North African students were found to struggle more with personal aspects of loneliness, homesickness, and discrimination than other international student groups, this study found that Middle Eastern and North African students, compared to Canadian counterparts, showed 44% lower odds to participate in LCs.

Implications and conclusion

While the results cannot be overgeneralized, the findings are limited to the variables and institutions included in the model; our study has multiple implications for practice and future research. The study confirms that the concept of LCs, an established feature in higher education, positively relates to international student learning outcomes and satisfaction with their college experience. However, simply creating LCs without intentionality, planning and supervision may not provide the best results, as the relationship between these practices and student learning outcomes and satisfaction is not always direct, and participation patterns may vary based upon student sub-groups.

As shown by the magnitude of the ten engagement indicators, the indirect effects of LCs can be more substantial than the direct effects. Specifically, the perception of supportive campus environments plays a predominant role in mediating the indirect effects for international students. The international students report that they perform better and are more satisfied when their institutions offer services that commit to their success and cultivate positive working and social relations among different groups on campus. Supportive campus environments mainly reflect three layers of the university ecosystem in this study: social strata, academic strata, and administrative strata. If institutional leaders create structures and procedures that integrate support and social involvement for international students when designing LCs, they help these students succeed not only academically but also with their non-academic responsibilities (work, family, etc.). Unlike for domestic students, active and collaborative learning, an underlying tenet of LCs, may not naturally happen for international students. Institutions should be sensitive to identifying structures that will help these students improve the quality of their relationships with other students, faculty members, and administrative personnel.

To understand the differences in student perception and needs, we also recommend that institutions continuously monitor and assess their LCs by measuring students' satisfaction and experiences to ensure that students receive the support that they need, and the intended impacts of LCs are accomplished for all students. This will help avoid the minimization of differences in international sub-student experiences. The results of this study indicate that international students coming from the Middle East and North Africa may be less likely to participate in LCs compared to peers. This may be due to differences in students'

understandings of the school system, the concept of LCs, or typical socialization norms of students from these regions. This interpretation does not intend to put the responsibility on students, however. While the regional culture of students can provide helpful information to explain student behaviors, institutional leaders should utilize this information to form more intentional efforts to develop interculturally adept curricula and recruitment efforts to meet the needs of various sub-group of international students.

Practices such as communicating the value of LCs to these students from orientation through graduation via interculturally oriented academic advising could aid recruitment, outcomes, and increase satisfaction. Learning analytics and academic monitoring systems are being used today more than ever and can be utilized to identify at-risk, self-isolated international students who are not participating in LCs or succeeding in their coursework. Because LCs come in many forms with various requirements, structures, and resources, some requiring mandatory participation and others on a voluntary basis, adopting such intentional efforts centered around student needs is essential in maximizing participation levels among diverse groups.

As reported in the literature review, some international students might be facing issues of harassment and discrimination which could result in self-isolation from unwelcoming environments. Because it may take time for these students to see the value of these practices, faculty and institutional leaders should integrate patience and persistence into their efforts to build and sustain relationships with these students. Taking students' concerns seriously and promoting cross-cultural, diverse group activities that would help reduce out-group biases and prejudices can help ease students' discomfort, ultimately affecting their participation patterns and enhance their success. Gone are the days where administrations can assume college readiness for all incoming students, a truth which compounds for international students facing different and perhaps additional barriers to those domestically born. To better help the growing population of at-risk international students, colleges must adapt their curriculum and programs to aid international students of all backgrounds.

Finally, additional research is needed to understand the precise linkages between LCs participation and student success. Using a quantitative multi-institution analysis, this study contributed insight which helps institutions identify the aspects of LCs that lead to positive outcomes among international students. However, as Kuh & Kinzie (2018) pointed out, these practices are effective when done well. Therefore, studying individual institutions and the quality of HIPs is necessary to unpack meaning from data and develop targeted solutions. A more focused survey or interviews done at the institutional level, further breaking down the experiences and other personal and attitudinal factors affecting perceptions of international students who participated in LCs, could shed a more accurate light on the effects of these practices. Using these methods will help us further understand the aspects of the LCs experience that make the most significant contributions to international student academic and personal achievement. As the world evolves, international students play an increasing role in the viability of higher education institutions' internationalization strategies, making it pivotal that we examine practices that will enhance their success and satisfaction.

References

- Andrade, M. (2007). Learning communities: Examining positive outcomes. *Journal of College Student Retention, 9*(1), 1–20.

- Astin, W. A. (1984). Student involvement: A development theory for higher education. *Journal of College Student Development*, 40, 518–529.
- Baker, S., & Pomerantz, N. (2001). Impact of learning communities on retention at a metropolitan university. *Journal of College Student Retention*, 2(2), 115–126.
- Bollen, K. A. (1989). *Structural equations with latent variables*. Wiley Press.
- Bryant, J., & Bodfish, S. (2014). *The relationship of student satisfaction to key indicators for colleges and universities*. Noel-Levitz, Inc. National Research Report. <https://eric.ed.gov/?id=ED570978>
- Brower, A. M., & Inkelas, K. K. (2010). Living learning programs: One high-impact education practice we now know a lot about. *Liberal Education*, 96(2), 36–43.
- Chickering, A. W., & Gamson, Z. F. (1987). Seven principles for good practice in undergraduate education. *AAHE Bulletin*, 39, 3–7.
- Cho, H. J., Levesque-Bristol, C., & Yough, M. (2020). International students' self-determined motivation, beliefs about classroom assessment, learning strategies, and academic adjustment in higher education. *International Journal of Higher Education Research*, 1–21.
- Engstrom, C., & Tinto, V. (2008). Learning better together: The impact of learning communities on the persistence of low-income students. *Opportunity Matters: A Journal of Research Informing Educational Opportunity Practice and Programs*, 1(1), 5–21.
- Fosnacht, K. & Graham, P. A. (2016, March). *Living on a prayer: A quasi-experimental investigation into the efficacy of learning communities*. ACPA Conference, Montreal, QC.
- Glass, C. R. (2015). International students' sense of belonging – Locality, relationships, and power. *AAA&U*. <https://www.aacu.org/peerreview/2018/Winter/Glass>
- Heaney, A., & Fisher, R. (2011). Supporting conditionally admitted students: A case study of assessing persistence in a learning community. *Journal of Scholarship of Teaching and Learning*, 11(1), 62–78.
- Henscheid, J. M. (2015). It is time to count learning communities. *Learning Communities Research and Practice*, 3(2), 9.
- Hill, W., & Woodward, L. S. (2013). Examining the impact learning communities have on college of education students on an urban campus. *Research in Brief*, 54(6), 643–648.
- Holliday, A. (1999). Small cultures. *Applied Linguistics*, 20(2), 237–264.
- Holt, E., & Nielson, A. (2019). Learning communities and unlinked sections: A contrast of student backgrounds, student outcomes, and in-class experiences. *Research in Higher Education*, 60(5), 670–683.
- Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indices in covariance structure analysis: Conventional versus new alternatives. *Structural Equation Modeling*, 6, 1–55.
- Inkelas, K. K., Daver, Z., Vogt, K., & Leonard, B. J. (2007). Living-learning programs and first-generation college students' academic and social transition to college. *Research in Higher Education*, 48(4), 403–434.
- Inkelas, K. K., Jessup-Anger, J. E., Benjamin, M., & Wawrzynski, M. R. (2018). *Living-learning communities that work: A research-based model for design, delivery, and assessment*. Stylus Publishing.
- Kilgo, C. A., Ezell Sheets, J. K., & Pascarella, E. T. (2015). The link between high-impact practices and student learning: Some longitudinal evidence. *Higher Education*, 69(4), 509–525.
- Kinzie, J. (2012). High impact practices. Promoting participation for all students. *Diversity and Democracy*, 15(3).
- Kuh, G. D., Schuh, J. H., Whitt, E. J. (1991). *Involving colleges: Encouraging student learning and personal development through out-of-class experiences*. Jossey-Bass.
- Kuh, G. D., Kinzie, J., Buckley, J. A., Bridges, B. K., Hayek, J. C. (2006). *What matters to student success? A review of the literature*. National Postsecondary Education Cooperative (NPEC) Commissioned report. https://nces.ed.gov/npec/pdf/kuh_team_report.pdf
- Kuh, G. D. (2008). *High-impact educational practices: What they are, who has access to them, and why they matter*. AAC&U. <https://www.aacu.org/node/4084>.
- Kuh, G. D. (2009). The national survey of student engagement: Conceptual and empirical foundations. *New Directions for Institutional Research*, 141, 5–20.
- Kuh, G. D., & Kinzie, J. (2018, May) What really makes a 'high-impact' practice high impact? *Inside Higher Ed*. <https://www.insidehighered.com/views/2018/05/01/kuh-and-kinzie-respond-essay-questioning-high-impact-practices-opinion>
- Kuh, G. D., Kinzie, J., Cruce, T., Shoup, R., & Gonyea, R. M. (2007). *Connecting the dots: Multifaceted analyses of the relationships between student engagement results from the NSSE, and the institutional practices and conditions that foster student success*. Lumina Foundation Report. <https://scholarworks.iu.edu/dspace/handle/2022/23684>.
- Kuh, G. D., O'Donnell, K., & Schneider, C. G. (2017). HIPs at ten. *Change: The Magazine of Higher Learning*, 49(5), 8–16.

- Lee, J. J. (2014). Engaging International Students. In S. J. Quaye & S. R. Harper (Eds.), *Student engagement in higher education: Theoretical perspectives and practical approaches for diverse populations* (2nd ed., pp. 105–120). Routledge.
- McCormick, A., Kinzie, J., & Gonyea, R. (2017, November). *High impact practices: Is the impact positive or negative for students of color?* ASHE Conference. Houston, Texas.
- NSSE [National Survey of Student Engagement]. (n.d.a). *Code book*. <https://nsse.indiana.edu/nsse/survey-instruments/us-english.html>.
- NSSE. (n.d.b). *Conceptual framework*. <https://nsse.indiana.edu/nsse/about-nsse/conceptual-framework/index.html>.
- NSSE. (n.d.c). *DQP toolkit*. <http://nsse.indiana.edu/html/DQPToolkit.cfm>.
- NSSE. (n.d.d). *Psychometric portfolio*. <https://nsse.indiana.edu/nsse/psychometric-portfolio/index.html>.
- Otto, S., Evins, M. A., Boyer-Pennington, M., & Brinthaupt, T. M. (2015). Learning communities in higher education: Best practices. *Journal of Student Success and Retention*, 2(1), 1–20.
- Pace, C. R. (1980). Measuring the quality of student effort. *Current Issues in Higher Education*, 2, 10–16.
- Pike, G. R. (1995). The relationship between self-reports of college experiences and achievement test scores. *Research in Higher Education*, 36(1), 1–21.
- Pike, G. R. (1999). The effects of residential learning communities and traditional residential living arrangements on educational gains during the first year of college. *Journal of College Student Development*, 40, 269–284.
- Pike, G. R., Kuh, G., & McCormick, A. (2008, November). *Learning community participation and educational outcomes: Direct, indirect and contingent relationships*. ASHE Conference. Jacksonville, FL.
- Pike, G. R., Schroeder, C., & Berry, T. (1997). Enhancing the educational impact of residence halls: The relationship between residential learning communities and first-year college experiences and persistence. *Journal of College Student Development*, 38, 609–621.
- Price, D. V. (2005, December). *Learning communities and student success in postsecondary education*. MDRC Report. <https://www.mdrc.org/publication/learning-communities-and-student-success-posts-econdary-education>.
- Rocconi, L. M. (2011). The impact of learning communities on first year students' growth and development in college. *Research in Higher Education*, 52, 178–193.
- Roy, M., Lu, Z., Loo, B. (2016). *Improving the International Student Experience: Implications for Recruitment and Support*. WES Research Survey Report. https://knowledge.wes.org/WES-Research-Report-Improving-Intl-Student-Experience.html?utm_source=WENR&utm_medium=CTA&utm_campaign=Oct-WENR.
- RStudio Team (2015). *RStudio: Integrated Development for R*. RStudio, Inc., Boston, MA. <http://www.rstudio.com/>.
- Selvadurai, R. (1992). Problems faced by international students in American colleges and universities. *Community Review*, 12(1–2), 27–32.
- Smith, B. L. (1991). Taking structure seriously: The learning community model. *Liberal Education*, 77(2), 42–50.
- Smith, B. L., MacGregor, J., Matthews, R. S., & Gabelnick, F. (2004). *Learning communities: Reforming undergraduate education*. Jossey-Bass.
- Soria, K. M., & Mitchell, T. D. (2015). Learning communities: Foundations for first-year students' development of pluralistic outcomes. *Learning Communities Research and Practice*, 3(2), 1–20.
- Tinto, V. (2003). Learning better together: The impact of learning communities on student success. *Higher Education Monograph Series*, 1–8.
- Tinto, V., & Goodsell-Love, A. (1995). *A longitudinal study of learning communities at LaGuardia Community College*. Office of Educational Research and Improvement Report. <https://eric.ed.gov/?id=ED380178>.
- Tyler, R. W. (1932). *Service studies in higher education*. Bureau of Educational Research, Ohio State University.
- Villalpando, O. (2003). Self-segregation or self-preservation? A critical race theory and Latina/o critical theory analysis of a study of Chicana/o college students. *International Journal of Qualitative Studies in Education*, 16(5), 619–646.
- Wang, R., & Brckalorenz, A. (2017, April). *A comparison of international students' engagement and faculty perceptions of international student engagement*. AERA Conference, San Antonio, TX.
- Zhao, C. M., & Kuh, G. D. (2004). Adding value: Learning communities and student engagement. *Research in Higher Education*, 45(2), 115–138.
- Zhao, C. M., Kuh, G. D., & Carini, R. M. (2005). A comparison of international student and American student engagement in effective educational practices. *Journal of Higher Education*, 209–231.