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Validation of the Academic Analogue of Psychological Momentum Theory on Sophomore Engineering Undergraduates for the Promotion of SDG4 Quality Education

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Abstract: The study validated an integrated framework of the academic analogue of the Psychological Momentum theory (PMT) in the context of Sophomore Slump phenomenon, based on the preliminary work of [9]. The sample of the study was 303 Second Year Computer Science, Mechanical, and Electronics Engineering Students under the STEM discipline at the Lovely Professional University, Phagwara, Punjab, India. The tools used for the study were the Academic Procrastination scale – short form by [33], the Engineering Self-Efficacy scale by [22], the Academic Inertia Scale by [9], and the Inspiration scale by [30]. Exploratory factor analysis and reliability analysis were conducted using SPSS Statistics software Ver 23.0 on 103 subjects of the data, and the remaining 200 sample size data was used for confirmatory factor analysis study to adapt the foreign tools in the Indian context, along with the validation of the integrative framework of the academic analogue of PMT on sophomore engineering students using structural equation modeling (SEM) through SPSS AMOS software Ver. 23.0. The overall hypothesized integrative framework of PMT in academic context for second-year engineering undergraduates under the sophomore slump phenomenon, displayed acceptable goodness of fit indices. Educational and psychometric implications of the study towards the promotion of sustainable development goal 4 of quality education under STEM discipline in India, are discussed.

Keywords: Engineering Undergraduates; Psychological Momentum Theory; Sophomore Slump; STEM Education; Sustainable development goal 4; Quality Education;

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1. Introduction

In Physics, according to the Newton's second law of motion [27], the force externally applied to an object brings about a proportional change in its velocity. The proportionality constant is the object's mass, which is the measure of its inertia property. As a part of a growing curiosity about whether psychological phenomena too generally adhere to physical principles or not, let to the proposal of the Psychological Momentum Theory (PMT; [15];[16]; [23]; [26]) in Psychology, where an analogy is drawn between the resistance to change the state of motion of a physical object, that is inertia, with the resistance to change in an individual's behaviour. The rate of change in the velocity of a body in the presence of an external force is drawn parallel to the frequency of a given behaviour in the presence of a stimulus. Psychological momentum theory does not provide a direct reference of psychological parallel to the physical quantity momentum which is defined as mass times velocity of an object. However, psychological mass is defined as "the degree to which the individual ascribes value to a given behaviour" [23] which can be related to the response rate of the behavior (velocity), leading to an indirect association to the psychological analogue of momentum, based on an individual's given state of activity or performance. Lack of activeness in pursuing certain task can be psychologically considered as a low momentum state (LMS), whereas actively pursuing the same can be considered to be in a high momentum state (HMS).

Though Psychological momentum as a construct was studied in sport [1] and experimental psychology [14]; [19], it did not receive any attention in the domain of education until [9] proposed the construct academic momentum in the context of academics with psychological mass as its originator. They proposed the construct academic inertia and conceptually defined it as "tendency to remain in a status quo state of academic behaviour". Since inertia is associated with the state of rest (momentum is zero) as well as the state of motion (momentum is non-zero), academic inertia also correspondingly was provided two states, namely, High momentum state of inertia (HMSI) and Low momentum state of inertia (LMSI). The variable Inspiration [30] was considered to be the psychological analogue of physical force, to examine the academic analogue of psychological momentum theory with further clarity. Academic inertia, through its two states, lower momentum state of inertia (LMSI) and higher momentum state of inertia (HMSI) state, was found to be related to the inspiration variable using hierarchical regression analysis technique. Also, LMSI positively correlated with academic procrastination and self-efficacy was found to be related to HMSI in line with previous works [18]. This preliminary study of [9] also provided the instrument to measure academic inertia and opened the possibility to conduct further studies on this construct and its relationship with Inspiration variable so that effective intervention strategies for the promotion of inspiration as an academic variable in educational institutions can be done, to help the learners facing academic or career related obstacles by being in lower momentum state of inertia (LMSI) move to the higher momentum state of inertia (HMSI). One such academic obstacles faced by students, specifically in the context of engineering education, is called the Sophomore slump [7].

The term Sophomore slump was coined by[11], and is defined as "a loss of students' engagement as they return and begin their second year" [24]. According to [17], while the first year of engineering is plagued with retention related issues, students on graduating to second year, represent the group of retained students, stabilizing the retention rate. Retention is defined as "an institution's ability to retain students from admission until graduation" [4]. The second year of engineering is an important period for the retention of university students, along with their retention in the chosen major subjects [25], which ultimately affects the overall academic success of the student [31]. However, the second year Sophomores are found to be the least academically involved out of the four typical student levels, that is, freshmen, sophomores, juniors and seniors This slump occurs due to the experiencing of fresh challenges and responsibilities, coupled with different academic and social stressors, on returning to the college. While deciding the study majors constitute academic stressor, the need to define their purpose in life, professionally and personally, make up the social stressor, required in the context of career choices and other significant choices in life. [12] found that the choice of the major is the very critical decision to make, since it significantly predicted the academic achievement of engineering students. The first-time opportunity to select the major courses in second year [20], makes it the perfect stage for conducting research on retention of STEM students [7] along with other areas of study, like the sophomore slump, specifically in engineering education. The academic and social stressors however make the experience of returning to the college, filled with amotivation and disengagement, along with the development of a negative perception about college in second year. They are also a neglected lot along with the juniors, in comparison to the freshers and the seniors [31]. Lack of programs specifically designed to meet the needs of these students further add to the less connected of these students to the campus [28]. If not adequately addressed by interventions and actions on the part of the sophomore students by the engineering institutions, this phenomenon can result in these students dropping out from the course and not returning to their junior (third) year. Moreover, little research is available on the topic of sophomore slump [21] and more so in the context of Indian engineering education [8].

To address the above detailed gap of research on Sophomore slump phenomenon in engineering students, the work of [9] was taken forward to develop and validate an integrated framework of the academic analogue of the psychological momentum theory using Structural Equation Modeling technique in the Indian context, which constituted the purpose of the current study.

2. Method

A. Participants

Descriptive study was conducted in this research, with survey method used to collect data using questionnaire developed for the studied variables. The total sample size was 303. [32] cited [2], [3] that minimum sample size of 100-200 is one of the generalized guidelines regarding sample size requirements of structural equation modeling conducted using SPSS AMOS Ver, 23.0. In the present research the sample size was hence fixed to be 200 second year engineering students of Computer science, Mechanical and Electronics engineering schools of the Lovely Professional University, who were selected using simple random sampling technique. Before data collection, the researcher personally visited the schools and took formal permission from of the Head of the Schools after explaining the purpose of the visit and the intended research work. The google form link of the questionnaire containing items of the tools of academic inertia, academic procrastination, engineering self-efficacy and Inspiration variables were shared with the sample subjects through the university chat messenger platform during regular classroom sessions after seeking permission of the faculty taking the class. The students were given verbal instructions on the purpose of data collection and how to fill the form. The students submitted the online form in 20-25 minutes.

B. Measures

1) Academic Inertia Scale

Academic inertia was measured using the 9 items instrument constructed by [9], where the first five items measured lower momentum state of inertia (LMSI) and the remaining nine items measured higher momentum state of inertia (HMSI). Sample item measuring LMSI has the statement “I find it difficult to get motivated to start studying for ordinary exams and quizzes in my science and engineering”. Sample statement of HMSI sub-scale is “After I start a course project in my science and engineering courses and I begin to see progress, I often want to continue working as long as possible so I can maximize my productivity”. The students provide their responses by selecting any one of the options of a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). A separate study to validate this tool in the Indian context was conducted by the authors on additional 103 sample subjects. Exploratory factor analysis applied using principal component analysis of extraction and varimax rotation extracted two independent factors explaining 76.683 % variance in academic inertia. The determinant was 0.001. The KMO sampling adequacy was 0.85, above the benchmark of 0.6 indicating sufficient sample size to conducted EFA. The Barlett's test of sphericity was significant (p=0.000). The first five items very strongly loaded (above 0.85) on the factor Lower momentum state of inertia (LMSI). The next four items very strongly loaded (above 0.85) on the other factor Higher momentum state of inertia (HMSI). The Cronbach's alpha measures of internal consistency reliability were excellent for Lower momentum state of inertia sub scale at 0.925 and that of the higher momentum state of inertia sub scale at 0.893. Confirmatory factor analysis study was done on 200 sample subjects to establish the two factors structure of the construct academic inertia and excellent goodness of fit estimates were obtained between hypothesized structure and the collected responses of the sample subjects. The Cmin/Df = 1.646 (less than the benchmark 5), CFI = 0.974 and TLI = 0.963 (above the benchmark of 0.9), RMSEA = 0.057 (less than the benchmark 0.08) and SRMR = 0.0483 (less than the benchmark 0.05) [13]. Academic inertia predicted LMSI with a factor loading of 0.344 and all the five items strongly (0.549-0.788) and significantly predicted their factor. The construct predicted another factor HMSI with a factor loading of 0.364 and all its four items also strongly (0.645-0.877) and significantly predicted their respective factor. The lower momentum state of inertia of 103 subjects correlated strongly and highly significantly with academic procrastination with the Pearson's product moment correlation coefficient r = 0.629 and p value = 0.000. Their higher momentum state of inertia correlated strongly and highly significantly with inspiration with the Pearson's product moment correlation coefficient r = 0.454 and p value = 0.000. The scale has its nomological network and thus displays general construct validity.

2) Inspiration

Inspiration was measured using the eight items instrument constructed by [30]. For all the eight items, two components, frequency and strength are reported. Four items of frequency component start with "How often does this happen" and the other four items of strength component start with "How deeply or strongly in general". Sample statement of scale is "I am inspired to do something". The students provide their responses by selecting any one of the options of a seven-point Likert scale ranging from 1 (not at all) to 5 (very deeply or strongly). Exploratory factor analysis conducted on 103 sample subjects, applied using principal component analysis of extraction and varimax rotation extracted one factor explaining 76.079 % variance in inspiration. The determinant was 0.000. The KMO sampling adequacy was 0.91, above the benchmark of 0.6 indicating sufficient sample size to conducted EFA. The Barlett's test of sphericity was significant (p=0.000). All the eight items loaded well on the construct (0.648 - 0.817). The Cronbach's alpha measures of internal consistency reliability were excellent for the inspiration scale at 0.955. Confirmatory factor analysis study was done on 200 sample subjects to establish the unidimensional factor structure of the construct inspiration and moderate goodness of fit estimates were obtained between hypothesized structure and the collected responses of the sample subjects. The Cmin/Df = 4.744 (less than the benchmark 5), CFI = 0.877 and TLI = 0.828 (close to the benchmark of 0.9), RMSEA = 0.1377 (more than the benchmark 0.08) and SRMR = 0.0644 (close to the benchmark 0.05). All the eight items loaded moderately to strongly (0.482 – 0.777) on the construct inspiration with p-value = 0.00. The lower momentum state of inertia sub scale of academic inertia of 103 subjects correlated negatively and highly significantly with inspiration with the Pearson's product moment correlation coefficient r = -0.413 and p value = 0.000. Their higher momentum state of inertia correlated positively and highly significantly with inspiration with the Pearson's product moment correlation coefficient r = 0.462 and p value = 0.000. The scale has its nomological network and thus displays general construct validity.

3) Academic Procrastination

The academic procrastination scale by [33] consists of five items, with sample items statement like "I put off projects until the last minute". The responses are recorded on a five-point Likert scale with 1=Agree and 5=Disagree. Exploratory factor analysis conducted on 103 sample subjects, applied using principal component analysis of extraction and varimax rotation extracted one factor explaining 62.032 % variance in engineering self-efficacy. The determinant was 0.189. The KMO sampling adequacy was 0.808, above the benchmark of 0.6 indicating sufficient sample size to conducted EFA. The Barlett's test of sphericity was significant (p=0.000). All the five items loaded well on the construct (0.692 - 0.820). The Cronbach's alpha measures of internal consistency reliability were excellent for the academic procrastination scale at 0.818. Confirmatory factor analysis study was done on 200 sample subjects to establish the unidimensional factor structure of the construct and excellent goodness of fit estimates were obtained between hypothesized structure and the collected responses of the sample subjects. The Cmin/Df = 1.009 (less than the benchmark 5), CFI = 1.000 and TLI = 0.999 (above the benchmark of 0.9), RMSEA = 0.007 (less than the benchmark 0.08) and SRMR = 0.0271 (less than the benchmark 0.05). All the five items loaded moderately to strongly (0.48 – 0.69) on the construct academic procrastination with p-value = 0.00. The lower momentum state of inertia of 103 subjects correlated strongly and highly significantly with academic procrastination with the Pearson's product moment correlation coefficient r = 0.629 and p value = 0.000. Their inspiration scores correlated negatively and highly significantly with academic procrastination with the Pearson's product moment correlation coefficient r = - 0.334 and p value = 0.001. The scale has its nomological network and thus displays general construct validity.

4) Engineering Self Efficacy

The engineering self-efficacy scale by [22] consists of six items to measure the general engineering self-efficacy adapted in the Engineering context from [5] Self Efficacy for Academic Achievement Scale, with sample items statement like "I can master the content in even the most challenging engineering course". The responses are recorded on a six-point Likert scale with 1=completely uncertain and 6=completely certain. Exploratory factor analysis conducted on 103 sample subjects, applied using principal component analysis of extraction and varimax rotation extracted one factor explaining 62.032 % variance in engineering self-efficacy. The determinant was 0.051. The KMO sampling adequacy was 0.859, above the benchmark of 0.6 indicating sufficient sample size to conducted EFA. The Barlett's test of sphericity was significant (p=0.000). All the six items loaded well on the construct (0.183 - 0.232). The Cronbach's alpha measures of internal consistency reliability were excellent for the academic procrastination scale at 0.874. Confirmatory factor analysis study was done on 200 sample subjects to establish the unidimensional factor structure of the construct and good goodness of fit estimates were obtained between hypothesized structure and the collected responses of the sample subjects. The Cmin/Df = 3.951 (less than the benchmark 5), CFI = 0.941 and TLI = 0.882 (close to the benchmark of 0.9), RMSEA = 0.122 (more than the benchmark 0.08) and SRMR = 0.0459 (less than the benchmark 0.05)[6]. All the six items loaded moderately to strongly (0.57 – 0.74) on the construct with p-value = 0.00. The lower momentum state of inertia of 103 subjects correlated negatively and highly significantly with engineering self-efficacy with the Pearson's product moment correlation coefficient r = -0.386 and p value = 0.000. Their higher momentum state of inertia scores correlated positively and highly significantly with engineering self-efficacy with the Pearson's product moment correlation coefficient r = 0.454 and p value = 0.000. The scale has its nomological network and thus displays general construct validity.

3. Results

In order to estimate the measure of central tendency - mean, measure of dispersion - standard deviation, measure of asymmetry- skewness and kurtosis, and measure of relationship – correlation, SPSS statistics version.23.0 was used. The data obtained of the research variables Academic Procrastination, Engineering Self-efficacy, Lower Momentum State of inertia, Higher momentum state of Inertia, Academic Inertia and Inspiration is shown below:

Table 1: Descriptive Statistics

N = 103	AP	LMSI	HMSI	AI	ESE	Inspiration
AP	1.00	0.629**	-0.240*	0.502**	- 0.369**	-0.334**
LMSI		1.00	-0.291**	0.847**	- 0.386**	0.413**
HMSI			1.00	0.262**	0.454**	0.462**
AI				1.00	- 0.137	- 0.160
ESE					1.00	0.610**
Inspiration						1.00
Mean	3.021	2.677	3.966	3.2503	4.658	4.849
Standard Deviation	0.985	0.863	0.594	0.475	0.700	1.174
Skewness	-0.145	-0.091	0.183	0.633	-0.573	-0.140
Kurtosis	-0.517	-0.267	-0.532	0.797	0.975	-0.413

** - Correlation is significant at the 0.01 level (2-tailed).
*- Correlation is significant at the 0.05 level (2-tailed).

Table 1 displays the estimates of descriptive statistics like mean, standard deviation, skewness, kurtosis and Pearson's product moment correlation coefficients of the research variables towards the reporting of measures of central tendency, dispersion, asymmetry and relationships respectively. While the mean of academic procrastination and academic inertia variables is close to the average value, the mean of engineering self-efficacy and inspiration variables is above the average level indicating the presence of these desirable variables to satisfactory extent in the sample subjects. Asymmetry in the form of skewness and kurtosis in the data of the variables is within limits of -3 to +3 for skewness and -10 to +10 for kurtosis when the statistical technique to be applied on the data is structural equation modeling [6]. The Pearson product correlation coefficient r between academic procrastination and lower momentum state of inertia is strong in magnitude, positive in sign and highly significant at $\alpha = 0.01$ level of significance. The higher momentum state of inertia relationship with engineering self-efficacy and inspiration is also moderate in strength, positive in sign and highly significant at $\alpha = 0.01$ level. Academic procrastination shares moderate in strength, negative in sign and significant result at $\alpha = 0.05$ level with Higher momentum state of inertia, engineering self-efficacy and inspiration. Also, inspiration shares strong, positive and highly significant relationship with

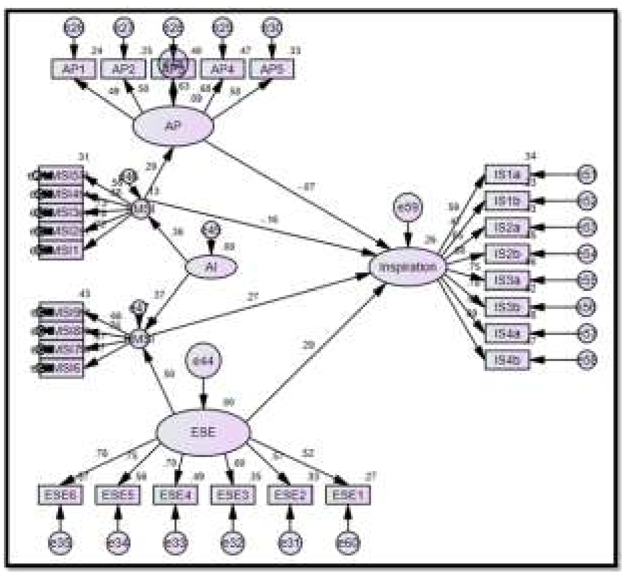

Fig. 1: Path Diagram of the Academic Analogue

engineering self-efficacy and moderate, positive and highly significant relationship with higher momentum state of inertia. Conclusively, all correlation results between the research variables are in concurrence with the literature.

Figure. 1. Path Diagram of the Academic Analogue of the Psychological Momentum Theory on Sophomore Engineering Undergraduates for the Validating the Integrative Model Framework through Structural Equation Modeling using the Factor Loadings of the associated variables and items measuring them; AI – Academic Inertia; AP – Academic Procrastination; ESE – Engineering Self-Efficacy; LMSI – Lower Momentum State of Inertia; HMSI – Higher Momentum State of Inertia

Table 2: Standard Regression Weights and their P-Values

			Estimate	P - Value
LMSI2	<---	LMSI	.779	***
LMSI3	<---	LMSI	.732	***
LMSI4	<---	LMSI	.578	***
LMSI5	<---	LMSI	.555	***
HMSI6	<---	HMSI	.765	
HMSI7	<---	HMSI	.871	***
HMSI8	<---	HMSI	.764	***
HMSI9	<---	HMSI	.658	***
AP1	<---	AP	.491	
AP2	<---	AP	.497	***
AP3	<---	AP	.634	***
AP4	<---	AP	.683	***
AP5	<---	AP	.577	***
ESE2	<---	ESE	.570	***
ESE3	<---	ESE	.595	***
ESE4	<---	ESE	.703	***
ESE5	<---	ESE	.749	***
ESE6	<---	ESE	.758	***
IS1a	<---	Inspiration	.587	
IS1b	<---	Inspiration	.475	***
IS2a	<---	Inspiration	.653	***
IS2b	<---	Inspiration	.595	***
IS3a	<---	Inspiration	.748	***
IS3b	<---	Inspiration	.785	***
IS4a	<---	Inspiration	.691	***
IS4b	<---	Inspiration	.687	***
ESE1	<---	ESE	.520	

From Table II, as part of reporting of significant predictive relationships, it is found that academic inertia predicts lower momentum state of inertia moderately and highly significantly since the simple linear regression coefficient R=0.357. Engineering self-efficacy predicts the higher momentum state of inertia moderately and highly significantly with R=0.501. The lower momentum state of inertia predicts academic procrastination weakly but highly significantly with R=0.295 for a p-value =0.004 which is less than the level of significance α=0.01. While higher momentum state of inertia and engineering self-efficacy predict inspiration weakly, positively and highly significantly for simple linear regression coefficient R=0.269 and 0.286 respectively, the variables lower momentum state of inertia and academic procrastination do not share predictive relationship with inspiration since the p-values of their simple linear regression coefficients are higher than the level of significance α=0.05 at 0.055 and 0.423 respectively. Finally, all the obtained simple linear regression results are in concurrence with the existing literature.

Table 3: Model Goodness of Fit Estimates

Estimands	Cmin/Df	SRMR	RMSEA	CFI	TLI
Benchmaks	<3	<0.08	<0.08	>0.9	>0.9
Estimates	1.498	0.0723	0.050	0.910	0.901

The hypothesized model of the relationship between Academic Inertia, Academic Procrastination, and Engineering Self-Efficacy in the context of Inspiration among Engineering Undergraduates was found to empirically fit well with the collected data since goodness of fit indices were found to satisfy their respective benchmark. The “CFI” and “TLI” obtained values were above the benchmark of 0.9, and the “RMSEA” and “Cmin/Df” obtained values were also found to be less than their respective benchmarks of 0.08 and 3 according to [13]. Also, “SRMR” value was found to be desirably lesser than its benchmark of 0.08.

4. Discussion

1) Engineering Education Implications of the Study:

[9] work contributed the constructs of academic momentum and academic inertia, along with the preliminary study on the relationship these variables have along with the constructs Inspiration, academic procrastination and self-efficacy, using hierarchical

and correlational analysis. The present study extended their work further by developing an integrative framework of the academic analogue of the psychological momentum theory. While the establishment of the relationship of academic inertia and its two states with inspiration was the focus of the study, the inclusion of academic procrastination [10] and engineering self-efficacy variables into the model was done to include a nomological network inside it to ensure a general construct validity to the model.

The hypothesized model fitted well with the collected data indicating that Newton's second law of motion applicable on all physical objects can be drawn to be true educational psychology as well. In line with the findings of the original work, the present study also found the lower momentum state of inertia to correlate positively with academic procrastination. Also, engineering self-efficacy predicted the higher momentum state of inertia.

While the work of [9] showed the moderating role of inspiration between the two states of academic inertia, the present study conducted regression analysis on these variables along with engineering self-efficacy. While the higher momentum state of inertia and engineering self-efficacy predicted inspiration positively and significantly, the lower momentum state of inertia and academic procrastination were found to be unrelated to inspiration since the regression coefficients were negative but non-significant.

These results show the importance of developing high engineering self-efficacy in sophomore students so that they can be placed in a higher momentum state of academic inertia in second year. Such a desirable state of mind would be helpful in developing inspiration in these undergraduates.

While the sustainable development goal four SDG4 of Quality Education stresses on lifelong education for engineering undergraduates to continue learning even after passing out from the campus and joining the engineering profession, reality is manifesting in opposite direction with students giving up on engineering education due to a platitude of reasons. [29] addressed the issue of high drop-out rate in the first two years of engineering in the Indian context. Some of the retention strategies discussed in that study as cited in [34] were to ensure retention was deploying support services to the students, mentoring, counselling and ensuring student involvement. This study identified the difficulties in studying the core gateway courses like Thermodynamics, Multivariate Calculus and Differential Equations, Mechanics of materials, Mechanics and Electric Circuits as the main cause for attrition of the sophomore students. However, sophomore slump, as an academic phenomenon needs to be empirically established in the India, along identification of our country specific causes behind it, which keep the second-year students of engineering in lower momentum state of academic inertia. In such a scenario, Inspiration though relatively a less researched construct, is evolving as a critical academic variable requiring its promotion in engineering institutions of India amidst the menace of high attrition rate in the first two years of the course. This variable, as shown in [9] work, can play the moderating role of transiting a student from higher momentum state of inertia. The higher momentum state of inertia, once attained, can be instrumental in inspiring the student to be a lifelong learner of engineering as envisioned globally under SDG4.

2) Psychometric Implications of the Study:

This study adapted the instruments of some of the critical and novel variables for engineering education researchers. This development can promote further studies to better understand the academic inertia and inspiration constructs. The integrative model presents an empirical framework on the relationship of these variables. But the model has to be shown to be measurement equivalent at factor structure, items and response levels, with respect to the vital confounding variables like gender, batch and stream of engineering education. Also, in the present study, general engineering self-efficacy was measured instead of specific engineering self-efficacy and its goodness of fit estimates can improve. Though [30] showed that inspiration is made up of two inter related dimensions, frequency and strength, the present study obtained a unidimensional structure of it during exploratory factor analysis, and a very high internal consistency reliability coefficient of Cronbach's alpha along with strong factor loadings of the eight items on the construct inspiration. Thus, further studies must be conducted to test the dimensionality of this construct in Indian context through the replication of the validation study in multiple contexts and across different populations. Also, the consideration of the ordinal nature of the data obtained from questionnaire should be accounted and Tetrachoric correlation-based validation and reliability estimation studies of the framework and its variables must be conducted.

5. Limitations

Though the sample size of n=303 is sufficient to conduct structural equation modeling (SEM) studies [2],[3], [32], due to the limited scope of the research and available resources, the study was limited to the sample subjects belonging to a private university of India. The subjects belonged to streams of engineering other than Computer science, Mechanical and Electronics engineering and from different engineering institutions must be included for the generalization of the findings of the present research on all streams of engineering under STEM discipline.

6. Conclusion

Advancement in the field of educational psychology is now extending to include parallels of physical variables in psychological realms like psychological momentum, inspiration and academic inertia for momentum force and mass. Present study tried to establish the interrelationship between these vital variables in the context of sophomore slump for the targeted population of engineering undergraduates, and the results are encouraging with cursory educational implications in engineering education of India. It is hoped that, engineering education students, teachers, scholars and policy makers would take notice of the mentioned implications of the study and play their respective niche parts to bring necessary changes in the curriculum of engineering discipline in second year.

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