Doctoral Students' Satisfaction Scale Development and Validation for Technical Institution in India

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Abstract

The present study makes an attempt to develop a scale of satisfaction for the doctoral students studying in technical institute of India. An offline questionnaire survey was conducted on 300 full-time Ph.D. scholars studying Science, Engineering, Mathematics and Humanities & Management in NIT Silchar and NIT Agartala. The scale constitutes four factors (i.e., guide & department support, reason for doing Ph.D., stress & lack of motivation and insecurity) explained 35.68 percent of the total variance and each factor explains important parts of the total variance. Using confirmatory factor analysis goodness of fit criteria, the validity of the model was assessed. The results indicated a valid and reliable scale that might be used to measure doctoral students' satisfaction in a technical institute in India. The finding of the study has several implications for faculties, departments, policymakers, and administrators.

Keywords: Doctoral studies; student satisfaction; scale development; factor analysis; India

Introduction

Education in the present globalization era is acknowledged as one of the most significant factors for accelerating socio-economic transformations for a nation. It helps the nations to become well educated, competent and equipped with pertinent skills. In addition to these, it also performs the duty of being the society's integrative force to impart values which in return promotes unity in society and national identity. In India, education has been a concurrent subject of focus since 1976. The education market as a whole is valued at US\$ 100 billion at present in the country and is anticipated to almost two-fold to US\$ 180 billion by the year 2020. Presently, India holds a significant position in the global education sector as it is about to eye witness world's largest population in higher education with second largest graduate talent pool across the globe by 2020 (India Brand Equity Foundation, 2017).

It is a well-known fact that the education sector makes significant contributions toward nation-building because it acknowledges a direct impact on the overall growth and development of society. In addition to this, it contributes to attaining equitable human development in the country taken as a whole. In the last two decades, the higher education sector of India has witnessed a rapid expansion by enrolling over 70 million students to turn out to be the largest in the whole world (Ernst & Young, 2013). In the area of the doctoral program, different committees were formed by the government of India to improve the quality of output. The empowerment committee which includes Kothari Post-Doctoral Fellowships, PhD Fellowships and Operation Faculty Re-charge Scheme which will help to create a supply of potential faculty. The Pay review committee was introduced to attract talents in the teaching profession by endorsing improves service condition and pay structure (University Grants Commission, 2008).

A doctoral degree is the highest level of academic degree awarded by an academic institute. Recipients of doctoral degrees usually occupied prestigious positions not only in research and education but also in business, both government and corporate value their knowledge which is one of the key drivers for innovation and economic growth. However, recently there are numerous reports of attrition of doctoral students studying at the prestigious institutions in India, (Mohanty, 2015; Kumar, 2017).

Attrition of doctoral students is wastage of department, institute, and government scarce resources. Valuable time for both faculty and students are wasted. Attrition is not only costly to academic institute but also put institute image at stake. An Institute image plays an important role for incoming fresher and for getting financial grants from government or industry.

Doctoral students dropped out for various reasons such as unable to adjust with the academic environment, financial issue, conflict with a supervisor, burnout, loss of interest, better career path, stress, problem with a thesis topic, personal and family issue etc. Discontented students are the one who dropped out of the doctorate program.

Doctoral student's satisfaction survey is a strategic tool to improve the doctoral program and doctoral student's persistence. Undergraduate and master level student's satisfaction scales have been developed in the Indian context (Singh & Srivastava, 2014; Agariya & Singh, 2012; Chadha, Tomar, Rai & Dugar, 2017). However, research on the doctoral level is rare and student satisfaction scale used for undergraduate and master level is not suitable for the survey of doctoral students since doctoral studies are more independent, less structured, involved heavier workload and complex task (Litalien, Guay & Morin, 2015). To our knowledge, no study has been conducted in the Indian context to develop students' satisfaction scale for doctoral students.

Selecting the right candidate is crucial for the successful completion of the doctoral program. Indian doctoral

program selection process heavily relied on generalized aptitude test which hardly measures the future performance of a candidate in the program. While Western universities doctoral selection process gives more weight age to candidates' dissertation proposal, statement of purpose and letter of recommendation. According to Tonbul (2014), a central exam that measures general skills is not meaningful in predicting candidates competencies to successfully complete the doctoral program. Several studies have recommended that PhD candidate should be accepted based on willingness to deal with challenges, higher academic goals, and competency in literature, previous success and creativity. Also, lack of monetary incentives and funding fail to attract qualified faculties in Indian Universities which is not the case for western universities.

As reported by Mishra (2019), according to MHRD data, 3211 faculty positions in NITs are lying vacant and 2813 faculty positions in IITs are lying vacant. Inspite of such differences between western and Indian educational environment, to our knowledge, no studies have been done on doctoral students' satisfaction in the Indian context. The present study makes an attempt to develop a scale of satisfaction for doctoral students studying in the Indian context.

The rest of the article is organized as follows; the next section represents the literature review on the doctoral program and the possible reason for students dropping out. The third section deals with the method which includes the construction of a five-point Likert scale survey questionnaires and data collection process. The fourth section discusses the data analysis and finding, the fifth section represent policy implication, the sixth section deals with the limitation and scope for future research and the final section give the conclusion of the study.

Literature Review

Attrition of doctoral students is wastage of resources and time of both faculties and students which could otherwise be utilized elsewhere, (.According to Berelson (1960), Bowen and Rudenstine (1992) and Lovitts (1996, 2001), 30 to 50 percent (on an average) of the doctoral students dropped out in Australian, British, Canadian and US Universities. Around the globe, studies have been conducted to find out the reason why doctoral students drop out of the program and how to retain them (doctoral students' satisfaction scales). However, most of the studies are inclined to developed nations. The studies of such kind are important as it will bring about developments, allow institutions to benchmark and provide indicators that will contribute to the reputation of the university in the marketplace, Rowley (2003); Ruben, Russ, Smulowitz and Connaughton (2007); Angelo and Cross (1993). Some of the studies are:

Appleton-Knapp and Krentler (2006), state that personal and institutional factors are two main factors that influence students' satisfaction in Higher education. Personal factors include gender, employment, ideal learning style, student's grades and institutional factors cover quality of instructions, promptness of the instructor's feedback, clarity of expectation, teaching style.

Barnes and Randall (2012), found the following factors that contribute to the attrition of student: the disconnection between students and department expectation, a mismatch between students and advisor, feeling of isolation, insecure job market, insufficient funding and poor mentoring.

According to Dericks, Thompson, Roberts and Phua (2019), supervisor support is the greatest predictor of doctor student satisfaction while there is no significant effect of supervisor academic qualification. Also, it is found that both department support and academic qualities significantly predict doctoral student satisfaction. Student-Advisor relationship is critical to the academic success of doctoral students. Selecting the right advisor is the most important decision for a doctoral student (Boyce, Napper-Owen, Lund & Almarode, 2019).

Johansen, Olsen, Øverby, Garred and Enoksen (2019) states that supervisor–student relationship is important for successful completion of the doctoral program. The main responsibility of the supervisor includes monitoring progress, feasibility analysis and intervenes when something is not going as according to plan.

According to Deem and Brehony (2000), doctoral students experience and research environment are quite different between science and non-science students, while the latter work is lonelier with frequent interaction only with their supervisor. Further states that part-time students and international students face more difficulty in accessing academic culture and peer cultures.

Flores-Scott and Nerad (2012) explained that peers can play a key role in the development of doctoral students into an independent researcher and members of academic communities. Peers interaction is quite different from the hierarchical interaction between advisor and student where students learn how to do research from his or her advisor. In peers interactions students provide and received constructive feedback, learned how to accept criticism from others, peers advisers can communicate their own experiences, share how they coped up with hardships and recommends strategies for success.

Litalien, Guay, and Morin (2015), state that motivation

plays a very important role in the completion of a doctoral degree. Dropout rate can be as high as 25 percent even among doctoral students receiving prestigious fellowships. Although students quit for various reasons, motivation has become a central concept in the understanding of academic persistence and achievement. One of the motivation theories that have demonstrated its value and validity in the context of education is self-determination theory.

Shin, Kim, Kim and Lim (2018) argue that motivation and socialization factors are associated with doctoral students' satisfaction. Doctoral students developed their research skills through their peers or participation in the research project. They will have difficulties in completing their studies if they are disconnected with other peers or advisors. Doctoral study is stressful as it requires intensive research participation, course work and research topic development, such stressors may be overcome if student's motivation is tied well with their goals and career aspirations.

In the Indian context, there are few reports of students dropout like the reports of Mohanty (2015) which report that in IIT Bombay, 90 percent of students who dropped out during 2012-2014 were either Ph.D. or M.Tech students. A similar case was found for IIT Delhi during 2012-2015, 537 students who were pursuing either Ph.D. or M.Tech dropped out. In the year 2014-2015, 209 students dropped out of IIT Kharagpur and 228 students dropped out of IIT Roorkee the same year.

According to Kumar (2017), 889 students have dropped out from different IITs in the academic year 2016-2017, Out of 889 drops out students 63 were undergraduates, 630 were Postgraduates and 196 were PhD students. The main reasons for Post Graduate and PhD to drop out of the course were job offers from public sector enterprise and the availability of better opportunities elsewhere.

Several studies showed that PhD candidate should be accepted based on willingness to deal with challenges, higher academic goals, and competency in literature, previous success and creativity. Central exams that measure general skills are not significant to predict a candidate's competencies to successfully complete the doctoral program (Tonbul, 2014).

To our knowledge, no studies have been conducted to develop doctoral students' satisfaction scales in India which could prevent attrition of doctoral student and improve research output which in turn improve universities ranking. Universities in North East region of India face similar issues with rest of the nation, that is issues with recruiting qualified faculties and selection of doctoral students are done through central exam score (NIT Silchar, 2019 & NIT Agartala, 2020). Hence, the present study is an attempt to develop a reliable scale to measure and evaluate doctoral students' satisfaction particularly for the doctoral students studying in the North East region of India.

Method

There are 8 National Institute of Technology (NIT) located in the North East Region of India. NIT Silchar and NIT Agartala which are the oldest NITs in North East of India were taken as sample frame because a sufficient number of Ph.D. scholars were available in these NITs compare to others NITs. A pilot study was conducted with 30 Ph.D. scholars in NIT Silchar and the feedbacks were analysis. The result states scholars, especially from engineering departments, were reluctant to disclose their department. The Final survey questionnaires was constructed consisting of 42 items which include opinions and feedback of doctoral students in the pilot study and variety of resources including articles and books (Litalien, Guay & Morin, 2015; Shin, Kim, Kim & Lim, 2018; Flores-Scott &

Nerad, 2012; Bair & Haworth, 1999; Lovitts, 2001). The questionnaires include questions about department support, guide or supervisor relation with students, why Ph.D., stress, personal and financial issue, motivation, peer support, insecurity and course structure. Five-point Likert scale with options (1) Strongly agree, (2) Agree, (3) Neutral, (4) Disagree and (5) strongly disagree was used to measure doctoral students satisfaction (Boyce, Napper-Owen, Lund & Almarode 2019; Shin et al. 2018). An offline questionnaire survey was conducted on 300 fulltime Ph.D. scholars studying Science, Engineering, Mathematics and Humanities & Management in NIT Silchar and NIT Agartala. As of 2018, the total number of doctoral students enrolled in NIT Silchar and NIT Agartala was 891. The doctoral student's population and sample are given in Table 1. The sample considers full-time students and excludes part-time doctoral students. Since, part-time students show different characteristic and requirements, (Shin et al. 2018). Data were collected for a period of 5 months between January to May 2019.

Field of Study	Population	Sample
Engineering	681	215
	(76.43)	(71.67)
Science	102	51
	(11.45)	(17.00)
Mathematics	47	19
	(5.27)	(6.33)
Humanities & Management	61	15
-	(6.85)	(5.00)
Total	891	300
	(100)	(100)

Table 1: Population and Sample Size

Note: Figure in the parentheses indicate percentage **Source:** NIT Silchar & NIT Agartala Annual Report

Table 1 shows the population and sample size of the present study. The total number of doctoral students was 891 and the sample size was limited to 300 respondents which are acceptable (Worthington and Whittaker, 2006). Out of 300 total respondents, 215 respondents were from the engineering department, 51 were from the science department, 19 were from the Mathematics department and 15 were from Humanities & Management department. Bartlett sphericity test and Kaiser-Myer-Olkin (KMO) measure of sample adequacy were applied for appropriateness of data for factor analysis (Fidan, 2016; Agariya & Singh, 2012). The evaluation of reliability and internal consistency of the questionnaires were measured using Cronbach Alpa (Cronbach, 1984).

Exploratory factor analysis was conducted in SPSS version 20 in order to explore the possible underlying factor structure and confirmatory factor analysis was conducted in IBM Amos 20 in order to confirm factor structure (Fidan, 2016; Agariya & Singh, 2012).

Out of 300 respondents, 76 were in the first year, 90 were in the second year, 87 were in the third year, 40 were in the fourth year and 7 were in the fifth year. The demographic distribution of the respondents was shown in Figure 1 (Gender), 2 (Age) and 3 (Marital Status).

Figure 1: Gender











Marital Status

Married Unmarried



From Figure 1, it was observed that 57 percent (i.e. 171 out of 300) of the respondent were male and 43 percent (i.e. 129 out of 300) of the respondent were female. It was observed from Figure 2, that 79 percent (i.e. 237 out of 300) of the respondent were below age 30 and 21 percent (i.e. 63 out of 300) of the respondent were above age 30. It was observed from Figure 3, that 82 percent (i.e. 246 out of 300) of the respondent were unmarried and 18 percent (i.e. 54 out of 300) of the respondent were married.

Data Analysis and Finding

Exploratory Factor Analysis

Measures of sample adequacy and factorability for the collected data were tested using Bartlett's test for sphericity

and Kaiser-Myer-Olkin (KMO) respectively. The tests suggest that sample sufficiency index KMO was higher than 0.6 and Bartlett's test for sphericity was found to be significant at 99 percent level of significance (p<0.001). As a result, the test results suggest that the data collected were suitable to conduct factor analysis. Maximum likelihood with direct oblique rotation was applied as a factor analysis method. Five factors with an eigenvalue greater than 1 and percentage of variance of at least 5 percent were extracted. All the five factors explained 40.8 percent of the total variance. According to Samuel (2016), factors having at least three items with loading greater than 0.30 should be retained. In the present study, the fifth factor has less than three items, so the fifth factor was ignored.



Figure 4: Scree Plot

Factor Number

Figure 4 represents the Scree test, a graphic representation of eigenvalues and factor number. It was observed from Figure 4 that a distinguished break up to a ninth factor, whereas after the ninth factor an almost liner part of the eigenvalue curve follows. The present study considers factors with eigen values which were over 1 and percentage of variance of at least 5 percent to be significant factors. Thus only five factors were taken and decide if they can interpret data in a satisfactory way.

The total variances of all the factors considered in the present study were shown in Table 2.

Factor	r Initial Figenvalues			Extract	Rotation Sums of Squared Loadings		
Factor	or initial Eigenvalues		•	Luaum	g,		Loadings
		%of	Cumulative		%of	Cumulative	
	lotal	variance	<u>%</u> 0	Total	variance	<u>%</u>	
1	6.17	14.71	14.71	5.38	12.82	12.82	4.90
2	3.64	8.68	23.39	2.91	6.94	19.76	2.82
3	2.90	6.91	30.31	2.18	5.21	24.97	3.69
4	2.25	5.37	35.68	1.89	4.51	29.49	2.06
5	2.15	5.13	40.81	1.61	3.84	33.33	2.05
6	2	4.76	45.57				
7	1.74	4.16	49.74				
8	1.54	3.68	53.42				
9	1.37	3.26	56.68				
10	1.30	3.10	59.79				
11	1.22	2.91	62.71				
12	1.15	2.75	65.47				
13	1.09	2.59	68.06				
14	1.02	2.44	70.51				
15	0.95	2.27	72.79				
10	0.89	2.12	74.91				
17	0.84	2.00	78.92				
10	0.79	1.88	78.80				
19	0.75	1.74	80.34				
20	0.08	1.65	82.17				
21	0.64	1.34	85.12				
22	0.01	1.47	85.19				
23	0.59	1.40	80.00				
24	0.55	1.30	80.16				
25	0.32	1.23	00.32				
20	0.48	1.13	90.32				
28	0.40	0.95	92.30				
20	0.40	0.93	93.23				
30	0.35	0.95	94.08				
31	0.34	0.85	94 90				
32	0.30	0.72	95.62				
33	0.27	0.64	96.27				
34	0.265	0.63	96.9				
35	0.200	0.55	97.45				
36	0.21	0.5	97.95				
37	0.18	0.44	98.39				
38	0.16	0.39	98.78				
39	0.15	0.37	99.16				
40	0.13	0.31	99.48				
41	0.11	0.26	99.74				
42	0.10	0.25	100				

Table 2: Total Variance

Source: Author's calculation

In Table 2, the first eigenvalue equal to 6.17 and explained 14.71 percent of the variance in the original data. The second eigenvalue equal to 3.64 and explained 8.68 percent of the variance. The third eigenvalue equal to 2.90 and explained 6.91 percent of the variance. The fourth eigenvalue equal to 2.25 and explained 5.37 percent of the variance. The fifth eigenvalue equal to 2.15 and explained

5.13 percent of the variance. All the five factors explained 40.81 percent of the total variance.

Table 3 presents the components and the factor loading produced after the exploratory factor analysis.

Table 3: Factor Analysis

Question Statement	Guide & department support	Reason for doing PhD	Stress & Lack of motivation	Insecurity
Overall, I am satisfied with the supervision	0.86			
My guide provides me with adequate feedback	0.82			
Whenever I face a problem my guide is easily approachable	0.76			
I am satisfied with the way in which my department monitors the progress of my Ph.D.	0.64			
I have a very good relationship with my guide	0.54			
I am satisfied with my department	0.53			
I am getting help from my peers	0.52			
Apart from academic activities, my departments help me to involve in other social/cultural/ sports-related activities	0.50			
My department provides a stimulating environment which fosters interaction and efficiency	0.42			
I am receiving proper support from my department (available of instruments in the lab related to my topic / financial support to build a prototype if required etc.)	0.42			
My department allows me to choose my guide/ advisor according to my preference	0.42			
I feel that more job opportunities related to my department are available	0.41			
Contribute to science, global development		0.85		
New achievement		0.81		
My interest in Learning/Research experience		0.71		
I usually skip my lunch & breakfast			0.73	
I am not having enough sleep			0.67	
very less opportunity to choose his interested topic/subject			0.55	
After enrolling in Ph.D. now I am getting less socially active			0.49	
I am not excited or learning anything			0.47	
After enrolling inPh.D. program my relationship with				
my close one's changes			0.43	
I am overburdened with my Teaching Assistant assignment / related task			0.39	
Though I am getting stipend still I am suffering from financial difficulties			0.36	

I have completely lost my interest/motivation for PhD	r my		0.35		
Even after completing Ph.D. I may not get salaried job		0.69			
I will quit Ph.D. if I get a high salaried job				0.62	
I often feel the fear of failure					
My Family expect me to function as a student an breadwinner	ıd			0.41	
Eigen value	6.17	3.64	2.90	2.25	
Variance Explained (%)	14.71	8.68	6.91	5.37	
Cronbach Alpha	0.86	0.83	0.75	0.60	

Kaiser-Meyer-Olkin Measure of Sampling Adequacy= 0.69

Bartlett's Test of Sphericity: $\chi 2 = 5047.81$, df =861, p=0.00.

Source: Author's calculation

It was observed from Table 3 that the first factor that is guide and department support. This factor consists of 12 items. Factor loading was between 0.86 and 0.41. It explained 14.71 percent of the total variance. Cronbach internal consistency coefficient was calculated as 0.86. The second factor that is, reason for doing Ph.D. This factor consists of 3 items. Factor loading was between 0.85 and 0.71. It explained 8.68 percent of the total variance. Cronbach internal consistency coefficient was calculated as 0.83. The third factor that is stress & lack of motivation consists of 9 items. Factor loading was between 0.73 and 0.35. It explained 6.91 percent of the total variance. Cronbach internal consistency coefficient was calculated as 0.75. The fourth factor that is, insecurity which consists of 4 items. Factor loading was between 0.69 and 0.41. It explained 5.37 percent of total variances. Cronbach internal consistency coefficient was calculated as 0.60. The four factors - guide & department support, reason for doing

Ph.D., stress & lack of motivation, insecurity explained 35.68 percent of total variance. The explained variance of less than 60 percent is still satisfactory in social science (Hair, Black, Babin and Anderson, 2014).

Confirmatory Factor Analysis

Confirmatory factor analysis (CFA) was conducted on IBM SPSS Amos 20.to determine the goodness of fit for the factors established with exploratory factor analysis. Root-mean-square error of approximation (RMSEA), the comparative fit index (CFI), Ratio of Chi-Square and degree of freedom (χ 2/df), Goodness of fit index (GFI) and standardized root-mean-square residual (SRMR) were examined to test the overall model fit to the data. Table 4 shows goodness of fit ranges and doctoral students' satisfaction model values.

Criterion	Acceptable Range	Good Compliance	Model Value	
Chi-Square/df	$\chi^2/\widetilde{df} < 5$	$\chi 2/$ df < 3	3.43	-
CFI	$0.05 \leq CFI \leq 0.97$	$0.07 \leq CFI \leq 1$	0.71	
GFI	$0.00 \leq GFI \leq 0.95$	$0.05 \leq GFI \leq 1$	0.77	
RMSEA	$0.05 \leq RMSEA \leq 1$	$0 \leq RMSEA \leq 0.05$	0.08	
SRMR	$0.05 \leq SRMR \leq 1$	$0 \leq SRMR \leq 0.05$	0.09	

Table 4: Goodness of Fit Ranges and Doctoral Students' Satisfaction model values

Note: CFI means Comparative fit index, GFI means Goodness of fit index, RMSEA means Root-mean-square error of approximation, and SRMR means Standardized root-mean-square residual. Source: Author's calculation

It was observed from Table 4 that Chi-Square/df equal to 3.43 which is below 5 and it is acceptable range. Comparative fit index (CFI) equal to 0.71 which is below 0.97 and it is acceptable range. Goodness of fit index (GFI) equal to 0.77 which is below 0.95 and it is acceptable range. Root-mean-square error of approximation (RMSEA) equal to 0.08 which is below 1 and it is acceptable range. Standardized root-mean-square residual (SRMR) equal to 0.09 which is below 1 and it is an acceptable range. All the models met acceptable criteria for good fit (Fidan, 2016).

Policy Implication

The literature acknowledges doctoral students have different challenges, concerns, and worries. Past studies support that financial issue, conflict with the supervisor, loss of interest, better career path, employment, stress, problem with the thesis topic, personal and family issue has a significant impact on doctoral student satisfaction. Our study found that guide and department support, reason of doing PhD, stress & lack of motivation and insecurity were found to be significant in doctoral student's satisfaction in the Indian context. This finding has several implications for faculties, departments, policymakers, and administrators. Such a survey can be used as a strategic tool to improve advisor-students relationship which is critical for doctoral students timely degree completion, evaluate and improve students' educational experience which will improve doctoral student's persistence and research output of the institutes. Institute can improve their selection process of doctoral students which allow them to understand the reason for enrolling to a doctoral program.

Limitation and Scope for Future Research

In the present study, deductive method was employed exclusively to generate items, which is based on literature reviews. A combined approach of both deductive and inductive (e.g., interviews, expert panel, and focus groups) methods can be used for item generation. Exploratory factor analysis (EFA) and Confirmatory Factor Analysis (CFA) was employed to assess construct validity. The sample size was limited to 300 respondents which are acceptable (Worthington and Whittaker, 2006). However, some researchers recommend obtaining the largest possible sample (minimum ratio of 10:1) to increase the credibility of the results and thus obtain a more exact outcome in the psychometric analysis (DeVellis, 2003).

An attempt can be made to modify the path model to get a better model fit. Getting the opinion of recent pass out and dropped out doctoral students might improve the item and quality of scale. The scale was developed focusing on doctoral students currently studying in technical institutes in North East region of India. The study was restricted to feedback from the current doctoral students. Students' satisfaction data and feedback can be collected from alumni and dropout students (even though it is difficult to contact dropout students). This allows the university to re-establish students' trust in the ability of the university that they have chosen to study and improve the retention rate of the students.

The generalizability of this scale will be limited to the doctoral program in the technical institute. Also, it should be noted that there are less basic science and social science department available in Technical Institute. A similar study can be conducted in Central Universities where more departments can be cover; it might give a different result.

Conclusion

Doctoral students' satisfaction scales might be used by the academic institutions to monitor and assess their doctoral program. It is a strategic tool for administrator and policymaker to improve the relationship between institute and students, enhance program development, monitor teaching quality, and guide freshmen orientation program.

The scale constitutes four factors (i.e., guide & department support, reason for doing Ph.D., stress & lack of motivation, insecurity). Four factors explained 35.68 percent of the total variance and each factor explains important parts of the total variance. Factor loading ranges from 0.86 to 0.41 and Cronbach Alpha internal consistency coefficients varied between 0.86 and 0.60. Using confirmatory factor analysis goodness of fit criteria, the validity of the model was assessed. The results indicated a valid and reliable scale that might be used to measure doctoral students satisfaction in the technical institute in India.

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