Impact of Student Engagement by Level of Interaction On Campus

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Abstract

This study examines how the institutional factors and individual characteristics affect student engagement by level of interaction on campus. College students interact with other campus members for their academic goals, and these relationships affect their diverse college activities within the specific learning environment that the institution provides. This paper shows how the different levels of interaction make a difference in affecting student engagement and examines what the role of institutional and individual factors are. The results indicate that institutional and individual factors are associated with student engagement in different ways, and their effect depends on the type of campus members involved and the level of interaction. This implies that a diverse set of possible approaches to improving student engagement for academic goals are required, and the following discussion provides further research directions to adopt more diversified supporting strategies for better student engagement.

Keywords: Student engagement, Institutional factors, Individual characteristics, level of interaction

Introduction

College students interact with various campus members and are engaged in diverse college experiences including curricular and extra-curricular activities. Prior studies show that student engagement is correlated with learning outcomes (Klem, & Connell, 2004; Kuh, Cruce, Shoup, Kinzie, & Gonyea, 2008; Reyes, Brackett, Rivers, White, & Salovey, 2012) and other studies have shown that the relationships between student cohorts also create new outcomes to help their continuous engagement (Appleton, Christenson, & Furlong, 2008; Cole, Kennedy, & Ben-Avie, 2009). Institutions provide the learning environments to support individuals' growth on campus. This intertwined connection between students' behaviors and the role of institutions affect how students are engaged in different campus activities in some ways. However, while previous studies have tended to focus on how each institutional or personal factor affects student engagement, few studies have examined the collective relationship between student engagement, learning environment, and the interactions between campus members. In this respect, this study emphasizes the role of interactions in student engagement and finds how different levels of interactions affect student engagement in the college education setting. This study not only includes students' interactions with peers and

faculty members, but also with staff on campus. The purpose of this study is to find the relationship between student engagement and diverse institutional/individual factors by level of interaction. The following research questions reflect the intention of this study clearly.

1. How is student engagement connected with individual characteristics of college students?
2. How is student engagement connected with institutional factors?
3. What is the role of the level of interaction between students and other campus members in determining student engagement?

This study explores how campus members interact with others in different ways, and in particular, it considers institutional/individual factors by the level of interaction in order to estimate the effect on student engagement. This clarifies the role of interactions between campus members on improving student levels of engagement and which other considered variables are connected with the student engagement.

Conceptual framework

Many scholars have investigated what student engagement is and how it is connected with different aspects of college life. They point out that college students interact with other campus members in their own way and share their experiences for individual growth and future planning. Their overall satisfaction and perceived educational gain during college is sometimes positively correlated with long-term participation for community-minded activities (Zhao & Kuh, 2004). The students who have these experiences react more positively toward environmental challenges and deep learning opportunities (Kuh & Gonyea, 2006). Individual attitudes and beliefs about educational values are different, and campus culture is an expression of the combined voices of the student population. The multiple coherences between a campus and its college students are linked with the level of interaction, and the inter-relation creates long-term educational outcomes. The different campus experiences are also not isolated from other important components, including individual background. To be more specific, Harper, Carini, Bridges, & Hayek (2004) acknowledge the role of gender in differentiating the level of student engagement among African-American students. Their results show males have more positive educational outcomes and have greater career ambitions, although female students put greater effort into their academic performance. Furthermore, other individual components, such as socioeconomic background (Pike & Kuh, 2005; Pike, Kuh, McCormick, Ethington, & Smart, 2011), campus transfer status (Roberts & McNeese, 2010), and working experience (Pike, Kuh, & Massa-McKinley, 2008) are modestly related to student engagement and educational outcome in different ways.

The relationship between student engagement and campus experience is also interpreted through the institutional perspective. When students interact with other campus members, the institution provides the environmental basis for the contact and allows enhanced learning to occur through diverse educational tools such as specific curricula or educational technology. Providing opportunities to interact with campus members from different backgrounds is important for character development, and the campus environment emphasizes diverse educational values that facilitate student participation in their curricular initiatives (Kuh & Umbach, 2004). Institutions stimulate intellectual aspects of students in a variety of academic activities and students have a great deal of interaction with faculty in the learning process (Pike & Kuh, 2005). High-performing institutions share several practices to improve student engagement in the learning process and encourage students to facilitate their leadership (Trowler & Trowler, 2010). Understanding student engagement is related to integrating the sociocultural perspective of individual students and the institutional influences in facilitating the complex process of student engagement (Kahu, 2013). Institutions use technological support for educational purposes, and this environmental interruption is positively correlated with effective educational practices such as better collaborative learning and student-faculty interaction (Laird & Kuh, 2005). This active institutional participation in improving student engagement in daily campus life creates a positive link between student engagement and effective learning outcomes (Kuh, Kinzie, Cruce, Shoup, & Gonyea, 2006).Different institutional contexts provide possible learning environments for better student outcomes and contribute to active interaction between campus members for successful college life.

While student engagement is closely related to the college experience, students' interaction with other campus members also facilitates student engagement. The relationship between campus members create campus environment and provide diverse opportunities for better student outcomes (Wolf-Wendel, Ward, & Kinzie, 2009). Students especially interact with faculty members in the classroom, and active interaction with instructors helps improve students' intellectual congruence and leads to positive educational outcomes (Cox & Orehovec, 2007; Cox, McIntosh, Terenzini, Reason, & Quaye, 2010). Faculty use active and collaborative learning techniques that help encourage students' active participation in the classroom and provide value-enriching educational experiences (Umbach & Wawrzynski, 2005). Faculty interaction with students leads to an improved learning process. Students interact with their peers for common educational goals or in daily tasks throughout the learning process on campus. High levels of interaction between students broadens insights about diversity across race, gender, and other demographic divides and contributes to improved student engagement (Pike & Kuh, 2006; Denson & Chang, 2009; Glass & Westmont,

2014).Students can share similarities or dissimilarities of individual characteristics and create a sense of belongingness for campus members. But the level of engagement can be different depending on the institutional environment and the socioeconomic and demographics of individuals. In addition, individual student perceptions and institutional environments are intertwined with each other, and student engagement can be a function of the interaction between students and institutional characteristics (Hu & Kuh, 2002). Positive interactions across race facilitate the development of students for a diverse workplace and long-term social participation for pluralistic democracy (Antonio, 2001; Saenz, Ngai, & Hurtado, 2007). The diversity and the influence of other campus members, including peer groups, give students the opportunity to develop close interpersonal benefits and understandings of diversity with socialization for long-term collaboration. Diversity in the student body operates through many paths to increase student levels of engagement in different curricular or extracurricular activities characterizes the behavioral contexts for better educational goal. Good relationships with instructors and peers provide positive feelings in students' educational programs and furthers academic progress (Meeuwisse, Severiens, & Born, 2010).

Literature Review

This study focuses on several educational concepts: student engagement, campus experiences, and interactions. These concepts are intertwined with each other to create better educational outcome on campus. Prior studies have explained their roles in college students' learning processes. First of all, student engagement refers to a comprehensive set of activities that each student experiences when they learn. Such activities include on- and off-campus experiences that influence student engagement. Axelson and Flick (2010) state that student engagement includes specific learning goals, contexts, types of students, and learning processes. Student engagement is related to diverse kinds of practices that make learning productive (Coates, 2005), and it is also explicitly linked to academic tasks and activities (Finn & Zimmer, 2012). Student engagement behaviors reflect not only individual characteristics (Flyn, 2014), but also campus-related factors and institutional support (Kezar & Kinzie, 2006), social networks (Junco, 2012), and instructors (Klem & Connell, 2004). Both structural and psycho-social influences overlap in student engagement (Kahu, 2013). Student engagement is positively related to certain social or learning communities (McFadden, & Munns, 2002; Zhao & Kuh, 2004; Pike, Kuh, & McCormick, 2011), and institutional structures affect student engagement in predictable ways (Porter, 2006). Therefore, to understand student engagement, it is critical to examine what experience students have in certain learning environments.

Campus experience is not easily defined. But this terminology is related to diverse activities which occur throughout direct or indirect experiences in students' daily lives in college. These diverse activities include knowledge or cognitive growth from academic curricula, their academic status, and reactions toward their college life. Individual college experiences can be different for students of different ages, races/ethnicities, and genders, and the demographic gaps reveal gaps in cognitive development processes on campus (Terenzini, Springer, Yaeger, Pascarella, & Nora, 1996). Departmental differences among individuals are associated with their unique college experiences (Espinosa, 2011). Students' emotions toward their college experiences are connected with diverse interactions with other campus members, especially faculty or peer groups (Martin, 2000).The development of technology can enhance the interactivity of college environments (Moreno & Mayer, 2007), and interactive learning environments also can increase students' self-efficacy, learning skills, and social perceptions toward others (Vidacek-Hains, Appatova, & Prats, 2008).

Interactions between campus members may affect learning outcomes. Students from different backgrounds or different views can interact with each other. They can also receive feedback from faculty or staff members to solve certain problems (Kuh, 2009). Students may share their emotions or evaluations with classmates and perform their own tasks under the guidance of faculty members. Student's attitudes toward their role as a participant in the classroom also affect educational outcomes that widely engage with a broad range of learners/The creation of an inclusive learning environment is essential to form a better understanding of students under given academic tasks (Lage, Platt, & Treglia, 2000; Reyes, Brackett, Rivers, White, & Salovey, 2012). Changes can also involve interactions, and through the exchange of value or individual attitudes toward specific academic or non-academic tasks, campus members create new outcomes. Many studies focus on student-faculty interactions in different ways. Students' backgrounds, which includes factors such as race and gender, may affect their perceptions of the interactions that occur within the classroom space (Bradley, Kish, Krudwig, Williams, & Wooden, 2002). Students' interactions predict better learning outcomes for students of color than for white students (Lundberg & Schreiner, 2004). Different student groups communicate with each other, and the group dynamics create new learning outcomes (Lindblom-Ylänne, Pihlajamäki, & Kotkas, 2003). Their interactions may vary depending on living styles (e.g., on- and off-campus) (McCaskey, 2010).

Data and Method

This study uses the 2015 National Survey of Student Engagement (NSSE) dataset, which measured the characteristics of college students (e.g., gender, race/ethnicity, age), institution-related variables (e.g., enrollment status, class type, enrollment size), and the self-recognized quality of students' undergraduate experiences. The respondents of this dataset came from 541 institutions, and the average response rate was around 29% (N=47,306). This dataset was created through 20% random sampling from the total 2015 NSSE dataset. The campus members in this study include three broad groups: a) a peer student group, b) faculty/teaching instructors, and c) other administrative staff members. To be more specific, the faculty/teaching instructor group is divided into two subgroups: academic advisors and faculty. The administrative staff group is also divided into two subgroups: student services and other staff. The rationale behind each of the categorizations is to make possible a comparison of the differences within groups according to the level of close interaction they have with students. The sample is categorized by the level of interaction (high-low) and the type of campus member (student peers, faculty member, and administrative staff). This analysis uses the SPSS program to answer the research questions. For the proposed analysis, this analysis excludes missing values through the listwise deletion of missing data, which means an entire record is excluded from analysis if any single value is missing. It is possible to further control the treatment of missing data with the missing subcommands in SPSS. In order to examine the relationship between student engagement and campus environment, this study uses the basic ordinary least squares (OLS) equation. The considered dependent variable is student engagement, which is the sum of the student engagement indicators in the dataset. The engagement indicators include ten factors: higher-order learning, reflective & integrative learning, learning strategies, quantitative reasoning, collaborative learning, discussions with diverse others, student-faculty interaction, effective teaching practices, quality of interactions, and supportive environment.

Each factor consists of several items to answer (1=never, 2=sometimes, 3=often, 4=very often), which are transformed into a continuous variable based on the NSSE method. According to the NSSE calculation, each engagement indicator is shown on a 60-point scale, which was revised through three steps. First of all, the four responses above are recoded with values of 0(never), 20(sometimes), 40(often), or 60(very often).Then, the recoded values for each item are averaged together with the required minimum number of answers for the sub-items. From the above processes, the indicator scores are the weighted averages of the student-level scores for each class level. Independent variables are composed of two parts: institutional level and student level. While the institutional-level variables include institutional type (four-year, two-year),

sector (public, private), online (the number of online courses), and credit, the student level variables explain how students do their activities based on their college experiences and demographic characteristics. Demographic variables such as age (traditional, non-traditional), gender, race/ethnicity (White, Non-White) are considered as some of the important control variables; campus-related variables such as their major (STEM, non-STEM), class (freshman/sophomore, junior/senior), enrollment intensity (full-time, part-time), and time management (time allocated for each activity) are also used for the equation considered below. Table 1 describes the variables used in this study. (see appendices)

Although this model provides some insights in measuring the relationship between student engagement and relevant variables as a whole, there are still some limitations in the study. First of all, student engagement is calculated as a mean of different types of engagement indicators by NSSE methods. This means that the specific aspect of student engagement is not shown clearly with each individual or institutional factor. For example, quantitative reasoning and supportive environment measure different sides of engagement. While the different styles of engagement factors help create a big picture of student behavior with other campus members, it may omit certain nuanced characteristics of student engagement. In addition, the students have similar answers when the survey asked about the level of interaction with different campus members. In other words, if someone answers that he or she has a higher level of interaction with some category of campus member, they tend to give relatively positive answers to other questions as well. This descriptive similarity seen in questions regarding interaction give rise to difficulties in categorizing each group by type of campus member and weaken the clarity of the interpretations of the results. However, this categorization is still significant for differentiating each type of campus member in terms of the survey participants' role on campus.

Results

Table 2 and 3 present the coefficient estimates of regressions of student engagement on various student and campus factors. Each model has two separate groups: high interactions and low interactions according to the self-reported NSSE questionnaires. The independent variables are categorized into four concepts: time management, institutional factors, college experiences, and student backgrounds. In Tables 2 and 3, the significance of each coefficient indicates (a) which variables affect student engagement and (b) how each group's coefficients are different from each other.

Through simple calculations based on unstandardized coefficients and standard error, Tables 2 and 3show the differences between the variables on the regression (Paternoster, Brame, Mazerolle, & Piquero, 1998). Living status and age are significantly associated with each group in most cases. Traditional (19-23 in age) students who live off-campus tend to have higher student engagement than their counterparts.

Model 1 shows that the interactions between peer student groups are associated with their student engagement. Whilst the group with a high level of interaction indicates that the time these students spend on diverse college activities is correlated with their overall level of student engagement, the low-interaction group is only partially associated with their engagement in terms of extra-curricular activities such as commuting, socializing, and family-related work. Interestingly, while off-campus students are positively correlated with student engagement in the low-interaction group, this effect appears in reverse among the high-interaction group, even though it is not significant.

For Model 2, the results show that students with higher class standing (junior/senior) in the low-interaction group are highly associated with student engagement. Despite the prevalence of studies which describe that white students are more interactive in the learning process, the regression results seen in Model 2 indicate that non-white students in the high-interaction group are positively associated with student engagement. These results imply that even though the average white student may have a higher level of interaction with his/her academic advisors, a small number of non-white students in the high interaction group may contribute to reducing the entire gap in the effect of their interactions on student engagement. Model 3 splits the student groups into their level of interaction with normal faculty members (not academic advisors like Model 2).

One of the major differences between the results in Models 2 and 3 is the effect of college transfer on student engagement. The relationship between students and practical academic advisors are not significant and do not provide any difference by the different interaction groups. However, non-transfer students who have low interaction with normal faculty members are negatively associated with student engagement compared to transfer students. Additionally, student athletes in the high-interaction group tend to be more negatively associated with student engagement. In line with prior studies about analyzing interaction effects on campus, the direction is reversed in the low-interaction group, and the coefficients in each group are significantly different.

Models 4 and 5 focus more on the interactions with campus staff members. There are few studies that examine the role of staff members and their interaction with college students, and the regression results provide some insight into how higher education researchers regard their effect on student engagement. Unlike other administrative staff members, those working in student service-related positions are more associated with student engagement in different ways (Table 3). Table 3 shows that the time allocated for certain activities during college is associated with student engagement with the high-level interaction subgroup of student service staff members. Full-time, higher class students who have higher levels of satisfaction and aspiration are positively associated with student engagement, regardless of their level of interaction with student service staff members. While domestic students in the low-interaction group are more positively associated with student service workers, the relationship in the high-interaction group is not significant, and the coefficients show their negative associations with student engagement within the low-interaction group.

Discussion

This study shows that levels of interaction affect student engagement in different ways and points out the role of individual characteristics. The institutional factors are not significantly associated with student engagement in the group with low levels of interaction. Interestingly, the effect of interaction on student engagement varies depending on certain institutional factors, such as size, type, and control. Compared to doctorate universities or larger institutions, students in bachelor-level or small-sized institutions are highly associated with student engagement. The type of institution does not significantly affect student engagement. This may be opposed to the finding that that small-size institutions may provide a friendly learning environment to connect other campus members closely and contribute to improved levels of student engagement (Kezar, 2006; Porter, 2006). The results also indicate that the effect of interactions is highly associated with institutional indicators, rather than individual variables, especially as only students with high levels of interaction are significantly associated with student engagement. This means that the learning environment on campus may affect only a certain range of student groups on campus. The group with a lower level of interaction may lose an opportunity to access diverse engagement activities in certain institution types. Another interesting point is the different effects of interaction between students and relevant campus members depending on the institution type. Findings show that students' relationships with other administrative staff members also play a certain role in affecting student engagement, as do peer groups and instructors. Recent studies have shown the expansion of college non-teaching staff members and their role in bettering

student outcomes (Baron & Corbin, 2012; Lester, 2013), and this result is in line with the growing interest of those staff roles at some point. Their role in student development and how they are engaged in specific student activities remains a salient subject for further study.

In line with prior findings, the results in this study confirm the importance of educational satisfaction and aspiration in explaining student engagement and acknowledge the role of demographic characteristics as a mediator. Through the comparison between coefficient values in each interaction, the effect size of each variable is different in explaining student engagement. Students' perceived college experiences from different learning environments enhance their engagement in the classroom (Samna, Azhan, Ali, Abdullah, & Sulaiman, 2014). The interaction difference between white and non-white students for student engagement implies how institutions support the different demographic backgrounds of students at some point. In sum, this study is significant because it explores the impact of different college learning backgrounds on student engagement, and it recognizes a number of campus staff roles that prior studies have ignored. The findings help higher education researchers understand how individuals' college experiences and different learning environments are related to student engagement based on their interaction levels with different campus members. The results also provide further possible research directions, such as how interactions are initiated with others and are managed by institutional leaders for better student engagement.

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Table 1. Description of learning outcome and considered variables in 2015 NSSE dataset

Category	Variable	Mean	Std.	Description
Student engagement	Higher-Order Learning	41.0	(13.92)	DV: Calculated mean of engagement indicators by those ten categories
	Reflective and Integrative Learning	38.3	(12.85)	
	Quantitative Reasoning	29.3	(17.12)	
	Learning Strategies	40.4	(14.50)	
	Collaborative Learning	33.1	(14.37)	
	Discussions with Diverse Others	41.6	(15.92)	
	Student-Faculty Interaction	23.4	(15.85)	
	Effective Teaching Practices	40.9	(13.42)	
	Quality of Interactions	42.5	(12.01)	
	Supportive Environment	35.3	(14.22)	
Interaction	Student - Student Student - Academic advisor Student - Faculty Student- Student service staff Stduent - Other administrative staff	0: poor, 1: medium, 2: excellent		Comparisons high- low relationship with campus members for estimating the effect of interaction
Time management (hours per week)	Preparing for class	14.5	(8.69)	
	Participating in co-curricular activities	5.0	(6.79)	
	Working for pay on-campus	3.3	(6.61)	
	Working for pay off-campus	9.1	(12.24)	
	Doing community service or volunteer work	2.8	(4.93)	
	Relaxing and socializing	11.2	(8.23)	
	Providing care for dependents (children, parents, etc.)	4.9	(9.93)	
	Commuting to campus (driving, walking, etc.)	4.2	(5.36)	
Institutional factors	Institutional type	0: public, 1: private		
	Carnegie	0: bachelor, 1: masters, 2: doctoral		
	Size	0: less than 5,000, 1: 5,000 - 20,000, 2: 20,000 or more		
College experience	Academic challenge	0: easy, 1: medium, 2: hard		
	Educational satisfaction	0: negative 1: positive		
	Educational aspiration	0: undergraduate or below, 1: graduate or above		
	Class	0: freshmen/sophomore, 1: junior/senior		
	Enrollment status	0: full-time, 1: part-time		
	Transfer	0: transfer, 1: non-transfer		
	Number of online course	0.47	(1.11)	
	Credit	4.51	(1.56)	
	Online-concentrated	0: yes, 1: no		
	Major	0: non-STEM, 1: STEM		
	Grade	0: poor, 1: medium, 2: excellent		
	Living on campus	0: yes, 1: no		
Student background	Parental education	0: high school or below, 1: college or university level, 2: graduate school		
	First-generation	0: no, 1: first-generation		
	Age	0: traditional, 1: non-traditional		
	International student	0: domestic, 1: international		
	Gender	0: female, 1: male		
	Student-athlete	0: yes, 1: no		
	Veteran	0: yes, 1: no		
	Disability/impairment	0: yes, 1: no		
	Race/ethnicity	0: White, 1:non-White		

Table 2. Regression result for the effects of interactions on student engagement - Peer student groups and faculty

		Model 1			Model 2			Model 3		
		Student - Student			Student - Academic advisor			Student - Faculty		
Category	Variable	High	Low		High	Low		High	Low	
Time allocated for each activity (hours per week)	Preparing for classes	.079 ***	.023		.075 ***	.061 ***		.072 ***	.076 **	
	Participating in co-curricular activities	.092 ***	.036		.121 ***	.088 ***		.125 ***	.025	†
	Working for pay on-campus	.017 *	.034		.024 **	.019		.018 *	.015	
	Working for pay off-campus	.035 ***	.012		.061 ***	.014	†	.040 ***	.040	
	Doing community services or volunteer works	.100 ***	.166 ***		.092 ***	.103 ***		.102 ***	.151 ***	
	Relaxing and socializing	-.033 ***	-.074 *		-.041 ***	-.003		-.034 ***	-.005	
	Providing care for dependents (children, parents, etc.)	.032 ***	.083 *		.025 *	.066 ***	†	.028 **	.093 **	†
	Commuting to campus (driving, walking, etc.)	.027 **	-.005		.030 **	.011		.025 **	.015	
Institutional factors	Institutional type	-.007	-.042		-.001	-.039		-.011	-.002	
	[carnegie=Bachelor]	.047 ***	.010		.025 **	-.013		.043 ***	-.030	
	[carnegie=Masters]	.024 **	-.045		-.026 **	-.002		.027 **	.025	
	[size=5,000 - 20,000]	-.026 *	-.013		.021	-.023		.025 *	-.006	
	[size=20,000 or more]	-.037 **	-.036		-.013	-.018		-.005	-.031	
Academic Status / College experience	[challenge2=Easy]	-.073 ***	-.197 ***		-.076 ***	-.184 ***		-.052 ***	-.204 ***	
	[challenge2=Medium]	-.223 ***	-.149 ***		-.232 ***	-.187 ***		-.222 ***	-.154 ***	
	Educational satisfaction	.181 ***	.289 ***		.170 ***	.290 ***		.127 ***	.236 ***	
	Educational aspiration	.093 ***	.098 **		.097 ***	.071 ***		.097 ***	.088 **	
	Class	.022 *	.085 *		.033 **	.104 ***	†	.021 *	.093 **	†
	Enrollment status	.040 ***	.015		.046 ***	.006		.052 ***	.003	
	Transfer	.010	-.060	†	.001	-.013		-.006	-.070 *	†
	Credit	.003	-.008		.005	.017		.002	.045	
	Number of online courses	.005	.025		.009	.015		.008	.042	
	Online-concentrated	-.024 *	-.091 *		-.050 ***	-.056 **		-.041 ***	-.053	
	Major	-.013	.040		-.003	.006		-.010	.008	
	Grade	.045 ***	.061 *		.042 ***	.067 ***		.029 ***	.041	
	Living on campus	-.002	.147 ***	†	.012	.059 **	†	.002	.081 **	†
Student backgrounds	[parental_education=college or university level]	.004	.028		.009	-.011		.004	-.023	
	[parental_education=graduate school]	.007	.024		.010	.017		-.002	-.026	
	First-generation	.021	.025		.016	.007		.019	.020	
	Age	-.057 ***	-.139 ***	†	-.062 ***	-.098 ***	†	-.057 ***	-.121 ***	†
	International student	.001	.024		-.004	.012		-.005	.030	
	Gender	.004	.003		-.002	-.001		-.001	.015	
	Student-athlete	-.032 ***	.020		-.038 ***	-.003		-.028 **	.070 **	†
	Veteran	.016 *	.060 *		.007	.049 **	†	.012	.047	
	Disability/impairment	-.002	-.045		-.007	-.018		-.018 *	-.017	
	Race/ethnicity	.047 ***	.034		.068 ***	.000	†	.069 ***	.037	

Dependent variable: student engagement

p***<0.001, p**<0.01, p*<0.05

† denotes significant differences from the high level of each interaction under $p < 0.05$.

Table 3. Regression result for the effects of interactions on student engagement -Student service staffs and others

Category	Variable	Model 4 Student- Student service staff High	Model 4 Student- Student service staff Low	Model 5 Student - other staff High	Model 5 Student - other staff Low
Time allocated for each activity (hours per week)	Preparing for classes	.066 ***	.071 ***	.066 ***	.087 ***
	Participating in co-curricular activities	.111 ***	.053 **	.122 ***	.079 ***
	Working for pay on-campus	.006	.031	.011	.032
	Working for pay off-campus	.042 ***	.025	.035 ***	.041 *
	Doing community services or volunteer works	.096 ***	.116 ***	.090 ***	.083 ***
	Relaxing and socializing	-.043 ***	-.008	-.031 ***	.001
	Providing care for dependents (children, parents, etc.)	.019	.097 *** †	.027 *	.058 **
	Commuting to campus (driving, walking, etc.)	.029 **	.002	.013	.012
Institutional factors	Institutional type	.000	.004	-.010	.011
	[carnegie=Bachelor]	.046 ***	-.010 †	.028 **	.036 *
	[carnegie=Masters]	.025 *	-.009	-.015	-.024
	[size=5,000 - 20,000]	-.018	.032	.006	-.020
	[size=20,000 or more]	-.014	.011	-.013	.014
Academic Status / College experience	[challenge2=Easy]	-.043 ***	-.201 *** †	-.056 ***	-.126 ***
	[challenge2=Medium]	-.231 ***	-.168 *** †	-.225 ***	.163 *** †
	Educational satisfaction	.160 ***	.251 ***	.173 ***	.273 ***
	Educational aspiration	.095 ***	.108 ***	.103 ***	.110 ***
	Class	.042 ***	.131 *** †	.046 ***	.102 *** †
	Enrollment status	.041 ***	.016	.057 ***	.031
	Transfer	.011	-.066 *** †	.001	-.024
	Credit	.005	-.001	.011	.012
	Number of online courses	.005	.033	.011	.048 *
	Online-concentrated	-.024	-.062 **	-.047 ***	-.055 **
	Major	-.007	.027	-.013	.017
	Grade	.033 ***	.040 *	.036 ***	.051 **
	Living on campus	.000	.060 ** †	.012	.040
Student backgrounds	[parental_education=college or university level]	.004	.014	.000	.008
	[parental_education=graduate school]	.013	.015	.008	.031
	First-generation	.028	.039	.012	.046
	Age	-.043 ***	-.111 *** †	-.068 ***	-.062 ***
	International student	-.016	.037 * †	-.004	.028
	Gender	.000	.019	-.003	.019
	Student-athlete	-.032 **	.007	-.028 **	.004
	Veteran	.000	.024	.001	.029
	Disability/impairment	-.027 **	-.023	-.005	-.022
	Race/ethnicity	.052 ***	.030	.064 ***	.037 *

Dependent variable: student engagement

p***<0.001, p**<0.01, p*<0.05

† denotes significant differences from the high level of each interaction under $p < 0.05$.