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Teachers' Knowledge of and Attitude Toward Wildlife and Conservation

A Case Study From Ladakh, India

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*Environmental education (EE) has recently been included in school curricula in India to improve understanding of ecosystems, their functions, and the effect of human actions on them. The need for EE is more pronounced in Ladakh, in the Indian Trans-Himalaya, where recent development activities pose challenges for the fragile mountain ecosystem and for traditional livelihoods. Inclusion of EE in school curricula by the Jammu & Kashmir State Education Board and a conservation education program organized jointly by various government and nongovernmental agencies across Ladakh are some of the significant steps taken. As part of the Wildlife Institute of India's collaborative conservation education program, a questionnaire survey was conducted to explore Ladakh school teachers' knowledge of and attitude toward wildlife and conservation. In all, 277 government school teachers took part in the study. Results of the study highlight that teachers in Ladakh are aware of local biodiversity and have favorable attitudes toward conservation. However, responses to specific statements on snow leopards (*Panthera uncia*) were found to be unfavorable. Despite a high percentage of respondents agreeing that conservation of snow leopards was important, they also were considered as a threat to the local economy. The study identifies the need for intensive preservice and in-service environmental education programs to spread conservation awareness.*

Keywords: *Knowledge; attitude; teachers; snow leopard; environmental education; conservation; Ladakh.*

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Introduction

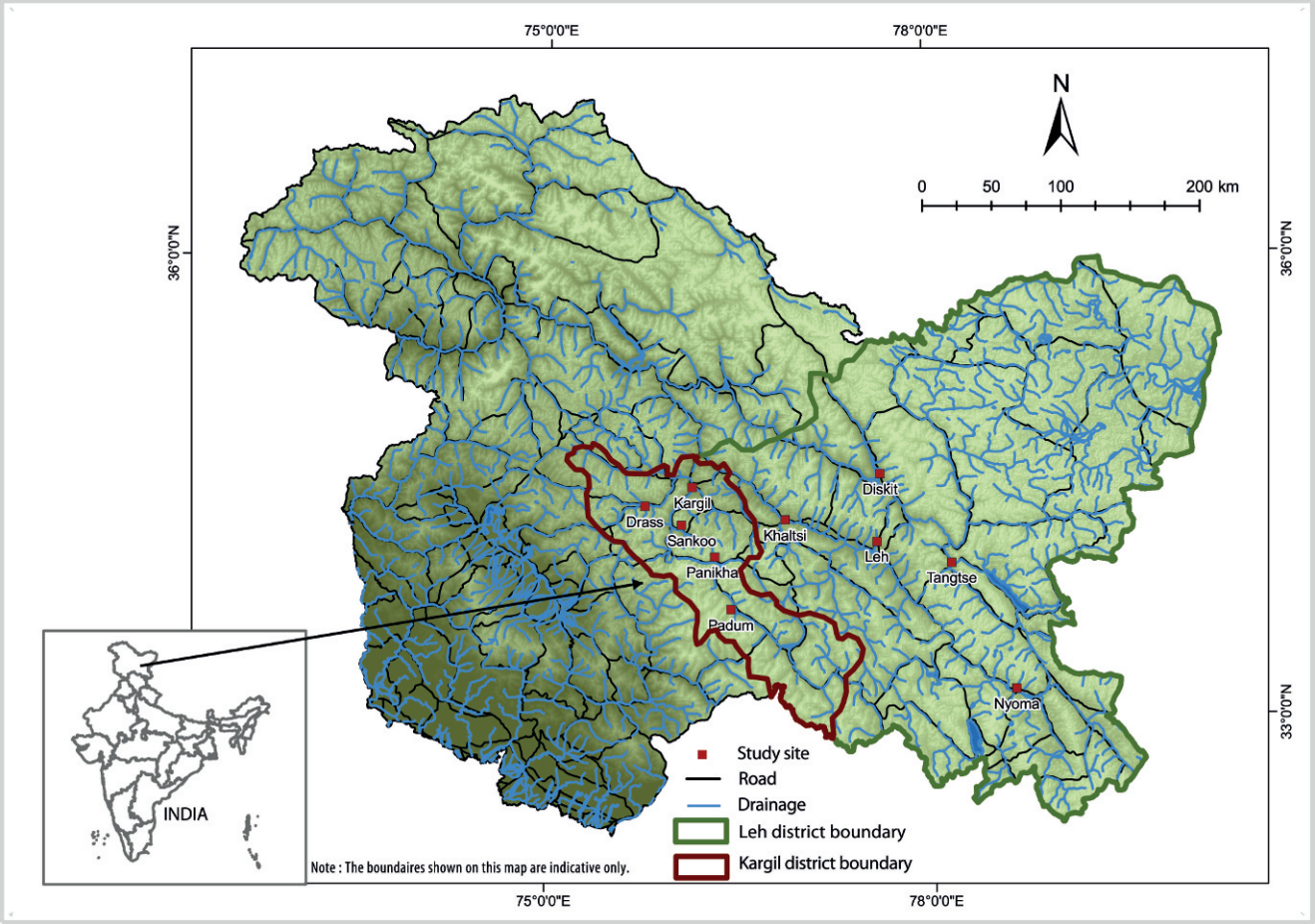
Environmental education (EE) is an important tool for improving people's understanding and for motivating local communities to cooperate and take initiatives for conservation and sustainable resource use (Pritchard 1968; Cerovsky 1969). The basic aim of an EE program is to assist people in developing awareness, knowledge, and appreciation of natural resources so they can make informed decisions, driving responsible behavior and constructive action (Leopold 1949; UNESCO 1980; Roth 1992). The importance of EE is highlighted by studies on relationships among knowledge, attitude, and behavior by emphasizing that an individual must have relevant knowledge to hold a positive environmental attitude, which, in turn, is a moderate predicator of behavior (Zimmerman 1996; Bradley et al 1999; Kaiser et al 1999; Pe'er et al 2007; Tuncer et al 2009; Esa 2010).

In recognizing the importance of and need for EE, India's National Policy on Education (1986), supported in 1991 by the Supreme Court of India's direction, made EE compulsory at all levels of education. However, it was realized that the desired result of curricula revision will not be attained unless simultaneous changes are made in the teacher education curricula to prepare teachers for EE. Hence, in 2005, the National Council for Teacher Education made EE a compulsory course in teachers' training (NCTE 2005).

As in other mountain societies, until the 1860s, education in Ladakhi society largely took place in the villages, in the fields, and by the family hearth (Norberg-Hodge 1991; Mingle 2003). Efforts to improve both the literacy rate and education led to an increase in the number of schools, from 72 in 1958 (Nair 1958) to 884 at present. Rizvi (1986) and Norberg-Hodge (1991) observed that modern schooling prevented children from viewing the context in which they live, which led to diminution of traditional values, skills, and sustainable lifestyles. The need for EE is more pronounced in Ladakh since development activities, concentrated over the past decade, have increased the vulnerability of its fragile mountain ecosystem and of the traditional livelihoods of the local communities. Responding to these concerns, the Jammu & Kashmir State Education Board along with the Centre for Environment Education worked toward inclusion of EE in school textbooks and in teachers' training curricula (Ravindranath 2007).

Simultaneously during 2005 and 2006, the Wildlife Institute of India, the International Snow Leopard Trust, the Centre for Environment Education, and the Snow Leopard Conservancy designed a conservation education program for Ladakh, which comprised dissemination

FIGURE 1 Map showing location of the study sites. (Map by Wildlife Institute of India)



material and workshops for government school teachers. Ecological information used for this program was obtained through the project "Strengthening field conservation through ecological studies, capacity building, and conservation awareness in the Ladakh Trans-Himalaya," which was a collaborative initiative of the Wildlife Institute of India, the International Snow Leopard Trust, Centre for Environment Education, and the Snow Leopard Conservancy. As part of the conservation education program, a study was undertaken to assess Ladakh teachers' knowledge of and attitude toward wildlife conservation, because little is known about this. Hence, the present study answers the following questions: (a) What is the ecological knowledge and attitude of the teachers? (b) What factors determine their knowledge and attitude? (c) Is there any relation between knowledge and attitude?

Study area

The study was conducted in Ladakh, located between 32°N and 36°N latitude and 75°E and 80°E longitude, in the State of Jammu & Kashmir, India (Figure 1). Ladakh is known for its fragile mountain ecosystem and unique geographical and geological features, with a rare floral and faunal assemblage (Namgail et al 2012). The region is a stronghold of Trans-Himalaya endangered carnivores and ungulates such as the snow leopard (*Panthera uncia*), Ladakh urial (*Ovis vignei vignei*), and Tibetan argali (*Ovis ammon hodgsoni*). Besides, 225 bird species have been recorded in Ladakh, and its high-altitude wetlands provide breeding grounds for the bar-headed goose (*Anser idicus*) and the globally endangered black-necked crane (*Grus nigricollis*) in India (Hussain et al 2008).

Administratively, Ladakh is divided into 2 districts, Leh and Kargil, which are further subdivided into 6 and 7 administrative units, respectively, known as blocks. Each block has a headquarter located in a town or city. At present, 3356 teachers teach in 884 government schools of Ladakh. Most of the government teachers are natives of Ladakh and were brought up in a rural setting, with the exception of the young generation of teachers, who were educated outside Ladakh. Livestock rearing and

TABLE 1 Teachers' responses to the knowledge statements (n = 277).

Statements	Yes (%)
The snow leopard is an endangered species.	98.3
Conservation education provides knowledge on the wise use of resources.	92.5
The correct names of wild animals not found in Ladakh were given by:	83.2
Each and every wild animal forms a part of the food web.	76.5
Hemis is the name of a famous national park and monastery.	61.7
The new textbooks provide good examples of the local environment.	56.9
Old/present textbooks provide enough information on the environment and its conservation.	37.3
Ladakh's biodiversity is truly unique.	85.0
The snow leopard lives in and around rocky mountains.	95.0
The correct list of Ladakh's wildlife was identified by:	62.0
Ladakh has national parks and wildlife sanctuaries to protect wildlife.	70.0
Old/present textbooks provide enough information on Ladakh's wildlife.	36.0

TABLE 2 Teachers' responses to the attitude statements (n = 277).

Statements	Yes (%)
It is important to teach children about conservation.	98.5
Natural resources form an important part of human wellbeing.	98.3
It is good that environmental education has become an integral part of the school curriculum.	97.4
For human survival, the wise use of natural resources is important.	96.7
Children should be taught about the local as well as the global environment.	94.8
Wildlife education should be made an integral part of the school curriculum.	93.7
Wildlife is beneficial for people.	85.7
Conservation of the snow leopard is necessary for human survival.	84.2
The snow leopard is a serious threat to people living in remote places.	74.3
Snow leopards and humans cannot live together harmoniously.	55.7
For a teacher, there is no use in learning about conservation education.	35.3
Children should be taught about the local environment only.	23.9

subsistence agriculture, the main traditional livelihood options, are still practiced by the families of the teachers. Both livelihood options are historically known to be threatened by the wild carnivores and ungulates of the region (Bhatnagar et al 1999).

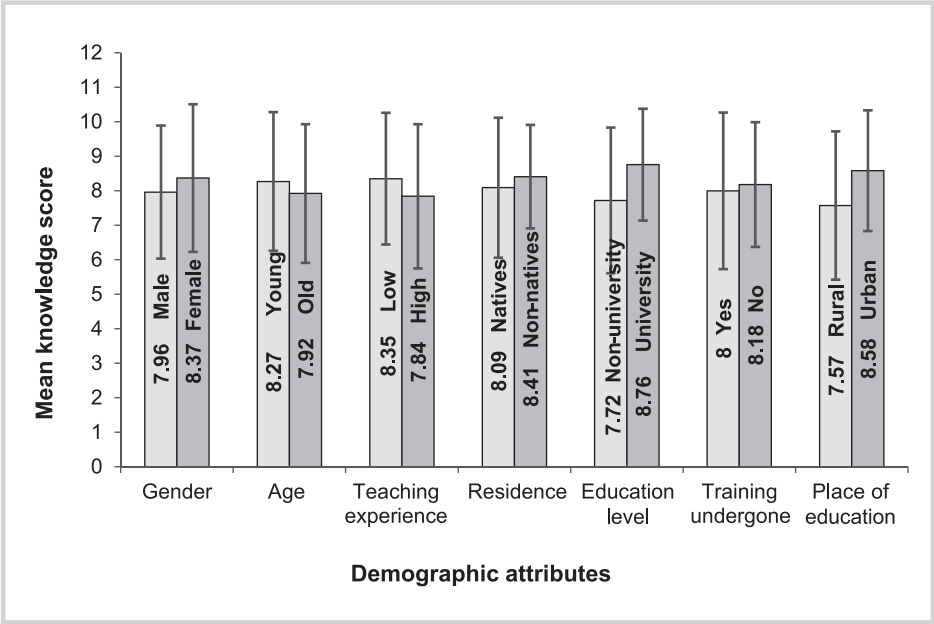
Methods

As part of the conservation education program for Ladakh, conservation education workshops were organized into 10 administrative block headquarters, across Leh and Kargil districts (Figure 1; Table S1, *Supplemental data*, http://dx.doi.org/10.1659/MRD-JOURNAL-D-11-00040.S1), during 2005 and 2006. The government school teachers teaching science and related subjects were nominated by the school administration to attend these workshops. To assess the knowledge and attitude of teachers in Ladakh, a questionnaire schedule was administered to the participating teachers before the start of the workshops. The teachers were told to return the duly completed questionnaire before commencing the training session. The purpose of this voluntary exercise was explained to them. Of 326 workshop participants, 277 voluntarily took part in this study.

The questionnaire schedule was divided into 3 sections. The first section obtained demographic data, the second section explored the teachers' knowledge through a set of 12 statements (Table 1), whereas the third section examined their attitude through another set of 12 statements (Table 2). All the statements had "yes" and "no" responses. Correct answers to each knowledge statement were given a score of 1. Hence, the overall knowledge score for each respondent was obtained by adding the correct answers to the 12 knowledge statements. For attitude statements, a favorable response (yes) was given a score of 2, whereas an unfavorable response (no) was given a score of 1; by adding coded responses for each attitude statement, we obtained the overall attitude score for each teacher. Higher attitude scores represented favorable attitudes, whereas lower scores indicated unfavorable attitudes.

The teachers were classified according to gender (male/female), age (young [<34 years]/old [≥34 years]), teaching experience (low [<12.5 years]/high [≥12.5 years]),

FIGURE 2 Teachers' demographic attributes and mean knowledge score (error bar denotes the standard deviation of the mean).



preservice training undergone (yes/no), education (up to grade 12/university degree), place of education (rural/urban), and provenance (natives/non-natives), to see if these factors influenced knowledge and attitude.

The results were analyzed by using descriptive, one way analysis of variance (ANOVA), correlation and χ^2 statistics, via SPSS 16.0.

Results

Demographic profile of respondents

Demographic attributes of 277 respondent teachers are summarized in Table S1 (*Supplemental data*, http://dx.doi.org/10.1659/MRD-JOURNAL-D-11-00040.S1). Overall, female representation was 34.5%; however, when gender participation was examined by location, it was found that female representation was higher in Tangtse, Diskit, Leh, and Khaltsi than in other places. The mean age of teachers was 34 ± 7.76 years, and they had an average of 12.5 ± 9.11 years of teaching experience. Participants from Leh, Khaltsi, Drass, and Panikhar were more experienced than those from other places. Most of the teachers (63.8%) had studied up to grade 12, whereas 36.2% had a university degree. Leh had the highest share of teachers who had undergone teachers' training (92.9%). Overall, only 41.5% had undergone such training. About 57% of participants taught science as an individual subject or in combination with other subjects. The highest percentage of non-native participant teachers was noted for Tangtse (52.6%).

Ecological knowledge of the teachers

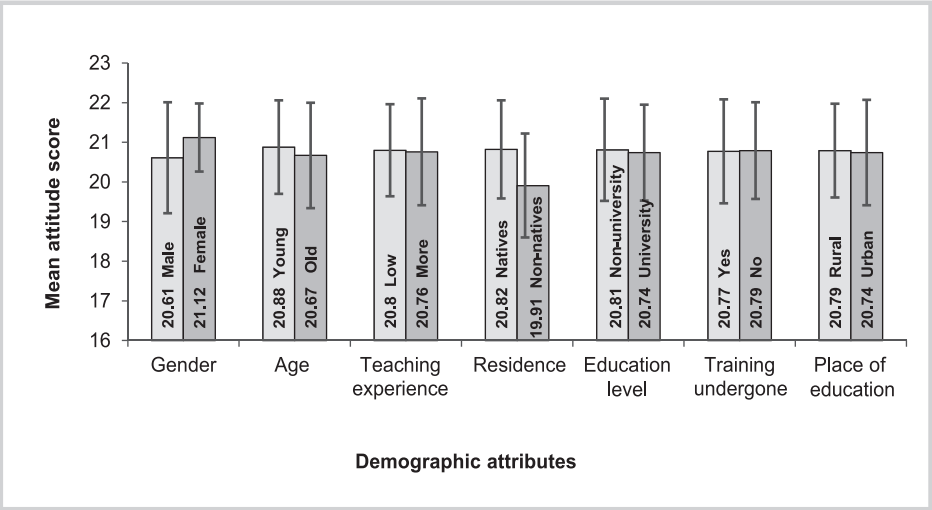
Responses to statements that aimed to establish the knowledge of the teachers are summarized in Table 1. Knowledge scores ranged from 3 to 12, with a mean of 8.11 ± 2.02. More than half of the respondents (61.3%) scored 8 or higher. Knowledge scores were dependent on the teachers' teaching experience, education, and place of education. Those who had fewer years of teaching experience (8.35 ± 1.91 years) had higher knowledge scores than more experienced teachers (7.84 ± 2.09 years) ($F[1,275] = 4.565$; $P = 0.034$). Teachers who had a university degree (8.76 ± 1.62) scored higher in knowledge than teachers who had studied up to grade 12 (7.72 ± 2.11) ($F[1,275] = 18.019$; $P = 0.000$) (Figure 2). Compared with teachers educated up to grade 12, higher knowledge scores were observed for teachers with a university degree because all of them (100%) were able to tell the correct list of wildlife of Ladakh ($\chi^2 = 31.36$; $P = 0.000$; df = 1), and 89% of them knew the fact that Ladakh has protected areas ($\chi^2 = 27.12$; $P = 0.000$; df = 1).

Place of education played an important role in determining the knowledge of the teachers. One-way ANOVA revealed significantly higher knowledge scores for teachers who had studied in an urban locality (8.58 ± 1.75) ($F[2,274] = 8.725$; $P = 0.000$) than for those who had attained education in a rural locality (7.57 ± 2.15) (Figure 2).

Attitudinal response of the teachers

In general, a large percentage of teachers had favorable attitudes (Table 2). Teachers' overall attitude scores ranged from 17 to 24, with a mean of 20.78 ± 1.25. More

FIGURE 3 Teachers' demographic attributes and mean attitude score (error bar denotes the standard deviation of the mean).



than half of the teachers (62.5%) scored above 20, which indicated favorable attitudes. Female teachers (21.12 ± 0.86) held more favorable attitudes compared with male teachers (20.61 ± 1.40) ($F[1,273] = 10.063$; $P = 0.002$). Similarly, attitude scores were higher for native teachers (20.82 ± 1.24) than for non-native teachers (19.91 ± 1.31) ($F[1,275] = 6.12$; $P = 0.014$) (Figure 3).

Despite the high percentage of teachers agreeing about the benefits of wildlife (85.7%), snow leopards were considered a serious threat to people living in remote places by three fourths of the teachers (74.3%), and more than half of the teachers (55.7%) felt that snow leopards and humans cannot live together harmoniously (Table 2). When further exploring these statements against demographic attributes, it was found that more natives (76%) perceived snow leopards as a threat than non-natives (42%) ($\chi^2 = 6.95$; $P = 0.008$; df = 1).

Relation between knowledge and attitude

A significant positive correlation was observed between teachers' knowledge and attitude scores. This correlation, though weak ($r = 0.242$; $P = 0.000$), contributes to the literature on the positive relation between knowledge and attitude.

Discussion

For teaching conservation to schoolchildren, the prerequisite is that teachers should be knowledgeable in terms of ecology and biodiversity conservation, and should have affirmative attitudes toward wildlife conservation. This study suggests that teachers in Ladakh are knowledgeable about the basics of local wildlife and have favorable attitudes toward wildlife, except when it threatens their economy, in this case, the snow leopard, which causes significant economic losses at the local level (Bhatnagar et al 1999).

Until recently, Ladakh had little access to higher education; the number of schools was limited to 72 in 1958 (Nair 1958). Hence, older teachers tended not to have a university degree, which explains the negative correlation. Although the number of primary and high schools has increased, there is still only one degree college in Leh and young people go outside Ladakh for university education, which explains the fact that young teachers are more educated and were educated in urban settings, mostly outside Ladakh.

The study found that teachers who had university degrees were more knowledgeable. These findings are in conformity with studies by other scholars (Fiallo and Jacobson 1995; Pyrovetsi and Daoutopoulos 1997; Gillingham and Lee 1999; Badola et al 2012) who concluded that education is an important factor that influences knowledge. Higher knowledge scores were observed for teachers educated in an urban locality. Respondents who were educated in an urban setting also definitely had a university degree. Hence, we concluded that studying in an urban setting provides ample access to the various sources of information as well as opportunities for higher education, which leads to holistic knowledge and better understanding.

The favorable environmental attitudes shown by female teachers in the present study support findings of Zelezny et al (2000), Alp et al (2006), and Tuncer et al (2009). Research results have shown that females express more concern about the environment than males, irrespective of cultural and educational status (Worsley and Skrzypiec 1998; Eagles and Demare 1999; Tikka et al 2000; Loughland et al 2003). Bord and O'Connor (1997) explain this as being due to differences in perceived

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vulnerability to environmental risks. Traditionally, women have been closer to nature while performing day-to-day activities, when even providing meals for the family is linked to nature, and women also perceive changes in the environment, which affects their capacity to provide for the family.

Tanner (1980) and Peterson (1982) suggest that informal education and life experiences with role models, such as parents and teachers, are crucial factors in developing the environmental sensitivity of an individual, which indicates that age and education did not influence the attitude of the teachers. Newhouse (1990) argues that favorable attitudes toward the environment are perhaps developed on the basis of life experiences rather than any educational program, which holds true for the present study, because native teachers of Ladakh were found to have higher attitude scores than non-natives. The strong background of traditional ecological knowledge reflected in the folk songs and the tradition of hunting and gathering resources for self-sustenance (Norberg-Hodge 1991; Koshal 2001) explains the overall favorable attitude of native teachers.

However, closer scrutiny of the individual attitude statements revealed that the native teachers had unfavorable attitudes toward snow leopards. We attribute this to the life experiences of these teachers, who grew up in a community dependent on livestock rearing, where any damage to livestock caused considerable economic losses (Bhatnagar et al 1999; Wang et al 2006). The significant correlation between higher knowledge scores and more favorable attitude scores established for teachers in the study area reemphasizes the positive relation between knowledge and attitude as noted by Chawla and Cushing (2007), Pe'er et al (2007), and Esa (2010).

Conclusions

Teachers working in Ladakh are well informed and show favorable attitudes toward conservation, except for snow leopards. During discussions with participants, older teachers were found to be a valuable source of traditional ecological knowledge. They can act as effective links between traditional and modern ecological knowledge. This capacity should be fully utilized to make the learning process interesting and to reinforce the importance of local-specific as well as global ecological knowledge. EE training for teachers should focus on local ecological systems, linking them to global systems, with emphasis on reducing unfavorable attitudes toward predator species of the region, especially snow leopards.

Informal discussions with government officials in the Jammu & Kashmir Education Department and the participant teachers have identified a number of limitations of implementing EE training programs. They include the overloaded school curriculum, a lack of financial support, essential facilities and resources, a high teacher-to-student ratio, lack of area-specific and area-appropriate instructional materials, and the remoteness of the rural communities. Despite these limitations, we suggest that both preservice and in-service EE programs should be prioritized for the education department and that such training should be compulsory for all science teachers and those living in remote places. Furthermore, once implemented, such training should subsequently be extended to nonscience teachers as well. We also recommend customized, mountain-specific EE courses for the regional teachers' training institutes to provide teachers with scientific ecological knowledge, aiming at building favorable attitudes and responsible behavior.

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Supplemental data

TABLE S1 Demographic attributes of the teachers from 10 administrative block headquarters of Ladakh, India.

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