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Interests, Public Attitudes and Sources of Scientific Information in South Africa

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Abstract

In the context of the restructuring of the scientific and technological system in South Africa, the government has allocated the responsibility for the promotion and support of public understanding and appreciation of science and technology to the Foundation for Education, Science and Technology.

The Foundation – an agency of the Department of Arts, Culture, Science and Technology - assisted by dedicated legislation is on the process of among others of bringing up to international standards the understanding of the interests, attitudes and sources of Scientific and Technological information of the public in South Africa.

To this end a survey of 1000 individuals is currently underway aiming at getting information related to scientific areas of interest to South Africans (e.g. medical, environmental etc), developing indices of informedness and attentiveness, identifying the sources providing Science and Technology information to South Africans and identifying the perceptions and trust of the public on science and scientists.

The effort is compatible with similar efforts in Europe and the USA and international comparisons are possible. The article reports the first results of this effort.

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Introduction

The SA government recognizing the importance of Science and Technology has institutionalized and allocated the responsibilities for the promotion of public understanding and appreciation of science and technology to the Foundation for Education, Science and Technology (FEST).

FEST as an agency of the Department of Arts, Culture, Science and Technology has the expressed mandate through its bill to:

- a) “Initiate and support programmes strengthening the public understanding and appreciation of science and technology at all levels of society.
- b) Act as a consultative body for and make recommendation to organs of state in all tiers of government on matters related to the interface of science and technology with society.
- c) Promote and support studies and initiatives aligning the country’s human resources needs with educational outputs in the pre-research environment.
- d) Inquire into, provide information and support on matters related to scientific, technological and innovation priorities in the national context.
- e) Promote and support the provision and dissemination of scientific and science related information.
- f) Foster and promote nationally and internationally, liaison between institutions and experts in the fields of interest to the Institute.” *IPS Bill 2000*.

In the effort to fulfill its mandate FEST is producing a number of scientific and educational journals, it manages the National Science, Engineering and Technology Week 2001, it runs a hands-on museum, it organises and manages the national Science Olympiad and it informs the national and provincial parliaments about issues of Science and Technology.

FEST, in order to benchmark and structure its activities and in order to bring the level of understanding related to public understanding and appreciation of Science and Technology up to international standards undertook a relevant survey of the public in South Africa. Small efforts have been undertaken sporadically in the field in the past (Pouris 1991, Pouris 1993) but this is the first large-scale effort in the field in the country.

The specific objectives of the survey are:

- to identify the level of interest of the public in selected issues,
- to examine the public attitudes towards science and technology, and
- to analyze the sources of information used by citizens to improve and maintain their understanding of scientific and technological issues.

This paper presents the results of that investigation.

The Sample

The survey was conducted among 1000 households in the main South African metropolitan areas – Pretoria, East Rand, West Rand, Vaal, Port Elizabeth, Cape Town, Bloemfontein and Durban/Pietermaritzburg during the last 3 months of 2000. A representative cluster sampling approach has been followed with face to face interviews. Each interview lasted approximately 20 minutes. Apart from the science and technology related questions the following information has also been collected from the respondents: gender, age, household income, race, life stage, highest educational level achieved, highest educational level achieved in mathematics and science, home language and marital status.

The collected information has been analysed and complete sets of cross tabulations have been produced.

Interest in Science and Technology Issues

Eight issues have been chosen and relevant questions have been asked in order to identify the public interest. Table 1 identifies the eight issues of interest and the number of respondents who answered that they were “very interested” in the issue according to different segments of the population.

Issue	Male	Female	Black	16-24 year old	Total
Foreign Policy	22%	13%	15%	13%	18%
New Science Discovery	39%	27%	34%	37%	33%
New Technologies	48%	36%	47%	47%	42%
Space Exploration	23%	13%	16%	25%	13%
Energy/Nuclear power	25%	16%	23%	27%	21%
Medical discoveries	57%	56%	61%	56%	57%
Environmental issues	52%	47%	51%	49%	49%
Economic Policy	49%	38%	50%	40%	43%

Table 2 provides the mean scores of indices of interest in scientific and technological issues by gender and level of education.

The tables indicate that the top issues of interest are medical discoveries, environmental issues and new technologies. Of least interest are space, foreign policy and energy/nuclear power. Women showed less interest than men on all issues and the interest was increasing as the educational level in general and/or the level of science /mathematics education increased. Young respondents (16 – 24 year old) show below average interested in economic and foreign policy and above average interest in issues of science and technology.

Table 3 shows the issue interest index scores for the EU, the USA, Japan and SA. The interests of South Africans appear to be within the boundaries of interests of the citizens of the industrialized world. South Africans show less interest in space exploration, energy and foreign/international policy.

Table 2 Mean score on indices of interest in scientific and technological issues, by gender and level of education: 2000

(Mean index scores)

	Foreign policy	New scientific discoveries	New technologies (not only IT)	Space exploration	Energy/nuclear power	Medical discoveries	Environmental issues	Economic policy	Sample size
All adults	37	56	63	35	38	73	69	62	1,000
Gender									
Male	43	62	69	43	45	74	71	67	498
Female	31	51	57	28	32	72	66	56	502
Educational level									
Some primary school	17	40	38	21	29	56	52	46	24
Primary school completed	28	43	54	21	31	70	61	61	69
Standard 6/Grade 8	39	52	57	33	39	69	65	60	91
Standard 7/Grade 9	32	55	64	25	35	72	67	64	55
Standard 8/Grade 10	34	49	54	28	33	68	65	53	138
Standard 9/Grade 11	37	60	64	38	39	73	73	64	90
Standard 10/Grade 12	37	59	66	39	41	76	69	62	347
Diploma	44	65	74	42	42	76	75	66	109
Degree	50	70	68	42	36	76	75	64	46
Other tertiary qualifications	47	60	66	61	52	79	79	77	31
Level of Science / Mathematics education^a									
Low	32	51	58	31	38	71	66	61	368
Middle	35	56	61	36	36	71	72	57	234
High	44	64	71	45	44	78	73	66	254

Each index is a summary measure of respondent reports that they are "very interested", "moderately interested" or "not at all interested" about the specific issue. The original responses were converted to a 0-100 index by assigning a value of 100 for a "very interested" response and a value of 50 for a "moderately interested" response in accordance with the NSF (1998).

^aRespondents were classified as having a "high" level of science/mathematics education if they took nine or more high school and college science/math courses. They were classified as "middle" if they took six to eight such courses, and as "low" if they took five or fewer.

Issue	European Union (1992)	United States (1995)	Japan (1991)	SA (2000)
New Scientific discoveries	61	67	50	56
New inventions and technologies	59	66	53	63
New medical discoveries	68	83	65	73
Environmental issues	75	74	71	69
Space exploration	-	50	45	35
Energy/nuclear power	-	54	59	38
Economic policy	-	68	65	62
Foreign and international policy	-	48	55	37

--issue not included in the survey
 Source: JD Miller, R Pardo and F Niwa, Public Perceptions of Science and Technology: A study of the European Union, the United States, Japan, and Canada (Chicago: Chicago Academy of Sciences, 1997) and FEST

Linked to the issue of interest is the issue of informedness. Informedness denotes an individual's self-assessment of his or her level of understanding of a particular issue area.

Interest in a particular issue coupled with informedness may identify gaps in the provision of information to the public and can assist in the development of appropriate policies.

Tables 4 and 5 provide information concerning the issue of informedness. Table 4 shows that only 9% of the respondents answered that they are 'very well informed' in space exploration and 12% on foreign policy. Environmental issues are the topic on the other side of the scale. Twenty eight percent of respondents answered that they are well informed on issues of environmental matters.

Young respondents' answers show that they think that they are better informed than the average respondents are while less women assess that they are informed about issues than men. The level of informedness is increasing with the level of education and increasing participation in science and mathematics education.

Examining the gap between interest and informedness (tables 2 and 5) we find that the biggest gaps are in medical discoveries and new technologies. Similarly the levels of self-reported understanding are significantly lower than the levels of interest in the same issues across all topics.

The third indicator that we examine in this section is the indicator of attentiveness. Attentiveness is a composite indicator of interest, informedness and information acquisition and reflects the need for selectivity. Citizens including all legislators must be selective regarding the fields in which they need and seek to be sufficiently informed in order to participate in policy discussions.

Issue	Male	Female	Black	16 – 24 year old	Total
Foreign policy	17	7	14	13	12
New scientific discoveries	20	10	16	20	15
New technologies	23	16	25	24	20
Space exploration	11	6	8	11	9
Energy/Nuclear power	15	11	15	21	13
Medical discoveries	27	25	29	32	26
Environmental issues	28	29	27	35	28
Economic policy	36	21	30	28	26

Respondents who display a high level of interest in a particular issue, who feel well informed about it and who show at least a minimal pattern of information acquisition are classified as attentive to that issue. The minimal pattern of information acquisition consists of either reading a newspaper at least a few times a week or reading a magazine 'regularly'. Respondents with a high level of interest in a particular issue but who feel that they are not well informed are classified as interested public for that issue.

Table 6 shows the attentive and interested public for each of the subject areas under investigation.

Environmental issues and medical discoveries have an attentive public almost equal in size with the attentive public in economic policy. All other fields under investigation have a substantially lower attentive public.

There is a direct relation between attentiveness to science and technology issues and the levels of education and of science and mathematics education. The attentive public for new scientific discoveries increases to 22% among those with a degree while it is only 6% among those with diploma or high school education. Similar jumps are observed in environmental issues and medical discoveries. In space exploration and energy/nuclear power the jump is observed at the postgraduate level.

Public Attitudes to Science and Technology

The attitudes of the public towards science and technology are usually assessed through two approaches – surveys assessing the confidence in the people running selected institutions and surveys assessing perceptions concerning risks and benefits of scientific research.

Table 6 shows the result of the survey on the public's confidence in the people running different institutions and comparing the results with these in the USA. The percentages represent those respondents expressing 'a great deal of confidence' when asked the following 'I am going to name some institutions in this country. As far as the people running the institutions are concerned, would you say that you have a great deal of confidence, only some confidence or hardly any confidence at all in them?' The scientific community together with the press were ranked average. Medicine, religion, TV and Banks were ranked above average, while government and labour were ranked below average.

Some interesting findings are becoming profound when the responses are compared with those in the USA. On average South Africans have more confidence in the people running the institutions of their country than the Americans do for their own. Medicine and scientific institutions enjoy similar trust in both countries. South Africans however trust more their government (Parliament and Executive Branches) religion, education, Banks and TV& Press, but they are relatively skeptical of their military and courts.

Table 5 Mean score on indices of informedness in scientific and technological issues, by gender and level of education: 2000
(Mean index scores)

	Foreign policy	New scientific discoveries	New technologies (not only IT)	Space exploration	Energy/ nuclear power	Medical discoveries	Environ-mental issues	Economic policy	Sample size
All adults	30	38	42	23	28	49	52	46	1,000
Gender									
Male	36	43	47	27	33	50	54	52	498
Female	24	32	37	19	23	49	51	40	502
Educational level									
Some primary school	3	21	17	3	13	38	33	26	24
Primary school completed	9	22	25	10	17	34	38	37	69
Standard 6/Grade 8	25	30	34	25	24	42	46	42	91
Standard 7/Grade 9	23	34	36	24	33	48	50	48	55
Standard 8/Grade 10	29	33	32	18	23	45	48	41	138
Standard 9/Grade 11	28	35	43	20	25	50	50	46	90
Standard 10/Grade 12	35	41	49	22	28	54	56	49	347
Diploma	36	45	49	32	35	53	60	49	109
Degree	40	50	42	28	27	56	57	50	46
Other tertiary qualifications	44	58	61	50	50	64	72	68	31
Level of Science / Mathematics education^a									
Low	23	31	36	19	25	46	48	43	368
Middle	31	37	43	24	26	50	55	47	234
High	40	51	52	31	35	57	62	53	254

Each index is a summary measure of respondent reports that they are "very well-informed", "moderately well-informed" or "poorly informed" about the specific issue. The original responses were converted to a 0-100 index by assigning a value of 100 for a "very well-informed" response and a value of 50 for a "moderately well-informed" response in accordance with NSF (1998).

^a Respondents were classified as having a "high" level of science/mathematics education if they took nine or more high school and college science/math courses. They were classified as "middle" if they took six to eight such courses, and as "low" if they took five or fewer.

Table 6 Public attentiveness to scientific and technological issues, by sex and level of education: 2000

(Percentages)

	Foreign policy		New scientific discoveries		New technologies (not only IT)		Space exploration		Energy/nuclear power		Medical discoveries		Environmental issues		Economic policy		Sample size
	AP	IP	AP	IP	AP	IP	AP	IP	AP	IP	AP	IP	AP	IP			
All adults	4	12	6	22	9	27	3	12	4	12	13	35	13	26	14	24	1,000
Gender																	
Male	7	12	9	25	11	30	5	15	6	16	14	35	14	28	17	26	498
Female	1	11	3	19	6	23	1	9	3	9	11	34	13	24	10	21	502
Educational level																	
Some primary school				8		8		8		8		29		8		13	31
Primary school completed		6		13		33		6		12	1	43		33	4	35	90
Standard 6/Grade 8	2	18	2	22	5	23	3	10	2	15	9	36	12	24	12	24	138
Standard 7/Grade 9	5	7	9	18	9	22	4	9	5	7	15	38	20	20	20	18	347
Standard 8/Grade 10	3	9	3	17	2	23	1	8	3	9	12	33	11	28	9	22	69
Standard 9/Grade 11	3	11	8	27	10	28	1	14	6	16	13	34	12	33	9	30	55
Standard 10/Grade 12	4	11	6	26	12	27	4	12	4	14	14	34	13	26	14	24	24
Diploma	5	14	6	28	10	33	5	17	8	11	13	36	16	23	16	22	91
Degree	9	24	22	24	11	28	2	17	4	11	24	26	24	26	22	17	109
Other tertiary qualifications	13	10	16	10	16	26	10	23	10	13	26	29	39	16	42	16	46
Level of Science / Mathematics education^a																	
Low	2	10	3	18	5	26	2	10	3	13	9	36	10	28	12	26	368
Middle	4	9	6	21	7	24	2	10	4	11	12	32	16	26	13	18	234
High	8	13	12	25	14	29	6	19	7	13	19	31	20	22	19	21	254

AP = attentive public; IP = interested public

Responses are to the statements: "There are a lot of issues in the news and it is hard to keep up with every area. I'm going to read to you a short list of issues and for each one, I would like you to tell me if you are very interested, moderately interested or not at all interested."; "How often do you read a newspaper: every day, a few times a week, once a week, or less than once a week?"; "What magazines do you regularly, if any?".

To be classified as attentive to a given issue area, respondents must indicate that they are "very interested" in that area, that they are "very well-informed" about it, and that they regularly read a newspaper or magazine. Citizens who report that they are "very interested" in an issue area, but who do not think that they are "very well-informed" about it, are classified as the "interested public". All the other individuals are classified as members of the "residual public" for that issue area.

^aRespondents were classified as having a "high" level of science/mathematics education if they took nine or more high school and college science/math courses. They were classified as "middle" if they took six to eight such courses, and as "low" if they took five or fewer.

Table 7 Public confidence in the people running various institutions: 2000

Institution	Percentages	
	SA	USA(96)
Average	34	23
Medicine	48	45
Scientific community	34	39
SA court	24	28
Military	27	37
Education	44	23
Major companies	35	23
Organized religion	45	25
Executive Branch of Government	19	10
Banks & Financial institutions	43	25
Parliament	20	8
Press	34	11
TV	45	10
Organized labour	26	11
Sample size	985	1925

Percentages represent those respondents expressing a 'great deal of confidence' when asked the following: 'I am going to name some institutions in this country. As far as the people running the institutions are concerned, would you say that you have a great deal of confidence, only some confidence or hardly any confidence at all in them?'

Table 8 shows the responses to questions concerning 'scientific promise' and 'scientific reservations'. 'Scientific Promise' and 'Scientific Reservations' represent the two dimensions of the psychological structure that humans use to integrate information and experience into coherent clusters. The first dimension represents belief in the promise of science and technology. The second one represents personal reservations. Different combinations of these two dimensions may be possible. Individuals may have strong belief in the promise of S&T and low levels of concern, low belief in the promise and high concerns and so on. The results show that South Africans believe strongly in the beneficial effects of S&T.

More than three quarters of the respondents believe that S& T makes our lives easier and more comfortable, that scientists work for the good of the average person, that work becomes more interesting and S&T will create more opportunities for future generations.

Respondents expressed concerns and reservations over the adverse effects of science and technology. Fifty eight percent of respondents agreed that we depend too much on science and not enough on faith and 69% agreed that science makes our way of life change too fast. These statements are probably the result and a reflection of a society experiencing a faster pace of social and economic change than earlier generations.

Table 8 Responses to items in the Index of Scientific Promise and the Index of Scientific Reservations: 2000 (Percentages)

	Strongly disagree	Disagree	Don't know	Agree	Strongly agree
Index of Scientific Promise					
Science and technology are making our daily lives healthier, easier, and more comfortable	3	7	7	51	33
Most scientists want to work on things that will make life better for the average person	3	9	12	50	26
With the application of science and new technology, work will become more interesting	3	8	12	48	29
Because of science and technology, there will be more opportunities for the next generation	7	11	11	40	31
Index of Scientific Reservations					
We depend too much on science and not enough on faith	6	21	14	37	21
It is not important for me to know about science in my daily life	20	39	7	25	9
Science makes our way of life change too fast	5	16	11	47	22

Responses are to the statement: "For each of the following statements, please tell me if you agree or disagree. If you feel especially strongly about a statement, please tell me that you strongly agree or strongly disagree."

Table 9 compares the indices of scientific promise and scientific reservation of SA with those of EU, USA, Japan and Canada. South Africans appear to be more optimistic about the benefits of science but at the same time they have more concerns that science affects the traditional way of life.

Table 9 Indices of Scientific Promise and Reservation in the EU, USA, Japan, Canada and SA

Region/country	Promise Mean score	Reservation Mean score
EU(1992)	69	58
USA (1995)	68	39
Japan (1991)	55	56
Canada (1988)	72	56
South Africa (2000)	78	65

Sources: JD Miller, R Pardo and F Niwa "Public Perceptions of S&T" Chicago Academy of Sciences 1997 and FEST. Each index is a summary measure of respondents, regarding the statements on promise and reservations respectively. A respondent answering 'strongly agree' to all 4 statements of promise received a score of 100. Four statements of strongly disagree received score 0 and all the rest proportional scores.

Information Acquisition

The third effort of the exercise was to identify the sources of information that the public is utilizing. In broad terms these indicators are threshold measures and reflect the number of South Africans who use various information sources more than some minimal threshold.

Table 10 indicates the different sources of information used by the total number of respondents, female respondents, those between 16 and 24 years old and African respondents. The most frequently mentioned media is reading a magazine and watching TV shows focusing on science and nature. The most frequently read category of magazines is family/actuality (e.g. You, Bona, De Kat etc.) mentioned by 58% of respondents, followed by women's magazines (Fair Lady, Femina etc.) which are read by 29% of the respondents. The most frequently

mentioned relevant TV programme is 50/50 (61% of respondents) followed by M.Net Explore (59%).

Science and Technology Museums, a relatively new activity in South Africa was mentioned by only 5% of the respondents. In contrast visiting a library and a zoo or aquarium were mentioned by 41% and 23% of the respondents respectively. The policy consequences are obvious.

Table 10 Public Sources of information

Source	Total	Female	16-24 year-olds	African
Read newspaper regularly	57	49	56	54
Read 1 magazine regularly	77	81	94	73
Visited a natural history museum	15	15	25	13
Visited a zoo or aquarium	23	22	31	19
Visited a science or technology museum	5	4	8	4
Visited a public library	41	42	69	31
Watch TV shows focusing on science and nature	66	62	68	47
Use computer at home	19	19	22	8

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