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Deconstructing Barriers to Access Higher Education: A Case Study of Students with Disabilities in University of Delhi

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ABSTRACT

This empirical study is conducted to highlight the kinds of barriers faced by students with disabilities enrolled in different undergraduate colleges of University of Delhi and their role in determining the level of academic engagement of such students. Barriers to access higher education stem from family level characteristics as well as college and University level characteristics. This analysis is based on the survey conducted from April to July in the year 2014, where 168 students with disabilities enrolled across 35 colleges were interviewed. Main findings from data analysis based on descriptive and inferential statistics, using ANOVA tests and multiple linear regression model estimation reveal the following: (i) Limited access to information and services among students with disabilities pose a significant barrier to access and utilization of the facilities and provisions already in place for such students, and (ii) The presence of a conducive and sensitive academic environment in college significantly enhances the level of academic engagement of students with disabilities. The study essentially reveals that attitudinal barriers posed by the insensitive behavior of students and staff members in colleges towards students with disabilities are more detrimental than physical barriers to access. The study thus highlights the need for colleges to focus more on eliminating the invisible behavioural barriers by adopting visible sensitization strategies.

Keywords: Students with disabilities, Higher Education, Barriers to Access, University of Delhi

INTRODUCTION

In India, the proportion of students with disabilities reduces as they go up the education ladder. Surveys by the National Council of Educational Research and Training (NCERT) and National University of Education Planning and Administration (NEUPA) have shown that by the time they reach secondary and higher secondary levels, only 1/8th of the students enrolled at primary level reach the higher secondary level of education (NCERT, 2013^[1]). The National Centre for Promotion of Employment for Disabled People (NCPEDP, 2005^[2]) conducted a survey of 119 Universities, where 52 universities provided data on the total number of students enrolled with them. Data analyses showed that only about 0.1% of the students enrolled were those with disabilities. While 3% seats are reserved for students with disabilities (SWD), this shows that several seats remain vacant as many of them decide to drop out after senior secondary education. Low enrolment rates are an outcome of the several barriers to higher education faced by such students.

Higher educational institutions are places where students enter at a crucial stage which demands the formation of an independent personal and social identity. Students with disabilities have to overcome the dual obstacle of academic demands combined with their disability. An *accessible educational system* is one in which persons with disabilities can access their environment and face the same duties and responsibilities as everyone else, with dignity and without impediment. In the context of higher education, as with elementary and secondary education, accessibility goes beyond physical accessibility, to include accessible curricula, and delivery and evaluation methodology, as well as the provision of the necessary supports and accommodations to ensure that SWD have equal opportunity in their education. Without appropriate support, students with disabilities are at risk of academic failure and associated loss of self confidence and self esteem.

Anecdotal evidence from SWD reveals how apart from physical, academic and institutional barriers, they routinely encounter attitudinal barriers based on negative perceptions and stereotypes about people with disabilities. Empirical studies examining the impact of such barriers on the level of academic engagement and performance of SWD are sparse. This paper attempts to empirically explore the main determinants of the academic performance and participation of SWD, with special focus on the role of different forms of barriers posed by family level and college level characteristics. It is based on primary data collected as part of the survey carried out under the project titled "*Creating a More Enabling Environment for Differently-abled Students in Universities in Delhi through a Dropout Prevention Programme*", funded by the University of Delhi under its Innovation Projects in Colleges scheme 2013-14, undertaken by a team of students and faculty members of Delhi College of Arts & Commerce, University of Delhi. Analyses is based on primary data collected from 168 students with disabilities, enrolled in 35 different undergraduate colleges of University of Delhi, during the academic years 2012-13 and 2013-14. Main findings of the survey highlight the prominence of attitudinal and behavioural barriers as an area of particular concern, with respondents emphasizing that the kind of academic environmental change required to really make a difference needs multi-pronged intervention by the concerned agencies and

stakeholders. SWD present a challenge to the higher education system, which if taken up, could represent a significant improvement in practice for not just the SWD, but for all students in general.

Section 2 of the paper lists out potential barriers faced by SWD, which may affect the extent of academic engagement of these students. Section 3 briefly discusses the survey sample and questionnaire. Section 4 presents detailed analyses of data collected through interviews. It presents details on personal profile of students interviewed, their family and household level characteristics, University and college level information, thereby identifying certain crucial barriers to access higher education, distinguishes between measures of physical and attitudinal barriers to access and constructs indices to measure (i) the extent of physical accessibility within college premises (Ease of Access [EOA] Index) and (ii) the level of sensitivity displayed by students and staff of college towards SWD (Sensitivity Index). ANOVA tests to find difference in means of (i) college level academic performance (ii) college level EOA index and (iii) college level sensitivity index are carried out across different categories. Section 5 of the paper presents econometric analyses of the determinants of (i) level of academic performance (University examination score is used as proxy variable) and (ii) level of academic participation (college attendance is used as proxy variable). This section once again highlights the importance of sensitization to foster the level of academic engagement of SWD. Section 6 presents concluding remarks.

BARRIERS FACED BY SWD AND THEIR IMPACT ON LEVEL OF ACADEMIC ENGAGEMENT

SWD face several kinds of barriers which affect their overall level of academic engagement and performance. Some of these stem from their personal and family level socio-economic characteristics, while some are defined by college and University level characteristics.

Family income is important from the viewpoint of being able to meet the hidden and upfront costs of attaining higher education (Akanle, 2007^[3]; Checchi, 2000^[4] and Eamon 2005^[5]). Sweet et al. (2012)^[6] highlight the significance of educational qualification of family members and find that students, whose parents have not been to a University, are less likely to attend a University themselves. Scholars have documented the importance of socio-economic status (SES), whether measured by family income, parents' education, or parents' occupation, as the most significant determinant of academic performance, sometimes swamping all other determinant (Krashen, 2005)^[7]. It is generally believed that high and middle SES families are in a better position to provide a learning environment at home with provision of extra learning facilities. Students from low SES families however, have limited access to such facilities and limited opportunity to make it to the top of their educational ladder and excel. Such gross deprivation of social and economic needs of students usually results in poor academic performance (Smith et al., 2005)^[8].

Higher education institutions equip students with the knowledge and skills needed for their future working lives. A challenge for most higher education institutions is to provide equal access to students with disabilities (SWD) while maintaining University standards. In pursuance of the goal of inclusive education with respect to SWD, two broad sets of challenges emerge: (i) ensuring ease of physical access by improving physical/architectural infrastructure, and (ii) eliminating attitudinal / behavioural barriers to access education by improving organisational and institutional infrastructure. Meeting any one of these sets of challenges will not suffice in achieving an inclusive education.

The establishment of Equal Opportunity Cells (EOCs) in Universities and colleges is an initiative of the Government of India to promote inclusion and diversity at the institutional level. The central EOC, University of Delhi was established in 2006 to oversee implementation of inclusive policies at institutional level. It is mandatory for all colleges to have an EOC / enabling unit. With EOCs established in almost all its undergraduate collegesⁱ, University of Delhi remains committed to provide an enabling environment to all its students, particularly those with special needs and from deprived backgrounds. It provides several facilities to SWD enrolled in the University and organizes various sensitization programmes with the objective of making the campus non-discriminatory, inclusive and sensitive to the disadvantaged groups. Various facilities provided by EOC to SWD include provision of laptops and relevant software, Braille readers and embossers, writers, recording equipment etc., apart from organizing special orientation programmes, counseling sessions, sports meet and capacity building classes for SWDⁱⁱ.

The physical presence of SWD in colleges does not automatically ensure their participation. A student's academic performance and participation depends on several college level factors such as college structure, composition of academic and non-academic staff and other determinants of general academic environment, which sets the parameters of a student's learning experience. The academic environment in a college is closely related to the interpersonal relations between students, teachers and other staff members. Within the college, lack of information pertaining to myths and stereotypes about SWD can result in negative attitude and insensitive behavior on the part of some faculty, staff and students towards SWD, which can make it even more difficult for SWD to access educational services equally. It is imperative for teachers and non-teaching staff to hold egalitarian attitudes towards all students and avoid any social discrimination in classrooms and college campus.

The objective of this paper is to empirically examine the antecedents and correlates of the level of academic engagement of SWD in undergraduate colleges of University of Delhi. These include family level and college level characteristics which aide access or pose as barriers to access higher education.

SURVEY RESULTS

Population and Sample: The EOC in University of Delhi maintains the database of SWD enrolled in different colleges and departments of the University. This list was obtained from the EOC on 29th January, 2014 with due permission from the head of EOC, for the academic years 2012-13 and 2013-14. On an average, there are around 1000 to 1100 such

students enrolled in different undergraduate and postgraduate programmes of the University. 168 undergraduate students, randomly selected from the two lists, were interviewed for the survey.

A comprehensive questionnaire was designed as a structured interview schedule, consisting of open and closed questions, some with multiple responses and some ranking and rating based questions. Care was taken to keep the questions concise and unambiguous. A pilot survey undertaken in January, 2014 enabled further refinement of the questionnaire. Main survey was conducted from April 2014 to July 2014.

DECODING SURVEY DATA: READING THROUGH DESCRIPTIVE AND INFERENCE STATISTICS

1. PERSONAL PROFILE OF SWD

Of the 168 questionnaires that were filled out for the survey, 9 of them were discarded during the data cleaning and coding stage (primarily due to several missing observations). Thus, survey results are reported for 159 respondents. The study sample has an over representation of male SWD (see Table-I). This is however, also true of the enrolment database provided by the EOC (which serves as the population for this study), which depicts a nearly 50% lower enrolment of female SWD in University of Delhi. 33% of SWD enrolled in 2012-13 were females (EOC database 2012-13). This is a direct fallout of a higher dropout rate of female SWD at secondary and higher secondary level of school education. NCERT (2013)^[1] in its study on enrolment, access and retention of SWD at the secondary and higher secondary stage finds that enrolment of female SWD fell consistently from 43.57% in 2009-10, to 43.07% in 2010-11, 41.51% in 2011-12, and 40.21% in 2012-13. It specifically notes and suggests,

“Low enrolment of girl students is a serious concern at this level of education. Strong initiatives are required to increase enrolment of girls. All the facilities earmarked for this purpose like escort allowance, stipend to girl students, transport facilities, hostel facilities, adapted toilets should be a priority for the States.” (NCERT, 2013)^[1].

Table-I: General Profile of Students interviewed for the Survey

Characteristics	Sub-Categories	No. of Respondents	Percentage
Gender	Male	104	65%
	Female	55	35%
Nature of Disability	OH	89	56%
	VH	60	38%
	Others (HH, Dyslexia, neurological problems)	10	6%
Age	17 to 20 years	77	51%
	21 to 23 years	62	41%

	24 to 28 years	12	8%
	Not Reported	8	
Local Residence	With Family/ Relative	116	73%
	Hostel/Paying Guest/Rented Accommodation/Free Hostel/Other local arrangements	43	27%
Mother Tongue	Hindi	148	93%
	Others	11	7%
Hometown	Delhi	85	53%
	NCR (National Capital Region, excluding Delhi)	6	4%
	Other Towns	68	43%

Source: Based on author's analysis of primary data.

Note: **OH** – Orthopedically Handicapped (includes impairments of the skeletal system, including the spine, other bones and associated muscles, that limit a person's abilities)

VH – Visually Handicapped (includes defects of vision, including total blindness and low vision)

HH – Hearing Handicap (includes a partial or total inability to hear).

Both the sample and population depict a dominance of students with an orthopedic and visual handicap amongst SWD enrolled in the University. In the study sample, students with these two types of disabilities account for 94% of all students interviewed (56% with OH and 38% with VH), while the 2012-13 database of EOC has 89% such students (see figure-I). Cases of students with hearing handicap and dyslexia are also documented, but these are very few.

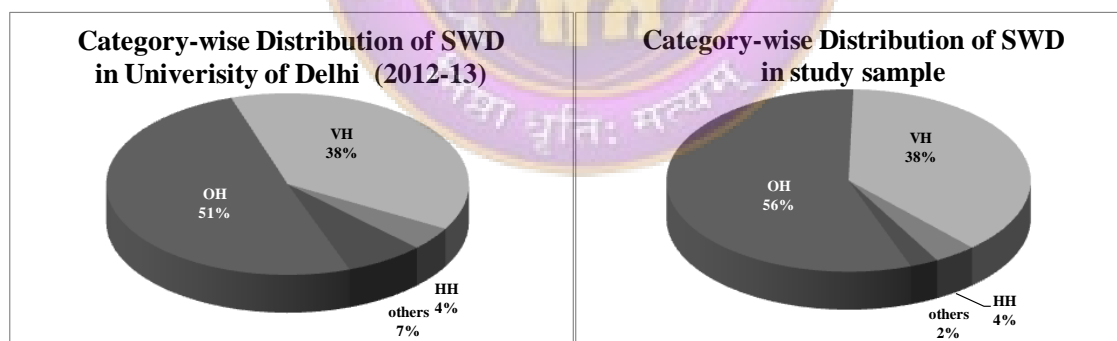


Figure-I: Distribution of Students with Disabilities according to the nature of disability

Source: Based on data from EOC, University of Delhi Database (2012-13) and survey data (2014)

Basic profile data also reveals that most SWDs are based in Delhi, with their hometown being Delhi-NCR (57%). Most of them live in the city with their family or relatives (73%).

2. FAMILY AND HOUSEHOLD LEVEL STATISTICS

Annual family income of SWD ranged between a minimum of Rs. 21,000 to a maximum of Rs. 19,20,000, with mean annual income of Rs. 3.2 lakh (see table-II for descriptive statistics). Family income here is the cumulative income of all earning members in the household. The frequency distribution of family income is highly positively skewed (see figure-II). Half the students interviewed had annual family income of less than or equal to Rupees 1.8 lakh, which is below the per capita income of Delhi in 2012-13ⁱⁱⁱ. Data on father's occupation was diverse ranging from Income tax commissioner and Professors to auto drivers and contractual labourers. This category was the most difficult to compile into groups.

Table-II: Descriptive Statistics of Household Characteristics

Descriptive Statistics	Average Annual Family Income (Rupees)	Number of Family Members	Number of Other Disabled members in Family
Mean	3,19,155	5.29	0.12
Median	1,80,000	5	0
Maximum	19,20,000	12	3
Minimum	21,000	3	0
Std. Dev.	3,69,856	1.70	0.39
Skewness	2.41	1.38	4.08
Observations	126	159	159

Source: Based on primary survey data.



Figure-II: Frequency Distribution of Annual Family Income (Rs.)

Source: Based on primary survey data.

The highest educational qualification attained by any family member is likely to capture the importance given to higher education in the family. Data compiled on the educational qualification of family members reveals that the highest educational qualification in the family was post-graduation or graduation for more than 60% of the respondents (figure-III). 2% of respondents had family members with no formal education.

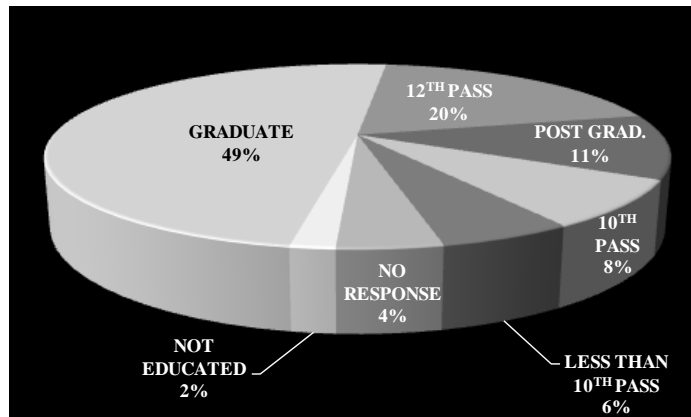


Figure-III: Highest Educational Qualification of family members

Note: The categories depicted in the chart are mutually exclusive.

Source: Based on primary survey data.

3. UNIVERSITY AND COLLEGE LEVEL STATISTICS

University of Delhi is the largest central university in India which educates students and employs teachers across culturally, regionally and financially varying backgrounds from all over the country. The convergence of students from different socio-economic and ethnic backgrounds provides a rich, multifaceted data base of students, including students with disabilities. Off campus colleges outnumber campus colleges in University of Delhi and this is also the case with the colleges whose students have been interviewed for this survey. 109 out of 159 students (69%) interviewed for the survey are from off-campus colleges. The under-represented female SWD are mostly from 'women's only colleges. This may reflect an overall preference amongst female SWD to enroll in 'women's only' colleges.

152 out of 159 students' first choice of University after schooling was University of Delhi. When it comes to choice of subject to graduate in, there seems to be a bias against Science subjects. 65% SWD enrolled for Bachelors in Arts, while 23% enrolled for Bachelors in Commerce. Very few opt for Bachelors in Science subjects. This trend continues from school where again a bias in favour of Arts and Commerce stream is observed^{iv}.

The survey data reveals that not all SWD are aware of the central EOC in University of Delhi. Only 67% of students interviewed were aware of the EOC, out of which only 40% had availed of EOC's services and facilities. Most of the SWD who know of the EOC is because of admissions and the Orientation Programme organised for them by the EOC. Off campus students who were aware of the central EOC stated difficulty in commuting to get to the University's EOC as the main reason for not availing of any specific help from the EOC, and expressed their desire to have an EOC also in South Campus. Students also mentioned that they were not aware of university provisions and resources for SWD. Only 12 out of 159 SWD received a scholarship (apart from the fee-waiver which is provided by the University for all SWD). Also, most of them avail of scholarships announced by other Institutions like the All India Confederation of the Blind

(AICB), National Federation for the Blind (NFB), National Handicapped Finance and Development Corporation (NHFDC) and the Organisation for the Blind. Most of the surveyed SWD were unaware of different kinds of waivers, schemes and scholarships for them announced by University like the Vice Chancellor's fund for SWD. They were unclear if they qualified for such provisions. This is a cause for serious concern. *Limited access of SWD to information and provisions* is also identified as a barrier. It limits their ability to effectively utilize the facilities and provisions earmarked for them. *Generating awareness among SWD of the provisions and facilities available for them is a prerequisite for efficient functioning and successful implementation of the policies of the University aimed at providing an inclusive education.*

University of Delhi is a huge one. There are 77 colleges spread all over the city, with 1,14,494 regular undergraduate students^v. For many SWD not residing in University hostels, commuting to and fro from college is the biggest hurdle. Survey data reveals that average time taken by a SWD to reach college was 49 minutes, with the maximum time taken being nearly three and a half hours. See table-III for descriptive statistics on time taken to reach college, distance from home/hostel, class size, hours in college, and college and school percentage in exams.

Table-III: Descriptive Statistics of College related data

	Time to reach College (minutes)	Distance to College (kms)	Class Size (number)	Time spent in College (hours)	Average Percentage of marks in College (%)	Percentage of marks in School-Class 12 th (%)
Mean	48.94	11.29	56.94	4.91	61.97	70.56
Median	45.00	10.00	50.00	4.75	62.00	70.00
Maximum	200.00	60.00	300.00	8.00	83.00	96.00
Minimum	2.00	0.000	10.00	1.00	35.00	48.00
Std. Dev.	34.63	9.37	30.52	1.23	9.41	11.94
Skewness	1.29	1.98	4.15	0.31	0.02	0.30
Observations	158	89	158	156	138	140

Source: Based on primary survey data.

It is mandatory for every college to have an EOC, and 90% of the colleges in the University have EOCs / enabling units (Dr. B. Tiwary, Officer on Special Duty and Dy. Dean, Students' Welfare, University of Delhi, personal communication, January 14, 2015). The survey data reveals that 42% of SWD were *Not Aware* of an EOC in their respective college (this includes cases where colleges had an EOC and the student was not aware, as well as cases where college did not have an EOC and student wasn't aware). 18% of SWD stated that there was no EOC in their college (see table-IV).

Table-IV: Awareness about EOCs in Colleges

Does the college have an EOC?	No. of Respondents	Percentage
1. YES	64	40.25
Have availed of Facilities by EOC	31	48.44

Have Not availed of Facilities by EOC	33	51.56
2. NO	28	17.61
3. NOT AWARE	67	42.14

Source: Based on primary survey data.

4. ANALYSING BARRIERS TO PHYSICAL ACCESS

In order to assess the ease of physical access to various sections of a college building and campus, respondents were asked to rate accessibility as Excellent, Good, Average or Below Average. The responses are compiled below (see table-V).

	Classrooms	Labs	Library	Washrooms	Canteen	Admin. Office
Excellent	14.6	13.9	22.9	12.3	9.7	10.9
Good	60.1	64.4	51.6	50.9	50.0	61.9
Average	24.1	20.8	21.0	30.9	32.5	26.5
Below average	1.3	0.9	4.5	5.8	7.8	0.6

Source: Based on primary survey data.

Data reveals that on an average more than 70% SWD rated accessibility to classrooms, libraries laboratories and Administrative offices as either good or excellent. 36% students rated accessibility to washrooms as average and below average. This is an area of concern and more needs to be done to improve access to washrooms in colleges.

The *Ease of Access Index*: Points were assigned to each rating as follows: 3 for an 'excellent' rating, 2 for a 'good' rating, 1 for an 'average' rating, and -1 for a 'below average' rating. For the weighted average composite index, called the *Ease of Access (EOA) Index*, the weights assigned to points given to classrooms, laboratories, library and washroom were twice that of those assigned to canteen and administrative office (which a student need not necessarily visit every day). The range of the computed index is [-1, 3]. For the sample surveyed, this index lies between -0.375 to 2.9 and the following sub-ranges of the index have been defined to categorize overall ease of access in a college (see table-VI).

Table-VI: Ease of Access Index based on responses of SWD

EOA Index	EOA Category	No. of Respondents	No. Of Colleges
-0.375 to 0.99	Very Poor	9	9
1 to 1.49	Below Average	29	19
1.5 to 1.99	Average	56	29
2 to 2.49	Good	50	27

2.5 to 2.9	Excellent	14	12
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Source: Based on analysis of primary survey data.

The data reveals that nearly 64 out of 159 SWD (41%), rate accessibility in their college premises as good or excellent (see figure-IV). 38 SWD (24%) rate accessibility as below average and poor. The last column of table-VI depicts that, students of the same college rate ease of access in their college differently (since only 35 colleges were covered for the survey). The same college was rated high in terms ease of access by one respondent, and rated very low by another. A college may provide facilities for better access within its premises for say the visually impaired students, but may have no specific facilities for the students on wheelchairs. Thus, it is probable that the same college is rated differently by different students.

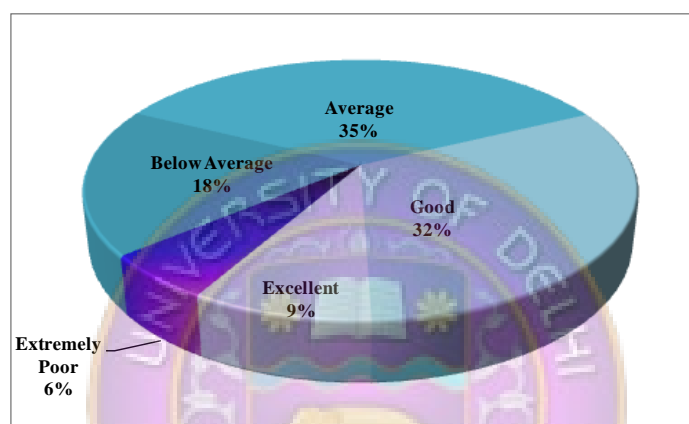


Figure-IV: Rating of Ease of Physical Access
(% Distribution of Responses)

Source: Based on analysis of primary survey data.

5. ANALYSING ATTITUDINAL / BEHAVIOURAL BARRIERS

Ease of physical access alone is only part of the problems that SWD face in their day to day endeavour to get to college and gain access to education. SWD face negative attitudes and stereotypes in the education system. Lack of knowledge about and sensitivity to disability issues on the part of some teachers, staff and students can make it difficult for SWD to access educational services equally.

For this study, the respondents were asked to rank attitude and behavior of fellow students, teachers and non-teaching staff members in their college as follows:

1. Sensitive: Very helpful and sensitive behavior, including cases of going out of the way to help and support.
2. Moderately Sensitive: Usual / normal considerate behavior towards all, help when asked (without any specific special concern for SWD), and
3. Insensitive: Not helpful at all and sometimes even harmful behaviour.

The responses are compiled in table-VII. It is clear that most SWD rate behavior of their peers in college as sensitive or moderately sensitive. This is a heartening finding, in

contrast with the considerable international evidence which shows that SWD in school are bullied and harassed more often than students without disability, resulting in decreased academic performance, absenteeism, anxiety, poor esteem and even depression (Carter and Spencer, 2006^[9]; AGDEEWR, 2009^[10]). Out of 159 students interviewed, merely two students reported instances of bullying or harassment by their peers in college.

	Teachers	Students	Non Teaching Staff
Sensitive	17.20	46.84	4.96
Moderately Sensitive	80.89	43.67	80.17
Insensitive	1.91	9.49	14.88

Source: Based on primary survey data.

Academic and non-academic staffs have a crucial role in facilitating curriculum access for SWD. They play an important role in arranging an inclusive educational setting. It is imperative for teachers and non-teaching staff to hold egalitarian attitudes towards all students and avoid any social discrimination in classrooms and college campus. Table-VII depicts that most teachers and non-teaching staff members have been rated as only moderately sensitive. This trend may also be a result of lack of teacher and staff-training on provision of specialized assistance to SWD. This highlights the need for further work on generating more awareness and sensitizing teaching and non-teaching staff. By raising faculty awareness about disability issues, many academic barriers can be eliminated.

The *Sensitivity Index* is computed as a weighted average of the sensitivity ratings across students, teachers and non-teaching staff members. Points assigned to each rating are as follows: 3 for a 'sensitive' rating, 2 for a 'moderately sensitive' rating and 1 for an 'insensitive' rating. In order to construct the Sensitivity index, the weights assigned to points given to student's and teacher's sensitivity are twice that of those assigned to non-teaching staff's sensitivity (since interaction with non-teaching staff is usually limited). The range of computed index is [1, 3]. For the sample surveyed, the distribution of sensitivity index based on ratings by students is presented in table-VIII.

Table-VIII: Sensitivity Index based on responses of SWD

Sensitivity Index	Category	No. of observations	No. of colleges
1 to 1.99	Insensitive	20	15
2 to 2.49	Moderately Sensitive	104	33
2.5 to 3	Sensitive	33	22

Source: Based on analysis of primary survey data.

Two-thirds of respondents rate the overall interaction in college with students and staff as moderately sensitive. 13% respondents rate it as insensitive (see figure-V). The last column of table-VIII depicts that students of the same college rate their interaction in college differently (since only 35 colleges only were covered for the survey). The same college was rated very highly in terms of sensitivity amongst students and staff by one

respondent, and rated very low by another. Problems faced by SWD differ across nature and extent of disability and thus it is probable to get such different responses for the same college. The facilities provided by a college along with the general level of awareness and sensitivity amongst staff and students, maybe effective for some SWD and not for others.

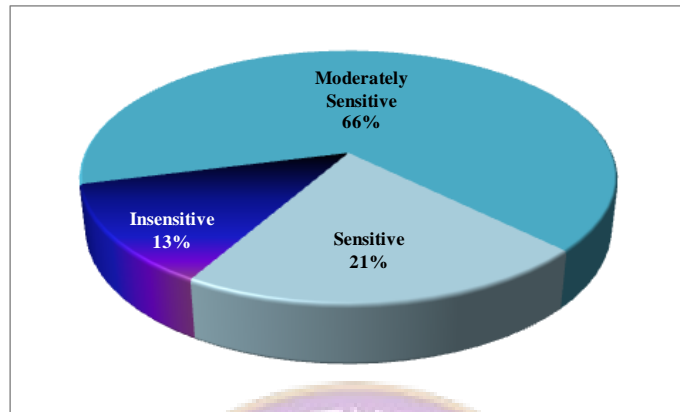


Figure-V: Rating Overall Sensitivity of Peers, Teachers and other Staff members in College

(% Distribution of Responses)

Source: Based on analysis of primary survey data.

Overcoming these barriers remains the single-most critical challenge for most colleges to ensure equal access to SWD and foster inclusive education. Consequently, colleges and the University must strive to understand the specific factors that contribute to the academic success of SWD in colleges in order to provide access while maintaining university standards.

6. ANALYSING DIFFERENCE IN MEANS (ANOVA TESTS)

ANOVA (analysis of variance) tests are conducted to detect if there is a statistically significant difference between the means of college performance, EOA index and Sensitivity index across different categories of observations. The results presented in table-IX are summarized below.

Table-IX: Testing Equality of Means (ANOVA tests)

I. Testing Equality of Means of ‘College Academic Performance (% marks)’					
Categorised by	Sub-categories	Count	Mean	ANOVA F-test Value	Probability
1. Gender	Female	45	62.2	0.328	0.568
	Male	96	61.2		
2. Campus College	Yes	44	67.3	26.47	0.000***
	No	95	59.0		
3.Disability	OH	83	60.4	2.14	0.1204
	VH	50	63.7		
	Others	8	59.38		
4.Family Qualification	No Education	3	62.0	2.11	.0681
	Less than 10 TH	9	59.03		
	10 TH Pass	11	55.26		
	12 TH Pass	28	60.44		
	Graduate	69	62.35		
	Post Graduate	16	66.44		
5.EOC in College	Yes	59	62.911	2.851	.095*
	No	26	58.912		
II. Testing Equality of Means of ‘EOA Index’					
Categorised by	Sub-categories	Count	Mean	ANOVA F-test Value	Probability
1.Campus College	Yes	50	1.895	4.173	.048**
	No	106	1.715		
2.Disability	OH	88	1.723	1.107	.332
	VH	60	1.849		
	Others	10	1.719		
3.Women’s College	Yes	46	1.912	5.419	.021**
	No	110	1.711		
III. Testing Equality of Means of ‘Sensitivity Index’					
Categorised by	Sub-categories	Count	Mean	ANOVA F-test Value	Probability
1.Campus College	Yes	50	2.264	1.723	.191
	No	106	2.138		
2.EOC in College	Yes	63	2.174	.489	.485
	No	28	2.117		
3.Women’s College	Yes	46	2.276	2.281	.133
	No	110	2.18		

Note: *** Significant at 1%; ** Significant at 5%; * Significant at 10%.

Source: Author’s calculations based on Survey data.

(i) Mean college level academic performance (measured in terms average percentage of marks received by the student in University exams) varies significantly between main campus and off-campus colleges (significant at 1% level of confidence) and between colleges with and without an EOC (significant at 10% level of confidence). Higher mean academic performance of campus college SWD may partly be an upshot of intake of SWD with higher school level percentages in campus colleges (which have relatively higher cut-offs for admission). Also, colleges with an EOC are likely to be in a better position to address problems faced by SWD, thereby positively impacting on their

academic performance. Again, whether a college has an EOC or not is entirely based on information provided by the SWD during the interview.

(ii) Mean ease of access index is higher for main campus colleges vis-à-vis off-campus colleges and this difference is statistically significant at 5% level of confidence. Tactile paths, ramps, lifts, low-floor buses for SWD in North Campus etc. are amongst the many provisions for SWD. Since campus colleges are located in the vicinity of each other, such facilities provided by one college generate positive benefits also for the SWD studying in other campus colleges. Off campus colleges are comparatively far more spread out across the rest of the city, and thus ease of access within college premises and campus area is entirely dependent on provisions made by the respective college.

(iii) Mean ease of access index is higher for women's colleges vis-à-vis co-educational colleges and this difference is statistically significant at 5% level of confidence. EOC of University of Delhi rates physical accessibility to be the best in Lady Shri Ram College for Women, Miranda House and Daulat Ram College^{vi}. The top three colleges are women's college. Daulat Ram College has one of the most active NSS unit which works closely with their EOC unit to provide help to SWD of not just their own college, but also those enrolled in other colleges^{vii}.

(iv) Mean sensitivity index is higher for (a) campus colleges versus off-campus colleges, (b) for colleges with EOC versus those without an EOC and (c) for women's colleges versus co-educational colleges. However we find no evidence of statistically significant difference in the above.



ECONOMETRIC ANALYSIS OF DETERMINANTS OF ACADEMIC PERFORMANCE OF SWD

1. MODEL SPECIFICATION

The basic premise of this paper is that the level of academic engagement of a SWD is determined by family/household level characteristics as well as college level characteristics. Positive family support and a congenial, supportive and accommodating college environment encourage greater academic participation of SWD. Proxy variables to capture the extent of academic engagement (including academic performance and participation) of a SWD are (i) PERC_COL: average percentage of marks obtained by the SWD in University exam and (ii) ATTND: percentage of college attendance. The following multiple linear regression model is estimated:

$$\text{PERC_COL} / \text{ATTND} = f(\text{PERS_VAR}, \text{FAM_VAR}, \text{SCHL_VAR}, \text{COL_VAR})$$

where PERS_VAR include variables defining personal profile of the SWD; FAM_VAR include variables that define family level characteristics; SCHL_VAR include information pertaining to the last school attended by the SWD, and COL_VAR include variables that capture college level characteristics. Two separate regression equations are estimated (one with PERC_COL as the dependent variable and one with ATTND as the dependent variable) using the method of ordinary least squares (OLS) to estimate the

regression coefficients. The following table (table-X) defines all variables and their expected impact on college level academic performance and participation.

Table-X: Description and Definition of variables used in Regression Analysis

Variable Name	Description	Units	Definition	Expected Sign
PERS_VAR: Variables describing Personal Profile				
GENDER	Gender of SWD	0/1	Gender Dummy = 0 for Female and 1 for Male students.	+/-
DISAB_KIND	Kind of Disability	1/2/3	Category variable: 1. OH; 2. VH, and 3.OHERS	
FAM_VAR: Variables defining Family / household level Characteristics				
FAM_MBRS	Number of family members	1,2,3,..	Total number of members in the household, including extended family if all live in the same house/ setup.	+/-
PWD_FAM	Number of other persons with disability in family	1,2,3,..	Number of other differently-abled members in the family / household	+
FAM_INCOME	Total income of the Household	Rupees per annum	Annual family income taken as the sum of the annual incomes of all the earning members of the household. Cases where the respondent specified an income range and not the exact figure, the midpoint of the range was taken as annual income.	+
EDUC_QUAL	Highest educational qualification of any family member	Coded: 1,2,3,...,6	The observations were coded as follows: 1. No Education- no formal education was received; 2. Less than 10 th Pass- formal education received but 10 th grade not completed (example- 8 th pass); 3. 10 th pass- formal education received only till 10 th grade; 4. 12 th pass- formal education received till 12 th grade; 5. Graduate only, including B.A, B.Com, B.Tech, MBBS, etc.; 6. Postgraduate and above including M.A, PhD, etc.; The numerical codes from 1-6 as assigned such that a higher educational qualification has a higher code.	+
SES	Index of Socio-economic Status of family	≥ 0	This index is a weighted average of family income (weight=1) and highest educational qualification of any family member (weight=2).	+
SCHL_VAR: Variables capturing School level information				
SCHL_PERC	% Marks in School (Senior Secondary) exams	%	Percentage of marks received in the 12 th Boards exams.	+
SPL_SCHL	SWD from a Special School	0/1	Dummy variable = 1 if the student attended a special school before joining mainstream college, 0 otherwise.	+/-
COL_VAR: Variables capturing College level information				
PERC_COL	Percentage of marks in University exams	%	Average percentage marks received in Undergraduate exam(s). In cases where the result was awaited, the average percentage of the previous exam(s) was taken.	Dependent Variable
CAMPUS_COL	SWD from a Main Campus College	0/1	Campus Dummy= 1if a student is enrolled in a Main campus college, 0 otherwise.	+

WOMEN_COL	SWD from a Women's only college	0/1	Dummy = 1 if a student is enrolled in a women's only college, 0 otherwise.	+
EOC_IN_COL	EOC / Enabling unit in student's college	0/1	Dummy = 1 if student's college has an EOC / Enabling unit, 0 otherwise.	+
EOA_IND	Index of Ease of Access	[-1,3]	Measure of ease of physical accessibility within college premises. It is a weighted average (refer to section 4.4 for details).	+
SEN_IND	Index of Sensitivity	[1,3]	Measure of degree of sensitivity of the behaviour of students, teachers and non-teaching staff in college towards the SWD. It is a weighted average (refer to section 4.5 for details).	+
CLS_SZ	Number of students in class	1,2,3,...	Average number of students in class, representing also the student-teacher ratio.	-
TIME_COL	Time to reach college from home/hostel	Minutes	Total time taken to reach college, summed up over different modes of transport used by the student.	-
ATTND	Average attendance in college	%	Average attendance in college over the years of college enrolment of the SWD	Dependent Variable

2. MODEL ESTIMATION AND RESULTS

The determinants of college level academic performance (PERC_COL) and academic participation (ATTND) are investigated. Different specifications of the linear model (Model 1.A to 1D) are estimated for PERC_COL equation using the OLS technique, after performing the entire range of diagnostic checks for the breakdown of classical assumptions. Only one model is presented for the ATTND equation (Model 2). Given that data is cross-sectional, the estimates are also corrected for heteroscedasticity using White's correction. The results of all models are compiled in the following table (table-XI).

Table-XI: Determinants of College level Performance and Participation of SWD

Dependent Variable →	PERC_COL				ATTND
	Model 1A	Model 1B	Model 1C	Model 1D	Model 2
Regressors ↓					
Constant	28.228*** (4.061)	25.107*** (3.907)	25.590*** (4.066)	27.168*** (4.352)	55.103 (4.539)
GENDER	0.615 (0.287)	1.240 (0.601)	1.507 (0.792)		
SES	0.638*** (2.674)	0.644*** (2.656)	0.617*** (2.656)	0.634*** (2.758)	
PERC_SCHL	0.212** (2.574)	0.204** (2.367)	0.202** (2.340)	0.204** (2.377)	
SPL_SCHL	3.792* (1.969)	4.020** (2.020)	3.967** (2.012)	4.215** (2.142)	
CAMPUS_COL	3.669* (1.887)	3.962** (1.984)	3.987** (2.017)	3.995** (2.064)	0.873 (0.339)
SEN_IND	3.808* (1.790)	4.518** (2.021)	4.662** (2.047)	4.358* (1.917)	12.402*** (2.608)
EOA_IND	2.358 (1.415)	2.245 (1.344)	2.335 (1.392)	2.282 (1.415)	0.404 (0.163)
CLS_SZ	0.015 (0.760)	0.013 (0.639)			
TIME_COL	-0.036 (-1.157)				
N	97	97	97	97	152
R-squared	0.420	0.409	0.407	0.403	0.078
Adjusted R-squared	0.359	0.355	0.360	0.363	0.059
S.E. of regression	7.837	7.863	7.833	7.817	15.391
F-Statistic	6.987	7.610	8.721	10.106	4.183
Probability (F-Statistic)	0.000	0.000	0.000	0.000	0.007

Note: 1. Values in brackets are the corresponding t-stats

2. *** implies significance at 1% level; ** implies significance at 5% level; * implies significance at 10% level.

Source: Author's calculations based on Survey data.

All variants of the model 1 (specifications A to D) with PERC_COL as the dependent variable and model 2 with ATTND as the dependent variable, fit the data well (based on F-statistic and associated probabilities) and are significant at 0.01 level. Thus, the models explain the deviations in the PERC_COL and ATTND.

Personal level characteristics such as DISAB_KIND or GENDER are not found to be significant determinants^{viii}.

Preliminary regressions showed significant impact of family level variables such as FAM_INC and EDUC_QUAL on PERC_COL. Thus, the socio-economic index variable SES, which is a weighted average of FAM_INC and EDUC_QUAL, is included in specifications 1A to 1D. SES is found to have the correct sign and a significant coefficient. Thus, our sample shows that families with higher socio-economic status can provide more and better facilities for academic engagement of SWD and this gets reflected in their college level academic performance.

School level variables such PERC_SCHL and SPL_SCHL are both found to be significant determinants of college level academic performance. A positive and

significant coefficient of PERC_SCHL implies that SWD who performed well in school, manage to keep up their academic performance in college as well. A positive and significant coefficient of SPL_SCHL implies that student's who attended special schools, are found to perform better academically in college. Students from special school are in fact expected to take longer to adjust to mainstream education system, since they get used to the specialized teaching techniques and the tailor-made curriculum and equipments provided in special schools. However, for the sample studied, it is found that students from specialized school are better equipped to handle the academic rigour of University level education.

Amongst the college level characteristics, TIME_COL and CLS_SZ have the expected sign, but are found to be statistically insignificant. The dummy variable CAMPUS_COL has the expected positive and significant coefficient. Like discussed earlier, main campus colleges have a much higher cut-off for admission and thus better academic performance of campus college students is partly fallout of such admission criterion. Also, with much better facilities for SWD in the campus area, a central EOC, University Braille library, Resource Centre for SWD etc., the benefits to SWD in campus colleges are bound to reflect in their academic performance.

The two other variables of significant interest and importance from the viewpoint of this research are SEN_IND and EOA_IND. Their coefficients capture the essence of the impact of behavioural and physical barriers on the academic performance of a SWD. Regression results reveal that SEN_IND is a significant determinant, as expected. Colleges with higher sensitivity index (as ranked by the students) have their SWD performing better academically. Thus, it can be argued that peers and members of teaching and non-teaching staff, as major stakeholders, have a crucial role in facilitating curriculum access and academic excellence for SWD.

Surprisingly, EOA_IND is not found to be a significant determinant of academic performance. This can be explained by the possible dependence of EOA_IND on SEN_IND to impact college level performance. Ease of physical access alone is likely to be of little use if SWD continue to face negative attitudes and stereotypes in the education system. Lack of knowledge about and sensitivity to disability issues on the part of some educators, staff and students can make it difficult for SWD to access educational services equally, even when physical accessibility issues have been resolved.

Model 2 investigates determinants of college attendance (ATTND) of SWD, another indicator of the extent of academic participation of SWD. The only significant determinant of greater participation of SWD is SEN_IND. Thus, our findings highlight the significance of efforts to overcome attitudinal barriers in making higher education more and more inclusive.

CONCLUSION

The main findings of the research analysis are summarized below.

(i) Need to improve access to information and provisions for SWD: This will empower SWD in the way they access information and services and help create enabling environments for equal opportunities for them, where the term 'environments' shall

include the physical environment, information, communication and technology and transport. Currently, the main drawback is not so much one of lack of facilities and provisions for SWD, but of the limited access to information regarding these with the SWD. Making sure that the information is made available to SWD in suitable formats regarding all the schemes, scholarships and other facilities at the resource centre and EOC etc., is equally important to ensure that they benefit from such provisions made by the University and colleges.

2. Train and Sensitise: Findings indicate the urgent need to raise awareness about disability issues among students, teachers and non-teaching staff in colleges. Insensitive behavior on their part creates a barrier that adversely affects the level of academic participation and performance of SWD. There is an urgent need to overcome such invisible barriers with visible strategies including educating students, faculty and other staff members about disabilities.

Many students in colleges work actively with the NSS units of their respective colleges. The need is to integrate the activities of the NSS and EOC units in any college, such that the students involved in the NSS activities can provide immediate help such as reading and recording for SWD, conduct workshops and other awareness generation programmes to sensitize other students towards SWD and their needs etc. Likewise, integrating the activities of the different students' societies in colleges and the college EOC, will allow for greater interaction between students with and without disabilities. Colleges must arrange for lectures on disability and stereotyping, which will encourage students to examine their preconceptions about the characteristics and abilities of SWD.

While the University has now made it mandatory to have a session on disability sensitization in all faculty-orientation and refresher courses^{ix}, there is the need to also educate the existing faculty members who are not required to attend such courses. The faculty members need to be aware of and sensitive towards the kinds of accommodation required for SWD. Sometimes, a SWD may not be able to attend classes regularly due to genuine medical reasons (often related to the requirement of prolonged treatment in cases of neurological problems, or orthopedic problems requiring surgeries or physiotherapy). Enforcing a minimum attendance criterion (to be eligible to take the final examination) for such students can be detrimental in some cases^x. Some flexibility needs to be introduced in the administrative procedures to ensure greater accessibility for SWD. Staff education and sensitization programmes / workshops must be made mandatory for all college staff members, and these should be aligned with the overall inclusive education policy of the University.

At the moment, the emphasis seems to be on improving physical accessibility for SWD. However, the main challenge for most colleges is something fundamentally deeper though less discernible, i.e. shaping the sensibilities and values of its students and staff members to enable mainstreaming of SWD and achieving an inclusive education.

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Endnotes

ⁱ Based on personal communication with OSD, EOC, University of Delhi (90% colleges in the University have an EOC).

ⁱⁱ Refer to <http://uic.du.ac.in/images/EOC.pdf> for details on role and functions of EOC.

ⁱⁱⁱ Per Capita Income of people in Delhi = Rupees two lakh in 2012-13. Ref: http://articles.economicstimes.indiatimes.com/2013-09-12/news/42011594_1_capita-income-2-28-lakh-sound-economic-situation.

^{iv} Based on personal communication with OSD, EOC, University of Delhi.

^v Reference: <http://www.du.ac.in/du/index.php?page=about-du-2>, accessed on 26/12/2014

^{vi} Based on personal communication with OSD, EOC, University of Delhi.

^{vii} Based on personal interaction with VH-category students of different colleges.

^{viii} DISAB_KIND was dropped from the model as it was not significant and the variable had little variance. Most students belonged to the OH or VH category.

^{ix} Based on personal communication with OSD, EOC, University of Delhi.

^x Personal meeting with a parent at the EOC Office in main campus revealed how her disabled child was not allowed by the College staff members to take her final exams, as she fell short on the minimum attendance requirement. The staff members followed the same eligibility rule and this child, for whom commuting daily to college is a daunting task given her disability, had to lose an academic session because of inflexible administrative rules.