International Journal of Innovative Research and Scientific Studies, 8(4) 2025, pages: 225-239

IJIRSS
International Journal of Innovative Research & Scientific Studies

ISSN: 2617-6548

URL: www.ijirss.com

Mind and means: Investigating the nexus of scientific temper, intellectual achievement, and economic capacity

Shivaprasad G[1*], Sengottuvelu C[2], Gayathri R[3], Ravindra Babu S[4]

[1,3]*Faculty of Management Studies, CMS Business School, JAIN (Deemed-to-be) University, India.*
[2]*MBA Department, Acharya Bangalore B-School, Bengaluru, India.*
[4]*School of Business and Management (SBM), CHRIST University, Bangalore, India.*

Corresponding author: Shivaprasad G (*Email: dr.shivaprasad@cms.ac.in*)

Abstract

Scientific temperament is known as an individual's attitude of logical and rational thinking. The current study debated the term scientific temper critically and explored its correlation with intellectual achievement among students undertaking higher studies. Furthermore, this research investigated the moderating role of monetary risk in such a correlation. The current study was carried out employing a quantitative research approach through a survey. The primary data was collected by administering the scientific temper scale. The survey was conducted in four locations in Karnataka, India. The census method was followed. Descriptive along with inferential statistics have been utilized to analyze the data. Hierarchical regression was utilized to perform moderating analysis. R programming was used for data analysis besides SPSS to test the hypothesis. It is found that there is a positive correlation between scientific temper and intellectual achievement. It is also found that there is a positive correlation between scientific temper and academic achievements. No correlation between scientific temperament and intellectual achievement was observed between boys and girl students. However, boys' scientific temperament was much higher compared to that of girl students. The study also practiced measures for the development of scientific temper among students, such as integrating critical thinking and design thinking into learning and following new methods of education. The norms of the New Educational Policy (NEP-2020) of India should be adopted too so that the scientific temperament of the students could increase further at their initial school stage. In addition to the significance of cultivating a scientific temper and overcoming the economic limitations of education, the findings of the study have significant policy and program implications for education. It is also found that the education system is undergoing a lot of changes by incorporating interdisciplinary approaches and covering socially relevant topics. The research concludes that taking financial risk is a significant moderator of the link between scientific temper and intellectual achievement, indicating that low-risk financial strategies were better at assisting students in attaining their academic aspirations.

Keywords: Economic capacity, Gender, Higher education, Intellectual accomplishments, Scientific temper.

DOI: 10.53894/ijirss.v8i4.7774
Funding: This study received no specific financial support.
History: Received: 1 May 2025 / **Revised:** 4 June 2025 / **Accepted:** 5 June 2025 / **Published:** 12 June 2025

Competing Interests: The authors declare that they have no competing interests.
Authors' Contributions: All authors contributed equally to the conception and design of the study. All authors have read and agreed to the published version of the manuscript.

Transparency: The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.
Institutional Review Board Statement: The Ethical Committee of the Faculty of Management Studies, CMS Business School, Jain University has granted approval for this studyon 27 November 2023 (Ref. No. FMS - JU/108/2023).
Acknowledgments: The author's wishes to express gratitude to the CMS Business School, Jain University for permitting to carry out research. The support and cooperation received from the administration, faculty, and participants were crucial in making this study a success.
Publisher: Innovative Research Publishing

1. Introduction

Scientific advancements in the last five decades have begun revolutionary work in the area of education and have contributed greatly to socio-economic advancement and overall levels of living. This advancement has brought solid confidence that science will have an even more crucial role to play in the coming days as it continues to progress with accelerating momentum. The world is becoming increasingly reliant on science and technology over time. Governments could participate in the formulation of scientific activities to promote socio-economic growth as well as mitigate the impacts of global challenges like climate change, poverty, disease, and drought [1]. The issue of scientific temper, nonetheless, implies experimenting and inquiring about new things in society. Whenever someone makes decisions in life with the assistance of the scientific method, it is argued that they possess a scientific temper. Jawaharlal Nehru initially employed the term "scientific temper" in his book "The Discovery of India." According to the author, scientific temper enriches human life as it applies logical, rational, and critical thinking. It is a person's mindset that utilizes observation, comprehension, examination, questioning, hypothesis formation, testing, confirming, and expressing.

Scientific communities continue to evolve. Religion is socio-cultural, and scientific awareness is being cognizant of things in society. The two paths do not go hand in hand at times, and religious ideas cannot be experimented with or verified through tests or reasonability. These realities thus indicate that India's scientific mentality has proven to be lagging behind, which is not preferable for its economic development [2]. The influence of India's inaugural Prime Minister Jawaharlal Nehru on Indian education culture was immense, primarily through his emphasis on developing a scientific temper. Nehru believed that growth and progress in India relied on developing a scientific temper and the use of modern principles of science. He envisioned creating a scientific temperament as a part of nation-building, which would make India a modern and progressive country. However, the examination of the scientific temperament of those students who have been fortunate enough to enjoy this legacy is not easy. Scientific temperament is the inclination of an individual towards rational, empirical, and evidence-based thinking, which one develops through the study of scientific concepts and principles [3]. This trait cannot be quantified easily, and its quantification cannot be achieved through a simple test or examination. The cultivation of a scientific temperament is an ongoing process, and it calls for a friendly environment that supports critical thinking, curiosity, and experimentation. The challenge, then, is to establish such an environment in the education system that supports scientific thinking and generates a desire to learn. These hypothetical idea-governing countries never develop scientifically and technologically. Science can at least offer the possibility of well-organized connections, and everybody can grow using the knowledge of science [2]. It must be evaluated to what extent such abilities become internalized in a person, especially in a student. Based on this perspective, the study will determine the scientific temper of Karnataka business students. Scientists and scientists' mindsets are not contrary to societal cultural ideals. They prefer methods and technologies to experiment and validate strongly held beliefs, and how these serve our society and culture.

In addition, the study also established the moderating effect of financial risk on the scientific temper and Intellectual achievement relationship between higher education students. Cagle and Baucus [4] and Halliburton et al. [5] concluded that financial hardship due to the Great Recession negatively affected intellectual achievement among students. It was discovered that the students of the regions of higher economic distress were more likely to have educational disturbances, like truancy at school, low marks on exams, and greater chances of dropping out. Ferreira [6] and Byrd et al. [7] have studied the impact of financial distress on the academic success of college students. Financial pressure was found to be associated with poorer grades, lower persistence, and increased dropout. The authors imply that the provision of financial support and aid to students can serve to reduce the adverse effects of financial stress on intellectual functioning. Further, Monk [8], Murray et al. [9], and Gerrans and Heaney [10] studied the correlation among financial strain, financial actions, and Intellectual achievement of the students. they discovered that financial stress was inversely related to Intellectual accomplishment and that students who indicated greater financial stress were more likely to participate in dangerous financial behavior, including accumulating excessive debt or not paying bills. Thus, the authors discovered that financial risk has an important part to play in the scientific temper and Intellectual achievements relationship. Particularly, financially risk-averse higher education students had a more positive relationship between scientific temper and Intellectual achievements. Therefore, we took financial risk as a moderator between scientific temper and Intellectual achievement.

Scientific temper refers to a rational and logical mental attitude, distinguished by open-mindedness, critical thinking, and adherence to evidence-based reasoning. Scientific temper is a belief system that promotes the challenging of assumptions, empirical fact-seeking, and methodical treatment of problems. Pedagogically, it is necessary to generate scientific temper in students to consolidate their analytical minds and develop lifelong learning skills. The Indian Constitution emphasizes the acquisition of a scientific temper as a compulsory duty of every citizen [11]. Educational programs like Rashtriya Avishkar Abhiyan focus on the transfer of scientific temper among students through practices like science exhibitions and quizzes [12].

The scientific temper includes scientific literacy, scientific attitude, scientific thinking, scientific method, scientific perception, and scientific habit [13].

Empirical research has proved a positive relationship between scientific temper and academic achievement. For example, Bhatnagar [14] concluded that students of senior secondary science with better scientific temper scores academically performed better. Likewise, Selvendiran et al. [15] proved that students with a high scientific temper scored higher in physics. These results indicate that the development of scientific temper can lead to increased intellectual accomplishment of students by problem-solving and critical thinking. Besides, affective indicators such as scientific temper, motivation, and emotional stability have been found to predict students' performance in science [16]. The variables determine students' interest and resilience to study and learn, and place additional weight on the impact of a scientific temper on academic performance.

The capability to pay for learning fees is a strong indicator of the academic existence of students. Money worries can result in stress, decreasing study time, and reducing the use of learning materials, impacting school performance. A University of Sussex study pointed out, for instance, that students struggling with fees were finding it difficult to graduate or re-enroll for studies, with students from abroad mostly affected by the devaluation of local currencies and national economic crises at home [17]. Financial stress can further hinder intellectual performance, as individuals with financial distress may lack the intellectual capacity for study [18]. This describes the significance of economic stability in supporting students' intellectual activities. The interconnection between scientific temper and intellectual success can be mediated by economic ability among students. Students with high scientific temper can possess resilience and problem-solving abilities to succeed in financial difficulties, thus sustaining academic achievement regardless of economic challenges. Economically disadvantaged students may not be able to utilize their scientific temper to the fullest, since economic stress can undermine cognitive ability and academic interest.

This moderating effect implies that financial capability can amplify or moderate the positive effect of scientific temper on intellectual attainment. Consequently, the dismantling of financial barriers becomes imperative to place every student in a position to leverage his or her scientific temper to pursue scholarly success. An appreciation of the interconnections among financial resources, intellectual achievement, and scientific temper has important policy and practice implications for education. Mechanisms must be created to provide students with financial assistance such as scholarships, payment facility options, and training in financial literacy. The curriculum also needs to focus on building scientific temper based on research-based learning and critical thinking activities. By addressing economic challenges and encouraging scientific temper, educational systems can provide a climate conducive to intellectual achievement for all pupils, regardless of economic conditions.

Scientific temper is a way of life - an individual and social process of action and thought that employs a scientific method, questioning, observation of facts, testing, hypothesizing, analysis, and communication [19]. Researchers are keen to observe the correlation between intellectual achievement and scientific temper among students. Shivaprasad et al. [20] have studied research scholars' scientific temper and intellectual achievement in management and expressed the view that inquisitiveness and reasonableness are the most characteristic features of research scholars' intellectual achievement. Mehraj [21] concluded that there is a significant correlation among rural and urban students based on several scientific temper traits in another study. Furthermore, Andrabi and Jabeen [22] concluded a significant positive correlation between the intellectual achievement of non-tribal group youths, but ST. Kour [23] identified that asking "why" and "what" leads to new inventions, the very definition of scientific temper. Bhat and Netragaonkar [24] conducted a study in Kashmir and showed that the scientific temper among first-generation learners was greater than that of non-first-generation learners. Similarly, Maqbool [25] showed that intellectual accomplishment and scientific temper are significantly different in science and social science based on curiosity and objectivity, but not on the basis of the other three categories. Saxena [26] highlighted the importance of exploring scientific temper and its social consequences in today's situation. The study also showed that older individuals, teachers, and mentors encourage healthy arguments among children to stimulate their thinking processes. Dhar [27] also suggested that scientific temperament describes attributes like open-mindedness, humility, disciplined judgment in the absence of facts, universalism, good skepticism, objectivity, and persistence, while Nadeem and Wani [28] developed a scientific temper scale (STS) with five constructs in order to measure respondents' scientific temper.

The interconnection of intellectual accomplishment and scientific temper is complicated and is conditioned by students' economic potential. Although scientific temper supports scholastic achievement, economic adversity can condition the connection, perhaps suppressing students' capacity for achievement. Stakeholders in education have to account for such interactions to devise inclusive plans that attend to the student holistically, making provision for access to quality education and intellectual accomplishment at par. As literature shows that there is a very high correlation between scientific temper and the intellectual achievement of students, it is relevant that the scientific temper of students should be nurtured so that their intellectual achievement increases and they are rational and logical personalities. Hence, the study puts forward the following hypothesis:

H_1: Scientific temper is positively correlated with Intellectual achievement among students pursuing education in higher learning institutions.

H_2: Financial Risk operates as a mediating variable between Intellectual achievement and scientific temper in a manner such that the relationship will be more intense for low financial risk.

2. Review of Literature and Method

Figure 1 shows graphic representation of the association between scientific temper and Intellectual achievement with demographic variables. The data employed in this figure has been gathered using scientific temper scale by Nadeem and Wani [28]. The figure shows the association between different demographic variables such as age, gender, institution type,

and residence place (urban/rural) and scientific temper and Intellectual achievement. The Fig. can be utilized so that one gets to find out about the extent of such factors and how they affect scientific temper and Intellectual success in the population sample. It can provide indications about areas of focus of intervention to build scientific temper and Intellectual success across different demographics.

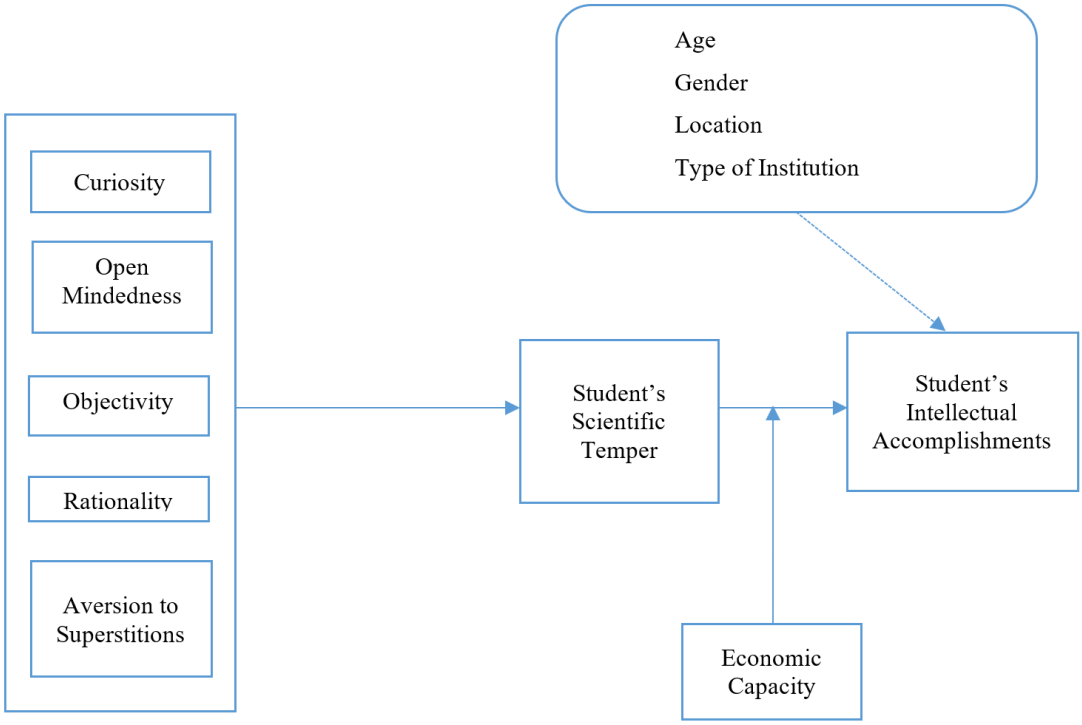

Figure 1.
Scientific temper characteristics and its effect on academic performance.

In order for students to excel academically and in any area of employment in today's competitive and fast-moving world, they need scientific balance and intellectual acuteness. Scientific temper is a habitual mode of thought, questioning assumptions, and rigorously evaluating evidence. It is the core of scientific discovery and human knowledge [29]. For the development of scientific temper in students, they should be curiosity-oriented, acceptable, and experimentation-friendly.

Intellectual achievement involves acquiring knowledge, skills, and talents such as becoming proficient in critical thinking, problem-solving, creativity, and analytical thinking skills. In past research, students endowed with scientific temperaments and intellectual abilities are likely to perform well academically and professionally [30]. Moreover, students are viewed as capable of comprehending complicated ideas, analyzing information, and solving intricate problems due to their scientific temperaments and intellectual abilities. Furthermore, students are likely to fulfill and resolve problems and challenges. Thus, students become self-assured, independent, and resilient, which helps them to be successful in their chosen field.

Especially for students when reasoning scientifically and intellectually, schools' range of learning opportunities and resources becomes important, e.g., providing mathematics, science, and other courses and providing textbooks, journals, and online materials. Teachers are also responsible for developing scientific minds and intellect in students [31]. Encouraging students to question, research new topics, and discuss in a bid to instill curiosity, critical thinking, and problem-solving. They also allow students to study and research in groups. Parents also contribute to the scientific temperament and intelligence of their children by making them read, watch documentaries, and follow their interests. They also give access to museums, libraries, and online courses. Besides formal education and the home environment, out-of-school learning activities also help children attain scientific temper and intellectual accomplishment [32]. Debating societies, science exhibitions, and similar activities help in developing critical thinking, creativity, and problem-solving. Seminars and workshops can also expose them to a broader horizon. Studies reveal that there is a significant positive correlation between scientific temper and academic achievement, with a correlation value of 0.73 at the 0.01 percent significance level [33]. There is a relationship between scientific temper and academic achievement reported that the Kruskal-Wallis test is less than 0.05 at the 5 percent level of significance [13].

The researchers have traveled to four locations in Karnataka, i.e., Mysuru, Tumakuru, Mangaluru, and Bengaluru, to collect primary data using the census method. Researchers obtained primary data through a structured questionnaire using the census method from the above-mentioned four cities. Four hundred sixteen students of B-School were selected from the aforesaid cities to obtain data. This scale includes five constructs, i.e., open-mindedness, curiosity, objectivity, resistance to superstition, and rationality. Apart from scientific temper, the present study also attempted to evaluate B-school students' academic success in terms of marks obtained by them at Pre-University College (PUC) and undergraduate (UG) levels. To do this, the researchers created a questionnaire with demographic details and questions relating to intellectual achievements.

To check the moderating effect of financial risk, the researchers included questions in the questionnaire based on available scales of financial risk.

Several statistical methods were used while analyzing data that had been gathered. A cross-tabulation of gender and location (bi-variate analysis) was conducted initially using descriptive statistics to derive the profile of the participants. The degrees of prior research of the students were examined using descriptive statistics to identify levels from their Pre-University College and Undergraduate degrees. The bond between intellectual achievement and scientific temper was examined using a regression test, which also examined the significance of this relationship between urban and rural students. Lastly, comparative analysis was done. These quantitative measures allowed us to critically analyze the data and explain the relationship between student academic performance and scientific temper at the higher education level. Hierarchical regression analysis was used to identify whether financial risk mediated the relationship between scientific temper and intellectual achievement.

It represents the average total marks the student obtains at their Pre-University College (PUC) and Undergraduate (UG) Programme. Satisfactory intellectual achievement refers to students scoring more than 70 percent of marks both at the PUC and UG levels, while satisfactory intellectual achievement is scoring 60 to 69 percent of marks. Less than 60 percent of marks is considered poor intellectual achievement.

Scientific temper refers to the capability of a person to think scientifically and behave scientifically. The Scientific Temper Scale (STS) includes five constructs: "curiosity," "open-mindedness," "objectivity," "rationality," and "aversion to superstitions." Each of these dimensions is rated on a 10-item standard questionnaire using a three-point Likert scale. Volunteers residing in urban areas belonging to municipal corporations and district city areas were accessed.

Those who come from economically disadvantaged homes are more challenged in developing a scientific temper because they have less access to educational materials and learning resources, minimizing the correlation between scientific temper and intellectual achievement [34, 35]. Economic considerations, including laboratory equipment, books, and other school material costs, can limit access to a merit-based education. In addition, poor students also face tremendous financial problems, which may affect their performance and concentration in academics. Financial risk, however, is one of the most significant possible moderating factors that help link scientific temperament to intellectual achievement. The study thus evaluates financial risk in terms of four categories such as: low risk, below average risk, moderate risk, above average risk, and high risk.

3. Results and Discussion

The demographic profile includes gender, institution location, course of study followed at the PUC/+2 level, and intellectual achievements. The location and gender of the respondents are mentioned in the table; 49.5 percent of the respondents are boys, and the remaining 54.10 percent are girls.

Table 1.
Location and Gender of the respondents.

Location	Gender		Total No. of Respondents	No. of Institutions Covered
	Boys	Girls		
Location -1 Mysuru	49	51	100	01
Location -2 Tumkuru	40	60	100	01
Location – 3 Mangaluru	53	47	100	01
Location -4 Bengaluru	49	67	116	02
Total	191	225	416	05

Table 2.
Demographic outline and Academic accomplishment of the students.

PUC / +2 Education undergone	No. of Respondents	Percent
Government-owned Institution	97	23.30
Private Institution	97	23.30
Government-funded Institution	75	18.00
Private School / College	90	21.60
Boarding School	57	13.70
Total	416	100.00
Academic accomplishments	No. of Respondents	Percent
Poor achievement	81	19.50
Good achievement	139	33.40
Very good achievement	196	47.10
Total	416	100.00

Table 2 shows that all the respondents are from urban backgrounds, among which 41.30 percent are studying in government-owned and funded schools, 44.90 percent in private schools and colleges, and the remaining 13.70 percent in boarding schools. Apart from this, almost 90.50 percent of the students have achieved above 60 percent in their Pre-University

College and Undergraduate studies, whereas the rest 19.50 percent have achieved below 60 percent, representing poor performance.

Table 3.
Academic accomplishments of different clusters.

Gender		**N**			**Mean**	**Std. Deviation**		
Boys		191			1.85	0.157		
Girls		225			2.28	0.770		
Variable	Gender	N	Mean	Std. Dev	Skewness	Kurtosis	t	Sig.
Scientific temper	Boys	191	1.851	0.157	-0.196	0.685	0.644	0.05
	Girls	225	2.28	0.770	-0.112	0.454	0.546	0.05

Table 3 presents descriptive statistics of the Intellectual achievement of various groups. In the study, it was discovered that Intellectual achievement made a significant difference for males and females.

3.1. Test Results - Regression

A regression test was done to establish whether Intellectual achievements and gender were significant or not. The regression test result is shown in Table 4.

Table 4.
Regression test Outcomes.

Gender		**Mean**	**Std. Dev**
Boys	Academic accomplishment	2.280	0.769
	Scientific temper	1.851	0.157
Girls	Academic accomplishment	2.280	0.770
	Scientific temper	1.842	0.134

Result Summary

Gender	R	R^2	Adjusted R^2	Std. Error of the Estimate	Change Statistics				
					R^2 Δ	F Δ	df1	df2	Sig. F Δ
Boys	0	0.000	-0.005	0.771	0.000	0.000	1	189	0.996
Girls	0.096	0.009	0.005	0.768	0.009	2.092	1	223	0.150

Coefficients[a]

Gender	Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
Boys	Constant	2.274	0.663		3.433	0.001
	Scientific temper	0.002	0.357	0.000	0.005	0.996
Girls	Constant	1.256	0.707		1.777	0.077
	Scientific temper	0.554	0.383	0.096	1.446	0.150

It is found that scientific temper and achievement of boys and girls have no correlation. It is also found that boys' scientific temper is greater than girls' at a 5 percent level of significance.

3.2. Relative Analysis

Relative analysis helps in identifying the significance of scientific temper in five aspects between students. Table 5 shows the outcome of the comparative analysis.

Table 5.
Comparative Analysis.

	Gen	N	Mean	Std. Dev	t	Sig.
"Curiosity"	Boys	191	1.764	0.327	0.068	0.946
	Girls	225	1.762	0.301		
	Gen	N	Mean	Std. Dev	t	Sig.
"Open-mindedness"	Boys	191	1.927	0.320	1.557	0.120
	Girls	225	1.881	0.280		
	Gen	N	Mean	Std. Dev	t	Sig.
"Objectivity"	Boys	191	1.706	0.299	-1.404	0.161
	Girls	225	1.747	0.292		
	Gen	N	Mean	Std. Dev	t	Sig.
"Rationality"	Boys	191	1.952	0.316	0.069	0.945
	Girls	225	1.950	0.309		
	Gen	N	Mean	Std. Dev	t	Sig.
"Aversion to Superstitions"	Boys	191	1.903	0.389	0.957	0.339
	Girls	225	1.869	0.350		

3.3. Univariate Analysis

A univariate test was performed to determine the dissimilarity in significance between scientific temper and academic enactment of boy and girl students. The outcome of the univariate test is shown in Table 6.

Table 6.
Between-Subjects Effects: Tests of Univariate Analysis.
Dependent Variable

Source	SoS	d.f	Mean-Square	F-stat.	Sig.
Corrected Model	1696.342	6	282.724	1.561	0.157
Intercept	10213.620	1	10213.620	56.389	0.000
"Curiosity"	527.788	1	527.788	2.914	0.089
"Open mindedness"	0.469	1	0.469	0.003	0.959
"Objectivity"	924.468	1	924.468	5.104	0.024
"Rationality"	50.781	1	50.781	0.280	0.597
"Aversion to Superstitions"	244.012	1	244.012	1.347	0.246
"Gender"	0.287	1	0.287	0.002	0.968

Note: a. R Squared = .022 (Adjusted R Squared = .008).

3.4. Gender and Intellectual Accomplishment Cross-tabulation

Cross-tabulation was drawn in order to find out the Intellectual achievement levels for female and male students. Cross tabulation between the gender and Intellectual achievement levels can be found in Table 7.

Table 7.
Intellectual Achievement and Gender Cross Tabulation.

Gender	Academic accomplishment			Total	Chi-Square	P-value
	Poor Achievement	Good Achievement	Very good achievement			
Boys	37 (45.7%)	64 (46%)	90 (45.9%)	191 (45.9%)	0.003	0.999
Girls	44 (54.3%)	75 (54%)	106 (54.1%)	225 (54.1%)		
Total	81 (100%)	139 (100%)	196 (100%)	416 (100%)		

Model Suitable Evidence

Model	Model Fit	Likelihood Ratio		
	-2 Log Likelihood	$\chi 2$	d.f	Sig.
Intercept Only	344.604			
Final	339.183	5.421	4	0.247

Pseudo R^2	
Cox-&-Snell	0.013
Nagelkerke	0.015
Mc-Fadden	0.006

It is observed that the academic achievements of the boys are greater than those of the girls.

3.5. Test - Likelihood Ratio

The correlation of academic achievement and scientific temper between private school students and government school students are computed by applying Likelihood Ratio Test. The Results of Likelihood Ratio Tests are given in Table 8.

Table 8.
Likelihood Ratio Tests.

Outcome	**Model Fit Measures**	**Likelihood Ratio**		
	-2 Log Likelihood of Reduced Model	**χ2**	**d.f**	**Sig.**
Intercept	339.183[a]	0.000	0	
Scientific Temper	344.601	5.418	2	0.067
Gender	339.193	0.010	2	0.995

The χ^2 statistic is the difference between the -2 log-likelihoods of the full model and a reduced model with a particular effect removed. The reduced model has all parameters of said effect set to zero, and the null hypothesis to be tested is whether or not this reduced model is a good fit for the data. The final model and the reduced model are equivalent because the reduced model is not introducing any additional degrees of freedom by removing the effect.

Table 9.
Logistic Regression Estimates for Predictors of Academic Accomplishment Based on Scientific Temper and Gender.

Academic accomplishment		**B**	**Std. Error**	**Wald**	**d.f**	**Sig.**	**Exp (B)**	**95% C-I**	
								Lower Bound	**Upper Bound**
Poor Achievement	Intercept	-0.150	1.722	0.008	1	0.931			
	Scientific Temper	-0.394	0.927	0.181	1	0.670	0.674	0.110	4.145
	Boys	-0.005	0.265	0.000	1	0.986	0.995	0.592	1.674
	Girls	0[b]			0				
Good Achievement	Intercept	2.910	1.441	4.079	1	0.043			
	Scientific Temper	-1.772	0.781	5.150	1	0.023	0.170	0.037	0.785
	Boys	0.019	0.224	0.007	1	0.932	1.019	0.657	1.581
	Girls	0[b]			0				

It is observed that Intellectual achievement is highly correlated with scientific temper in students who are studied in government schools and private schools.

3.6. Test for Normality Check

R programming was used to test the normality. It also identifies the outliers of the dataset. The Figure 2 illustrates the distribution of the dataset. For all the constructs, it can be seen that the data depicts a normal distribution because the data points lie on a straight line and only extend towards the extremes.

The data were processed in R Studio version 3.5.1. Normal Q-Q plotted results are provided in Figures 2 to 6.

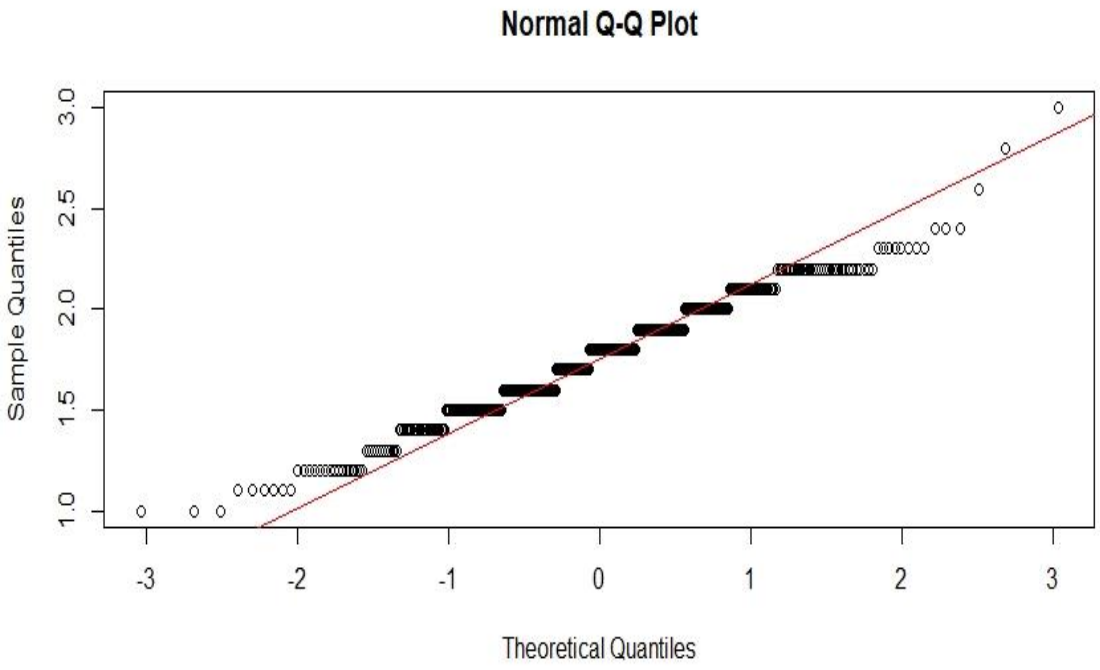

Figure 2.
Curiosity.

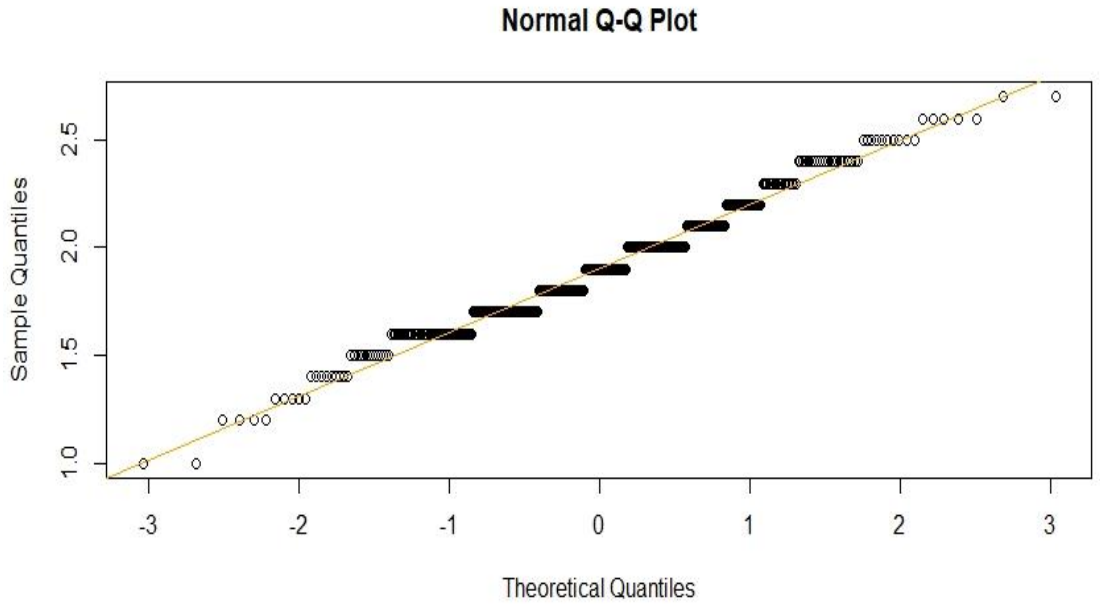

Figure 3.
Open mindedness.

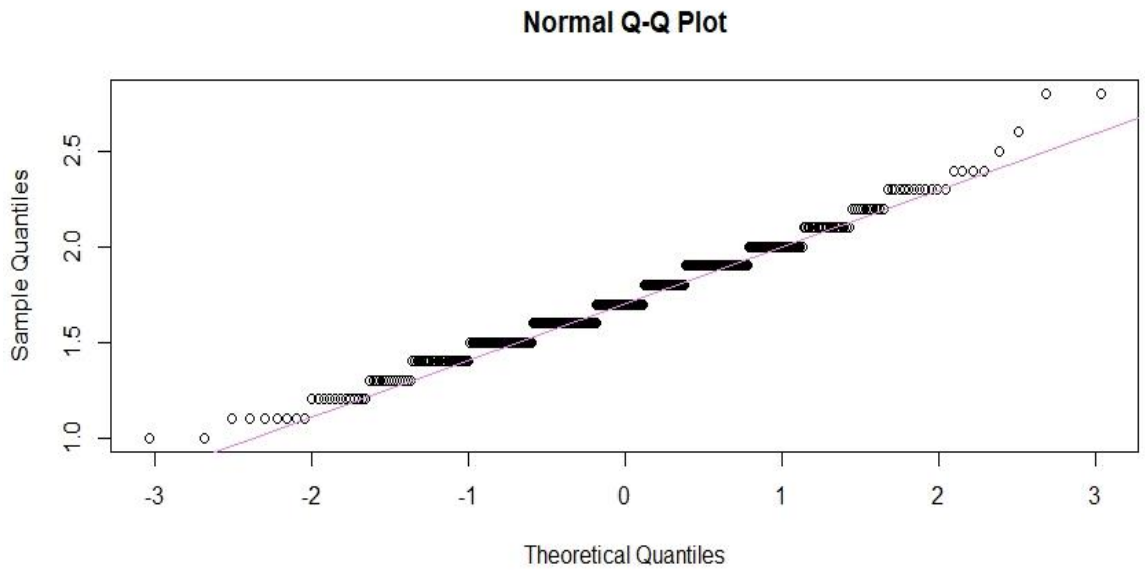

Figure 4.
Objectivity.

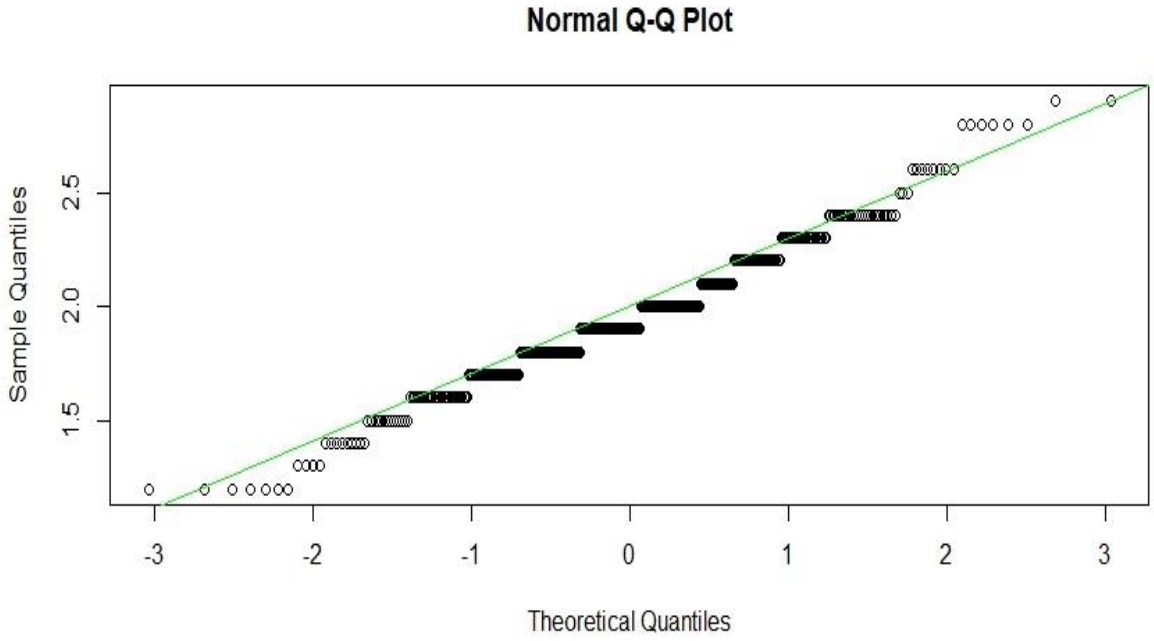

Figure 5.
Rationality.

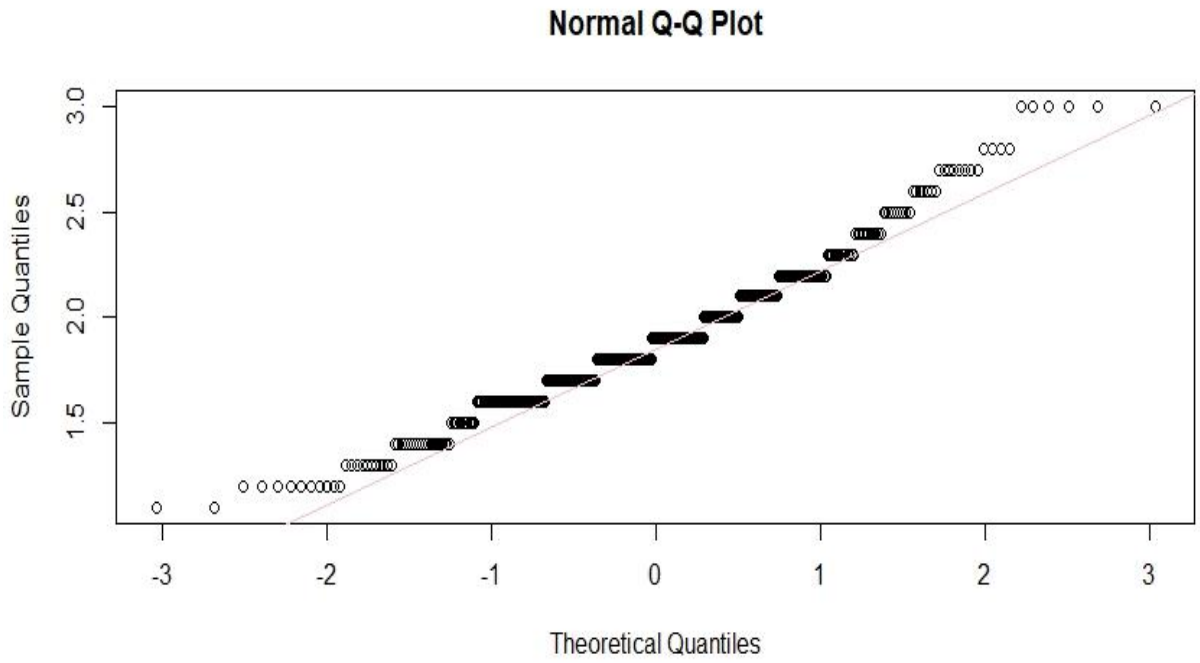

Figure 6.
Aversion to Superstition.

3.7. t- Test - Welch

To observe the significance among gender and scientific temper, the t-test Welch was applied.

Table 10.
Welch t-test Output for the five Constructs Measuring Scientific Temper.

Constructs	t-value	d.f	Sig. (2-tailed)	Mean Value	
				G1	G2
"Curiosity"	0.067	390.47	0.94	1.763	1.76
"Open Mindedness"	1.53	380.3	0.12	1.92	1.88
"Objectivity"	1.4	399.8	0.16	1.7	1.74
"Rationality"	0.069	400.3	0.94	1.95	1.95
"Aversion to Superstition"	0.694	390.3	0.48	1.91	1.88

It is also observed that the p-value is above .05 in all the constructs. Therefore, gender does not exist among the scientific temper attitudes of inquisitiveness, openness, objectivity, reasonableness, and aversion to dogma of the subjects. The observations confirm that no matter what the gender is, their scientific temper for each of the constructs remains the same. Large t-values reveal that the larger the difference is between the two sample data sets. The two samples (girls and boys) reveal that there is no difference.

3.8. Moderating Effect of Financial Risk

Hierarchical regression analysis was used in the research to investigate the moderating effect of financial risk on scientific temper and academic achievement. From the results, the coefficient for the moderating effect was valued at -1.75 with a p-value < 0.05.

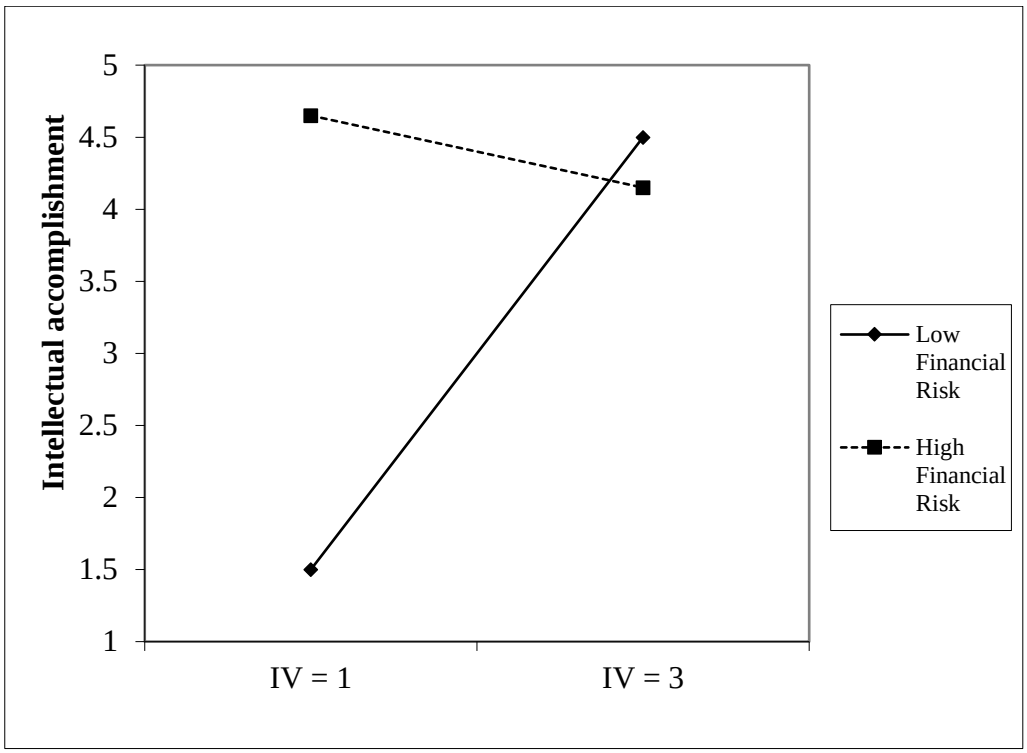

Figure 7.
Moderating effect of Financial Risk.

This suggests that the effect of scientific temper on academic accomplishment is greater for students with lower levels of financial risk, and so on. The research implies that poor family students who are exposed to higher levels of financial risk need extra resources and attention to adopt a scientific temperament and attain academic accomplishment. However, the findings highlight the imperative to break down financial barriers to education in a bid to promote equitable access to excellence in education for all students.

4. Findings

This research utilized a set of statistical tests to analyze the data. The data analysis was initially carried out through descriptive statistics, regression analysis, and hierarchical regression analysis. The use of these statistical tests assisted in carrying out the analysis of the data in an appropriate manner and provided insight into the correlation between scientific temper and academic accomplishment among higher education students. The findings of the research support that among the demographic background of the students are gender, location of the institution where they enrolled, PUC/+2 schooling completed, and criteria for judging intellectual achievements. It is evidently clear from Table 1 that the number of girl students (225) is greater than the number of male students (191). Additionally, nearly 90.50 percent of the students have scored above 60 percent in their Pre-University College and Undergraduate studies, while the remaining 19.50 percent of students have scored below 60 percent, indicating poor performance.

No major correlation was observed between the academic performance of girls and boys with the scientific temper evoked in the study. Scientific temperament was found to be higher in student boys than in girl students at the 5% level of significance. A comparative study helps to find out the relevance of scientific temper on five aspects among urban students. Univariate analysis was conducted for the relationship between scientific temper and the academic performance of girl and boy students. The academic performance of boy students is presumed to be greater than the academic performance of girl students. Financial risk in the research was used to assess its moderating effect on the relationship between scientific temper and academic performance through hierarchical regression analysis. The size of the effect coefficient of moderation was -1.75 and significant. It indicates that students with lower financial risk exert a greater influence on intellectual performance, and vice versa.

The research emphasizes the need to provide solutions to financial limitations on education in order to encourage equal access to good quality education to all students. Based on the findings, students who have been exposed to greater financial risk need greater support and facilities to cultivate a scientific temperament and academic accomplishment. The study holds important implications for the relationship between scientific temper and academic achievement for students of higher learning, which is relevant to inform education programs and policy. The study has implications for teachers and policymakers in that it reveals the necessity for developing scientific temper among low-income students, particularly, and remedying financial access barriers to provide quality education opportunities to achieve fairness.

The research provides a range of theoretical implications that can inform future study and pedagogy. To begin, the findings of the study account for the theory that the scientific temperament of a student influences his or her academic achievement directly by demonstrating that academic achievement and gender have no relationship between them in both male and female students. Future research can control for other mediating and confounding variables for this relationship.

Second, the findings of the study show at a 5% significance level, boy students are more scientific in nature than girl students, which accords with the current body of research that has found gender differences in scientific behavior and attitude. That conclusion suggests that interventions to build a scientific temper may have to be tailored for boys and girls. Third, the study's evidence that economic risk mediates the scientific temperament-intellectual ability relationship highlights the importance of addressing socioeconomic disparities in education [36]. Subsequent studies can explore the manner in which financial risk influences performance and seek to minimize its impact.

The Indian higher education system has experienced revolutionary changes over the past few years as a result of the increasing power of market forces [37]. Higher Education Institutions (HEIs) in India are now expected to compete with one another to provide efficient, competitive, and customer-focused services [38]. This change from a classical model of academe to one that is more market-oriented led to the creation of a new student identity as 'customers' of higher education.

In India, where the traditional perception of education as a means of gaining knowledge, skills and values has prevailed, this new profile has upset the traditional role of education and is altering students' expectations. In addition to academic excellence, students now expect a variety of comfort and convenience-oriented amenities and services from their higher education institutions. Although this consumerism trend in higher education has raised concerns regarding the commodification of education and its impact on education quality. Therefore, there is a need to strike a balance between academic rigor and the expectations of students as 'customers'. The traditional approach to education, which emphasizes intellectual inquiry and critical thinking, is now in competition with the demand for career-focused courses and industry-specific skills [39]. While academic excellence remains a top priority, higher education institutions are also under pressure to offer courses that are market-driven and equip graduates with employability skills. The rising cost of education poses a second difficulty for Indian higher education institutions. As HEIs strive to provide better amenities and services, the cost of education has considerably increased, rendering higher education unaffordable for many students from low-income backgrounds. This has raised concerns regarding educational equity and access, especially for marginalized communities.

In response to these challenges, a number of Indian HEIs are employing innovative educational strategies [40]. The integration of industry-specific skills into the curriculum enables students to gain the competence for employment alongside academic excellence. A second strategy is to adopt a more student-centered approach, in which the requirements and aspirations of the students are prioritized. However, despite the fact that these approaches may address some of the challenges confronting HEIs in India, they also raise concerns regarding the commodification of education and its effect on the quality of education. The emphasis on employability and market-driven coursework may result in a restricted focus on vocational training at the expense of intellectual inquiry and critical thinking. In addition, rising education costs may restrict access to education and perpetuate social inequality.

5. Conclusion

The research was conducted with the intention of developing the correlation between scientific temper and academic performance among business students from four locations in Karnataka, India. Data were collected using the Scientific Temper Scale (STS) questionnaire, and respondents' information was statistically validated. No correlation between scientific temperament and intellectual achievement was observed between male and female students. However, male students' scientific temperament was significantly higher compared to that of female students.

The study also practiced measures for the development of scientific temper among students, such as integrating critical thinking and design thinking into learning and following new methods of education. The norms of the Ministry of Human Resource Development [41] of India should be adopted too, so that the scientific temperament of the students could increase further at their initial school stage.

In addition to the significance of cultivating a scientific temper and overcoming the economic limitations of education, the findings of the study have significant policy and program implications for education. The research emphasizes extending special care and assistance to students belonging to poor families to nurture a scientific temper and perform academically well. These findings can help teachers and policymakers formulate effective strategies to facilitate a scientific temper among all, irrespective of their socio-economic status. By surmounting the economic barriers to education and imparting a scientific temper, we can provide equal access to good quality education and empower students to reach their full potential.

The research has a few limitations, including data collection from just four cities in Karnataka, India, and the measurement of scientific temper using only five dimensions. It can be improved by adding more dimensions such as innovation, critical thinking, and design thinking. A five-point scale would be more beneficial compared to the current three-point scale. STS can be enhanced with more skill-based types of questions as a process of questioning and engagement in science-based projects. In this study, only intellectual academic performance was measured. Other areas such as co-curricular achievement, extracurricular achievement, extended activities, and general student development need to be measured. The future also includes the examination of higher secondary students and high school students' scientific temper and the development of a model on the scientific temper characteristics based on different dimensions.

References

[1] P. Chacko, "The search for a scientific temper: Nuclear technology and the ambivalence of India's postcolonial modernity," *Review of International Studies*, vol. 37, no. 1, pp. 185-208, 2011.

[2] G. Raza, *Scientific temper and cultural authority of science in India. In The Cultural Authority of Science*. United Kingdom: Routledge, 2018.

[3] S. Sahoo, "Recast (e) ing scientific temper in a democracy: The eccentricities of Ambedkarian science," *Sociological Bulletin*, vol. 69, no. 2, pp. 174-190, 2020.

[4] J. A. Cagle and M. S. Baucus, "Case studies of ethics scandals: Effects on ethical perceptions of finance students," *Journal of Business Ethics*, vol. 64, pp. 213-229, 2006.
[5] A. E. Halliburton, M. B. Hill, B. L. Dawson, J. M. Hightower, and H. Rueden, "Increased stress, declining mental health: Emerging adults' experiences in college during COVID-19," *Emerging Adulthood*, vol. 9, no. 5, pp. 433-448, 2021.
[6] R. R. Ferreira, "A review of case analysis and simulation for use in hospitality marketing education," *Hospitality & Tourism Educator*, vol. 4, no. 4, pp. 16-19, 1992.
[7] K. Byrd, W. Achilles, J. Felder-Strauss, P. Franklin, and J. Janowich, "Effective outreach strategy and programs in higher education," Faculty Publications and Presentations, No. 18, 2012.
[8] D. H. Monk, "Education productivity research: An update and assessment of its role in education finance reform," *Educational Evaluation and Policy Analysis*, vol. 14, no. 4, pp. 307-332, 1992.
[9] S. E. Murray, W. N. Evans, and R. M. Schwab, "Education-finance reform and the distribution of education resources," *American Economic Review*, pp. 789-812, 1998.
[10] P. Gerrans and R. Heaney, "The impact of undergraduate personal finance education on individual financial literacy, attitudes and intentions," *Accounting & Finance*, vol. 59, no. 1, pp. 177-217, 2019.
[11] Scientific Temper, "Wikipedia," Retrieved: https://en.wikipedia.org/wiki/Scientific_temper. [Accessed 2024.
[12] U.P. Basic Education Dept *U.P. basic education dept to promote scientific temper among students*. India: Hindustan Times, 2022.
[13] G. Yashodha, "The effectiveness of scientific temper among students of PG and research departments in Tiruchirappalli, Tamil Nadu," *Journal of Emerging Technologies,*, vol. 6, no. 3, pp. 154–162, 2019.
[14] R. D. Bhatnagar, "Study of the scientific temper of senior secondary science students," *International Journal of Advanced Research*, vol. 9, no. 5, pp. 452–458, 2021.
[15] R. Selvendiran, A. Tholappan, and K. Anandan, "Scientific temper and achievement in physics," *International Journal of Early Childhood Special Education*, vol. 14, pp. 3220–3223, 2022. https://doi.org/10.9756/INT-JECSE/V14I1.386IJES
[16] H. Lalhminghlui and R. Lalhriatpuii, "Predicting students' achievement in science from selected affective factors," *SN Social Sciences*, pp. 1-33, 2021. https://doi.org/10.1007/s43545-020-00040-2
[17] The Guardian, "Sussex university students warned they may not graduate if fees remain unpaid," Retrieved: https://www.theguardian.com/education/article/2024/may/28/sussex-university-students-warned-they-may-not-graduate-if-fees-remain-unpaid, 2024.
[18] A. Mani, S. Mullainathan, E. Shafir, and J. Zhao, "Poverty impedes cognitive function," *Science*, vol. 341, no. 6149, pp. 976-980, 2013. https://doi.org/10.1126/science.1238041
[19] J. Nehru, *The discovery of India*. Oxford: Oxford University Press, 1958.
[20] G. Shivaprasad, C. Sengottuvelu, and R. K. PremaRajan, "Analysis on scientific temper and intellectual accomplishments among research scholars in management studies discipline," *Journal of Positive School Psychology*, vol. 6, no. 6, pp. 7249–7258, 2022.
[21] R. Mehraj, "Study on scientific temper among secondary school learners," *International Journal for Advance Research in Science and Engineering*, vol. 7, no. 4, pp. 571-580, 2018.
[22] A. A. Andrabi and N. Jabeen, "Scientific temper and academic achievement among tribal and non-tribal students," *International Journal of Indian Psychology*, vol. 4, no. 3, pp. 5–12, 2017. https://doi.org/10.25215/0403.081
[23] S. Kour, "Scientific temper among academically high and low achieving adolescent girls," *Journal of Education and Practice*, vol. 6, no. 34, pp. 96-101, 2015.
[24] S. A. Bhat and Y. D. Netragaonkar, "Scientific temper and Intellectual accomplishment of First and non-first generation learners in Kashmir," *School Research Journal of Humanities, Science, Engineering and Language*, vol. 1, pp. 660–669, 2014.
[25] A. Maqbool, "To study the scientific temper and intellectual accomplishment of science and social science stream adolescent in educational zone Dangiwacha District Baramulla Kashmir," *International Journal of Humanities and Social Sciences Research*, vol. 1, no. 1, pp. 83–89, 2014.
[26] A. Saxena, "Understanding scientific temperament and assessing its social relevance," *Journal of Scientific Temper*, vol. 2, no. 1 & 2, pp. 121–140, 2014.
[27] P. L. Dhar, "Developing scientific temper," Retrieved: https://pldhar.files.wordpress.com/2009-09/scientific-temper.pdf. [Accessed 2009.
[28] N. A. Nadeem and S. R. Wani, *Scientific temper scale, english version*. Srinagar, India: Faculty of Education, University of Kashmir, 2008.
[29] M. A. Jaworek, "The effects of temper traits and study method (full-time vs. extramural) on Polish students' adaptability to online learning as a result of COVID-19. A pilot study," *Sustainability*, vol. 13, no. 24, p. 14017, 2021. https://doi.org/10.3390/su132414017
[30] M. Walter, L. Weber, and L. Temper, "Learning and teaching through the online environmental justice atlas: from empowering activists to motivating students," *New directions for teaching and learning*, vol. 2020, no. 161, pp. 101-121, 2020.
[31] J. Gorham and D. M. Christophel, "Students' perceptions of teacher behaviors as motivating and demotivating factors in college classes," *Communication Quarterly*, vol. 40, no. 3, pp. 239-252, 1992.
[32] V. Costenbader and S. Markson, "School suspension: A study with secondary school students," *Journal of School Psychology*, vol. 36, no. 1, pp. 59-82, 1998.
[33] M. S. Bhat, "Scientific temper and academic achievement of Gujjar and Non-Gujjar students – A comparative study," *Online Submission*, vol. 22, no. 1, pp. 315-325, 2017.
[34] A. G. Rabbani, W. Heo, and J. M. Lee, "A latent profile analysis of college students' financial knowledge: The role of financial education, financial well-being, and financial risk tolerance," *Journal of Education for Business*, vol. 97, no. 2, pp. 112-118, 2022.
[35] S. Chatterjee and F. Ionescu, "Insuring student loans against the financial risk of failing to complete college," *Quantitative Economics*, vol. 3, no. 3, pp. 393-420, 2012.
[36] M. Tas, H. B. Saydaliev, and S. Kadyrov, "Impact of collaborative, entrepreneurship education on the financial risk taken by university students," *Industry and Higher Education*, vol. 36, no. 5, pp. 595-603, 2022.
[37] B. Rafi and P. Lewis, "Indian higher education students in Australia: Their patterns and motivations," *Australian Journal of Education*, vol. 57, no. 2, pp. 157-173, 2013.

[38] N. Garg, A. Talukdar, A. Ganguly, and C. Kumar, "Knowledge hiding in academia: An empirical study of Indian higher education students," *Journal of Knowledge Management*, vol. 25, no. 9, pp. 2196-2219, 2021. https://doi.org/10.1108/JKM-10-2020-0783
[39] P. G. Altbach, "The dilemma of change in Indian higher education," *Higher Education*, vol. 26, no. 1, pp. 3-20, 1993.
[40] J. O. Fernandes and B. Singh, "Accreditation and ranking of higher education institutions (HEIs): Review, observations and recommendations for the Indian higher education system," *The TQM Journal*, vol. 34, no. 5, pp. 1013-1038, 2022. https://doi.org/10.1108/TQM-04-2021-0115
[41] Ministry of Human Resource Development, *National education policy 2020*. India: Government of India, 2020.