Grade Seven Female Learners' Attitudes towards Natural Sciences in Sekhukhune District, South Africa

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Abstract

The purpose of this study was to find out grade seven female learners' the attitudes towards science and also to explore whether self-confidence towards science and knowledge about the usefulness of science influenced their attitudes. Grade seven girls' (N=15) were the participants. A questionnaire and interview schedules were used to study the relationship between factors affecting the attitudes of young female learners towards science at the primary school. T-test show that there was a significant difference between those who has self-confidence and those who said did not (T-test; $p<0.05$). Thus, there was a significant difference between the two variables. Also, attitudes of female students towards science was positive, suggesting that there was a perceived increase in the enrolment of girls in science subjects. The study may help educators and curriculum designers to produce science materials that help to capture the interest(s) of female learners in science.

Keywords: *Attitudes, self-confidence and knowledge, female learners, natural science.*

1. Introduction

Attitudes play a significant role in influencing and guiding action, emotions and in knowledge processes (Petty & Cacioppo, 1986; Kara, 2009) thereby shaping learning and teaching processes. It is argued that effective teaching is based on the interactive system of subject matter knowledge, pedagogical knowledge, learners' knowledge and environmental context knowledge (Cochran, et al, 1993). Attitude is a key factor in pupils' learning in science, about science and through scientific method (Wolf, 2009; Anwer, et. al., 2012; Ali & Awan, 2013).

In studying attitudes towards science education, researchers attempt to explain why students strive for particular goals, how intensively they strive, how long they strive and what feelings and emotions characterize them in this process. Therefore, it is important for teachers to understand learners' attitudes towards science and respond to them ((Anwer, et. al., 2012; Ali & Awan, 2013). Female grade seven learners are of special interest because at this stage, children start to doubt their abilities in science (Pers. Obs.). They become less confident in learning science and need special support from their teachers to continue being engaged in learning science (Pers. Obs.). This observation is in agreement with American Association of University Women Educational Foundation (AAUW) (1992); Linn and Hyde (1989); and Lowenfeld and Brittain, (1987) who contend that as females progress through secondary grades, they become less confident of their academic skills; and thus, their career aspirations are narrowed. Therefore, failure to guide and support learners at this crucial stage can lead to low perceptions of their abilities in science with immediate and potentially life-long effects on how they perceive and value science. Promoting positive attitude towards science is likely to enable learners to engage meaningfully with science in school.

2. Literature Review

In general policies and practices in education have been discriminative against women (Anaeme, 2012; Ecklund, et al., 2012). For instance, women were prevented from taking science courses and working in scientific laboratories (Rosser, 2004). Although these policies are no longer in effect in the United States, other forms of gender discrimination persist (Rosser, 2004). For example, a Massachusetts Institute of Technology (1999) task force found that female faculty

members in the sciences were paid less, given less laboratory space, and promoted less often than their male counterparts. Such practices or tendencies affect learners' attitudes hence performance in various disciplines including science (Ecklund et al., 2012). According to the theory of reasoned action (Ajzen & Fishbein, 1980) and planned behaviour, (Ajzen, 1985) a person's intention depends on different determinants such as attitudes towards the behaviour, subjective norm and perceived behavioural control. The third determinant is close to Bandura's (1997) concept of self-efficacy. The strength of the determinants is different from one person to another as well as from one action to another. The establishment and maintenance of high self-efficacy in science education should promote interest within that domain (Bandura, 1982; Eccles, 1994; Farmer, et al., 1999). A favourable classroom climate is not defined solely by behaviour exhibited by others but also by the perceptions learners hold about the learning environment.

Promoting positive attitudes towards science enables pupils to engage meaningfully with science in school and later on as adults (Pavlou & Kambouri, 2007; Anwer, et. al., 2012; Ali & Awan, 2013). This is crucial because science is important in everyday life as a way of demonstrating intelligence (Gardner, 1993; Prentice, 1999). Promoting positive attitudes towards science is likely to enable pupils to engage meaningfully in science (Anwer, et. al., 2012; Ali & Awan, 2013) and express themselves through the media. Thus, assessing pupils' attitudes at this stage offers an indirect evaluation of the overall effects of science education at the primary school level. Due to lack of systematic studies on rural primary school pupils' attitudes towards science, the authors sought ideas about how to conceptualize attitudes in science education.

Positive attitudes towards schooling are associated with pupils feelings of success, enjoyment, interest and/or stimulation, whereas, negative feelings towards schooling are associated with feelings of inadequacy, failure, and/or boredom (Blake, 1994; Anwer, et. al., 2012; Ali & Awan, 2013). When referring to pupils' attitudes, the study includes the notion of enjoyment expressed in its "positive form" as interest, love, happiness, liking and fun, or in its "negative form" as boredom and hate. Some studies also include perceptions of confidence expressed as level of difficulty, ease of use, feelings of inadequacy, and success versus failure. For instance, Todman and Dick's study (1993) included the dimension of usefulness, which is fundamental, given the instrumental position of science as a subject (Dick, 1989). It was therefore of necessity to explore factors that influenced learners attitudes and their impact on science education.

In addition, Todman and Dick (1993) as well as Prokop et al. (2007) demonstrated that pupils' attitudes towards a school subject were influenced by their teachers' attitudes towards the subject. In reviewing attitudes to science education, Weinburgh (1995) noticed how little difference there was between the attitudes of girls to science as reported in the literature, between 1970 and 1991. Commenting on this scenario, Weinburgh suggests that girls need to have positive attitudes to be motivated to achieve in science. Therefore the task of science teachers is to plan classroom activities that can bring success to girls in co-educational classes. Stark and Gray (1999), reporting on data collected by the Assessment of Achievement programme in Scotland, present learners preferences for different classroom activities for learners in primary 7 (11- 12 years old) and secondary 2 (13-14 years old). The most popular activity for boys and girls alike at both ages, was found to be working with apparatus and materials. The least popular for primary 7 was doing a science work card whilst for secondary 2 it was learning about famous scientists. Stark and Gray (1999) report no statistical significant differences between boys and girls in their liking for different activities. However, similar preference does not mean similar treatment. If schools are co-educational and equality of outcome is not to be gender biased then teachers need to adopt classroom practices that reduce differences rather than increase them. Observers of classroom practices contend that boys tend to dominate classroom interactions and thereby appropriate a disproportionate amount of classroom time and learning opportunity (Walberg, 1991; Mohammad et al., 2012). Research by Tulley and Lucas (1991) showed that given a chance, girls are equally as successful as boys in lock constructions. This finding is consistent with that of Adamuti-Trache and Sweet (2013) which showed that girls received higher teacher assigned grades while boys obtained higher scores on science literacy tests.

Attitudes have been recognized as important predictors of individual differences in many educational endeavours (Akcay et. al., 2010). A study by Ajzen and Fishbein (1977) reported that "attitudes toward targets predict multiple-act criteria, provided that the attitudinal and behavioural entities involve the same target elements" (p. 981). Likewise, Woodrow (1991) contends that our awareness of students' attitudes toward computers should be "a critical criterion in the evaluation of computer courses and in the development of computer-based curricula" (p. 165). It is believed that attitudes towards computers not only play an influential role in determining the extent to which students accept the computer as a learning tool but also future behaviours towards the computer such as using it for further study and vocational purposes (Rosen & Weil, 1995). These findings are consistent with Ali et. al. (2013) which found out that teachers' positive attitude towards Mathematics positively influenced learners' attitudes towards learning Mathematics. On the contrary, studies on gender roles and school subjects reveal the avoidance of additional science courses by

females (Maple & Stage, 1991). Schibeci (1984) reported that females exhibit more positive attitudes towards biology and males towards physics. However, there is no universal agreement among researchers on this issue. It was apparent that many studies reported in the literature have been conducted in the urban or English-speaking countries and therefore the need for this study which was based on a rural non English speaking context.

Research on science majors suggests that gender is an important variable in the learning of science in college courses (Ecklund et al., 2012; Anaeme, 2012). For example, Cavallo, Potter and Rozman (2004) found that among science majors studying physics, the male students had significantly higher self-efficacy, performance goals, and physics understanding compared to females, which persisted throughout the course. It has been found that, among the science majors who "leak from the science pipeline" during the undergraduate years, there are a higher percentage of women than men (Siebert, 2001: 288). Data from the American Association of University Women indicate the need to focus more attention on females' development of positive attitudes towards science (American Association of University Women, AAUW, 1992). As females progress through secondary grades, they become less confident of their academic skills; thus, their career aspirations are narrowed ((American Association of University Women, AAUW, 1992; Linn & Hyde, 1989). Mechanisms for ensuring equality of treatment as well as equality of opportunity for men and women are important (Ecklund et al., 2012). This exacts a commitment to ensure the eradication of social norms and prejudices that construe female as unequal in value to male in terms of their contributions and entitlements. Thus, assessing gender equality requires gauging whether fundamental freedom and choices are as available to female as they are to male. As such, this study endeavoured to investigate the attitudes of grade seven female learners towards natural science and suggest a remedial course of action to address the issues therein.

3. Methodology

3.1 Research design

The study was both quantitative and qualitative approaches. For quantitative, a survey research design (Bogdan & Biklen, 1982) was used. This design was chosen because we wanted to learn about people's attitudes, beliefs, values, behaviour, habits, desires, ideas and other related types of information towards science education.

3.2 Participants

The participants were girls from a mixed (boys and girls) primary school in Driekop circuit, Sekhukhune district in Limpopo province, South Africa. The participants were 15 female learners who were randomly selected according to their ages. Girls in grade 7 ranging from 12 to 14 years were the focus group of this study. They were of special interest because at this age pupils start to doubt their abilities in science become less confident in the discipline (Lowenfeld & Brittain, 1987) and need special support. This can lead to low perceptions of their abilities in science with immediate and potentially life-long effects (Morgan, 1995).

3.3 Instruments

The data was collected using interviews schedule (Table 1) and a questionnaire (Appendix 1) as 'science and scientists' (ASA) (Sjoberg, 2000). ASA is about pupils' experiences outside school, what they want to learn about science and their views of science and scientists.

3.4 Procedure

Grade 7 pupils had the same teacher during the school year 2010. The teacher's instructional approach included a mixture of direct instruction, cooperative learning and laboratory work. At the beginning, the teacher taught science using the direct instruction method and then moved to cooperative structured groups of laboratory work. Before administering the survey, permission from the school board and parents was obtained. Participants were informed about the research in order to get their consent. The duration of the study was one month. The researchers took one week interviewing and observing and the remaining three weeks were used to complete the questionnaire. To understand and interpret data it was important to know the backgrounds and context of pupils, be part of them and observe them. An interview schedule with interview questions was used. The respondents then completed the attitude questionnaire that was tested and re-

tested using 10 female grade 7 learners from similar backgrounds and an overall Cronbach Alpha of 0.93 was obtained, which suggest that the instrument was reliable for the target group. The questionnaire address a variety of issues that could reflect girl's attitudes towards science in school, such as the nature and value of science, personal relation with science (enjoyment and confidence), using a 5- point Likert-type scale ranging from 1 (Never), 2 (Rarely), 3 (Sometimes), 4 (Usually), 5 (Always).

3.5 Data analysis

Bogdan and Biklen (1982) define qualitative data analysis as "working with data, organizing it, breaking it in to manageable units, discovering what is important and what is to be learned and deciding what you will tell others" (p.145). Therefore, qualitative data were analyzed for themes that were related to study. All written notes were organized and placed raw data into logical meaningful categories. The analysis included reading and checking for common ideas that could form themes and later re-examining those themes to form major categories in line with the purpose of the study. Quantitative data were analysed using both descriptive and inferential statistics. For descriptive statistics, percentages, means and standard deviations were used where a T-test was used for inferential statistics.

4. Results and Discussion

The interview schedule contained four questions. The first question was about subject choice of science. Short responses were sought to further clarify respondents' reasons for intending to or not to take science at secondary school level. All participants responded to the first question which asked whether they would take science or not. Those who said 'yes' intended to go on to further study science in the secondary school and after leaving school. They intended to study science career-orientated courses. Learners intending to go on further believed that science was more relevant to their careers than those who did not like it.

Table 1 indicates that learners aged 12 were interested in taking science. 3 learners out of 5 learners answered 'No', meaning that 75% agreed to further science courses. For respondents aged 13 and 14, 50% reported 'Yes' and 50% reported 'No'. All age groups responded positively to the second question, that science was a challenging subject. It was evident that learners aged 12 were enjoying science because 3 learners out of 5 learners responded 'Yes' to the third question and 2 said 'No'. All age groups 13 and 14 showed 50% 'Yes' and 50% 'No'.

Table 1. Grade 7 female learners' responses on learning Natural Sciences.

Questions	Age	Yes %	No %	Total %
Are you going to take science in grade 10 and why?	12	60	40	100
	13	50	50	100
	14	50	50	100
Is science challenging subject and how?	12	100	0	100
	13	100	0	100
	14	100	0	100
What do you enjoy when studying science?	12	60	40	100
	13	50	50	100
	14	50	50	100

The survey showed that all participants answered with strong agreement to the statements. Items 1, 2, 4, 13 and 17 were related to motivation in science learning; items 5, 6 and 12 relevance of science learning to personal goals; items 3, 8, 11, 14, 15 and 18 responsibility or self-determination for learning science and items 7, 9, 10, 16, 19 and 20 confidence in science learning. Most of the learners (93%) had confidence in science. This indicated that most girls had a positive attitude towards science and were highly motivated to achieve in science and to take science in secondary school. 87% enjoyed learning science and 80% responded that science was relevant to their lives. 53% never agreed that it was their fault if they did not understand science.

The instrument used for sharpening focal themes in depth was qualitative interview. This deeper qualitative level was important to better understand what could be involved in making science subjects more attractive to female learners as potential pathways to science oriented careers. From the interviews, it was evident that female learners' descriptions

of science focused on two themes: functional and utilitarian perspectives. For example, many female learners pointed out the importance of "using science in their future career" and the need to be "relevant to their career in future". One learner commented that: "… if I am to study engineering, it must not conflict with my future motherhood role when I grow up". Similarly another learner said: "Yes, my career should link to what actually life is all about. I mean…. what I will enjoy with my family like my husband, children and relatives and so on…" Thus, most female learners posted positives attitude towards science. This is in tandem with the findings of Ramsden (1998): "If we are really lucky, we might even get more young people choosing to study science subjects because they feel science really does offer them something of use and interest" p.134. This linked to a concern over the uptake of science subjects at both the secondary and tertiary level (Ramsden 1998). Glynn et al. (2007) observed that "furthermore, women may be more likely than men to believe that science is relevant to their career" (p.1091). Likewise, Glynn et al. (2007) found that "The students' written explanations and interview responses indicated that many students were motivated to learn science, not because they found it relevant to their careers, but because they found it relevant to their health, life, and understanding of the world" (p. 1098).

Differences were found between the two groups of respondents on 20 items. Those that 'do' had a mean of 11.9 ± 1.8 SD as compared to those that said, 'do not' have self-confidence (mean 3.1 ± 1.7 SD). Using a T-test the results show that there was a significant difference between those who said 'do' and those who said 'do not' have self-confidence (T-test; $p<0.05$). Therefore, it could be deduced that most of the female learners had positive attitudes towards science as a subject to study.

5. Conclusion

In conclusion, female learners believed that science was an important and worthwhile subject to study. This study indicated that 53% of girls had positive attitudes towards Natural Sciences and were highly motivated to achieve in science and were more likely to select science subjects as electives in high school. This was attested to by a study by Pauling (1951) who observed that citizens need to have enough knowledge of the world to make the right decisions; and in the modern world this means that the citizen must have a significant understanding of science. To meet Pauling's challenge the study findings suggest that science teachers should endeavour to arouse, direct and sustain their female learners' attitudes. They need to motivate them to learn science by making explicit connections between the learner's future professional lives and the course they are learning. This paper argued the case for revisiting attitudes to science and primary school science in particular and to outline some possible ways forward for attitudes research.

6. Suggestions for Further Research

Based on the findings that female learners had positive attitudes towards science as opposed to the common belief that they exhibit negative attitudes, the following recommendations were made: further research should be conducted to suggest methods of improving and sustaining science attitude of female learners, as well as to enhance interest and interaction with science equipment in primary schools.

References

Adamuti-Trache , M., & Sweet, R (2013). Science, Technology, Engineering and Math Readiness: Ethno-linguistic and gender differences in high-school course selection patterns. *International Journal of Science Education*, http://dx.doi.org /10.1080 /09500693. 2013.819453

American Association of University Women Educational Foundation (AAUW), (1992). *How schools shortchange girls: Executive summary*. Washington, DC: Author.

Anaeme, F.O. (2012) Reducing Gender Discrimination and Violence against Women through Library and Information Services. *Library Philosophy and Practice 2012 Accessed from:* http://unllib.unl.edu/LPP/ August 15, 2013.

Ali, M. S. & Awan, A. S. (2013). Attitude towards science and Its relationship with students' achievement in science. *Interdisciplinary journal of contemporary research in business*, 4(10), 707-719.

Anwer, M., Muhammad, H. & Harrison. C. (2012). Students' Attitude towards Science: A Case of Pakistan. *Pakistan Journal of Social and Clinical Psychology,* (9)2, 3-9.

Akcay, H., Yager, R. E., Iskander, S. M. & Turgut, H. (2010). Change in student beliefs about attitudes toward science in grades 6-9. Asia-Pacific Forum on Science Learning and Teaching, 11(1), 1-6.

Ajzen I., & Fishbein, M (1977). Attitude-behavior relation: A theoretical analysis and review of empirical research. *Psychological Bulletin,* 84, 888-918.

Ajzen,I. & Fishbein, M. (1980). *Understanding Attitudes and Predicting Social Behavior*. Englewood Cliffs, N.J: Prentice-Hall Inc.

Ajzen, I. (1985). From intensions to actions: A theory of planned behaviour. In J. Kuhl & J. Beckmann (Eds.), *Action control: From cognition to behavior*. New York: Springer-Virlag.

Armitage, D. (1993). Where are the girls? Increasing female participation in computer, math, and science education. In D. Carey, R. Carey, D.A. Willis, & J.Willis (Eds.), *Technology and teacher education annual* (pp. 14-18). Charlottesville, VA: Association for Advancement of Computing in education.

Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist*, 37, 122-147.

Bandura, A. (1997). *Self-efficasy. The exercise control*. New York: W.H Freeman and Company.

Blake, D. (1994). Children's attitudes to school at key stage 1 and 2. *Primary Education Studies*, 8 (3), 50–58.

Bogdan, R. C., & Biklen, S.K. (1982). Qualitative research for education: *An introduction to theory and methods*. Boston: Allyn and Bacon, Inc.

Cochran, K. DeRuiter, J. & King, R. (1993). Pedagogical content knowing: An integrative model for teacher preparation. *Journal of teachers Education*, 44 (4), 263-272.

Cavallo, A. M. L., Potter, W. H. & Rozman, W. H. (2004). Gender Differences in Learning Constructs, Shifts in Learning Constructs, and Their Relationship to Course Achievement in a Structured Inquiry, Yearlong College Physics Course for Life Science Majors. *School Science and Mathematics*, 104(6), 288-300.

Eccles, J.S. (1994). Understanding women's educational and occupational choices: Applying the Eccles et al. model of achievement-related choices. *Psychology of women Quarterly*, 18, 585-609.

Ecklund, E. H., Lincoln, A. E. & Tansey, C. (2012). Gender segregation in elite academic science, *Gender and Society*, 26, 693-717.

Farmer, H.S, Wardrop, J.L. & Rotella, S.C (1999). Antecedent factors differentiating women and men in science/ non-science careers. *Psychology of women Quarterly*, 23, 763-780.

Gardner, H. (1993), *Frames of mind: the theory of multiple intelligences*. London: Fontana.

Glynn, S. M., Taasoobshirazi, G., & 1 Brickman, P. (2007). Nonscience Majors Learning Science: A Theoretical Model of Motivation. *Journal of Research in Science Teaching*, 44(8), 1088–1107.

Kara, A. (2009). The effect of a 'learning theories' unit on students' attitudes toward learning. *Australian Journal of teacher Education*, 34(3), 100-113.

Lowenfeld, V., & Brittain, L. (1987). *Creation and mental growth*. New York: Macmillan.

Linn, M.C., & Hyde, J.S, (1989). Gender, Mathematics and science. *Educational Researcher,* 18, 17-19.

Maple, S.A., & Stage, F.K. (1991). Influences on the choice of math/science major by gender and ethnity. *American Educational Research Journal,* 28 (1), 37-60.

Meager, N., & Ashfield, J. (1995). Teaching art at key stage 2. Corsham, Wiltsshire: National Society for Education in art & Design, Visual Impact Publications.

Morgan, M. (1995). Art 4-11.*Art in the early years of schooling*? Cheltenham: Stanley Thornes.

Mohammad, N., Ebrahim, E., Aazam, D. & Maryam, R. (2012). Students' Attitude towards Science and Technology. *Inter disciplinary journal of contemporary research in business*, 3(10), 1-6.

Pauling, L. (1951). The significance of chemistry to man in the modern world. *Engineering and Science,* 14, 10-12.

Pavlou, V., & Kambouri, M. (2007). Pupils' attitudes towards art teaching in primary school: an evaluation tool. *Studies in Educational Evaluation* 33, 282-301.

Petty, R., & Cacioppo, J. (1986) the elaboration like hood model of persuasion. *Advance in Experimental Social Psychology,* 19, 123-205.

Prokop, P., Tuncer, G. & Chudá, J. (2007). Slovakian Students' Attitudes toward Biology. *Eurasia Journal of Mathematics, Science & Technology Education*, 3(4), 287-295.

Prentice, R. (1999). Art: Visual thinking. In R. Prentice & J. Kiley (Eds) The curriculum for 7 – 11 year olds. London: Paul Chapman.

Ramsden, J. M. (1998). Mission Impossible? Can anything be done about attitudes to science? International Journal of Science Education, 20 (2), 125 – 137.

Rosen, L.D., & Weil, M. M. (1995). Computer anxiety: A cross-cultural comparison of university students in ten countries. *Computer in Human Behavior,* 11, 45-64.

Rosser, S. V. (2004). *The science glass ceiling: Academic women scientists and the struggle to succeed*. Oxford, UK: Taylor & Francis.

Schibeci, R. A. (1984). Attitudes to science: An update. *Studies in Science Education,* 11, 26-59.

Stark, R., & Gray, D. (1991). "Gender difference in learning science." *International Journal of science education*, 21(6), 633-643.

Sjoberg, S. (2000). *Science for the children? Report from the Science and Scientists-project*. Oslo: University of Oslo.

Siebert, E. D. (2001). Science education program standards. In E.D. Siebert&W.J. McIntosh (Eds.), College pathways to the science education standards (pp. 115–138). Arlington, VA: National Science Teachers Association Press.

Todman, J., & Dick, G. (1993). Primary children's attitudes to computers. *Computer Education*, 29(2), 199–203.

Tulley, A., & Lucas, A.M: (1991). "Interacting with science museum exhibit; Vicarious and direct experience and subsequent understanding." *International Journal of science Education*, 13(5), 533-42.

Walberg, H. J. (1991). "Improving school science in advanced and developing countries; *Review of Educational research*, 61(1), 25-69.

Weinburgh, M: (1995). "Gender differences in students attitudes towards science: Meta-analysis of the literature 1971-1991," *Journal of the literature in science teaching*, 32(4), 387-98.

Wolf, D. (2009). Science Multimedia Presentations' Effects on Female Students' Achievement and Attitudes toward Science. Western Kentucky University - Bowling Green, KY.

Woodrow, J. (1991). A comparison of four computer attitude scales. *Journal of Eduactional Computing Research,* 7, 165-187.

Appendix 1

Questionnaire

This investigation is intended to enable me to find out attitudes of grade 7 learners towards science.

I would like your reactions in this series of statement in relation to attitudes of pupils in grade 7 towards the teaching and learning of science in the primary school.

I would be highly appreciative if you respond to these statements as carefully as possible.

A. Science Attitude Questionnaire

In order to better understand what you think and feel about your science learning area.
Please respond to each of the following statement from the perspective of: When I am in my science class…" Circle one choice that best describes your interest,
_1 (Never), 2 (Rarely), 3 (Sometimes), 4 (Usually), 5 (Always).

01. I enjoy learning the science.
1 Never 2 Rarely 3 Sometimes 4 Usually 5 Always

02. I enjoy performing experiments in the laboratory.
1 Never 2 Rarely 3 Sometimes 4 Usually 5 Always

03. I spend a lot of time reading science books.
1 Never 2 Rarely 3 Sometimes 4 Usually 5 Always

04. I find learning the science interesting.
1 Never 2 Rarely 3 Sometimes 4 Usually 5 Always

05. I think about learning science can help my career.
1 Never 2 Rarely 3 Sometimes 4 Usually 5 Always

06. I like to do better than other learners on the science test.
1 Never 2 Rarely 3 Sometimes 4 Usually 5 Always

07. I like to participate in science expo.
1 Never 2 Rarely 3 Sometimes 4 Usually 5 Always

08. I find science difficult because I really need to concentrate.
1 Never 2 Rarely 3 Sometimes 4 Usually 5 Always

09. I am confident I will do well on science test.
1 Never 2 Rarely 3 Sometimes 4 Usually 5 Always

10. I am confident I will do well on the science labs and projects.
1 Never 2 Rarely 3 Sometimes 4 Usually 5 Always

11. What I learn in science is useful in everyday life.
1 Never 2 Rarely 3 Sometimes 4 Usually 5 Always

12. The science I learn is relevant to my life.
1 Never 2 Rarely 3 Sometimes 4 Usually 5 Always

13. Understanding science gives me a sense of accomplishment.
1 Never 2 Rarely 3 Sometimes 4 Usually 5 Always

14. I think about how I will use science I learn.

1 Never 2 Rarely 3 Sometimes 4 Usually 5 Always

15. Science is useful because it develops me to think critically.
1 Never 2 Rarely 3 Sometimes 4 Usually 5 Always

16. My teacher helps me when I'm having difficulties.
1 Never 2 Rarely 3 Sometimes 4 Usually 5 Always

17. It is my fault if I do not understand the science.
1 Never 2 Rarely 3 Sometimes 4 Usually 5 Always

18. I put enough effort into learning the science.
1 Never 2 Rarely 3 Sometimes 4 Usually 5 Always

19. I know how to do my science work.
1 Never 2 Rarely 3 Sometimes 4 Usually 5 Always

20. The things which I use in the sciences laboratory are working poorly.
1 Never 2 Rarely 3 Sometimes 4 Usually 5 Always