

Causal Attributions, Successfulness And Performance Of Higher Education Students In Sciences

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Abstract: *The present study was aimed to investigate the significant differences among the second, fourth and sixth semester undergraduate students of Sciences on the scores of causal attributions. The analysis was done on the basis of gender and successfulness. The term successfulness used in the present study depicts the perception of the students about their success or failure on the achieved score. The current study examined the causal attributions of 254 students from 2nd, 4th and 6th semesters of Bachelor of Sciences (B.Sc.). In order to find the significant differences with respect to gender and perceived success or failure, two-way MANOVA was used and on getting significant group differences, two-way ANOVA was conducted as a follow up test. The results indicated no gender difference on the subscales of causal dimension scale, further, there exists no significant interaction effect of gender and successfulness. However, both successful and unsuccessful students differ significantly with respect to their causal attributions.*

Keywords: *Causal Attribution, Science Students, Gender, Successfulness, Performance, India*

Introduction

In the past few decades, a lot of work has been done in the field of causal attribution. The social and psychological field researchers started working in this area in early 1980s. They tried to understand the influence of perceived success or failure on the achievement orientation of the students (Burke 1978, Elig and Frieze 1979, Weiner 1979). The research in the field of causal attribution tried to identify various types of attributions which people give in order to explicate their failure and success. According to Weiner (1985) people generally attribute to efforts, ability, luck, mood and task difficulty for their failure or success. The cause may be “internal/external, stable/unstable and controllable/ uncontrollable”. Individuals make causal explanations according to the situation, in order to protect their self-image. For an instance, if a student gets success, he will attribute to internal reasons for their success and if he gets failure, he will attribute external reasons for the failure, Weiner (2000). The nature of the cause also has great influence on the perceived self-efficacy of the students. Banks and Woolfson (2008) reported that the unsuccessful students with learning difficulties display negative attributions more often. Many previous studies have proved the influence of causal attribution on the affective reaction towards the academic performance of the students (McMillan & Forsyth, 1983; McMillan & Spratt, 1983; End et al. 2003; Taylor & Tyler, 2001; Wann et al. 1998, 2000, 2001). Weiner (1974) emphasised that the causal attribution is closely related with the expectancy of success in future. If an individual attribute his failure to his low ability (i.e. “internal, stable and uncontrollable” cause) in the course, then this attribution will make himself handicapped and will hinder him in putting more efforts to be

successful and in turn will give disappointment and dissatisfaction. If a student attributed his success to unstable and external factors then there would be a doubt that if the prior success will get repeated or not. The attributions for success to external and unstable causes and failure to internal and stable causes is linked with the learned helplessness. Learned helplessness is a condition where a person considered that his or her failure is inevitable and permanent. Deweck et al. (1978) advocated that females are more likely to display learned helplessness as compared to males. Leana- Leana-Tascilar (2016) indicated that the girls scored higher on self-regulated learning skills such as planning, strategy using and assessment and total self-regulated learning skills and no significant gender difference has been found w.r.t causal attribution for success and failure. However, Mahasneh et al. (2013) revealed that female and male students do not differ significantly on their attributional style. Lohbeck et al. (2017) found that boys attributed high ability for their success, while girls attributed low ability and difficult task for their failure. Gosiewska-Turek (2017) indicated that successful students attribute internal factors like efforts and ability for their success and unsuccessful students attribute external factors like luck and difficulty of the task for their failure. The previous studies were focussed on studying the causal attributions of the students from biology, psychology, developmental mathematics and foreign language learning etc. (Basturk and Yavuz, 2010; Heikkila et al. 2012; Dasingar, 2013; Fisher, 2001; Graham, 20002; Dong et al. 2013; Solar, 2015). The review of the related literature confirmed that there is paucity of the research on the study of causal attributions in India particularly on the population of science students. As the curriculum of the Indian colleges and universities is very cumbersome and need a great deal of perseverance from the students. When the students step in colleges or universities, they face huge problems in adjustment in the new life. Some students are not able to cope up with the demands of the tough college curriculum, and on finding themselves unable to understand the logics and concepts they start thinking that they are lacking with the ability to understand the concepts and they will not be able to succeed even if they do hard work. This rigid thought about the inability to do a particular task, make them helpless and such situations give rise the condition of either dropout or failure in the course and in turn will make the students depressed and dissatisfied and hinder the holistic growth of the student. The present study will be helpful for the educators, policy makers, administration in order to understand the attributional pattern of the students, so that they could plan some intervention programs for the students who display learned helplessness and self-handicapping.

The main aim of the study was to investigate the significant differences among the second, fourth and sixth semester students of Sciences (B.Sc) on the scores of causal attributions. The analysis was done on the basis of gender and successfulness. The term successfulness used in the present study depicts the perceptions of the students about their success or failure on the achieved score.

Hypotheses

Based on the existing literature on causal attributions in academic setting, following hypotheses were framed

1. There is no significant difference in causal attributions of undergraduate science students with respect to gender.
2. There is no significant difference in causal attributions of undergraduate science students with respect to successfulness.
3. There is no significant interaction effect of gender and successfulness on the causal attribution scores of undergraduate science students.

Method

Participants

The sample of the present study comprised of 254 students from 2nd, 4th and 6th semester of Bachelor of Science (B.Sc.). Further, from B.Sc. 2nd semester, 90 students (63 (70%) females, 27 (30%) males), from B.Sc. 4th semester, 65 students (40 (61.5%) females, 25 (38.5% males) and from B.Sc. 6th semester, 99 students 52 (52.5%) females, 47 (47.5%) males) were selected from the various colleges and universities of Punjab state of India.

Instrument

In order to get the causal attributions about the success or failure in the achieved score “The Revised Causal Dimension Scale (CDSII)” by McAuley et al. (1992) was used. The researcher personally visited each class after taking permission from the head of the department for explaining the purpose of the study. The students were asked to mention their achieved score in the subject, ‘Inorganic Chemistry’ for B.Sc. 2nd semester, ‘Physical Chemistry’ for B.Sc. 4th semester and ‘Inorganic Chemistry’ for B.Sc. 6th semester. After that they were asked to report if they consider the reported score as successful or unsuccessful. Further, they need to provide the main cause for their success or failure and rate the cause on the twelve items of CDS II scale. It is a bipolar 9-point rating scale measuring “Locus of Causality”, “Stability”, “External Controllability” and “Personal Controllability”. The higher scores on each dimension refers to more “Internal, Stable, Externally Controllable and Personally Controllable” attributions.

Results

In order to find out the significant differences on “Locus of Causality”, “Stability”, “External Controllability” and “Personal Controllability” dimensions of causal attributions (continuous dependent variables) due to gender and successfulness, two-way MANOVA was applied. The homogeneity of variance- covariance was checked by Box’s test. The results of Box’s test have been reported in table-1.

Table-1 Summary of box's test of equality of covariance matrices with respect to various dimensions of Causal Attributions of B.Sc. 2 nd , B.Sc. 4 th and B.Sc. 6 th semesters			
Box Test	B. Sc. 2 nd Sem	B.Sc. 4 th Sem	B.Sc. 6 th Sem
Box's M	33.38	57.18	62.31
F	0.98	1.64	1.85
df1	30	30	30
df2	3906	5395	4922
Sig.	0.501	0.016	0.003

Table-1 reveals that for B.Sc. 2nd semester, Box’s M= 33.38, F (30, 3906) = 0.98, $p > 0.001$, for B.Sc. 4th semester, Box’s M= 57.18, F (30, 5395) = 1.64, $p > 0.001$ and for B.Sc. 6th semester, Box’s M= 62.31, F (30, 4922) = 1.85, $p > 0.001$. The Box’s test for B.Sc. 2nd, B.Sc. 4th and B.Sc. 6th semesters is not found to be significant at 0.001 level of significance. On the basis of insignificant results of Box’s test, the equal variance-covariance among matrices can be assumed. Hence, in order to interpret MANOVA results, ‘Wilk Lambda’ (λ) test statistic was used. The results of two-way MANOVA analysis have been reported in table-2.

Table-2 Summary of MANOVA for 2x2 Design with Respect to Various Dimensions of Causal Attribution in Relation to Gender and Successfulness of Science Students			
	B.Sc. 2 nd Semester	B.Sc. 4 th Semester	B.Sc. 6 th Semester

Effect	Gender	Successfulness	Gender * Successfulness	Gender	Successfulness	Gender * Successfulness	Gender	Successfulness	Gender * Successfulness
Multivariate Test	Wilks' Lambda			Wilks' Lambda			Wilks' Lambda		
Value	0.96	0.81	0.95	0.98	0.85	0.98	0.97	0.78	0.98
F	0.87	4.78**	1.03	0.35	2.62*	0.37	0.84	6.55**	0.48
Hypothesis df	4	4	4	4	4	4	4	4	4
Error df	83	83	83	58	58	58	92	92	92
Sig.	0.49	0.00	0.4	0.84	0.04	0.83	0.51	0.00	0.75
Partial Eta Squared	0.04	0.19	0.05	0.02	0.15	0.03	0.04	0.22	0.02

*significant at 0.05 level, ** significant at 0.01 level

B.Sc. 2nd Semester																			
LoC										ST									
Gender	Female			Male			Total			Female			Male			Total			
Successfulness	U	S	Total	U	S	Total	U	S	Total	U	S	Total	U	S	Total	U	S	Total	
N	33	30	63	9	18	27	42	48	90	33	30	63	9	18	27	42	48	90	
M	5.34	6.09	6.08	5.89	6.03	6.16	5.46	6.67	6.11	4.38	6.17	5.23	4.55	5.56	5.22	4.42	5.94	5.23	
σ	1.89	1.54	1.89	2	1.95	1.94	1.91	1.71	1.89	2.01	1.47	1.97	2.03	1.93	2.08	2.05	1.66	1.99	
EC										PC									
M	4.08	4.47	4.26	3.48	4.09	4.43	3.95	4.63	4.31	5.57	6.09	6.25	4.85	6.03	5.81	5.42	6.73	6.12	
σ	1	1	1	1	1	1	1	1	1	2	1	1	2	1	2	2.1	1	2	

	5 9	4 8	54	4 8	9 3	89	5 7	6 6	64	0 1	6 5	97	5 1	8 1	13	1	7 2	02	
B.Sc. 4th Semester																			
	LoC									ST									
N	1 2	2 8	40	1 2	1 3	25	2 4	4 1	65	1 2	2 8	40	1 2	1 3	25	24	4 1	65	
M	5. 3 6	6. 3 5	6. 05	5. 7 8	6. 5 1	6. 16	5. 5 7	6. 4	6. 09	4. 6 1	6. 3 3	5. 82	5. 1 1	5. 8 5	5. 49	4.8 6	6. 1 8	5. 69	
σ	1. 5 4	1. 3 5	1. 46	1. 3 1	1. 1 3	1. 25	1. 4 2	1. 2 7	1. 38	1. 9 1	1. 6	1. 86	1. 6 5	0. 9 4	1. 35	1.7 6	1. 4 3	1. 68	
	EC									PC									
M	4. 9 5	5. 2	5. 13	4. 6 9	4. 8 7	4. 79	4. 8 2	5. 1	5	5. 9 2	6. 6 8	6. 45	6. 1 9	6. 5 4	6. 37	6.0 6	6. 6 3	6. 42	
σ	1. 1 7	1. 2 8	1. 24	1. 5 6	1. 6 6	1. 58	1. 3 5	1. 4	1. 38	1. 7 3	1. 4 9	1. 58	1. 4 6	1. 4 4	1. 41	1.5 7	1. 4 5	1. 51	
B.Sc. 6th Semester																			
	LoC									ST									
N	1 9	3 3	52	1 0	3 7	47	2 9	7 0	99	1 9	3 3	52	1 0	3 7	47	29	7 0	99	
M	5. 2 6	6. 2 3	5. 88	6. 0 3	6. 3 1	6. 25	5. 5 3	6. 2 7	6. 05	4. 3 2	5. 9 6	5. 36	4. 6 7	6. 1 9	5. 86	4.4 4	6. 0 8	5. 6	
σ	1. 5 8	1. 6	1. 64	2. 3 7	1. 7 9	1. 9	1. 8 8	1. 6 9	1. 77	1. 4 4	1. 8 6	1. 88	1. 9 2	1. 8 3	1. 93	1.5 9	1. 8 4	1. 91	
	EC									PC									
M	4. 1 1	5	4. 67	4. 0 7	5. 3 3	5. 06	4. 0 9	5. 1 8	4. 86	5. 7 7	6. 2 9	6. 1	5. 8 3	6. 2 5	6. 16	5.7 9	6. 2 7	6. 13	
σ	1. 8 3	1. 9	1. 91	1. 3 2	1. 7 3	1. 72	1. 6 5	1. 8 1	1. 82	1. 6 4	1. 8 1	1. 75	1. 8 5	1. 7 7	1. 72	1.6 8	1. 7 4	1. 73	

Note- LoC-“Locus of Causality”, ST-“Stability”, EC-“External Controllability”, PC-“Personal Controllability”, S-“Successful”, UN-“Unsuccessful”

Table-4 Summary of 2x2 ANOVA Design with Respect to Various Dimensions of Causal Attribution in Relation to Gender and Successfulness of B.Sc. 2 nd , B.Sc. 4 th and B.Sc. 6 th semester students													
B.Sc. 2 nd Semester													
Source	Gender				Successfulness				Gender Successfulness *				
Dependent	Lo C	ST	EC	PC	LoC	ST	EC	PC	Lo C	ST	EC	PC	

Variable												
SS	0.0 2	0.8 4	0.1 1	8.7 2	16.7 5	33.66	14.27	35.53	5.7 3	2.6 6	4.7	0
Df	1	1	1	1	1	1	1	1	1	1	1	1
MSS	0.0 2	0.8 4	0.1 1	8.7 2	16.7 5	33.66	14.27	35.53	5.7 3	2.6 6	4.7	0
F	0.0 1	0.2 4	0.0 4	2.3 9	5.14 *	9.72**	5.46*	9.74*	1.7 6	0.7 7	1.8	0
Sig.	0.9 5	0.6 2	0.8 4	0.1 3	0.03	0	0.02	0	0.1 9	0.3 8	0.1 8	0.9 7
B.Sc. 4 th Semester												
SS	1.2 2	0	1.2	0.0 7	10.5 5	21.6	0.68	4.37	0.2 3	3.4 9	0.0 2	0.6 2
Df	1	1	1	1	1	1	1	1	1	1	1	1
MSS	1.2 2	0	1.2	0.0 7	10.5 5	21.6	0.68	4.37	0.2 3	3.4 9	0.0 2	0.6 2
F	0.6 8	0	0.6 2	0.0 3	5.87 *	8.79**	0.35	1.91	0.1 3	1.4 2	0.0 1	0.2 7
Sig.	0.4 1	0.9 9	0.4 4	0.8 7	0.02	0	0.56	0.17	0.7 3	0.2 4	0.9 2	0.6
B.Sc. 6 th Semester												
SS	3.3 7	1.5 9	0.4 1	0	7.33	47.81	22.27	4.23	2.3	0.0 7	0.6 6	0.0 5
Df	1	1	1	1	1	1	1	1	1	1	1	1
MSS	3.3 7	1.5 9	0.4 1	0	7.33	47.81	22.27	4.23	2.3	0.0 7	0.6 6	0.0 5
F	1.1	0.5	0.1 3	0	2.39	15.04*	7.07*	1.4	0.7 5	0.0 2	0.2 1	0.0 2
Sig.	0.3	0.4 8	0.7 2	0.9 8	0.13	0	0.01	0.24	0.3 9	0.8 8	0.6 5	0.9

*significant at 0.05 level of confidence, ** significant at 0.01 level of confidence

Table-2 shows that, the main effect of ‘Gender’ in case of B.Sc. 2nd semester [Wilk λ = 0.96, F (4, 83) = 0.87, $p > 0.05$, multivariate $\eta^2 = 0.04$], for B.Sc. 4th semester [Wilk λ = 0.98, F (4, 58) = 0.35, $p > 0.05$, multivariate $\eta^2 = 0.02$] and for B.Sc. 6th semester [Wilk λ = 0.98, F (4, 58) = 0.35, $p > 0.05$, multivariate $\eta^2 = 0.02$] is not found to be significant even at the 0.05 level of confidence. Hence, the hypothesis 1 stated as “There is no significant difference in causal attribution of undergraduate science students w.r.t Gender” is accepted. This shows that male and female students of B.Sc. 2nd, B.Sc. 4th and B.Sc. 6th semesters do not differ significantly on “Locus of Causality”, “Stability”, “Personal Controllability” and “External Controllability” dimensions.

The data inserted in table-2 shows that the interaction effect (Gender*Successfulness) for B.Sc. 2nd semester [Wilk λ = 0.95, F (4,83) = 1.03, $p > 0.05$, multivariate $\eta^2 = 0.05$], for B.Sc. 4th semester [Wilk λ = 0.98, F (4, 58) = 0.37, $p > 0.05$, multivariate $\eta^2 = 0.03$] and for B.Sc. 6th semester [Wilk λ = 0.98, F (4, 92) = 0.48, $p > 0.05$, multivariate $\eta^2 = 0.02$] is not found to be significant even at the 0.05 level of confidence. Hence the hypothesis 3 stated as “There is no significant interaction effect of gender and successfulness on the causal attribution scores of undergraduate science students” is accepted. This shows that there is no interaction effect of gender and successfulness in attributing a cause for success or failure.

The data of table-2 clearly reveals that the main effect of ‘Successfulness’ in case of B.Sc. 2nd semester [Wilk λ = 0.81, F (4, 83) = 4.78, $p < 0.01$, multivariate $\eta^2 = 0.19$], for B.Sc. 4th semester [Wilk λ = 0.85, F (4, 58) = 2.62, $p < 0.05$, multivariate $\eta^2 = 0.15$] and for B.Sc. 6th semester [Wilk λ = 0.85, F (4, 58) = 2.62, $p < 0.05$, multivariate $\eta^2 = 0.15$] is found to be significant either at 0.05 or 0.01 level of confidence. Therefore, the hypothesis 2 stated as “There is no significant difference in causal attribution of undergraduate science students w.r.t Successfulness” is not accepted. This shows that successful and unsuccessful students significantly differ on different causal dimensions of causal attributions. Hence, the significant MANOVA results for ‘Successfulness’ demanded univariate ANOVA to determine significant group differences for each dependant variable viz ‘Locus of Causality’, ‘Stability’, ‘Personal Controllability’ and ‘External Controllability’. Thus, the obtained scores were subjected to two-way ANOVA and the results have been presented in the table-4.

The data inserted in table-4 clearly reveals that the main effects of gender and interaction effect of (gender*successfulness) in all 2nd semester, 4th semester and 6th semester are not found to be significant even at the 0.05 level of confidence. Further, in case of B.Sc. 2nd semester, the F-ratios for ‘Locus of Causality’, ‘Stability’, ‘External Controllability’ and ‘Personal Controllability’ are found to be 5.14, 9.72, 5.46 and 9.74 respectively. In case of, B.Sc. 4th semester, the F-ratios for ‘Locus of Causality’ and ‘Stability’ dimensions came out 5.87 and 8.79 respectively and for B.Sc. 6th semester, and the F-ratios for ‘Stability’ and ‘External Controllability’ dimensions came out 15.04 and 7.07 respectively, which are found to be significant either at 0.05 or 0.01 level of confidence. This indicates that the successful and unsuccessful students differ from each other on the one or more dimensions of causal attributions.

Discussion

It has been found from the results that the male and female students of all the 2nd, 4th and 6th semesters of Bachelor of Sciences do not differ from each other on the scores of “Locus of Causality”, “Stability”, “Personal Controllability” and “External Controllability”. The findings of the present study enjoy support from the previous researches who also reported no significant gender difference in attributing the cause for their success or failure (Travis et al. 1991; Hyde, 2005; Wu, 2011; Pishghadam and Motakef, 2011). On the contrary, Wolleat et al. (1980) found that females reported higher on “success-effort”, “failure- ability” and “failure-task” subscales, showing that female students attributed success to their efforts

and failure to lack of ability or difficult task. It is clear that in early 1980s females were lacking self-efficacy and had less confident about their ability, this was the case decades ago, now the scenario has been changed, girls are now getting equal opportunities and parents, teachers and people are acknowledging their efforts and abilities which in turn boosting their morale up. Further, it has been found that successful and unsuccessful students from 2nd, 4th and 6th semesters of Bachelor of Sciences differ significantly in attributing their success or failure. The successful and unsuccessful students of B. Sc. 2nd semester differ significantly on the scores of “Locus of Causality”, “Stability”, “External Controllability” and “Personal Controllability”, in case of B. Sc. 4th semester, the successful and unsuccessful students differ significantly on the scores of “Locus of Causality” and “Stability” and from B. Sc. 6th semester, the successful and unsuccessful students differ significantly on the scores of “Stability” and “External Controllability” dimensions. On comparing the mean score table-3 it has been revealed that successful students attribute internal, stable, personally controllable and externally controllable causes like high ability, aptitude, study habits, test preparation, help from teachers followed by good luck and mood for their success, whereas, unsuccessful students attributed low ability, lack of efforts and poor preparation for exam followed by bad luck for their failure. The present results are in tune with the results of Hassaskhah and Vahabi (2010) who revealed that effort was the most quoted cause for failure in language. Likewise, Adiba (2004) investigated that learners with high level of proficiency attributed their good and bad performances to internal attributions like ability and effort and students with low level of proficiency attributed their failures to external factors like luck and difficulty of the task. The previous researches supported that success is most likely attributed to internal factors (Williams et al., 2001; Graham, 2002; Dong et al., 2013; Solar, 2015). However, Dasinger (2013) showed no significant differences between low achieving female and male non-traditional students. Further, no significant interaction effect has been found between gender and successfulness.

Limitations and Further Research

The study was limited to only science program students only. The causal dimension scale (CDS II) provided limited to only attribute fixed causes like effort, ability, study habits, mood, luck, teacher but there could be some more causes behind their success or failure. So, future research can be considered by constructing or adapting multiple causal attribution scale where the students are free to respond as many causes as they perceived responsible for their success or failure. Sample size is always a big constraint in the way to generalise the results, as only 254 students were selected for the study and from only one state of India. Hence, it is suggested that the further study can be conducted in other states also for generalising the results. Also, the further research can be conducted by comparing the students of different programs altogether.

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