

MATCH BETWEEN TEACHERS' AND THEIR STUDENTS' INTEREST IN SCIENCE TOPICS

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Teachers' and their early adolescent students' interest in science topics is investigated in 14 upper primary schools of Kerala in the context of declining interest in science and satisfaction with the quality of science teaching reported by National Science Survey. Significant high positive correlation between the preferences for science topics of students and their science teachers is found. Study confirms the general trend that life oriented topics and those which helped in real life situations were preferred by students. The second most interested science subject, for teachers and students, is physics where students have higher preference than teachers. The least interested science subject for both teachers and students is chemistry. Students of teachers with high interest in the specific fields - biology, chemistry and physics - had significantly higher interest in biology, chemistry and physics respectively. This study corroborates suggestion that individual teachers can have a major effect on both overall science interest and on specific topic related ones.

CONTEXT OF THE STUDY

Students' interests towards studying science has been a substantiate feature of the works of science education research community for more than quarter of a century. Now, mounting evidences of decline in the interest of young people in pursuing science emphasize its current importance. National Science Survey (Shukla, 2005) has shown that interest in science as well as satisfaction with the quality of science teaching declined as the age increased. Studies demonstrate a shift away from science at the plus two and under-graduate levels (Patil, 2003).

Gardner (1975) in his review regarding interest and attitude to science noted that science attitude and interest developed quite early in the primary school and continued into secondary school stage and adulthood. Factors that caused change in science interest from middle school to 14+ were said to be effects of teacher, perception of difficulty and preference for practical work (Bottomley and Omerod (1981). Other Factors studied included students' opinions about science classes, their out-of-school experiences, and their attitudes toward science and technology (Trumper, 2006).

Students' interest is quite malleable and individual teachers can have a major effect on both overall science interest and on specific topic related ones. A single teacher can have quite different effects while teaching different topics in different ways and also teaching the same topic to different classes. Thus a teacher can bring about changes in students' interests (Kelly, 1988). Leading by example is one of the strongest environmental influences available to a teacher. Students are exquisitely sensitive to what teachers value (Sternberg, & Grigorenko, 2007). In order to develop interest, students should have possibilities to meet role models and

participate learning activities which support the development of basic psychological needs for competence (tasks, constructive evaluation), autonomy (plan, take responsibility) and social relatedness (get benefit from learning together) (Lavonen, 2009). Teachers thus acts not only as role models for developing interest but also facilitate the development of interest through the meeting the basic psychological needs for competence, autonomy and social relatedness among their students through their interaction with students in and out of the classrooms. In this context, present study examines the influence of upper primary teacher's interest in science topics on the interest in science topics of their students.

OBJECTIVES OF THE STUDY

The broad objective of the study is to find out whether there is relation between teachers' and their early adolescent students' interest in science topics. The study specifically intends:

To rank the select areas of primary school science in accordance with both the teachers' and the students' interest in each area and to estimate the relationship between the teachers' and students' preferences for the select areas of primary school science

To find out whether there is a match between teachers and students in upper primary schools in the orders of preference for the three fields of science namely biology, chemistry and physics

To find out whether there exist significant difference in extent of interest of students in upper primary schools in: a) biology, b) chemistry and c) physics topics as the level of their teachers' interest vary respectively in a) biology, b) chemistry and c) physics

METHOD

Sample

Thirty two teachers who teach science in 14 upper primary schools of Kozhikode revenue district of Kerala and their students studying in classes V to VII constituted the sample. Number of students included is 1460. Proportionate representation is given to teachers and students from rural, urban, government, aided and unaided schools.

Tools used

Scale of Interest in Science (SIS) (Gafoor & Smitha, 2008) which lists 63 science topics appropriate for upper primary school students was used to obtain students' interest in science topics. Test-retest coefficient of correlation of SIS was 0.70. Split-half coefficients of correlation for the scale and the sub scales were SIS ($r=0.70$), Interest in Biology ($r=0.86$), Interest in Physics ($r=0.84$), and Interest in Chemistry ($r=0.86$). Cronbach's alpha coefficient of homogeneity for SIS ($r=0.95$), Interest in Biology ($r=0.88$), Interest in Physics ($r=0.87$) and Interest in Chemistry ($r=0.87$) are also very high. SIS has substantial positive correlation of 0.56 with the grades that pupils obtained in science. A parallel but abridged version (some of the topics could be merged by using age appropriate terminology) of SIS were administered to the teachers.

DATA ANALYSIS

For both teachers and their students interest in science topics was analyzed at three levels-1) total interest in science, 2) interest in three fields of science viz., biology, physics and chemistry and 3) interest in 27 science areas (formed by combining and averaging the scores of closely related topics). Teachers were grouped into High, Average and Low groups with respect to interests in three fields of science viz., biology, physics and chemistry. This was by converting the interest scores into z scores and grouping teachers with z scores on or above 1 as High, Between +1 and -1 as Average and below -1 as Low on interest.

FINDINGS

Areas of science in the order of teachers' and the students' interest

The select 27 areas in science are listed in the decreasing order of interest in them for teachers at upper primary level. The values in parentheses are the rank order of the preference of the area by students at the same level. 1. Organ Systems in Human Body (1), 2. Health And Hygiene (2), 3. Adaptations Of Animals (3), 4. Food adulteration (7), 5. Components of Sunlight (16), 6. Sound (9), 7. Pollution, (5), 8. Conductors and Non Conductors (15), 9. Preservatives (19), 10. Economic Importance of Plants and Animals (21), 11. Classification Of Animals (4), 12. Photosynthesis (12), 13. Interdependence of life (24), 14. Energy (8), 15. Plant Movements (18), 16. Solar system (6), 17. Chemical Reactions (13), 18. Elements And Compounds (27), 19. Gravity (10), 20. Acids and Alkalis (14), 21. Conduction, Convection, Radiation (17), 22. Atoms and Molecules (11), 23. Magnetism (20), 24. Pesticides (23), 25. Characteristics of Matter (22), 26. Images Formed By Convex and Concave Lens (25), and, 27. Chemical Equations (26). For teachers, it is notable that of the 27 areas listed, all the biology areas except one are

ranked below the middle rank of 14; while all the chemistry areas, except one, have rank above 14; indicating teachers' preference for biology topics and apathy for chemistry topics. Even though the students' preferences are not as clear as that of teachers, the preferences are almost the same.

Relationship between the teachers' and students' interest in science topics

Spearman's correlation between teachers' and students' rank order of interest in science topics were estimated. There exists significant and high positive correlation between the preferences for science topics of students and their science teachers at upper primary level, (Spearman's $\rho = 0.69$; $p < .01$).

Match between teachers and students in interest in the three fields of science

The average of the rank of topics, that are conventionally grouped, under biology, chemistry and physics in secondary and above levels of education were found for both teachers and students in order to find out and make a comparison of interest in these subjects. It was found that for both teachers and students the most interested science subject is biology, even though teachers prefer biology (average rank of biology topics=7.8) more than the students (average rank of biology topics=9.7). For both teachers and students the second most interested science subject is physics, where students have higher preference (average rank of physics topics= 14.8) than teachers (average rank of physics topics=16.3). Among the three subjects the least interested science subject for both teachers and students is chemistry with no major difference between the average ranking of the chemistry topics for teachers (19.57) and students (19).

Difference in Interest of students in biology topics taught by teachers with High , average and low interest in biology

Analysis of variance of interest in biology of students taught by teachers with high, average and low interest in biology showed that students' interest in biology significantly differ among the three groups ($F = 49.06$, $df (2,1457)$, $p < .01$). Post hoc comparison of means using Scheffe test revealed that students of teachers with high interest in biology had significantly higher interest in biology (mean interest=84 %) than that of students taught by teachers with average interest in biology (mean interest=73.5 %, $p < .01$), and than that of students taught by teachers with low interest in biology (mean interest=78.5 %, $p < .01$). But it was found that students taught by teachers with average interest in biology possess significantly less interest (mean interest=73.5 %) than that of students taught by teachers with low interest in biology (mean interest=78.5 %, $p < .01$).

Difference in Interest of students in chemistry topics taught by teachers with High, Average and Low interest in chemistry

Interest in chemistry of students taught by teachers with high, average and low interest in chemistry differ significantly ($F = 10.27$, $df (2, 1457)$, $p < .01$). Post hoc comparison of the means using Scheffe test revealed that students of teachers with high interest in chemistry had significantly higher interest in chemistry (mean interest=78.5%) than that of students taught by teachers with average interest in chemistry (mean interest=72.9 %, $p < .01$). There is no difference between interest in chemistry topics of students of teachers having low (mean score=75.5%) and average interest in chemistry (mean interest=72.9 %, $p > .05$).

Difference in Interest of students in physics topics taught by teachers with High, Average and Low interest in physics

Interest in physics of students taught by teachers with high, average and low interest in physics differ significantly ($F = 13.40$, $df (2, 1457)$, $p < .01$). Post hoc comparison of means using Scheffe test revealed that students of teachers with high interest in physics had significantly higher interest in physics (mean interest=81.84%) than that of students taught by teachers with average interest in physics (mean interest=76 %, $p < .01$), and, than that of students taught by teachers with low interest in physics (mean

interest=74.5 %, $p < .01$). There is no difference between interest in physics topics of students of teachers having low (mean score=74.5%) and average interest in physics (mean interest=6 %, $p > .05$).

CONCLUSIONS

The most preferred areas in science for both students and teachers at upper primary level are those related to Organ Systems in Human Body, Health and Hygiene, and, Adaptations of Animals. There exists significant and high positive correlation between the preferences for science topics of students and their science teachers. For both teachers and students the most interested field is biology though teachers prefer biology topics more than students do; the second most interested science subject is physics where students have higher preference than teachers. The least interested science subject for both teachers and students is chemistry. Students of teachers with high interest in biology had significantly higher interest in biology; students of teachers with high interest in chemistry had significantly higher interest in chemistry and students of teachers with high interest in physics had significantly higher interest in physics.

It can be concluded that there is close relationship between teachers' and students' interest in science. While the study confirms the general trend that life oriented topics and those which helped in real life situations were preferred by students (Tsabari and Yarden, 2005), it is further clear that teachers too are not different in this respect. The findings of this study corroborates, in Indian context, Kelly's (1988) suggestion that individual teachers can have a major effect on both overall science interest and on specific topic related ones.

SUGGESTIONS

It is better for students to have teachers with broader and wider interest in science, at least during school education when the students' interest in science develops. Science teachers at primary level need to broaden their interest base in science through professional development and continuing education. Pre-service and in-service preparations of teachers have in their objectives something to improve the academic improvement of teachers especially in chemistry related concepts. Teaching, especially of chemistry related topics, requires to be made more life oriented and life related as it is the weakest among teachers and students as well. In physics related topics as well teachers need to take care not to hamper students' interests, because teachers prefer physics topics less than students. Students are exquisitely sensitive to what teachers value. Teachers need to know what their preferences are in the teaching of sciences and how these preferences will influence the future interest of their students. Those who are well aware of their weaker interests in specific topics and fields of science may seek the support of their colleagues who can compensate their lack of interest by adopting team teaching strategies.

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