

## Campus Adaptations of Engineering Undergraduates across Academic Years

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### ABSTRACT

The study aims to empirically test the relationship between types of campus adaptations across academic years of engineering undergraduate B. Tech students pursuing a four-year study at Indian Institute of Technology (IIT's) and National Institute of Technology (NIT's) in India. The Multivariate Analysis of Variance (Manova) test was run with SPSS vs. 21 to compare the student's campus adaptations of IIT's and NIT's by student's academic year level. Multistage random sampling with n = 1420 students were selected comprising of Multistage random sampling with n = 1420 students were selected comprising of first academic year (n = 160), second academic year (n = 273), third academic year (n = 460) and fourth academic year (n = 561). In academic adaptation, first year and second year students had negative outcomes with third and fourth year students having positive outcomes. In Social Adaptation, first year and fourth year students had negative outcomes with second and third year having positive outcomes. In physical - psychological and institutional adaptation, only second year students had negative outcomes with first, third and fourth year had positive outcomes driving towards mental well-being and successful completion. Campus adaptations do vary across academic years influencing student's experiences at IIT's and NIT's.

### KEYWORDS

transition, academic year, engineering student

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## Introduction

Addressing the transition to tertiary education in engineering - *the little fish in a big pond* especially in first year where student is unaware of faculty and other institutional features (Hargreaves, 1998) are a huge challenge in educational setting. Student voices are often unheard in education. Administrators are assumed to know better because of their years of campus experience or professional training (Miller, Anderson, Cannon, Perez, & Moore, 1998). With predictors of adjustment assumed to be similar among first year students (Cohorn & Giuliano, 1999); the programs to enhance first year

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engineering experiences in campus (C. Pieronek, McWilliams, Silliman, & Uhran, 2005) impacts student living on campus causing student engagement, growth and success (Lanasa, Olson, & Alleman, 2007).

Early bird preparing engineering freshmen or first year for engineering (Jeschke, Wilke, Kato, Pfeiffer, & Zorn, 2008) by uncovering what it means to be an engineer (Courter & Anderson, 2009) emphasizes human need in a first-year engineering course (Estell & Reid, 2010). The engineering elements profile among first and final year engineering students differs (Phang et al., 2011) indicating that first year students transition to university (Bowles, Dobson, Fisher, & Mcphail, 2011) has more of propensity score adjustments that assess the effectiveness of a college first year students (Clark & Cundiff, 2011). Exploring epistemologies of sophomore or first year engineering students (Frye, Montfort, Brown, & Adesope, 2012); the newcomers to the academic environment (Majzub, 2012) face adjustment to college differing by academic year and study level (Al-Khatib, Awamleh, & Samawi, 2012). These adjustment differ from making friends, culture difference, adapting to food etc (Barnes & Loui, 2012). Thus engaging diversity in first year college classrooms facilitates student engagement (A. Lee, Williams, & Kilaberia, 2012). In short, pre college student experiences influences first year student experiences (Cheong & Ong, 2014) and adjustment to university (Nikfal Azar & Reshadatjoo, 2014). In short, treading the first year characteristics and campus experiences manoeuvres learning outcomes of students (Liu & Chang, 2014).

The student population at institute of national importance in the field of engineering and technology as per all India Survey reports from 2011 – 2016 are as follows: -

**Table 1.** Four Year B.Tech Student Population

Academic year	First year		Second year		Third year		Fourth year	
	Male	Female	Male	Female	Male	Female	Male	Female
2011 – 12	90299	23741	77793	20487	66365	18978	57413	17999
2012 – 13	92329	23282	86769	23526	76281	20443	70080	18246
2013 – 14	89366	23085	89420	23548	84607	23189	76178	20466
2014 – 15	104303	27132	97583	24967	91859	24570	90635	25676
2015 – 16	100378	27810	99205	26551	92532	24381	89296	24039

*Source:- All India Survey Reports on Higher Education*

As per the table above there has been a persistent drop in student enrolment over the year. In other words, there has been a decline in persistence rate among students in undergraduate b.tech education.

The study seeks to analyse the relationship among academic years on campus adaptations of students with the following research question and research objective: -

**Research Question:** - What makes campus adaptations of academic, social, physical - psychological and institutional attachment be unique across academic years?

**Research Objective:** - To examine variance among campus adaptations of academic, social, physical psychological and institutional across academic years.

## 1. Campus Adaptation

### 1.1 Academic Adaptation

The first year academic programs influence students persistence on rest of the years (Porter & Swing, 2006) leading to development and assessment of an undergraduate curriculum for first-year engineering students (Cox, Diefes-Dux, & Lee, 2006). First year engineering students witnessed tensions between the students' interest in other engineering academic majors (Bailey & Sheppard, 2006) causing intellectual development to take places in college years (Baxter Magolda, 2006). Tinto states expectancy value theory impacts academic achievement in first year (Neuville et al., 2007). It is the context of study that enhances first year undergraduate students performance (Kilgore, Atman, Yasuhara, Barker, & Morozov, 2007). The students success in first year academic courses influences student learning and democratic outcomes of future date (Engberg & Mayhew, 2007) where on an extended thought, the development of an engineering technology freshman seminar course (Kinsler, Leite, & Williamson, 2007) could also prove handy in student engagement of first year enhancing students quality of college experiences (Krause & Coates, 2008).

Academic literacy of first year impacts student experience and tertiary expectations (Scouller, Bonanno, Smith, & Krass, 2008) making innovation in linking and thinking by critical thinking and writing skills of first-year engineering students (Damron & High, 2008). The college seniors theory states that college seniors impact academic motivation (Van Etten, Pressley, McInerney, & Liem, 2008) where attendance are important contributors to academic success in second year beyond than first years (Horn, Jansen, & Yu, 2008) determining persistence of first year students in academic majors towards academic performance (Powell, 2008). Increasing student-centred learning in a first-year (Gieskes, Bryant, & McGrann, 2009) focuses on theory versus practical in a curriculum for engineering students where theory before practical approach revealed a much higher average pass rate over the years (Swart, 2009) indicated by assessing students' knowledge in first-year engineering laboratory (Salim, Daud, & Puteh, 2009). The final year assessment of projects added on to improving the consistency, traceability and global quality of assessment processes (Valderrama & Rullán, 2009) withdrawing the writing apprehension of first year engineering students (Scott, 2009).

Further though entry portfolio and other variables impacts academic performance of first year at college (O'Donoghue, 2009) ; class attendance varies by academic year (Holbrook & DuPont, 2009). Expectancies, values , achievement and career plans determine motivation among first year students (Jones, Paretti, Hein, & Knott, 2010). Retaining engineering students by project and team-work from the first semester (Friesel, 2010) has an effect on final year engineering projects (Ku & Goh, 2010). Moreover the first class at institution acts as an icebreaker in transition in a tertiary institutional environment (Kavanagh, Clark-Murphy, & Wood, 2011) where students who maintain a high



school average are more determined towards their academic performance in first year (Gallander et al., 2011) making academic achievement in first-year university, totally depends on students who maintain a high school average grades (Wintre et al., 2011). First contact of students with engineering methods influences engineering education at a new public university contributes to students performance at college in first year (Romero, Leite, Mantovani, Lanfredi, & Martins-Filho, 2011). Further fostering learner mobility between engineering education and a twenty first century workplace (Abu-aisheh & Grant, 2011) is like engaging with higher education academic support that leverages first year students teacher transition model (Penn-edwards & Donnison, 2011) with lecture and tutorial attendance impacting academic success of second year students (Horn, Jansen, & Yu, 2011). Hence academic achievement impacts academic adjustment among first year college students (Calaguas, 2011).

Undergraduate students academic performance differed across academic levels of first to final year (Akinrefon & Adejumo, 2012) as knowledge and interest in engineering academic majors differ across academic levels from first year to final years (Jin, Purzer, & K., 2012). Developing independent learning and non-technical skills amongst final year engineering students (Knobbs & Grayson, 2012) is possible by self directed learning in first year of engineering (Taratutin et al., 2012). The greatest help that could occur for first-year engineering students in transition is by promoting transformative learning in student by faculty development (Leung, Ko, & Chow, 2012). Added on an engineering introductory seminar course for first year engineering students (Fan et al., 2012) or an introduction of activity week into the first year of a chemical engineering undergraduate (Gan et al., 2012) may contribute to academic engagement influencing learning at four year institution (Sinanan, 2012).

Moreover academically, the four main engineering elements which are inquiry, design, optimisation and sustainability differ from first year to final year (Phang et al., 2012). As observed first semester academic results in terms of fail or pass influences student motivation (Stanton & Siller, 2012) as it is students academic preparation with students backgrounds develop problem solving skills in first year that helps to close gap achievement gaps between diverse student population (Grigg & Benson, 2012). Academic engagement impacts students engagement in four year institutions (Flynn, 2014) towards baccalaureate attainment of college Students at 4-year institutions (Flynn, 2014). In short, though grades have a dampening effect on academic performance of students at post-secondary institutions (Rajandran et al., 2015) (Jacobs, Williamson, & Pretorius, 2015) and varying perception of attendance of students across academic years (Lowder et al., 2015) could hopefully set right by seminar intervention to enhance first year academic performance (Jacobs & Pretorius, 2016).

## **1.2 Social Adaptation**

Student-faculty informal relationships influences educational outcomes especially among first year (Pascarella & Terenzini, 1978). The students' gains from first year out of college to third year out will differ by age group where low socio economic status students had positive relationship between educational attainment and post college gains especially among women students (Sanchez, Laanan, & Wiseley, 1999). Social acquaintances in terms of team based learning

where older students impacted younger students learning especially that of first years (Tichon & Seat, 2002) indicated that classroom gender dynamics persisted at every level of engineering education (Gravel, Rushton, Kelley, & Maitland, 2003). The varying demographic characterization of first-year engineering students (Catherine Pieronek, Uhman, McWilliams, & Silliman, 2004) surmounts parenting and campus climate experience on first year adjustment to college (Mounts, 2004) also with persuasive intellectual growth by senior college students at college (Marra & Palmer, 2004). Social support influences first year students experiences in higher education (Wilcox, Winn, & Fyvie-Gauld, 2005) with first year engineering students experiences having a direct bearing on their learning in communities (Thompson, Oakes, & Bodner, 2005). This is a little diversified among students of minority race whose student satisfaction vary by academic year of students (Einarson & Matier, 2005). Social integration varies by students of race in first year of college (Flowers, 2006). This could bring about engineering students' change in profile over the freshman year across male and female (Imbrie & Lin, 2006) which has affective and relational factors influence classroom experience and career outlook among first-year engineering undergraduates (Lee, Hansen, & Wilson, 2006).

Social support as predictors of adjustment to university among first year undergraduates (Friedlander, Reid, Shupak, & Cribbie, 2007) impacts institutional life for seniors towards quality of life at college (Orte, March, & Vives, 2007) with a sense of belonging to institutions varying by race (Hausmann, Schofield, & Woods, 2007). The career identity of first year women or minority race and colour varied (Johanna Geldenhuis & Lange, 2007) influencing active and cooperative learning towards persistence among first year students in engineering impacting motivation orientation (Reisslein, Tylavsky, Matar, Seeling, & Reisslein, 2007). Building community among first year engineering students (Hansen, Stein, & May, 2008) with ethics impacts academic integrity in first year engineering students (Jiménez, O'Neill-Carrillo, & Rodríguez, 2009). However college adjustment problems persisted among first year college students who witnessed adjustment disorder which was higher in female than male students (Rodgers & Tennison, 2009). Social factors impact adjustment among first year students (Salami, 2011). The advice seeking behaviour among first year engineering students impacts retention (Groll, 2011) influencing identity development especially of first year engineering students (Louis & Matusovich, 2011). This also positively influences learning communities on first year students' growth and development in college (Rocconi, 2011). Further vehicle ownership affect time utilization on study, leisure, social activities, and academic performance of first year engineering students at rural institutions (Limanond, Jomnonkwao, Watthanaklang, Ratanavaraha, & Siridhara, 2011).

Social engagement has an effect on learning at four year institution (Sinanan, 2012) social and cultural capital differences impacts students expectations of achievement on their performance and learning in first year (Dukhan, Cameron, & Brenner, 2012). The social adjustment problems seemed greater than education and psychological adjustment problem among first year college students (Jemal, 2012a) where female first year students academic experience (Joyce & Hopkins, 2012) especially of engineering impact next year recruitment (Lehr, Obispo, Finger, & Kwang, 2012).



Social achievement goals for social behaviors also have a bearing adjustment in first semester among first year at college (Shim & Ryan, 2012). Academic advising improves the success of first year students (Abdykhalykova, 2013) as mentoring and counselling facilitates cultural and educational transition of first year students (Sinacore & Lerner, 2013). This boosts academic persistence that differs among ethnic students of first year students (Rigali-Oiler & Kurpius, 2013) especially among poor, minority and rural female students who are systematically underrepresented in four year institutions (Xiaobing Wang, Liu, Zhang, Shi, & Rozelle, 2013). Hence socio-demographics impacts academic performance of first year students (Deliens, Clarys, De Bourdeaudhuij, & Deforche, 2013) with demographic and socio-economic contextual factors act as predictors in first year educational attainment (Mcmanus, Dewberry, Nicholson, & Dowell, 2013).

Social engagement impacts students engagement and baccalaureate attainment of college students in four year institutions (Flynn, 2014). The effect of perceived social support by peer than family support in first academic year of student adjustment (Páramo, Martínez, Tinajero, & Rodríguez, 2014) indicates that demographic variables (Adeniyi, Adediran, & Okewole, 2014) which are a part of students cultural background (Burgess, Crocombe, Kelly, & Seet, 2014) can be set of as structural diversity facilitating interracial friendships across college years (Martin, Tobin, & Spenner, 2014).

### **1.3 Physical - Psychological Adaptation**

1.3.1 Physical adaptation :- The flourishing and substance use has an effect on students involvement or engagement in first year of entering college (Low, 2011) rendering that health behaviour impacts academic performance of first year student (Deliens et al., 2013). The body weight also correlates to academic performance in first year university students (Deliens et al., 2013) where any indication of chronic illness among first year students has an indefinite bearing on students' academic performance (Herts, Wallis, & Maslow, 2014). From a health perspective, social context for sexual behaviour among college students of first years also varied (Uecker, 2015).

1.3.2 Psychological Adaptation :- Psychological distress of students increased over four years of education at university campus (Sher & Wood, 1970). Academic performance in first year is influenced by previous academic performance, Integration into university, self-efficacy, and employment responsibilities (McKenzie & Schweitzer, 2001). Social cognitive variables have played a fruitful role towards persistence to second year (Kahn & Nauta, 2001) with academic self-efficacy and optimism majorly contributing to academic performance among first year students (Chemers, Hu, & Garcia, 2001). Further understanding the competencies of engineering as a profession varies by academic year or levels. Thus perceptions of it differ from first year to final year students (Codone, Lackey, & Grady, 2004) leading to development of first year students perceptions of the engineering profession of realistic client driven problems (Moore, Diefes-Dux, & Imbrie, 2005).

Students' perceptions of institutional climate varies across years by psychological and behavioural adjustment (Way, Reddy, & Rhodes, 2007). Stress as predictors of adjustment to university among first year undergraduates (Friedlander et al., 2007) is also boosted by self-esteem as predictors of

adjustment (Friedlander et al., 2007) and a culmination of self-esteem and perceived control as predictors of first-year college students academic achievement (Friedlander et al., 2007). Moreover first year educational academic engineering experience on self efficacy beliefs of students (Hutchison-Green, Follman, & Bodner, 2008) helps in critical thinking disposition and perceived academic control fostering academic achievement of first year students (Stupnisky, Renaud, Daniels, Haynes, & Perry, 2008).

Academic stress impact psychological health of first year college students (Verger et al., 2009). The childhood emotional maltreatment impacts psychological distress in later years among college students (Wright, Crawford, & Del Castillo, 2009). Thus stability impacts adjustment outcomes of students of first years who are in their initial phase of transition to college (Marnie Hiester, Alicia Nordstrom, & Lisa M. Swenson, 2009) where socio economic status, and social support affected psychological health of first year college students (Verger et al., 2009). However year, and transfer status impacts engineering students self efficacy too (Concannon & Barrow, 2009). Moving on to coping on university adjustment;(Abdullah, Elias, Uli, & Mahyuddin, 2010); development of psychological well being among first year students impacts persistence and retention (Bowman, 2010) where over confidence in first year students (Hamlin, Riehl, Hamlin, & Monte, 2010) shows that adults are wiser than college students (Ardelt, 2010). Psycho factors impact adjustment among first year students (Salami, 2011). First year engineering students are strikingly impoverished in their self concept as professional engineers (Smyth, Guilford, & Nosek, 2011). Development of spatial skills in first-year engineering students (Martín-gutiérrez & Navarro, 2011) with contextual support in first year impacts self efficacy (Reisberg et al., 2011) engagement and performance (Lizzio & Wilson, 2011) that eventually helps out in adjustment problems, help seeking behaviours and dysfunctional coping among first year undergraduates (Ayele, 2011). Further moral consolidation and moral transition impacts moral development in first year students (Mayhew, Seifert, & Pascarella, 2012b).

First year students professional way of thinking (Opgenorth & Games, 2012) requires emotional maturity (Sharma, 2012) with self regulation abilities (Park, Edmondson, & Lee, 2012) so that self esteem seeps into better academic performance (Rosli et al., 2012). Added to this irregular sleep affects stress among first year students (Lev Ari & Shulman, 2012). Students do unethical behaviour during academic years (Iorga, Ciuhodaru, & Romedea, 2013). The emotional intelligence present among students impacts academic performance in first and final year students (Chew, Zain, & Hassan, 2013) with negative emotions influencing adjustment of first year students to a greater extent (Nyamayaro & Saravanan, 2013) making stress of adaptation build up among first year student's (Cliniciu, 2013). Hence freshmen year mental health symptoms and level of adaptation reflect predictor of internet addiction (Yao, Han, Zeng, & Guo, 2013) that could build up stress and students engaging in psychosocial wellness seminar in first year could benefit psycho social adjustment and stress management (Conley, Travers, & Bryant, 2013). In brief, students self-concept and college involvement impacted first year students academic success (Zhou et al., 2014).

The academic resilience (Cazan, 2014) with academic self efficacy, learning academic motivation and satisfaction with college environment influences college adjustment of first year students (Salmalin, Azar, & Salmani,



2014). More observably, first year students have high levels of stress (Al-Daghri et al., 2014) and test anxiety that creates psychological distress dampening academic motivation among first year students (Rajiah, Coumaravelou, & Ying, 2014). Further self-perception, beliefs control over events (feeling of mastery), belief human nature, trust in people feeling of alienation (David, & Nită, 2014) pressures up identity diffusion and identity distress envisaging identify coping among first year students (Sica, Aleni Sestito, & Ragozini, 2014). Psychological capital determines adaptive to stress among first year students (Wen & Lin, 2013). The personality type variables (Adeniyi et al., 2014) coupled with loneliness (Wohn & Larose, 2014) and self perception, trust, mastery and alienation impacts adjustment of first year students to university (David & Nită, 2014). However much needed optimism and self efficacy has a slow manoeuvring on transition and adjustment of first year students (Mergler & Boman, 2014; Nikfal Azar & Reshadatjoo, 2014). Lastly, though the behavioural perceptions of students experience persist in terms of bullying at high school; it is carried forward at college having an endurance on motivation (Goodboy, Martin, & Goldman, 2016) between college students and older adults (Buchanan, Lai, & Ebel, 2015).

#### **1.4 Institutional Adaptation**

The distributive effects of public junior college availability impacts attendance at later four year higher education institutions (Tinto, 1975) and subsequent retention of first year minority students of race in engineering (Davis & McCoullum, 1992). By addressing first-year issues in engineering education mentoring and peer tutoring influences retention of first year students (Baillie, 1998) where grades, financial aid, average credit hours, and enrolment at campus 4 year institutions are factors that contribute to successful retention (Teresa Makuakane-Drechsel, Linda Se, 2000).

The academic ability in terms of past performance influences first year students persistence to second year (Kahn & Nauta, 2001). In the beginning students at campus need the necessary skills to explore their campus where they seek the help of information literacy to gather information on their campus and surroundings (Hartmann, 2001). Further the relative effectiveness of first year engineering seminars impacts retention (Montgomery, Follman, & Diefes-dux, 2003). Never the less even academic performance with grades affects students decision to retention or withdraw after first year (Herzog, 2005). However persistence of first year students of race in engineering is vital (Fleming, Engerman, & Griffin, 2005) with first year experience pronounce retention among undergraduate engineering students of race (Meadows et al., 2006).

The standard of undergraduate institutions has lowered over the years due to unbalanced growth of engineering private institutions (Singh, 2006) where retention of students by their engineering academic major remains a challenge (Sash, Detloff, Chen, Grandgenett, & Duran, 2006). The satisfaction with first year experience facilitates retention (Courter & Johnson, 2007) depending on connections formed between and among students by learning community (Tsang, Halderson, & Kallen, 2007) via hands on activities and team based learning (Knight, Carlson, & Sullivan, 2007) transforms attitudes of first years towards retention (Doolen & Long, 2007). Student engagement in first year grades instigates persistence (George D. Kuh, Ty M. Cruce, Rick Shoup,



Jillian Kinzie, & Robert M. Gonyea, 2008) although academic performance, motivation, and social connectedness varies the degree of influence in third year retention too (Allen, Robbins, Casillas, & Oh, 2008). The relationship between students and institutions determine the probability of graduation at four year institutions (Cragg, 2009). Students first year academic grades influences retention (Jamelske, 2009) and first year college experience impacts persistence and retention (Dunn & Mulvenon, 2009) ushering degree completion at four year institutions (Xueli Wang, 2009). More noticeably academic persistence differ across academic year of engineering students (Chang, Lin, & Hu, 2009). Further quality of high school infrastructure and violence at school impacted academic achievement of first year students (Wolniak & Engberg, 2010) where moral reasoning development in first year students moved towards retention (Matthew J. Mayhew, Tricia A. Seifert, & Ernest T. Pascarella, 2010). Tutoring program also lead to retention in first year students (Louie & Sullivan, 2011) where pre matriculation student attitudes determined student drop out or attrition in first year (Rivas, Sauer, Glynn, & Miller, 2011).

The influential learning strategies and academic motivation contributes to students persistence and academic success among first year students (Vanthournout, Gijbels, Coertjens, Donche, & Van Petegem, 2012). Students' expectations and preparedness encourage a better match between student and institution among first year (Jansen, André, & Suhre, 2013) where students who attended single sex two year pre secondary instittue had higher rate of attendance at later four year bachelor education colleges than students with coeducational academic (Park, Behrman, & Choi, 2013). Grades and financial status have a bearing on student retention (Djulovic & Li, 2013) determining that first year academic performance influences persistence in academics in future years of study at college (Cabrera, Miner, & Milem, 2013) where first year programs like orientation programs impact adaptation of students resulting in retention of across years (Mayo, 2013).

The causes for retention and attrition in first year transition, academic advising, career planning and placement etc (Zerna & Ph, 2014) has more to do with student engagement in type of academic and social engagement influencing bachelorette attainment or degree completion in four year institutions (Flynn, 2014). Though course preference, and first year educational performance – were significant predictors of attrition (Harvey & Luckman, 2014); knowledge and skills imparted in first year influences retention of students (Pande, Pande, Parate, Pande, & Sukhsohale, 2014). Lastly, effective academic library use and e resources in campus positively effects academic performance of first year undergraduate students impacting their retention (Tewell, 2015)

The study proposes the following research hypothesis: -

H<sub>1</sub>: - Campus adaptations of academic, social, physical – psychological and institutional environments do not vary among undergraduate students by academic year.

H<sub>1a</sub>: - There is a significant difference among undergraduate students across four academic years in campus adaptations of academic, social, physical – psychological and institutional environments.

## Methods

**2.1 Participant:** - The reference population were undergraduate 4-year B. tech students enrolled on a regular study mode at IIT's and NIT's. A total of 1460



students participated with 1420 of valid responses for an overall 97.26 percent participation rate after deducting the questionnaire that contained empty answers. Data was collected for 20 weeks across institutions of IIT's and NIT's. Of the 1420 undergraduate respondents on their academic year, 11.26% were first year students, 19.22% second year students, 32.39% third year students and 39.50% fourth year students.

**2.2 Sampling:** - Probability sampling technique with multistage sampling followed by cluster sampling in identification of institutes of IIT's and NIT's was adopted. This is followed up with stratified sampling in sample choice of undergraduate students' population and simple random in collecting data from the chosen student population stated above.

**2.3 Instrument and Procedure:** - The survey was conducted using a structured online questionnaire with reference to student's campus and non-campus email accounts. At all times, the students were informed of the anonymous, confidential, and voluntary nature of their participation and any doubts that arose were clarified.

**2.4 Measures:** - All the 21 items in the questionnaire were measured with rating on a five point Likert scale ranging from "1 = strongly disagree" to "5 = strongly Agree". Reliability and validity of the questionnaire was tested.

## Data Analysis

Multivariate analyses of variance (MANOVA) were conducted to assess academic year group differences in campus adaptation. This was followed by discriminant analysis to determine the nature of effect of campus adaptations by each academic year group. There are several assumptions behind a MANOVA, including multivariate normality, linearity of relationships, low influence of univariate and multivariate outliers, homogeneity of variance-covariance matrices and an absence of multi-collinearity. Each assumption was tested, and no serious violations were noted.

**Table 2.** Pearson's Correlation

Pearson Correlation						
Campus Adaptation	1	2	3	4	M	SD
1.Academic Adaptation	1.00				2.61	0.702
2.Social Adaptation	0.575	1.00			2.72	0.755
3.Physical – Psychological Adaptation	0.519	0.573	1.00		2.28	0.771
4.Institutional Adaptation	0.577	0.613	0.788	1.00	2.14	0.784
Note :- n = 1420 .Correlations greater than 0.05 are statistically significant (p < 0.5)						

A Pearson product moment correlation analysis, that examined the relationship between campus adaptations revealed correlations greater than 0.05, hence statistically significant.

## 3.1 Descriptive Statistics

**Table 3.** Distribution of difference in dimensions of campus adaptations

Campus Adaptation Scale								
Academic year	Academic		Social		Physical - Psychological		Institutional	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
First Year (n = 160)	2.26	0.709	2.54	0.679	2.15	0.729	2.06	0.805
Second Year (n = 273)	2.53	0.697	2.72	0.727	2.23	0.746	2.07	0.764
Third Year (n = 460)	2.68	0.682	2.82	0.763	2.36	0.781	2.23	0.782
Fourth Year (n = 561)	2.67	0.688	2.69	0.771	2.29	0.782	2.13	0.785
Total (n=1420)	2.61	0.702	2.72	0.755	2.28	0.771	2.14	0.784

The mean in the descriptive statistics indicate that among undergraduate B.Tech students, first year to fourth year students had high level of social adaptation, with first year ( $M = 2.54$ ,  $SD = 0.679$ ) second year ( $M = 2.72$ ,  $SD = 0.727$ ) third year ( $M = 2.82$ ,  $SD = 0.763$ ) fourth year ( $M = 2.69$ ,  $SD = 0.771$ ) However, students across academic years from first year to fourth year had low level of institutional adaptation with first year ( $M = 2.06$ ,  $SD = 0.805$ ) second year ( $M = 2.07$ ,  $SD = 0.764$ ) third year ( $M = 2.23$ ,  $SD = 0.782$ ) fourth year ( $M = 2.13$ ,  $SD = 0.785$ )

Further within Academic Adaptation, third year students had high level of adaptation ( $M = 2.68$ ,  $SD = 0.682$ ) and first year students had low level of adaptation ( $M = 2.26$ ,  $SD = 0.709$ ).

In Social Adaptation, third year students had high level of adaptation ( $M = 2.82$ ,  $SD = 0.763$ ) and students of first year had low level of adaptation ( $M = 2.54$ ,  $SD = 0.679$ ).

In Physical – Psychological adaptation, third year students, had high level of adaptation ( $M = 2.36$ ,  $SD = 0.781$ ) and first year students had low level of adaptation ( $M = 2.15$ ,  $SD = 0.729$ ).

In Institutional adaptation, third year students had high level of adaptation ( $M = 2.23$ ,  $SD = 0.782$ ) and first year students had low level of adaptation ( $M = 2.96$ ,  $SD = 0.805$ ).

Overall, across campus adaptations and academic year groups, students had high level of social adaptation ( $M = 2.72$ ,  $SD = 0.755$ ) and low level of Institutional adaptation ( $M = 2.14$ ,  $SD = 0.784$ ). However, within academic year groups third year students had high level of social adaptation ( $M = 2.82$ ,  $SD =$



0.763) and first year students had low level of institutional adaptation ( $M = 2.06$ ,  $SD = 0.805$ ).

### 3.2 Inferential statistics

The Box's M value of 36.214 indicates test of assumption of equality of covariance matrices are roughly equal as assumed with  $p = 0.209$  ( $p > 0.001$ ).

Using Manova test statistic of Pillai's Trace, there was a significant effect of academic year on students' Academic, Social, Physical – Psychological and Institutional campus adaptations ( $V = 0.052$ ,  $F(12,4245) = 6.237$  and  $p = 0.000$ ) \* ( $p < 0.05$ ).

Using Manova test statistic of Wilks Lambda, there was a significant effect of academic year on students' Academic, Social, Physical – Psychological and Institutional campus adaptations ( $\Lambda = 0.949$ ,  $F(12, 3738) = 6.289$  and  $p = 0.000$ ) \* ( $p < 0.05$ ).

Using Manova test statistic of Hostelling's trace, there was a significant effect of academic year on student's campus adaptations of Academic, Social, Physical – Psychological and Institutional ( $T = 0.054$ ,  $F(12, 4235) = 6.328$  and  $p = 0.000$ ) \* ( $p < 0.05$ ).

Using Manova test statistic of Roy's largest root, there was a significant effect of academic year on student's campus adaptations of Academic, Social, Physical – Psychological and Institutional ( $\Theta = 0.043$ ,  $F(4,1415) = 15.057$  and  $p = 0.000$ ) \* ( $p < 0.05$ ).

The univariate test statistic with Levene's test of equality of variances for each of the dependent variable is non-significant i.e.  $p > 0.05$  with academic adaptation of 0.826, social adaptation of 0.172, physical – psychological adaptation of 0.218 and institutional adaptation of 0.838 enabling the assumptions of homogeneity of variance being met.

However separate univariate analysis or ANOVA on the outcome with  $F(3,1416)$  for Academic, social, Physical – Psychological and institutional adaptation too revealed a significant effect with  $F$  value (17.052), (6.188), (3.709), (3.002) and  $p$  value less than 0.05 (0.000), (0.000), (0.010) and (0.030),

Further the between – subjects SSCP matrix indicates that the sum of squares for the error SSCP matrix are substantially bigger than in the model (or academic year) SSCP matrix, whereas absolute values of cross products are fairly similar. This pattern of relationship indicates that the relationship between dependent variables is significant than individual dependent variables themselves. Thus to determine the nature of effect of academic year among dependent variables Manova is followed with discriminant analysis,

The first discriminant function explained 79.1% of the variance with canonical  $R^2 = 0.043$ ; the second discriminant function explained 15.1% of the variance with canonical  $R^2 = 0.008$ ; the third discriminant function explained 5.8% of the variance with canonical  $R^2 = 0.056$ ; indicates that the variance in the canonical derived dependent variable was associated for academic year level.

In combination these discriminant functions significantly discriminated the academic year groups. The first and second discriminant function significantly differentiated the student academic year groups, with the first

function  $\Lambda = 0.949$ ,  $\chi^2$  (12) 74.813,  $p = 0.000$  ( $p < 0.05$ ) and second discriminant function  $\Lambda = 0.989$ ,  $\chi^2$  (6) 15.832,  $p = 0.015$  ( $p < 0.05$ ). However, the third discriminant function  $\Lambda = 0.997$ ,  $\chi^2$  (2) 4.409,  $p = 0.110$  ( $p > 0.05$ ). indicates the non-significant effect of discriminant functions,

The correlations between outcomes and the discriminant functions revealed that academic adaptation loaded highly on first function ( $r = 0.912$ ) indicating it contributed more to the academic year group separation (Bragman, 1970) than the relatively fair high loading in positive relationship with second function ( $r = 0.218$ ) third function ( $r = 0.317$ ),

Social adaptation loaded highly on second function ( $r = 0.921$ ) indicating it contributed more to the academic year group separation than the relatively high loading in positive relationship with first function ( $r = 0.382$ ) and third function ( $r = 0.070$ ),

Institutional adaptation loaded highly on third function with ( $r = 0.831$ ) indicating it contributed more to the academic year group separation than the relatively fair high loading in positive relationship with first function ( $r = 0.22$ ) and second function ( $r = 0.511$ ).

Physical and Psychological adaptation loaded highly on third function with ( $r = 0.581$ ) indicating it contributed more to the academic year group separation than the than relatively fair high loading in the first function ( $r = 0.349$ ) and second function ( $r = 0.447$ ).

## Findings

The first year students had positive outcomes on Physical – Psychological and institutional adaptation (0.050) with negative outcomes in academic (-0.537) and Social (-0.047) adaptation.

The second year students had positive outcomes on social adaptation (0.045) with negative outcomes on academic (-0.080) and Physical – Psychological and institutional adaptation (-0.109).

The third year students had positive outcomes on academic (0.081), social (0.114) Physical – Psychological and institutional adaptation (0.042).

The fourth year students had positive outcomes in academic (0.131) Physical – Psychological and Institutional (0.007) adaptation with negative outcomes in Social adaptation (-0.095).

In brief the alternate hypothesis ( $H_1$ ) is accepted and the null hypothesis ( $H_0$ ) is rejected that stated campus adaptations did not vary across academic years.

## Conclusion

The students stay at campus is more of costing themselves to an environment that is usually lured as an assumed tranquillity. The students experience themselves indicate that there is much more divisibility in the environment that which is perceived as normal by bare eyes. The nature of divisibility further gives us a vivid picture that transcends us to know more which was by far let out as easy going. Hence, the adaptability of the students diversifies across academic years has its leaps and bounces over a period of time.



## Implication

The more the student gets acquainted with campus and its being, the more successful is one's adaptation to the college environment. The period of acquaintances could vary making some easily comply with surroundings and some initially adjust dwindling over a period of time to adapt themselves to the campus environment. Students experiences on nature of adaptability that diversify across academic years could also be led towards introspection on other thrust areas like academic major manoeuvred over a longitudinal study. The study could also be extended on different campus environments based on the study duration held by the student at large.

## Disclosure statement

The Authors reported that no competing financial interest.

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