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Scientific attitude of secondary school teachers of Jammu & Kashmir and Ladakh: A comparative study

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Abstract---The primary objective of this investigation is to find out the scientific attitude of secondary school teachers of Jammu & Kashmir and Ladakh. The study is descriptive- survey in nature. The method of stratified random sampling was used to select a sample size of 600 secondary school teachers, with 300 teachers from each UT. The data was collected from different secondary school teachers by using Scientific Attitude scale (2006) standardized and developed by Shailaja Bhagwat. The data were examined with the help of percentage, mean, S.D. and t-test. The descriptive analysis of this research showed that 3.66% of Jammu & Kashmir and 2.33% of Ladakhi secondary school teachers have very high scientific attitude. 11.00% of secondary school teachers of Jammu & Kashmir and 7.00% of Ladakhi secondary school teachers were found to have a high scientific attitude. The data further revealed that majority i.e., 63.00% of secondary school teachers in Jammu & Kashmir and 64.33% of secondary school teachers in Ladakh were found to have a moderate scientific attitude. 21.00% of Jammu & Kashmir secondary school teachers and 24.66% of Ladakh secondary school teachers was discovered to have a low level of scientific attitude. A small chunk i.e., 1.33% in Jammu & Kashmir and 1.66% in Ladakhi secondary school teachers was discovered to have a very low scientific attitude. The inferential analysis revealed that there is significant mean difference between the two groups, which confirms that the groups differ significantly on scientific attitude.

Keywords---scientific attitude, secondary school teachers, stratified sampling, descriptive analysis, inferential analysis.

Introduction

Education is a strong tool for socioeconomic and significant innovation, all of which are required for the achievement of national objectives to be achieved. Contextually, the term "education" comes from the Latin term "educere," which literally translates as "to discover," "to raise," or "to sustain," as well as "to pull out." The term "effort to draw out" refers to the efforts made throughout the education process rather than the work put in. Another school of thought holds that the term "education" refers to the act of training or instructing.

At the beginning of time, when man became conscious of his circumstances and began to reflect on the environmental factors wherein he found himself immersed, this newfound understanding of the physiological world not only altered his perception of his surroundings, but it also altered his outlook on and reaction to the challenges he encountered in his daily life. Science is defined as the systematized reservoir of human thought that has been accumulated as a result of the generalization and interconnection of diverse independent facts. The term "science" derives from the Latin word "scientia," which literally means "to know." The Guidelines for Science Education say that science can be defined as "a cumulative and infinite sequence of scientific observations that leads to the development of ideas and theories, with both these ideas and theories based on evidence."

In light of new empirical facts, theories may need to be revised or revised again. In science, information is both a collection of facts and an ongoing process of accumulating and refining facts. To a large extent, in the middle Ages, science was thought of as part of philosophy, but it was called "natural science." Since the 16th century, science has progressed very quickly thanks to the brains of people who did most of their research on their own in their fields of study.

Science is really a body of knowledge that is always growing and growing. It is dedicated to finding out what nature is all about. Because of this, it has had a significant impact on humanity, and it is impossible to envision a future without scientific advancements. In those days, scientific understanding had little impact on the everyday lives of ordinary people. However, since the turn of the century, even the average person has become conscious of the effects of science on society as well as the dawning of a new era in science. When we organize our information in a way that dictates or makes feasible the description of more of the latent potential found in individuals and in their environments, we can say that we are doing science. As a result, science education should be used to protect and enhance the distinct potentialities of each kid born. For example, according to Digumarthi Bhaskara Rao (2004), "science has a universal character, and it has no boundaries of any type." The scientific revolution originated in Western Europe, which was the birthplace of modern science, but it has already spread throughout the world, people all across the world benefit from the products of one country's scientific ambitions. It is a win-win situation. In science, there are no distinctions between castes, creeds, or colours, and there are no territorial boundaries. "It is thought that this kind of structure would have an effect on how the students see things and helps them become more open-minded," says Page 3. The scientific revolution causes behavioural changes in the student, as well as the

enrichment of his or her personality and character. Inventiveness and constructive creativity are facilitated by scientific investigation. The learner acquires the habit of seeking the truth as a result of this experience. These characteristics have an impact on the student's pattern of behaviour. It is an important part of science education to emphasise that anything the student knows will have immediate applicability in his or her environment. In the process of acquiring science, students gain valuable problem-solving skills that can be applied in many different situations. The stories of scientists that are in the science class help to teach students how to be scientific.

Scientific Attitude

The purpose of learning is to mould the attitude of the student so that it satisfies the requirements and standards of the public sphere. There are a lot of different characteristics that behaviour is measured against. Attitude is among the most significant characteristics. The way in which one thinks about things in this environment, be they a person, a concept, or an object, has a significant impact on how one behaves in response to those things. His attitudes have an impact not only on his ability to learn a topic but also on his development of habits, passions, and other psychological tendencies. According to Petty (1981) "The distinguishing feature of attitudes would be that they convey an appraisal of various objects" (p.382). The judgement of people, things, situations, actions, and concepts in a good or negative light can both be considered to be attitudes. An attitude is "a behavioural propensity that is exhibited by judging an enable precise with some level of favour or dislike," according to one definition. Attitudes can be positive or negative. Thurston said that a person's attitude is made up of all of their tendencies and preferences.

As per the International Encyclopedia of Education, a person's science attitude is how he or she feels regarding science in general. With a scientific attitude, an individual is more likely doing the right thing after assessing the pros and cons of different options and making logical arguments supported by evidence. Scientific attitude has been really made up of a quantity of lifestyles or propensities to respond to new or difficult situations in the same way over and over again. Some of these lifestyles or predispositions are being accurate, intellectually truthful, and open-minded, not making snap decisions, being critical, and always looking for a real causation link. This is a way of thinking. Scientists' ways of thinking are usually associated with their attitudes. These lifestyles are essential not just for scientists but for everyone in their everyday lives and viewpoints. Bhaskara Rao wrote in 1986, "It has now been realised it without improving a scientific attitude, whatever majority of scientific knowledge is useless."

Science knowledge doesn't add much to the growth of a country or even to the system of socialization (p.60). Scientific attitudes have qualities that are assumed to be right or wrong, but they don't say anything about how they are good or bad. To avoid confusion, scientific attitudes might be better called "scientific attributes." Scientific attitudes include being Rational, curious, open-minded, being intellectually honest and Suspended judgment. Scientific attitudes are ways of thinking that tend to go in a certain direction. One of the goals of teaching science is to help students think more like scientists. That is a very important

result of the way science is taught. During the process of learning science, the only way to develop a scientific mindset is through direct experience and careful observation. The instructor has to put the children in situations where there is interaction between teacher and students or out in the field where they can see or feel how important it is to create this attitude.

Some related studies

Kumar & Indu (2021) investigated, “tribal children studying in residential tribal Ashram school which is fully functional under the supervision of Kerala State Government. In this study it was found that there are different levels of Scientific Attitude among secondary school tribal students. It was also found that there is no significant difference in Scientific Attitude among secondary school tribal students based on gender of the students.” Aggarwal (2020) conducted, “study with a goal to determine the scientific attitudes of science and arts secondary school teachers in the Agra region regarding sex. A sample of 100 teachers working in secondary schools in Agra district was given the Scientific Attitude Scale (SAS) developed and designed by SC Gakhar and Dr. Amandeep Kaur. The mean, S.D. and t-test was used to analyze the data. It was found that female secondary school teachers have a more scientific attitude than male secondary school teachers.” Rajendran, P. (2020) explored, “to determine the scientific attitude of Students in the Perambalur district. The researches major findings were: B.Ed. trainees had an average level of scientific attitude. Female B.Ed trainees have higher scientific aptitude than male trainees. Second-year B.Ed. pupils were more scientific than first-year pupils. Urban B.Ed. trainees are more scientific than rural ones. Trainees in both nuclear and joint families have the same level of scientific attitude.” Sakin (2020) explored, “to identify the scientific attitudes of pre-service teachers in the preschool education programme for sustainable professional development. In this study, a post-test control group design was used along with a quantitative research method. The "Scientific Attitude Inventory-II" (SAI-II) was used to measure the scientific attitudes of pre-service teachers in a sample of 89 university students. It was found that the students who scored highest in the sub-dimensions of readiness to do scientific research were included in the overall attitude score of the control group. Thus the findings showed that the average scientific attitude score for the experiment group was more positive than the average score of the control group. This is important because scientific attitudes are important for long-term professional development.” Rehman & Naz (2019) conducted, “a study to find out the relationship between science teachers' attitudes and students' academic achievement. A survey-style questionnaire was created for this purpose in order to gather information about science teacher's academic and professional qualifications and experience. To determine science teachers' attitudes toward science, a 50-item attitude scale with five components was developed and adapted from TOSRA. The survey was given to 80 secondary school science teachers from 40 different institutions, with a mix of gender, urban/rural, and private/public secondary schools. The results of quantitative data analysis revealed an inverse relationship between teacher's academic and professional qualifications and their students' academic achievement. The majority of teachers had an exceptionally positive attitude toward their specific subject. A positive association was also discovered between science professors' attitudes toward science and their

students' academic results. More research may be conducted to determine the causes of a negative link between educators' academic/professional qualifications and their students' performance, as well as to investigate specific elements that influence educators' attitudes toward science." Ualesi & Ward (2018) studied, "teacher's attitudes using van Aalderen-Smeets et al. (2012)'s multidimensional framework. Concerns have been expressed around the world that teachers' their lack of interest in science education hurts the pupils they teach. While the teacher has been mentioned as having a role in students' attitudes, there has been little written regarding teachers' view. In order to close this gap, the investigation looks at how six Year 8 teachers in a New Zealand middle school feel about teaching science. Individual semi-structured interviews was undertaken to examine the teachers' attitudes. The teachers' perspectives were explored through autobiographical data as well as semi-structured interviews. The factors that influence their happiness or unhappiness are examined. Implications for supporting science teachers through the learning and growth opportunities for professionals are discussed in order to foster favorable attitudes towards science teaching." Nooguri (2018) investigated, "the scientific attitude of secondary school science teachers in relation to male and female and high school management type. The study was conducted from June to April of the 2016–2017 academic years. The study's sample included 50 secondary school science teachers from Telangana's Mancherla District. In this study, a survey method was used. Data was analyzed by using mean, S.D. 't'-test. The study's findings showed that there was no significant relationship among male and female, high school management type, and prospective teachers' attitudes toward scientific education". Roy (2018) concluded, "Scientific attitude to be a primary goal of science teaching. Attitudes are formed over time, not inherited. They can be altered or changed over time. Culture, tensions, wants, emotions, experiences, and other factors all have a role in changing attitudes. In the sphere of science, we see a similar mindset, which we refer to as a "scientific attitude." The scientific attitude here refers to one's mental propensity or desire to pursue scientific information. Teachers should strive to make science learning a pleasurable experience. At the level of teaching and learning, the teacher's views have a significant impact on science subjects in the classroom. It should be noted that while teaching science-related courses in schools, laws, information, and facts must be transmitted in a reliable and valid manner. As a result, it is easier to comprehend the value of science and the importance of learning science." Pitafi & Farooq (2012) studied, "to measure the scientific attitude of secondary school students. The data was collected from ten schools of District Rajanpur, Pakistan. Through randomization method a 100 students was selected. The data was collected through questionnaire and it consists eight main elements of scientific attitude which are: curiosity, rationality, willingness to suspend judgment, open mindedness, critical mindedness, objectivity, honesty and humility. By using statistical tools, the empirical data was analyzed. The mean score for each items, eight parts and over all were calculated. The result showed that the attitude of the students is slightly scientific."

A summary of scientific studies shows that India has contributed little in this field. Several researchers tried to cover the above-mentioned science research. Each of the above research relates to the current research's own value. In fact, a comparative analysis of how teachers in the Indian states of Jammu and Kashmir

and Ladakh feel about science is an area of education research that hasn't been looked into yet. As the findings shows little work is done on the issue. This component, which the investigator has occupied, has never been studied before.

Rational and objective of the study

Science knowledge doesn't add much to the growth of a country or even to the system of socialization. Scientific attitudes have qualities that are assumed to be right or wrong, but they don't say anything about how they are good or bad. To avoid confusion, scientific attitudes might be better called "scientific attributes." Scientific attitudes include being Rational, curious, open-minded, being intellectually honest and Suspended judgment. Our culture is quite scientific. Science is becoming integral to our lives, and we can't imagine a universe without it. The marvels of science have changed our civilization into a scientific one. Thus, there's little need to justify science's role in a school's general education programme. Science should reduce obstructionism and sex, caste, religious, and linguistic stereotypes. Our country needs more scientists in this age of research and technology. Moreover, it is only conceivable if the teaching of science can attract a large number of pupils, as it satisfies the want to know, fosters democratic behaviour, and promotes scientific attitudes and critical thinking.

Teachers should foster a scientific attitude. Only teachers can enthuse students about technology. Through their dedication, many learners acquire lasting scientific curiosity, resilience, and an appreciation for science. So a teacher, science or non-science, should have a favorable attitude towards science to impart it to pupils. Attitude displays a person's inner view; hence it's important for schooling. If a person wants something, he will work hard to get it. He avoids objects he dislikes. A teacher's role in developing pupils' scientific attitudes is crucial. Only under the stunning personality and able leadership of the teacher can achieve new heights of glory. In a developing society, teachers have a significant obligation to produce excellent citizens who can carry out their vocation properly and productively. Modern teachers are expected to prepare students to attain their goals. Aspirations and teachers' attitudes affect pupils' scientific attitude. Hence, the current study aims to assess the scientific attitude of secondary school teachers of Jammu & Kashmir and Ladakh, based upon the following objectives:

1. To study the Scientific Attitude of secondary school teachers of Jammu & Kashmir and Ladakh.
2. To compare the scientific attitude of secondary school teachers of Jammu & Kashmir and Ladakh
3. To compare the scientific attitude of male and female secondary school teachers of Jammu & Kashmir and Ladakh

Hypothesis

The following hypothesis were formulated for this research

H₁. Secondary school teachers of Jammu and Kashmir and Ladakh differ significantly on scientific attitude.

H₂. Male and female secondary school teachers of Jammu & Kashmir differ significantly on scientific attitude

H₃. Male and female secondary school teachers of Ladakh differ significantly on scientific attitude

Methodological framework

The present research study was conducted by using descriptive method of research. The study was conducted to measure the scientific attitude of secondary school teachers of Jammu & Kashmir and Ladakh. In this study, the secondary school teachers of Jammu & Kashmir and Ladakh consists the sample for the present investigation. The sample of 600 secondary school teachers was selected randomly from different secondary schools of Jammu & Kashmir and Ladakh by using stratified random sampling technique. The breakup of the sample is as under:

1. Jammu and Kashmir secondary school teachers-300
2. Ladakh secondary school teachers-300

The scientific attitude scale developed by Shailaja Bhagwat was used by the researcher to collect the data. The data was collected through the personal visit of these schools with the help of above- mentioned scale. The data was put into a table as per the manual of the scale. The investigator used percentage statistics, mean, S.D. and t-test to analysis the data and draw the inferences

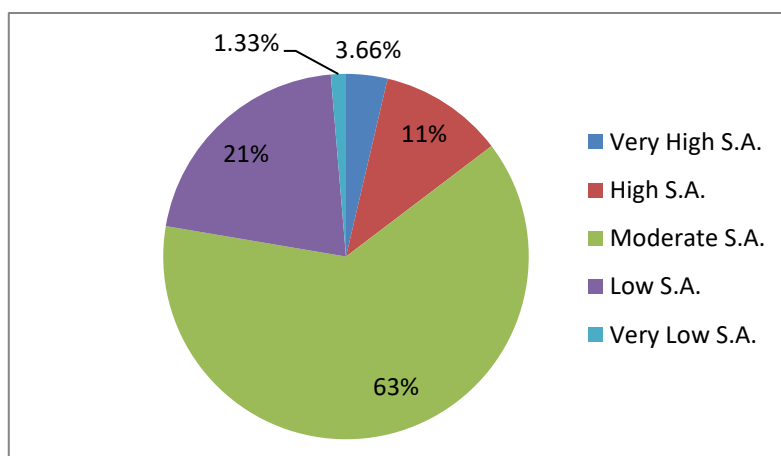
Table 1 showing the percentage distribution of scientific attitude of secondary school teachers of Jammu & Kashmir and Ladakh

Score obtained on scientific attitude	J&k Secondary school teachers	Percentage %	Ladakhi Secondary School Teachers	Percentage %	Category
92 and above	11	3.66	07	2.33	Very high
77 to 91	33	11.00	21	7.00	High
62 to 76	189	63.00	193	64.33	Moderate
57 to 61	63	21.00	74	24.66	Low
42 and below	04	1.33	05	1.66	Very low

A quick glance from the above table reveals the level of scientific attitude of secondary school teachers in Jammu and Kashmir and Ladakh. The statistical data reveals that 3.66% of Jammu & Kashmir and 2.33% of Ladakhi secondary school teachers were found to have very high scientific attitude. 11.00% of secondary school teachers of Jammu & Kashmir and 7.00% of Ladakhi secondary

school teachers were found to have a high scientific attitude. The data further reveals that a good percentage of 63.00 of secondary school teachers in Jammu & Kashmir and 64.33% of secondary school teachers in Ladakh were found to have a moderate scientific attitude. 21.00% of Jammu & Kashmir secondary school teachers and 24.66% of Ladakh secondary school teachers were found to have a low level of scientific attitude. A small chunk of 1.33% of Jammu & Kashmir and 1.66% of Ladakhi secondary school teachers were found to have very low scientific attitude.

Scientific attitude of secondary school teachers of Jammu & Kashmir



Scientific attitude of secondary school teachers of Ladakh

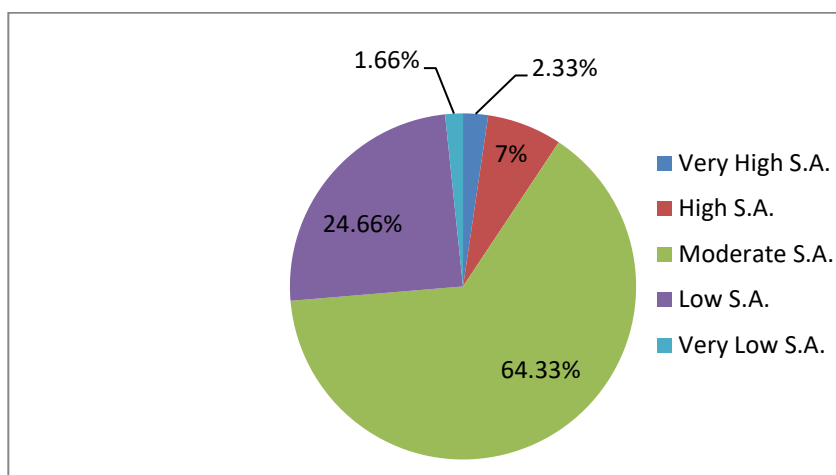


Table 2 showing the mean comparison of scientific attitude among secondary school teachers of Jammu & Kashmir and Ladakh

Group	N	Mean	S.D	t-value	Level of Significance

J&K	300	91.01	10.33	2.53	Significant at 0.05 Level
Ladakh	300	88.96	9.92		

The table 2 shows the mean comparison between secondary school teachers in Jammu & Kashmir and Ladakh on scientific attitude. The data shows that there is significant mean difference between the two groups, which confirms that the groups differ significantly at 0.05 level of significance. The mean difference favours the teachers of Jammu & Kashmir, which means that Jammu & Kashmir teachers have higher degrees of scientific attitude as compared to teachers of Ladakh.

Thus in the light of the above research evidence, the hypothesis No.1, which reads as, *"Secondary school teachers of Jammu & Kashmir and Ladakh differ significantly on scientific attitude."* Stands accepted.

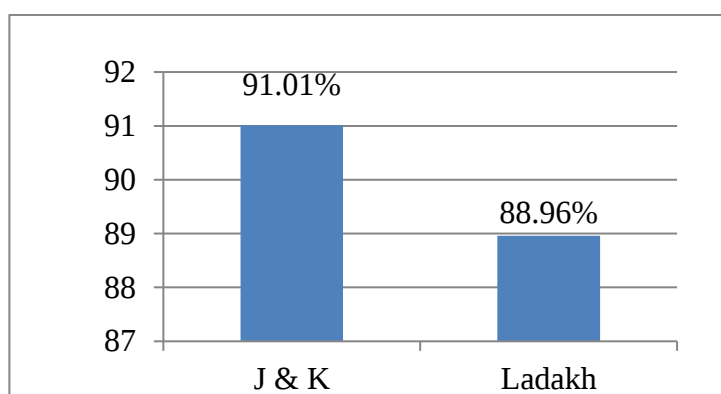


Table 3 showing the mean comparison of scientific attitude between male and female secondary school teachers of Jammu & Kashmir

Group	N	Mean	S.D	t-value	Level of Significance
Male	150	89.06	9.31	0.14	Not Significant
Female	150	88.91	8.93		

A quick glance of the table 3 shows a comparative analysis of male and female secondary school teachers of Jammu & Kashmir. The data reveals that there is no significant mean difference between the two groups, which confirms that the groups have almost similar scientific attitude. Though the mean difference favours male school teachers of Jammu & Kashmir, but the difference failed to arrive at any confidence level.

Thus in the light of the above research evidence, the hypothesis No.2, which reads as, *"Male and female secondary school teachers of Jammu & Kashmir differ significantly on scientific attitude"* stands reject.

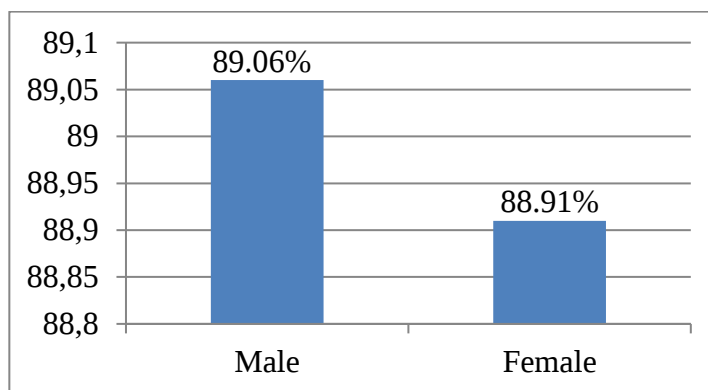
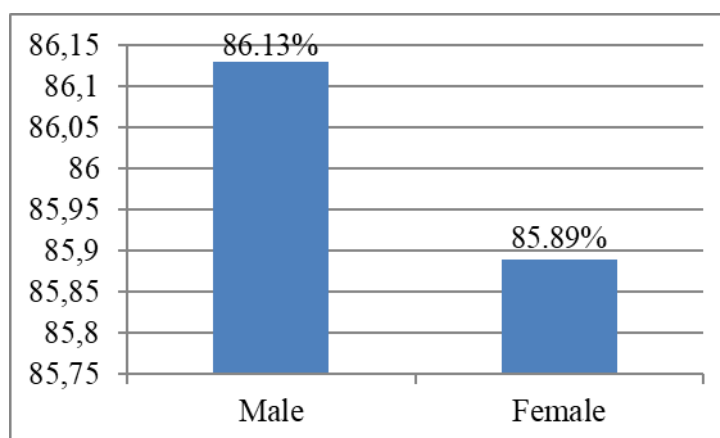


Table 4 showing the mean comparison of scientific attitude between male and female secondary school teachers of Ladakh

Group	N	Mean	S.D	t-value	Level of Significance
Male	150	86.13	8.37	0.25	Not Significant
Female	150	85.89	7.91		

A quick look at the table 4 shows a comparative analysis of male and female secondary school teachers of Ladakh. The data reveals that there is no significant mean difference between the two groups which confirms that the groups are equal on scientific attitude. The mean difference favours the male teachers of Jammu & Kashmir, but the difference is failed to arrive at any confidence level.

Thus in the light of above research evidence, the hypothesis No.2, which reads as, *“Male and female secondary school teachers of Ladakh differ significantly on scientific attitude.”* stands reject.



Major findings of the study

On the basis of the statistical data, the following findings have been drawn from the present investigation:

1. In this study, Table 1 presents the results showing that a good percentage of 63.00 secondary school teachers in Jammu and Kashmir and 64.33% of Ladakhi secondary school teachers were found to have a moderate scientific attitude. The data also reveals that 3.66% of Jammu and Kashmir and 2.33% of Ladakhi secondary school teachers were found to have a very high scientific attitude. The data further reveals that 1.33% of Jammu and Kashmir and 1.66% of Ladakhi secondary school teachers have a very low scientific attitude.
2. The table 2 presents the results, which shows that there is a significant mean difference between Jammu & Kashmir and Ladakh, which confirms that secondary school teachers in Jammu and Kashmir have higher degrees of scientific attitude as compared to secondary school teachers in Ladakh.
3. The table 3 shows the results that there is no significant mean difference between male and female secondary school teachers in Jammu and Kashmir, which shows that both male and female secondary school teachers have almost the same scientific attitudes.
4. The table 4 reveals the results that there is no significant mean difference between male and female secondary school teachers in Ladakh, which shows that both male and female secondary school teachers have the same scientific attitude.

Education implication

1. The study provides an opportunity to learn about secondary school teachers' attitudes toward scientific attitudes.
2. The results of this study help us learn more about how science programmes are put into place in secondary schools.
3. The study's findings showed that secondary school teachers in Jammu and Kashmir have a more scientific attitude as compared to Ladakhi secondary school teachers.
4. According to the findings of this study, secondary school teachers have a positive vibe about developing a scientific attitude among secondary school children.

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