

STUDENTS' ATTITUDES TO SCIENCE IN URBAN AND RURAL SCHOOLS IN TRINIDAD AND TOBAGO

Rawatee Maharaj-Sharma

This study is a pilot project that attempts to analyse, on a small scale, students' attitudes towards science in two different localities—one urban and one rural—in Trinidad and Tobago. Though the sample was small, the study suggests that students attending urban schools generally display a more positive attitude toward science—in terms of its perceived relevance and usefulness as well as its interest and challenge level—than students attending rural schools. Furthermore, the project revealed that the attitudes displayed by boys were different from those displayed by girls within each locality, and that the gender difference was more pronounced in the rural schools. Additionally, it was found that urban girls had the most positive attitudes towards science, while more than 80% of rural girls perceived science as being difficult, with many of them indicating that it was not a subject they were inclined to pursue at higher levels.

Introduction

In Trinidad and Tobago great significance is placed on terminal examinations, which are usually external to the school and which are the predominant focus of both teachers and students. Teachers are hard-pressed by public opinion and school administrators to produce good examination results, as they are made to feel that their competence is reflected in these results. There is a perception among many teachers and administrators that students' interests and desirable attitudes would be automatically nurtured through the application of the "correct" pedagogical principles of teaching for the test. Thus, teaching has been geared to ensuring that content is covered, while the long-term attitude development is left unattended (Ibrahim, 1984). In the local context, this neglect of emphasis on the development of positive attitudes has resulted in many students expressing sentiments of displeasure and unwillingness to pursue certain subjects on the national curriculum. Expressions of this

Rawatee Maharaj-Sharma

nature are very common among science students, many of whom have suggested that science is “too abstract,” “difficult,” and “no fun.” The result is that many students pursue science learning by rote, and many only because it is a subject requirement for a future course of study that they intend to undertake. It is not surprising therefore that many students clinically experience the science teaching/learning process but do not develop desirable attitudes towards science (Hu, 2003).

This project attempts to investigate the attitudes to science of students in two different localities—one urban and one rural—in Trinidad and Tobago. It is a pilot project as it is the first phase of a more comprehensive study that will comparatively explore students’ attitudes towards science in both localities on a larger scale by: (a) surveying more schools, and therefore more students, in each locality; (b) examining other aspects of attitudes that may emerge based on the findings of this project; and (c) making any necessary amendments to the design and instrumentation of this project to gain further insights into students’ attitudes towards science. The larger study will probe deeper into the underlying beliefs and assumptions that students may have developed through interactions in the home environment, the school environment, and in the social arena, which may have influenced their attitudes towards science.

The participants surveyed for this project comprised students who had undergone two years of Integrated Science or General Science in six New-Sector schools in Trinidad and Tobago. These schools have been described as:

government schools, [which] emerged during the 1970s and 1980s as a result of the government’s efforts to expand the secondary school intake and broaden the curriculum. The New Sector consists mainly of a two-tiered system incorporating the three-year junior secondary schools, with transitions into the two-year or four-year senior secondary/senior comprehensive schools. It also encompasses the five-year composite schools. Schools in this sector offer courses in both academic and technical/vocational subjects. (Quamina-Aiyejina, L., et al., 2001, p. 2)

Students' Attitude to Science in Urban and Rural Schools

Three urban schools and three rural schools were selected. It is important to note that the Trinidad and Tobago context is somewhat unique in that any typical urban school will have a small but not negligible percentage of suburban and rural students. The converse is also true for some rural schools. In this project, the influence of this variability among the students was significantly minimized by analysing the biographical data of the students and subsequently eliminating those students who lived in localities different to the locality of the school they attended. Since this is a pilot project, only two aspects of students' attitudes were assessed:

1. Interest in and/or enjoyment of science.
2. Awareness of the importance of science to social and economic life.

Interest, in this context, refers to liking and having a positive view and personal desire to pursue science learning, while awareness refers to the knowledge and understanding of the relevance and usefulness of science to one's well-being in everyday life and for future plans. For this research, the term *attitude* will be used to describe the combined effect of students' interest and awareness as described above, which is defined, according to Bednar and Levie (1993), as affective responses, cognitions, behavioural intentions, and behaviours. Other definitions include "a manner of acting, feeling or thinking that shows one's disposition and or opinions" (Penguin Webster Handy College Dictionary, 2003). Zimbardo and Leippe (1991) suggest that "attitudes are learned or established predispositions" that vary in direction (positive or negative), degree (amount of positive or negative feeling), and intensity (the level of commitment the individual has to the position). In this project, the latter interpretation will be implied in the reporting.

Research Questions

Three research questions tailored the approach adopted in this project:

1. Do urban students display attitudes different to those of rural students towards science?
2. Do boys and girls display different attitudes towards science?
3. How do students' attitudes toward science relate to their view of its importance to their lives?

Literature Review

Fishbein and Ajzen (1975) suggested that a person's attitude towards an object is a function of his or her beliefs about the object and the implicit evaluative responses associated with those beliefs, while Bednar and Levie (1993) described attitudes by saying that they are not directly observable, but the actions and behaviours to which they contribute may be observed. These behavioural descriptions arising out of beliefs and responses, in large part, govern an individual's perception. With respect to students, Osborne, Simon, and Collins (2003) found that students' attitudes had a significant impact on their views of subject matter, particularly in the area of science, when constructs such as value of science and usefulness of science were used to gauge their attitudes.

Furthermore, attitudinal differences towards science between boys and girls were noted in several studies (e.g., Leventhal & Brooks-Gunn, 2000; Marsh, 1992; Weinburgh, 1995). The first study found that the neighbourhood in which a child lives has a significant impact on his or her attitude towards science learning, to the extent that urban students generally had more positive attitudes towards science than students schooled in rural settings. Roscigno and Crowley (2001) reported that urban boys displayed a more positive attitude toward science, indicating that it would be useful to them in the future, while urban girls reported that science was fun to learn. DeYoung (1987) reported that, generally, rural boys thought that science was relevant and enjoyable and that rural girls indicated that science was a difficult subject, while Jones, Howe, and Rua (2000) found that, in general, across urban, suburban, and rural communities, significantly more females than males reported that science was difficult to understand, but that more males were interested in pursuing science as they saw it as necessary for a future career. It is clear, therefore, that the existing literature suggests that there are differences in attitudes toward science between urban and rural students, as well as differences between boys and girls in each of the two localities.

The Sample

The sampling unit was a school. A rural school is defined in this project as a school that is located outside a radius of 12 km from any major city, borough, or town in Trinidad and Tobago. Given the local context in which the project was done, this definition of a rural school was arrived at based on the defining limit as described by Leventhal and Brooks-Gunn (2000). The three rural schools selected were located at distances of 13, 17, and 25 km respectively from the closest town, and were purposively chosen from the north, central, and south regions of the island respectively.

Similarly, as described by Leventhal and Brooks-Gunn (2000), in the local context, an urban school is defined as a school that is located within a 12 km radius of any major city, borough, or town. Two urban schools were chosen from the north and one from the south. Because this was a pilot project that will be used to inform a larger, more comprehensive study, six schools selected from among the eight educational districts provided a fair representation of students (though on a very small scale) across the country.

The students surveyed were in their third year of secondary school and were all aged between 14–16 years. These schools practise ability grouping or streaming, and so in order to arrive at a random sample, a stratified random sampling was carried out in all the third-year science classes in each of the six schools selected.

Urban sampling

Most of the classes in these schools were small, with less than 20 students in a class on any given day. A total of 201 urban students volunteered for the survey but only 189 actually completed the opinionnaire, of which 15 were incomplete and were therefore not included in the project. A total of 60 urban students, comprising 31 boys and 29 girls, were selected from the three urban schools. To maintain some degree of uniformity, in terms of the number of students selected from each of the three urban schools, 17, 21, and 22 students were respectively selected from each of the three schools, since in one of these

schools only 17 opinionnaires had intelligible data that was relevant to the project.

Rural sampling

A similar selection criterion was use in the case of the three rural schools, where a total of 181 students from the three rural schools completed the opinionnaire. In this locality, 28 of the opinionnaires were not included in the project. A total of 58 rural students—17, 19, and 22, respectively, selected from each of the three rural schools—were included in the project. The project therefore involved the participation of a total of 118 students—60 urban and 58 rural. Table 1 shows the distribution of the sample by gender and locality.

Table 1. Distribution of Sample by Gender and Locality

Locality	Sex		Total
	Male	Female	
Rural	26	32	58
Urban	31	29	60
Total	57	61	118

Instrument

A Likert-type opinionnaire (Trochim, 2002) was used to collect data for this project. An instrument of this type was chosen as it provided an easy way of gauging students' responses. This was important because many classes in the New Sector schools chosen had students with reading/comprehension difficulties, so that the Likert instrument provided the researcher with an opportunity to easily and accurately manage students' responses (see Appendix A). A pilot testing of the instrument was carried out several weeks before the data collection phase of the project started. Some items in Section A were reworded to remove ambiguities identified in the pilot-testing phase before the instrument was used in this project.

The data collection process began by reading the statements and response options to all the students (sometimes several times), and then allowing

Students' Attitude to Science in Urban and Rural Schools

them to record their responses on the Likert range from *Strongly Agree* to *Strongly Disagree*. Some of the students had reading difficulties and so additional time was spent reading the statements in Section A to these students to ensure that they understood what they were required to respond to. They were subsequently asked to circle their response to each question.

Section A of the opinionnaire consisted of 12 opinion statements, which sought to assess students' attitudes towards science. The statements were all negatively skewed to allow for consistency, ease of analysis and interpretation, and to avoid ambiguity for students.

Additionally, though, because it was practically impossible to capture all aspects of students' attitudes from the characteristic closed items of the Likert opinionnaire, three open-ended questions were also included as Section B of the opinionnaire. These questions provided students with further opportunity to explain their attitudes towards science and to suggest behaviours, events, or occurrences that might have shaped their attitudes. This section also allowed them to articulate in writing the extent of their awareness of the role of scientific knowledge in their lives. Some students also had difficulties writing responses to the open-ended questions, and so the questions in this section were also read to them. Their oral responses were audiotaped shortly after they completed section A of the opinionnaire. The audiotapes were subsequently transcribed and coded.

The Data

The data obtained from Section A of the opinionnaires were used to identify codes and relevant labels that captured different aspects of students' attitudes. The written responses to the open-ended questions given by students were analysed against these labels and new/emerging ones were added. The data, including the codes and labels assigned to the written responses, were reviewed several times to ensure that the codes and labels reflected the attitudes expressed by the students. Attitude statements with similar labels were grouped together under a theme that represented the data in a broader sense. In so doing, five broad themes emerged from the data: relevancy of science, usefulness of science, enjoyment in science, difficulty in science, and science is not for me. In

the context of this project, the themes “relevancy of science,” “usefulness of science,” and “enjoyment of science” were interpreted as contributing toward a positive attitude to science, while “difficulty in science” and “science is not for me” were interpreted as contributing toward a negative attitude to science.

The numbers in Table 2 represent the actual number of students (boy or girl; urban or rural) who expressed views on each of these themes. The themes emerged after careful examination and coding of the raw data.

Table 2. Emerging Themes of Students’ Attitudes to Science

Attitudes	Urban		Rural	
	Boys {31}	Girls {29}	Boys {26}	Girls {32}
Relevancy of science (everyday understandings)	20	23	15	15
Usefulness (Future education/career)	26	24	12	3
Science enjoyment	28	28	18	5
Science is difficult	10	9	16	26
Science is not for me	12	6	20	30

Findings

The numbers in Table 2 were translated into percentages to comparatively report the findings of this project (see Table 3).

Similar to the findings of Leventhal and Brooks-Gunn (2000), this project revealed that there are differences in the attitudes of urban and rural students towards science. In general, urban students showed greater interest in science learning and were more aware of its importance to the environment and to their livelihood. However, contrary to what was reported by Roscigno and Crowley (2001), this project revealed that girls in the urban locality were slightly more enthusiastic than boys about learning science, with 79% of the girls indicating that science was relevant to them academically and socially. The boys in these schools indicated that they had interest in science and that they saw it as being a

Students' Attitude to Science in Urban and Rural Schools

relevant subject worth pursuing, but only 64% of them indicated explicitly that it was relevant to their lives. This suggests that they may have slightly less desirable attitudes to the pursuit of science than urban girls.

As for the usefulness of science, however, 84% of the boys surveyed said "it was useful to their life" but that "the classes were boring." An almost equal percentage of urban girls (83%) reported that science was useful to their lives. Furthermore, in terms of perceived difficulties, again an almost equal percentage of urban girls and urban boys (32% and 31% respectively) felt that science was difficult.

In the rural schools, however, the effect was slightly different, with only about 58% of the boys in this locality reporting that they had a strong inclination to science learning based on their view of it being relevant. Only 47% of the rural girls opted to pursue science for its relevance to their lives. A total of 46% of the rural boys indicated that science was useful to them but only 9% of rural girls felt that science was useful to their lives; while 62% of rural boys and 81% of rural girls perceived science to be a difficult subject. Despite the perceived difficulties, the responses obtained from 69% of rural boys suggested that they found science to be "interesting and exciting" while 46% thought that it was "important for their future studies." In contrast to the boys in the rural schools, only 16% of rural girls indicated that they enjoyed science, while many of the other girls in this locality reported that science was "boring" and that it was "no fun learning science... because they don't understand the meanings of the words used." In addition, 81% of rural girls also suggested that the "calculations were too hard," with many of them indicating that they would "not be needing this in their future life."

There was a unique theme emerging from the data, based on several responses obtained, which suggested that some students felt that science was "not meant for them." This view seemed to be more common among the students in the rural schools and more specifically among the girls in this locality. Examples of actual verbatim responses suggestive of this include "this is not for me," "I wasn't cut-out for science," and "my mind cannot do science." The available data indicated that only 21% of the urban girls felt this way as against an overwhelming 94% of the rural

Rawatee Maharaj-Sharma

girls. It would be interesting to explore the reasons behind this feeling/belief in the larger study.

In terms of the combined numbers (boys and girls) in both localities, the project revealed that:

1. 88% of urban students indicated that science was relevant to their lives, while only 52% of rural students viewed it as a relevant pursuit;
2. 83% of urban students reported that science was useful to them while only 26% of rural students saw the usefulness of science to their lives;
3. 93% of urban students reported that they enjoyed science but only 40% of rural students indicated that they enjoyed science learning;
4. 32% of urban students felt that science was difficult but 72% of rural students felt that it was difficult; and
5. 30% of urban students indicated that science “was not for them” but 86% of rural students expressed this sentiment.

Table 3 summarizes the findings of this pilot project. Columns 2–8 give the findings with respect to the emerging themes listed in Column 1 in the following categories:

1. The attitudes of **all** the students surveyed across both localities (Column 2)
2. The attitudes of **all** urban students (Column 3)
3. The attitudes of urban boys (Column 4)
4. The attitudes of urban girls (Column 5)
5. The attitudes of **all** rural students (Column 6)
6. The attitudes of rural boys (Column 7)
7. The attitudes of rural girls (Column 8)

Table 3. Percentage of Students in Each of the Emerging Themes

Columns							
1	2	3	4	5	6	7	8
Themes	All Students	Urban Students			Rural Students		
		All	Boys	Girls	All	Boys	Girls
Relevancy	62	88	64	79	52	58	47
Usefulness	55	83	84	83	26	46	9
Enjoyment	67	93	90	97	40	69	16
Difficulty	52	32	32	31	72	62	81
Science is not for me	57	30	39	21	86	77	94

Conclusion

Within recent years, some attempts have been made to include affective learning outcomes in science curriculum documents. However, teachers have indicated that it is difficult for them to incorporate these into their classes, either because they have not been trained to do so or because of the limited time in which to cover the science content of the respective syllabuses. This project suggests that two gaps, in terms of attitudes, exist among the students surveyed. The first is the difference in attitude toward science between urban students and rural students, and the second is the difference in attitude between girls and boys towards the subject. This seems to indicate, therefore, the need for teacher training in areas such as the use of more innovative teaching strategies, lesson planning, and time management skills in an attempt to bridge the gap in both cases.

Among the urban students, only a few more girls than boys found science to be useful, relevant, and enjoyable but a few more boys than girls indicated that science was a difficult and unappealing subject. In general, however, urban boys and urban girls seem to share similar feelings and views about the various aspects of science education explored in this project.

Among the rural students, however, there were large differences in the attitudes expressed by boys and girls, especially with respect to the usefulness, enjoyment, and difficulty of science—more boys than girls expressed positive attitudes in these areas. As for the relevance of science, only a few more rural boys than girls thought that science was a relevant pursuit. In a very general sense, this project revealed the following:

1. Urban students had more positive attitudes to science than rural students.
2. Urban girls had more positive attitudes to science than urban boys.
3. Rural boys had more positive attitudes to science than rural girls.
4. Despite the locality in which students were schooled, those who viewed science as enjoyable, relevant, and useful to their lives had more positive attitudes towards the subject.

Discussion

It is important to remember that this is a pilot project, and that the findings cannot be generalized to all schools in each of the localities identified or even across gender borders. No tests of significance were done, as this project was meant to give an overview, in a broad sense, of some of the differences in attitudes that exist across locality and gender. Indeed, a more detailed study that probes deeper into the various aspects of attitudes, with a much larger sample, is needed to further substantiate the findings obtained in this project.

It is interesting, however, to note that the findings here were similar to that obtained by Leventhal and Brooks-Gunn (2000) and Weinburg (1995), in that more students schooled in urban settings exhibited positive attitudes towards science than those schooled in rural settings. Further, in general, more boys than girls had a positive attitude towards science. However, the findings of this project in the urban context were different to that reported by Hu (2003), who reported that in urban areas more boys than girls had a positive attitude towards science.

Students' Attitude to Science in Urban and Rural Schools

In view of the findings of this project, it can be speculated that there is perhaps an unspoken/subtle relationship between students' social, economic, and cultural backgrounds and the way they view/perceive science education. It would be interesting to investigate this supposition in science, in the first instance, and then in other curriculum areas, as this project did not probe into the influence and/or possible relationship/s that these variables may have on students attitudes towards science learning.

Several aspects of students' economic, social, and cultural backgrounds and experiences (in both localities) will be explored in the larger study in an attempt to gauge the impact that these variables have on students' overall attitude towards science learning. Furthermore, the influence/s of students' cultural contexts may also have a bearing on the way they view science and the attitudes they develop toward the discipline. Consideration of this perspective is an excellent topic for future research.

References

- Bednar, A., & Levie, W. H. (1993). Attitude-change principles. In M. Fleming & W. H. Levie (Eds.), *Instructional message design: Principles from the behavioral and cognitive sciences* (pp. 283–304). Englewood Cliffs, NJ: Educational Technology Publications.
- DeYoung, A. J. (1987). The status of American rural educational research: An integrated review and commentary. *Review of Educational Research, 57*(2): 122–148.
- Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.
- Hofman, H. H. (1977). An assessment of eight-year-old children's attitudes toward science. *School Science and Mathematics, 77*(8): 662–670.
- Hu, S (April 29, 2003). Educational aspirations and postsecondary access and choice: Students in urban, suburban, and rural schools compared. *Educational Policy Analysis Archives, 11*(14). Retrieved [insert date] from <http://epaa.asu.edu/epaa/v11n14/>
- Ibrahim, A. B. (1984). Attitudes to science of students in Sarawak. *Journal of Science and Mathematics Education in Southeast Asia, 7*(1): 10–14.
- Jones, G. M., Howe, A., & Rua, M. J. (2000). Gender differences in students' experiences, interests, and attitudes toward science and scientists. *Science Education, 84*(2), 180–192.
- Leventhal, T., & Brooks-Gunn, J. (2000). The neighborhood they live in: The effects of neighborhood residence on child and adolescent outcomes. *Psychological Bulletin, 126*(2), 309–337.

Rawatee Maharaj-Sharma

- Marsh, H. W. (1992). Content specificity of relations between academic achievement and academic self-concept. *Journal of Educational Psychology, 84*(1), 35–42.
- Osborne, J., Simon, S., & Collins, S. (2003). Attitudes towards science: A review of the literature and its implications. *International Journal of Science Education, 25*(9), 1049-1079.
- Penguin Webster Handy College Dictionary* (3rd ed.). (2003). New York: Penguin.
- Quamina-Aiyejina, L., Mohammed, J., Rampaul, B., George, J. M., Kallon, M., Keller, C., & Lochan, S. (2001). *A baseline study of the teacher education system in Trinidad and Tobago*. Monograph Series, 1. St. Augustine, Trinidad: School of Education, UWI.
- Roscigno, V. J., & Crowley, M. (2001). Rurality, institutional disadvantage and achievement/attainment. *Rural Sociology, 66*(2), 268–292.
- Trochim, W. M. K. (2002). *Research methods knowledge base* (2nd ed.). New York: Longman.
- Weinburgh, M. (1995). Gender differences in students' attitudes towards science: A meta-analysis of the literature from 1970–1991. *Journal of Research in Science Teaching, 32*(4), 387–398.
- Zimbardo, P. G., & Leippe, M. R. (1991). *The psychology of attitude change and social influence*. New York: McGraw-Hill.

Students' Attitude to Science in Urban and Rural Schools

Appendix A

INSTRUMENT TO DETERMINE STUDENTS' ATTITUDES TOWARDS SCIENCE – (3 URBAN SCHOOLS AND 3 RURAL SCHOOLS)

Please complete both sections of the questionnaire as completely and honestly as you can. If you are unsure about any question, please raise your hand and ask for assistance.

THIS IS NOT A TEST

Section A

	Question	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	Science is boring					
2	Only bright people can do science					
3	Science is a difficult subject					
4	Science is no fun					
5	Science is not useful to me					
6	Science is too abstract					
7	Science cannot help me solve everyday problems					
8	Science is not interesting					
9	Science is too much mathematics					

10	Science is not important to my future education					
11	I dislike attending science classes					
12	I will skip science class if I can					

Section B

1. Write a short description of **ALL** your feelings about the subject Science.

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

2. Do you feel that Science is useful to your everyday life? Why?

.....
.....
.....
.....
.....
.....
.....

Students' Attitude to Science in Urban and Rural Schools

.....
.....
.....
.....
.....

3. What do you believe is the importance of Science to you now and later on in your life?

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

Thank you for your assistance.