Chapter 7

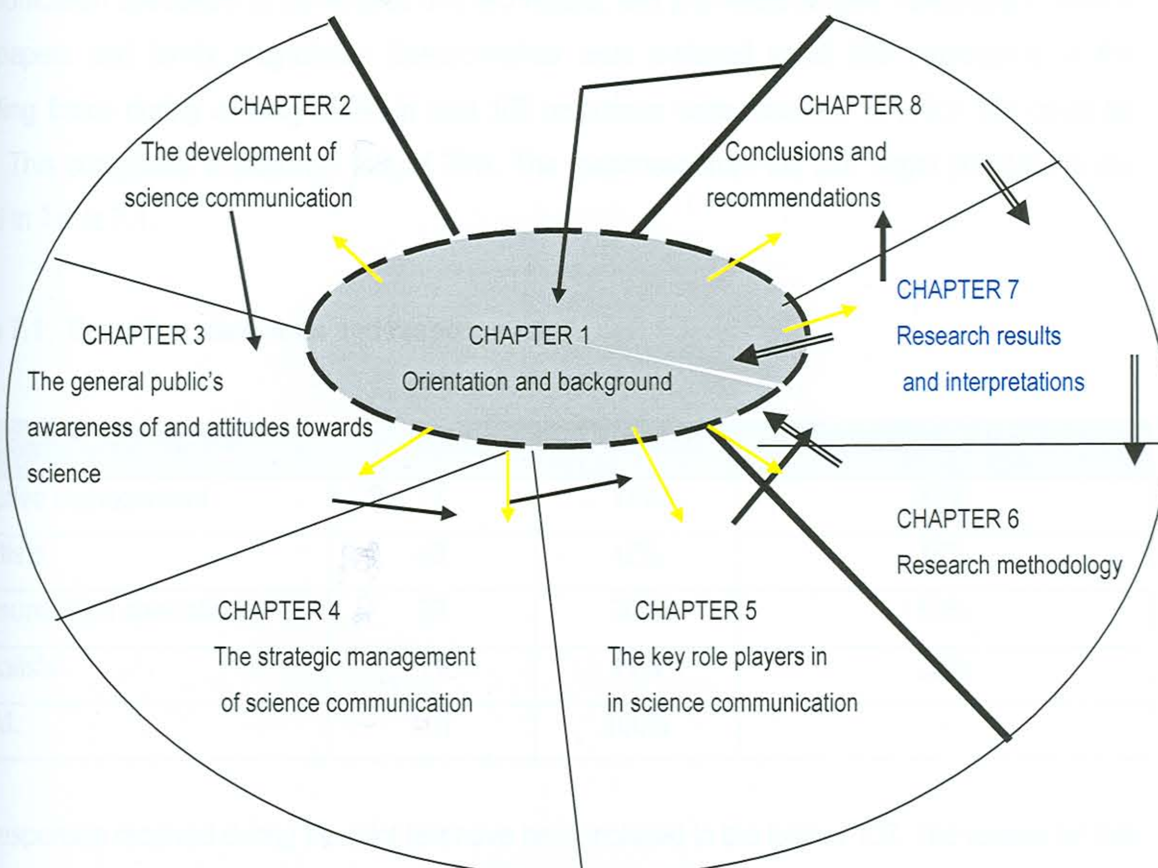
Research results and interpretations

7.1 INTRODUCTION

In this chapter the empirical evidence and interpretation of the research findings constitute the focal point. The results of this study are presented in two phases: Phase 1, the survey and Phase 2, the content analysis. Each result is structured according to the research objectives described in Chapter 1. The presentation of evidence and the simultaneous interpretation in relation to each objective are based on the theory as described in Chapters 2 to 5.

As mentioned earlier, there is a constant interplay between the empirical component of the study and Chapter 1. The specific interaction of Chapter 7 with the rest of the chapters is illustrated in Figure 7.1.

Figure 7.1: Chapter 7 in relation to other components of the empirical phase



Before the results and interpretation of Phase 1 and Phase 2 are discussed, general background information on each phase is provided to put the research results into context.

7.2 PHASE 1: GENERAL BACKGROUND

Every research study is characterised by a certain research strategy and design, as well as by specific research methods and techniques. As a result, every research project is set within a particular context. It is important to take this context into consideration when obtained data is analysed and results are interpreted. This study, for example, is exploratory in nature, but uses a quantitative research strategy because the purpose is not to generalise the findings to the population, but to gather a wide range of opinions on science communication. It is information about the sampling frame and response rate, as well as about the profile of the units of analysis and data sources that help to build the context of the study.

The sampling frame for this study consisted of members of executive management, scientists and communication specialists at universities and technikons, and journalists at daily newspapers, weekly newspapers and family magazines. Questionnaires were e-mailed to all 389 participants in the sampling frame during January 2004. In total 102 responses were received, of which 101 could be used. This constitutes a response rate of 26%. The responses from the four target populations are tabled in Table 7.1.

Table 7.1: Sampling realisation and response rate

SAMPLING FRAME	NUMBER OF RESPONSES		RESPONSE RATE
Executive management	17	17%	37%
Scientists	43	42%	18%
Communication specialists	30	30%	53%
Journalists	11	11%	22%
TOTAL	101	100%	-

The responses received during the pilot test have been included in the total of 102. The reason for this is because only minor changes were made to the questionnaire after the pilot test. Unfortunately two respondents submitted blank questionnaires. The two respondents were contacted immediately, but only one respondent was prepared to complete the questionnaire again.

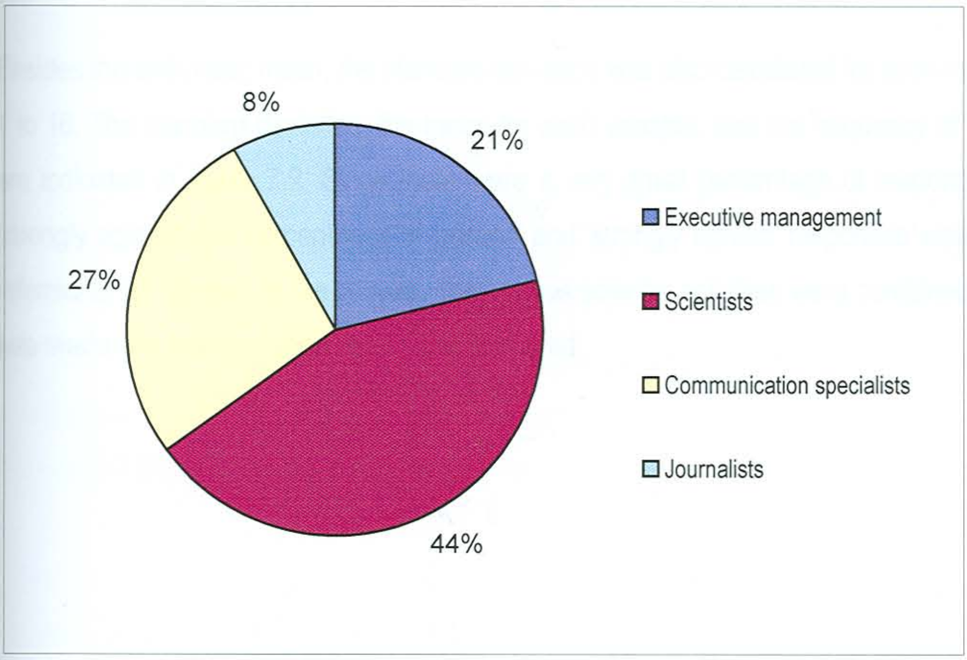
7.3 PHASE 1: RESULTS FOR RESEARCH OBJECTIVES 1 TO 5

In the parahraphs that follow, the analysis of the results is discussed with reference to one measure of location (the mean) and one measure of spread (standard deviation). These measures are the most commonly used descriptive statistical measures.

7.3.1 Objective 1: The importance of science communication

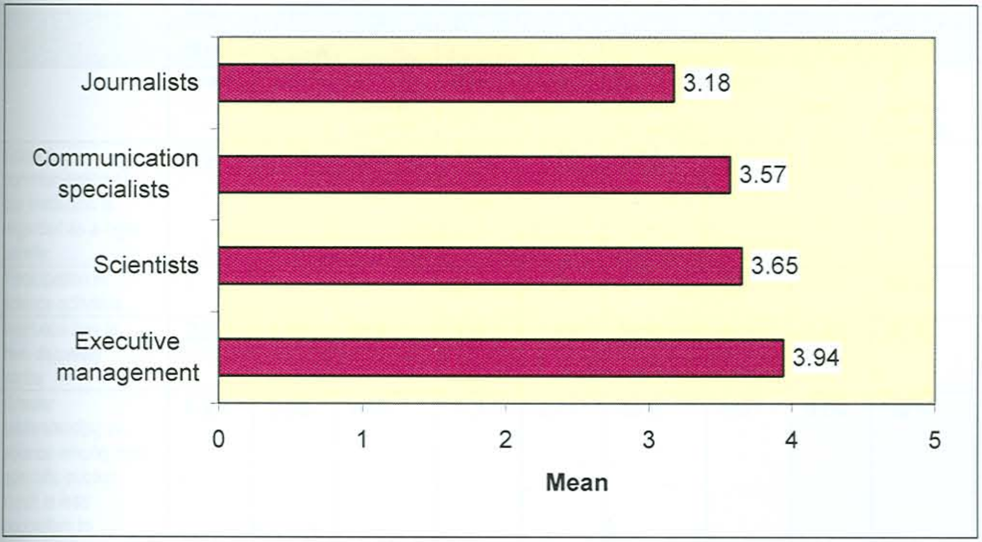
In Questions 1-7 of the questionnaire intended for the members of the executive management, Questions 1-16 of the version for scientists and communication specialists and Questions 1-6 of the journalists' questionnaire, respondents were asked to indicate how important they considered science communication. They were also asked to indicate which of their institutions participate in science communication activities such as science festivals and exhibitions, and which of the institutions had a science centre. The 5-point Likert scale was used in this study and respondents were requested to indicate the extent of their disagreement or agreement with the statements in the questionnaire. Question 1 was asked to all four groups of respondents and respondents were requested to indicate how important or unimportant science communication was regarded at their institution. Figure 7.2 illustrates the respondents' measure of agreement with the statement concerning the importance of variables.

Figure 7.2: Key role players' agreement on the importance of science communication



The mean values for each variable (key role player) with regard to the importance of science communication are depicted in Figure 7.3.

Figure 7.3: Importance of science communication to key role players



As displayed in Figure 7.3, executive management had the highest mean, followed by scientists, then communication specialists and lastly journalists. However, the means for all the variables indicate that respondents were more or less equally agreed and disagreed on the statement that science communication was regarded as a priority. This is consistent with the theoretical perspectives surrounding science communication (Nelkin, 1995:15).

Besides the arithmetic mean, the standard deviation was also calculated for each variable in Questions 1 to 16. The standard deviation, the mean for each variable, and the frequency of 'agreed' responses are indicated in Table 7.2. Since there were a very small percentage of respondents that indicated 'strongly agreed', the percentages of 'agreed' and 'strongly agreed' responses were added up and are referred to as 'agreed' in the results. The various science activities were combined when the analysis was made and the combined values are displayed.

Table 7.2: Importance of science communication for key role players: mean, standard deviation and frequency

STATEMENT	EXECUTIVE MANAGEMENT			SCIENTISTS			COMMUNICATION SPECIALISTS			JOURNALISTS		
	Mean	Std dev	% Agreed of n=17	Mean	Std dev	% Agreed of n=43	Mean	Std dev	% Agreed of n=30	Mean	Std dev	% Agreed of n=11
Science communication at our institution is regarded as *a high priority*.	3.9	0.97	76%	3.7	1.13	63%	3.6	1.22	63%	3.2	1.47	45%
Participation in science activities	-	-	-	3.2	1.0	44%	3.4	1.2	59%	-	-	-
Institution has its own *discovery centre*	2.8	1.68	41%	2.8	1.03	23%	3.2	1.41	46%	-	-	-
Greater understanding of science among non-scientific publics result in *less opposition* to scientific research.	4.2	0.56	94%	4.3	0.77	86%	4.3	0.64	90%	4.0	1.0	73%
Scientists have a *duty* to communicate their research to the general public.	4.12	0.93	77%	4.4	0.76	93%	4.5	0.57	97%	4.7	0.47	100%
New science discoveries should be communicated to all stakeholders.	4.2	0.88	82%	4.1	0.79	79%	4.5	0.51	100%	4.9	0.30	100%
Social implications of science prohibit scientists to communicate their research.	2.3	0.86	35%	2.5	1.37	33%	3.0	1.22	37%	2.54	0.93	45%
Ethical implications of science prohibit scientists to communicate their research.	2.6	1.23	24%	2.4	1.27	23%	2.9	1.15	27%	2.45	1.13	36%

The standard deviation values for all the variables are relatively low. This indicates that respondents did not differ much in their opinions about the importance of science communication. Less than 50% of South African universities and technikons have their own science discovery centre, as can be seen from the frequency results in Table 7.2. Although respondents indicated that they regard science communication as a priority, participation in science communication activities indicates the opposite, since only 44% of scientists and 59% of communication specialists participate in science activities.

The variables with the highest standard deviation warrant further discussion. The means and standard deviation of all variables for universities and technikons were calculated to determine whether there was a difference of opinion between university and technikon respondents. (Journalists were obviously not included, since they were not located at either universities or technikons.) The results are displayed in Table 7.3.

Table 7.3: Responses per HEI: mean and standard deviation

RESPONDENTS	UNIVERSITY MEAN	TECHNIKON MEAN	UNIVERSITY STANDARD DEVIATION	TECHNIKON STANDARD DEVIATION
Executive management	3.9	4.0	1.10	0.82
Scientists	3.6	4.0	1.14	-*
Communication specialists	**3.94**	**3.0**	**1.21**	**1.04**

* There was only 1 scientist respondent from technikons.

Bold indicates a significant difference in mean values between variables.

The mean and standard deviation of the communication specialists' variable indicate a significant difference of opinion regarding the importance of science communication. This difference of opinion may be result from the fact that technikons' main focus is not research, as is the case with universities.

In conclusion, it can be said that there are definite indications of the importance with which science communication is regarded by key role players. However, there are also definite indications of the fact that science communication is not regarded as a high priority, indicating that the results are not as positive.

7.3.2 Objective 2: The relationship between key role players in science communication

Questions 8-14 in the questionnaire for executive management, Questions 17-21 for scientists, Questions 17-24 for communication specialists and Questions 7-9 for journalists addressed the relationships among key role players in science communication. Both the mean and the standard deviation were calculated and are displayed in Table 7.4, together with the percentage of variables that agreed with the statements.

Table 7.4: Agreement in terms of relationship amongst key role players: mean, standard deviation and frequency

Summarised statement	Executive management			Scientists			Communication specialists			Journalists		
	Mean	Std dev	% Agreed of n=17	Mean	Std dev	% Agreed of n=43	Mean	Std dev	% Agreed of n=30	Mean	Std dev	% Agreed of n=11
Executive management has trust in communication specialists.	3.4	0.87	41%	-	-	-	3.3	1.15	53%	-	-	-
Executive management empower communication specialists.	3.5	0.80	59%	-	-	-	3.0	1.22	36%	-	-	-
There is a relationship of trust between executive management and communication specialists	3.6	0.94	65%	-	-	-	3.3	1.15	57%	-	-	-
There is a relationship of trust between executive management and scientists	**4.1**	0.83	82%	**3.0**	1.16	40%	-	-	-	-	-	-
There is a relationship of trust between executive management and journalists	3.0	0.87	31%	-	-	-	-	-	-	2.8	0.99	64%
There is a relationship of trust between communication specialists and scientists	-	-	-	2.9	1.02	33%	3.3	1.15	53%	-	-	-
There is a relationship of trust between communication specialists and journalists	-	-	-	-	-	-	3.7	0.92	67%	3.3	1.10	54%
There is a relationship of trust between scientists and journalists	-	-	-	**3.2**	0.78	33%	-	-	-	**2.5**	0.69	9%
A relationship of trust between the key role players will add to a greater understanding of science by stakeholders	**3.9**	0.81	71%	4.1	0.68	81%	**4.4**	0.56	97%	-	-	-
A relationship of trust between the key role players will result in stakeholders trusting information received from the institution	4.1	0.43	94%	4.2	0.70	86%	4.3	0.70	87%	-	-	-

Bold indicates a significant difference in mean values between the variables.

As can be seen from Table 7.4, the executive management and communication specialists do not agree that there is a relationship of trust and empowerment among them in respect of science communication. Only 41% of executive management agreed/strongly agreed to have trust in communication specialists, compared to the 53% of communication specialists who were of the opinion that executive management trusted them. On the other hand, 59% of executive management agreed/strongly agreed that they do in fact empower communication specialists, compared to the low percentage of 36% of communication specialists who did not consider themselves empowered by executive management. In the next tables the various frequency distributions for this construct are displayed.

Table 7.5: Trust in the executive management and communication specialists relationship

DESCRIPTOR	SCALE VALUE	EXECUTIVE MANAGEMENT		COMMUNICATION SPECIALISTS	
		FREQUENCY	%	FREQUENCY	%
Strongly disagree	1	6	35.2	3	10
	2	3	17.7	4	13.3
	3	1	5.9	7	23.4
	4	3	17.7	13	43.3
Strongly agree	5	4	23.5	3	10
TOTAL	-	n=17	100	n=30	100

Table 7.6: Empowerment in the relationship between executive management and communication specialists

DESCRIPTOR	SCALE VALUE	EXECUTIVE MANAGEMENT		COMMUNICATION SPECIALISTS	
		FREQUENCY	%	FREQUENCY	%
Strongly disagree	1	-	-	5	16.7
	2	2	11.8	3	10
	3	8	47.1	11	36.6
	4	5	29.3	8	26.7
Strongly agree	5	2	11.8	3	10
TOTAL	-	n=17	100	n=30	100

Of interest is the high number of both executive management members and communication specialists who are not certain that communication specialists are empowered by executive management. Furthermore, as illustrated in Table 7.4, there are differences of opinion among variables regarding the trust between them, as well as about the understanding of science by stakeholders. Table 7.7 displays the means and standard deviations.

Table 7.7: Variations of opinion between key role players' trust and understanding

SUMMARISED STATEMENT	EXECUTIVE MANAGEMENT		SCIENTISTS		COMMUNICATION SPECIALISTS		JOURNALISTS	
	Mean	Std dev	Mean	Std dev	Mean	Std dev	Mean	Std dev
There is a relationship of trust between *executive management* and *scientists*	4.1	**0.83**	3.0	**1.16**	-	-	-	-
There is a relationship of trust between *scientists* and *journalists*	-	-	3.2	**0.78**	-	-	2.5	**0.69**
A relationship of trust between the key role players will add to a *greater understanding of science by stakeholders*	3.9	**0.81**	4.1	0.68	4.4	**0.56**	-	-

It is obvious from Table 7.7 that respondents differed significantly in their opinions regarding a relationship of trust among them. They further differed in opinion about whether a relationship of trust would add to a greater understanding of science by stakeholders. These results imply that there are not yet trust relationships among the key role players in science communication in South Africa.

Questions 25 and 26 in the communication specialists' questionnaire and Questions 10 and 11 in the journalists' questionnaire address the perception of participants of the importance of news received from communication specialists. Table 7.8 and Table 7.9 display the frequency distribution of perceptions of the importance of science news and sceptism of information received from communication specialists, respectively. Another question, Question 36 in the communication specialists' questionnaire, of which the results are displayed in Table 7.9, also addresses the importance of two-way flow of communication. As can be seen from the results in Table 7.10, only 57% of communication specialists agreed that they have to ensure that their institutions follow a two-way flow of information, compared to executive management's 77% of agreement.

Table 7.8: Perception of Importance of science news: communication specialists versus journalists

DESCRIPTOR	SCALE VALUE	COMMUNICATION SPECIALISTS		JOURNALISTS	
		FREQUENCY	%	FREQUENCY	%
Strongly disagree	1	3	10	1	9.1
	2	15	50	7	63.6
	3	5	16.7	1	9.1
	4	4	13.3	2	18.2
Strongly agree	5	3	10	-	-
TOTAL	-	n=30	100	n=11	100

Table 7.9: Sceptisism of information received: communication specialists versus journalists

DESCRIPTOR	SCALE VALUE	COMMUNICATION SPECIALISTS		JOURNALISTS	
		FREQUENCY	%	FREQUENCY	%
Strongly disagree	1	3	10	3	27.3
	2	15	50	4	36.3
	3	4	13.3	-	-
	4	7	23.4	3	27.3
Strongly agree	5	1	3.3	1	9.1
TOTAL	-	n=30	100	n=11	100

Although a small percentage of both communication specialists and journalists did not agree that journalists are sceptical about information received from communication specialists, the fact remains that very few scientific articles do appear in the media.

7.3.3 Objective 3: The role of communication specialists in science communication

Questions 15-31 in the questionnaire for executive management, Questions 24-27 for scientists and Questions 28-44 for communication specialists address the role of communication specialists and whether they are regarded as strategists, managers or technicians. These questions are derived from

Concept 2. Questions 28-30, 37 and 40-44 attempted to determine the extent to which communication specialists assume the roles of strategist, manager or technician (compare Steyn & Puth, 2000:20-21, as well as Chapter 4 for a discussion of the different roles) and they also include questions about trust and empowerment. Very briefly to summarise the discussion in Chapter 4, the role of *strategist* is determining the consequences of an institution's strategies and policies on its relationships with various stakeholders. Information gathered serves as input in an institution's strategic decision-making process. The role of the *manager* involves the development of a corporate communication strategy (deciding what should be communicated to stakeholders), while the *technician* role involves the implementation of communication plans and campaigns.

Table 7.10: Agreement on the role of communication specialists: mean, standard deviation and percentage

SUMMARISED STATEMENT	EXECUTIVE MANAGEMENT			SCIENTISTS			COMMUNICATION SPECIALISTS		
	Mean	Std dev	% Agreed of n=17	Mean	Std dev	% Agreed of n=43	Mean	Std dev	% Agreed of n=30
The current role of communication specialists is to:									
... make a *strategic* contribution regarding communication with stakeholders	4.4	0.62	94%	-	-	-	4.0	1.07	80%
... *influence* key strategic decisions of executive management in communicating science to stakeholders	3.5	0.80	59%	-	-	-	3.1	1.11	36%
... *get the institution's name into the media*, specifically regarding science performed at the institution.	4.3	0.77	94%	-	-	-	3.9	0.84	77%
... use their *journalistic skills* to establish what the media will consider newsworthy about the institution	4.3	0.47	100%	-	-	-	4.1	0.97	83%
... *facilitate mutual understanding* between the key role players of science communication	**3.9**	0.70	82%	**3.1**	1.12	33%	3.4	0.89	57%
... ensure that scientists communicate their *science* through communication specialists to stakeholders	3.5	0.71	88%	3.05	1.19	33%	3.4	1.00	53%
... assist scientists in communicating their *research* to stakeholders of HEI	3.8	1.07	77%	3.3	1.23	52%	3.2	1.19	53%
... play a vital role in ensuring a *relationship of trust* develops between key role players of science communication	3.6	1.06	71%	3.1	1.13	35%	3.7	1.15	60%
... ensure that our institution follows a *two-way flow of information* in communicating with stakeholders, to enable stakeholders to provide feedback where applicable	3.9	1.0	77%	-	-	-	3.5	1.01	57%

SUMMARISED STATEMENT	EXECUTIVE MANAGEMENT			SCIENTISTS			COMMUNICATION SPECIALISTS		
	Mean	Std dev	% Agreed of n=17	Mean	Std dev	% Agreed of n=43	Mean	Std dev	% Agreed of n=30
... not only *obtain favourable publicity*, but also to *prevent unfavourable publicity* in the media	3.9	1.0	59%	-	-		4.1	0.80	80%
... inform executive management *of societal values/norms* so that they can adjust institutional decisions/strategies accordingly	3.8	1.03	77%	-	-	-	3.2	1.26	27%
... do surveys before starting a science communication plan to find out how *well management and our stakeholders understand each other*	3.7	1.05	65%	-	-	-	2.9	1.12	27%
... disseminate *accurate* information, but not to volunteer *unfavourable* information	3.6	0.80	59%	-	-	-	3.8	0.90	73%
... *influence executive management decisions* to ensure that this institution is regarded by society as being 'trustworthy'	4.1	1.0	82%	-	-	-	3.6	1.13	57%
... *develop mutual understanding* between our management and the stakeholders that the institution affects	4.1	0.97	82%	-	-	-	3.8	0.92	73%
... be a *neutral disseminator* of information rather than a mediator that connects management to stakeholders	3.1	1.09	35%	-	-	-	3.2	1.01	47%
... act as an *advocate* for key internal publics by explaining their views to executive management	3.6	0.80	53%	-	-	-	3.1		40%

Bold indicates a significant difference in mean values between variables.

The mean and standard deviation calculated for the variables do not reveal much about the opinions of the respondents. However, when studying the frequencies, it seems that respondents had different opinions regarding the role of communication specialists. Only one significant discrepancy occurred between the responses of executive management and scientists regarding the role of communication specialists in facilitating mutual understanding between the key role players in science communication. This discrepancy is displayed in bold in Table 7.10.

The frequency of agreement in Table 7.11 also indicates that communication specialists do not agree as much as executive management about the communication specialists' role. Table 7.11 highlights this difference of opinion. Furthermore, Table 7.12 illustrates the discrepancy in opinion amongst executive management, scientists and communication specialists regarding communication specialists' role to ensure that scientists communicate their science via communication specialists to stakeholders.

Table 7.11: The role of communication specialists as strategists, managers or technicians

DESCRIPTOR	SCALE VALUE	EXECUTIVE MANAGEMENT		COMMUNICATION SPECIALISTS	
		FREQUENCY	%	FREQUENCY	%
Strongly disagree	1	-	-	3	10
	2	2	11.8	4	13.3
	3	5	29.4	12	40
	4	9	52.9	8	26.7
Strongly agree	5	1	5.9	3	10
TOTAL	-	n=17	100	n=30	100

An interesting finding involves the large number (almost half) of the communication specialists who are uncertain that they influence key strategic decisions of executive management in communicating science to stakeholders. There may be two reasons for this uncertainty: firstly, it may be that communication specialists are of the opinion that when they voice their opinion, executive management do not listen; or secondly, it may be that science communication activities are not discussed on a strategic level at HEI.

Table 7.12: The facilitator's role of communication specialists

DESCRIPTOR	SCALE VALUE	EXECUTIVE MANAGEMENT		SCIENTISTS		COMMUNICATION SPECIALISTS	
		FREQ	%	FREQ	%	FREQ	%
Strongly disagree	1	-	-	4	9.5	1	3.3
	2	2	11.8	10	23.8	5	16.7
	3	4	23.5	15	33.4	8	26.7
	4	11	64.7	8	19.0	13	43.3
Strongly agree	5	-	-	6	14.3	3	10
TOTAL	-	n=17	100	n=43	100	n=30	100

The results above display some interesting facts. Firstly, the members of executive management are largely in agreement (88%) that communication specialists have to ensure that scientists communicate their research through communication specialists to stakeholders, while a very low percentage of scientists (33%) and only 53% of communication specialists agree with the statement. Another 33% of scientists are to a large extent uncertain about the facilitator's role of communication specialists.

Two other statements about which executive management and communication specialists differ significantly in terms of their agreement with them refer to the strategic component of communication specialists' tasks. The results are discussed next.

Statement :"... inform executive management of societal values/norms so that they can adjust institutional decisions/strategies accordingly".
Only 27% of the communication specialists agreed/strongly agreed, compared to 77% of executive management who agreed/strongly agreed with the statement.

Statement: "... do surveys before starting a science communication plan to find out how well management and our stakeholders understand one another".
Again, executive management (65%) agreed/strongly agreed, compared to a low percentage of 27% of communication specialists who agreed/strongly agreed with this statement. The reason might be that the members of the executive management are under the impression that communication specialists conduct surveys, which might not be the case, or that communication specialists do not work out a science communication plan at all.

The results of the responses by both executive management and communication specialists indicate that communication specialists are not seen as strategists, but rather as managers or to a smaller extent technicians, since many of the tasks they have to perform fall in the category and description of managers in communication management.

The entire executive management group (100%) agreed that communication specialists have to use their journalistic skills to establish what the media will consider newsworthy about their institutions. This places a huge responsibility on communication specialists to have journalistic skills and/or training in order to be able to provide the correct information and press releases to the media.

7.3.4 Objective 4: Training in science communication

Questions 28-30 in the questionnaire for scientists, Questions 45-50 for communication specialists and Questions 13-14 for journalists are derived from Concept 1, that is, the extent to which training is offered to scientists, communication specialists and journalists to enable them to write science articles. Again, the results on the mean, standard deviation and percentage of frequency of agreement are depicted in table format.

Table 7.13: Training provided in science communication: mean, standard deviation and frequency

SUMMARISED STATEMENT	SCIENTISTS			COMMUNICATION SPECIALISTS			JOURNALISTS		
	Mean	**Std dev**	**% Agreed of n=43**	**Mean**	**Std dev**	**% Agreed of n=30**	**Mean**	**Std dev**	**% Agreed of n=11**
Journalists in South Africa received basic training in science writing to be able to write science articles.	-	-	-	-	-	-	1.8	1.17	9%
Scientists at our institution are equipped to communicate science directly to stakeholders.	2.9	1.12	40%	-	-	-	-	-	-
Communication specialists at our institution received basic training in science writing to communicate science.	-	-	-	2.2	1.10	14%	-	-	-
A *basic course* in science writing is not a requirement to communicate science to various stakeholders.	2.9	1.15	36%	2.2	0.87	7%	2.9	1.14	46%
Our institution offers a course in *science journalism*.	-	-	-	1.9	1.11	7%	-	-	-
Scientists prefer to *communicate directly* with journalists.	**3.7**	0.87	57%	**3.1**	1.09	33%	**2.4**	1.04	19%
Scientists provide enough information to communication specialists to distribute to the media.	2.8	0.96	26%	2.8	1.28	33%	-	-	-
Journalists have a good knowledge about science when interviewing scientists.	2.0	0.94	10%	2.1	0.78	3%	2.1	0.94	9%

Bold indicates a significant difference in mean scores between the respondent groups.

The lack of training resulted in the assumption that journalists are not trained well enough to interview scientists and that scientists do not understand what journalists require. The results further indicate that scientists should provide communication specialists with more information to enable the latter to communicate science information to stakeholders, including the general public and the media.

The standard deviation values for almost all the variables are relatively low. This implies that respondents did not differ much in their opinions regarding training. However, the mean, standard deviation and percentage of frequency of agreement reflect a significant difference of opinion between the responses of scientists and communication specialists, as well as between those of scientists and journalists regarding the statement that scientists prefer to communicate directly with journalists. The fact that scientists prefer to communicate directly with journalists, indicates that the relationship of trust and mutual understanding between scientists and communication specialists has not been established yet. Scientists might still fear that their research would not be conveyed correctly to the stakeholders by communication specialists.

Similarly, the variables 'universities' and 'technikons' yielded relatively low means and relatively high standard deviations. These values are derived from the communication specialists' responses. The results of the differences mentioned above are displayed in the next table.

Table 7.14: Training provided in science communication: responses per HEI

STATEMENT	UNIVERSITY		TECHNIKON	
	MEAN	STD DEV	MEAN	STD DEV
A basic course in science writing is not a requirement to communicate science to various stakeholders.	1.8	1.89	2.5	2.58
Our institution offers a course in science journalism.	2.2	2.28	1.4	1.41

The significant difference of opinion between universities and technikons regarding the requirement of a basic course in science writing can be due to the fact that technikons do not have many scientists and therefore science communication is not an important task assigned to communication specialists. The significant difference of opinion about the statement that institutions offer a course in science journalism reflects the strong possibility that a science journalism course is not offered at many institutions.

The majority of communication specialists and journalists agreed that they did not receive any science writing training. The frequency distribution of the data values for training received is indicated in Table 7.15.

Table 7.15: Training received by communication specialists and journalists

DESCRIPTOR	SCALE VALUE	COMMUNICATION SPECIALISTS		JOURNALISTS	
		FREQ	%	FREQ	%
Strongly disagree	1	7	23.3	5	45.5
	2	13	43.3	5	45.5
	3	8	26.7	-	-
	4	2	6.7	-	-
Strongly agree	5	-	-	1	9.0
TOTAL	-	n=30	100	n=11	100

Table 7.15 indicates that only two communication specialists and only one journalist were trained in science writing. The eight communication specialists' uncertainty about receiving basic science writing training was probably due to the fact that they interpreted the question wrongly. Perhaps there were more than one or two communication specialists at the institution and the respondent was uncertain whether the other communication specialists received such training or not. Another explanation for their uncertainty could be that the respondents attended a short course in science writing (one or two days) and the respondent was uncertain whether that would apply to the specific statement.

In the following table the frequency distribution of results about science writing training are displayed.

Table 7.16: Science writing training: communication specialists versus journalists

DESCRIPTOR	SCALE VALUE	COMMUNICATION SPECIALISTS		CUMULATIVE PERCENTAGE	JOURNALISTS		CUMULATIVE PERCENTAGE
		FREQ	%	%	FREQ	%	%
Yes	1	4	13.8	13.8	1	9.1	9.1
No	2	25	86.2	100	10	90.9	100
Missing	-	1	-	-	-	100	-
TOTAL	-	n=30	100	-	n=11	100	-

The results of Table 7.16 again raise concern. Only 13.8% of the communication specialists received any science writing training, while the majority (86.2%) did not receive any training in science writing or science journalism. Furthermore, the results reflect that only one of the journalist respondents who participated in the study had received science writing training or completed a course in science journalism. The fact that such a small percentage of communication specialists and journalists received training in respect of science writing indicates that there is indeed a lack of proper training in science writing in South Africa. Training in science communication writing is imperative for communication specialists and journalists to be able to convey the correct facts received from scientists to the general public. Without proper training, incorrect interpretations of what is meant by scientists can have detremendous effects, especially when research findings of scientists contain risks for human beings. Proper training in science communication is also important to ensure that a relationship of trust and mutual understanding amongst key role players in science communication is established.

7.3.5 Qualification and training of respondents

As described in the theoretical part of this study, training in science writing is vital. Only one journalist confirmed to have received science journalism training as was exhibit in Table 7.15. In the tables below, the qualifications of communication specialists for their current employment are displayed. The results pertaining to the academic qualifications of the communication specialists, as well as how related this qualification is to public relations, are displayed in Tables 7.17 and 7.18 respectively.

Table 7.17: Communication specialists' qualifications

DESCRIPTOR	SCALE VALUE	COMMUNICATION SPECIALISTS		CUMULATIVE PERCENTAGE
		FREQUENCY	%	%
Certificate	1	-	-	-
Diploma	2	7	23.3	23.3
B degree	3	5	16.7	40
Honours	4	12	40	80
Master's	5	6	20	100
Doctorate	6	-	-	-
TOTAL	-	**n=30**	**100**	-

The largest percentage of communication specialists had obtained an honours degree. None of the respondents had acquired a doctoral degree, which may be due to the fact that in most cases the maximum requirement for employment is a master's degree. Only 20% of the respondents were in possession of a master's degree.

Table 7.18: The relation of communication specialists' qualifications to public relations

DESCRIPTOR	SCALE VALUE	COMMUNICATION SPECIALISTS		CUMULATIVE PERCENTAGE
		FREQUENCY	%	%
Yes	1	17	56.7	56.7
No	2	13	43.3	100
TOTAL	-	n=30	100	-

The results about the relatedness of communication specialists' qualifications to public relations raise concern. Altogether 43.3% of the communication specialists at HEI had qualifications that are not related to public relations. A possible reason for this relatively high data value may be that communication specialists interpreted the question in a narrower sense, or that they probably have either a marketing or communications qualification, but did not relate those qualifications to public relations.

7.3.6 Objective 5: Coverage of scientific topics in the mass media

Questions 31-33 in the questionnaire intended for scientists, Questions 56-58 for communication specialists and Questions 17-21 for journalists addressed media contact, while Questions 51-57 for communication specialists and Questions 15, 16, 22 and 23 for journalists addressed the amount of coverage.

The mean values of the variables 'communication specialists' and 'journalists' indicate a significant difference of opinion about the contact communication specialists had with the media during the past year. The difference of opinion may result from the fact that communication specialists had contact with journalists, but such contact did not pertain to any science activity. Another reason might be that communication specialists perhaps had contact with the media on a regular basis, but that contact involved only one or two media representatives. Table 7.19 provides the mean, standard deviation and frequency percentage of agreement regarding media contact.

Table 7.19: Key role players' contact with the media: mean, standard deviation and frequency

SUMMARISED STATEMENT	EXECUTIVE MANAGEMENT			SCIENTISTS			COMMUNICATION SPECIALISTS			JOURNALISTS		
	Mean	Std dev	% Agreed of n=17	Mean	Std dev	% Agreed of n=43	Mean	Std dev	% Agreed of n=30	Mean	Std dev	% Agreed of n=11
Journalists are *sceptical* of science information received from communication specialists.	-	-	-	-	-	-	2.6	1.07	26%	2.5	1.44	36%
Communication specialists/Scientists at our institution had contact with the media *more than three times* during last year.			-	4.1	1.03	40%	**4.5**	0.94	70%	**3.6**	0.67	55%

Bold indicates a significant difference in mean scores between the respondent groups.

Table 7.20 displays the values of the mean, standard deviation and frequency percentage of agreement for the variables 'scientists', 'communication specialists' and 'journalists' in terms of their opinions regarding coverage of science articles in the various media.

Table 7.20: Coverage of scientific articles in the mass media: mean, standard deviation and frequency

SUMMARISED STATEMENT	SCIENTISTS			COMMUNICATION SPECIALISTS			JOURNALISTS		
	Mean	Std dev	% Agreed of n=43	Mean	Std dev	% Agreed of n=30	Mean	Std dev	% Agreed of n=11
The general coverage of science in *national newspapers* is efficient.	-			1.9	0.96	3%	2.0	1.0	9%
The general coverage of science in *local newspapers* is efficient.	-	-	-	1.9	0.98	3%	2.0	1.0	9%
The general coverage of science in *magazines* is efficient.	-	-	-	2.3	1.17	17%	2.3	1.19	18%
The general coverage of science on *radio* is efficient.	-	-	-	2.2	1.0	13%	2.5	1.04	18%
The general coverage of science on *TV* is efficient.	-	-	-	2.7	1.18	30%	2.6	1.12	28%
Our institution is satisfied with the *amount of coverage* of science in the media.	-	-	-	2.3	0.83	7%	-	-	-
Scientific articles *do not sell* newspapers.	-	-	-	3.2	1.30	37%	3.4	1.36	45%
The media *sensationalises* science.	**3.8**	1.01	67%	2.8	1.15	27%	**2.7**	1.49	36%

Bold indicates a significant difference in mean scores between the respondent groups.

The standard deviation values for all variables are relatively low. Again this indicates that the respondents did not differ much in their opinions about the coverage of scientific articles in the mass media. However, regarding the statement that the mass media sensationalises science, there was a significant difference of opinion between the responses of scientists and communication specialists, as well as between those of scientists and journalists. Scientists (67%) agreed/strongly agreed that the mass media sensationalises science, in contrast to low percentages of communication specialists (27%) and journalists (36%) who agreed/strongly agreed with the statement.

It seems from the results that communication specialists feel that scientific articles do not appear efficiently in the media. Even radio and television coverage of science is unefficient. It can be concluded that communication specialists are of the opinion that the coverage of science by the mass media in general is unefficient.

7.4 PHASE 2: RESULTS OF THE CONTENT ANALYSIS

7.4.1 Objective 6: Content analysis of scientific articles

In Phase 2 of this study 16 South African publications were monitored over a period of three months, from 1 March to 31 May 2004. South African regional and national print media titles that reflect a geographical and cultural diversity in its target markets and that are produced by South African-based companies were selected.

As was indicated in the discussion of the sampling frame of the study (Section 6.5.6) the printed media were divided into three groups, namely daily newspapers, including *The Pretoria News, Die Beeld, Die Burger, Die Volksblad, Sowetan, This Day, The Mercury* and *Cape Argus;* weekly national newspapers, including the *Mail & Guardian, Sunday Times* and *Rapport,* and five family magazines namely *Financial Mail, Finansies & Tegniek, De Kat, Huisgenoot* and *You.* Family magazines were selected because they focus on the whole family, are not gender orientated and do not focus on a specific target audience, such as agriculture or wildlife. *Financial Mail* and its Afrikaans equivalent, *Finansies & Tegniek* were selected, because they might cover articles on mathematics and new technological developments, although mathematicians and information technology do not constitute their specific target markets.

7.4.2 Results for Objective 6: content analysis of printed media articles

The results under every heading first provide an overall assessment across the different groups of publications (i.e. the daily and weekly newspapers and family magazines) to form an overall impression of the status of the South African media. Thereafter, the groups are divided to assess the situation within each group and finally the results are compared with the study of Van Rooyen conducted in 2002. Associations of importance are also discussed. (See Appendix 7 for the units that were analysed and the coding that was used for the analysis.)

7.4.2.1 Amount of coverage

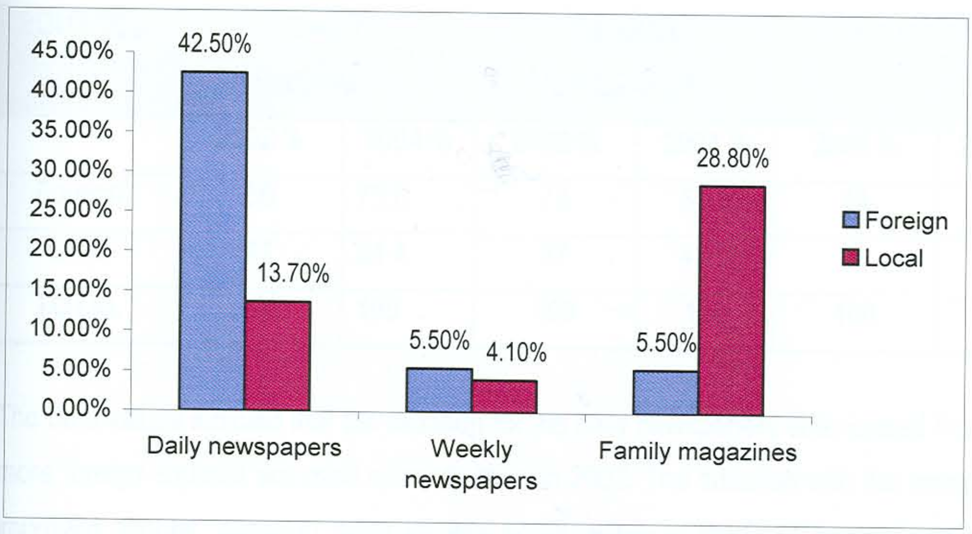
In the editorial content studied during the three months only 0.9% was dedicated to science and technology. The only daily newspaper that has a reserved space for science matters is *Die Burger*, which is focused on the Cape region. *Die Volksblad* has a section for agriculture on a regular basis, but once again, its target group is the Free State. Not one national paper has a column devoted to science or science-related issues. Furthermore, whenever any scientific news was published, it originated almost without exception from international sources, such as CNN and the BBC.

In the Van Rooyen study (2002:13), 1.8% of the editorial content studied dealt with science and science-related matters, compared to the 0.9% dedication to science and technology articles in the current study.

7.4.2.2 Local versus foreign sources

Although local journalists are responsible for the published articles, the larger percentage of sources was obtained from foreign publications, such as the *Daily Mail* and wire services including Reuters, Sapa and Associated Press. According to the data values, 53% of the science and technology coverage in this particular sample of the South African media quoted foreign sources, compared to 47% that came from local scientists and sources. The percentage of foreign and local sources per unit of analysis is illustrated in Figure 7.4.

Figure 7.4: Usage of foreign versus local news sources



The daily newspapers use by far more foreign than local sources – 42.5% out of 100%. Table 7.21 displays the frequency distribution of the variables 'foreign' and 'local'.

Table 7.21: Usage of foreign versus local news sources per print medium

SOURCES	DAILY NEWSPAPERS		WEEKLY NEWSPAPERS		FAMILY MAGAZINES	
	Frequency	%	Frequency	%	Frequency	%
Foreign	31	75.6	4	57.1	4	16
Local	10	24.4	3	42.9	21	84
TOTAL	n=41	100	n=7	100	n=25	100

As indicated by the frequency distribution data values both daily and weekly newspapers use more foreign sources to obtain their science information, while the opposite is true for magazines, they use a far greater percentage of local sources than foreign sources.

In conclusion, although the comparison of foreign versus local sources may not be a reason for concern, the individual percentages of variables, especially the high use of foreign sources by daily newspapers, are causing concern. A comparison of the sources as shown by the results of this study and the results of the study previously conducted by Van Rooyen (2002:14) is displayed in Table 7.22.

Table 7.22: Frequency of usage of foreign versus local news sources: 2002 and 2004

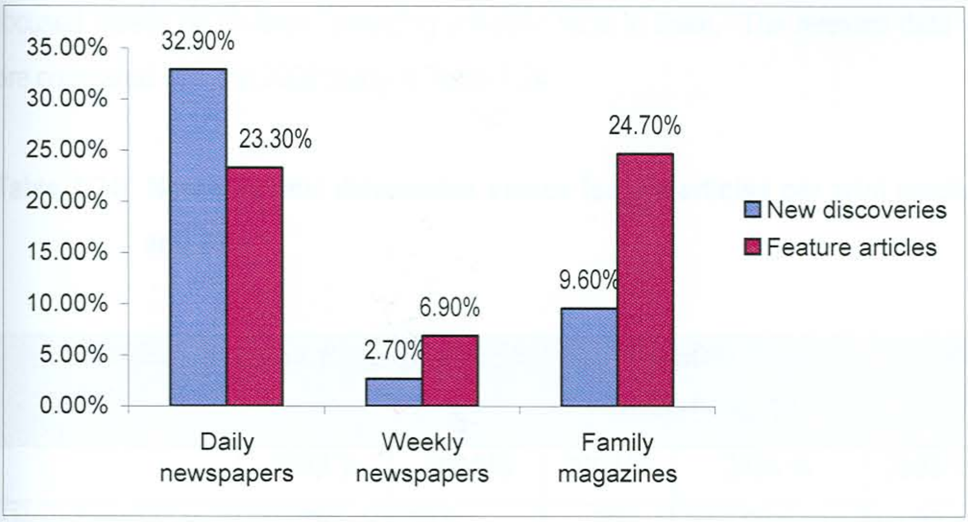
SOURCES	DAILY NEWSPAPERS		WEEKLY NEWSPAPERS		FAMILY MAGAZINES	
	2002 %	2004 %	2002 %	2004 %	2002 %	2004 %
Foreign	59	75.6	73	57.1	44	16
Local	41	24.4	27	42.9	56	84
TOTAL	100	100	100	100	100	100

The data values indicate that the situation for the daily newspapers deteriorated from 2002 to 2004, as more foreign sources are used currently than in 2002. The situation with the weekly newspapers has improved slightly, although more or less equal usage is made of foreign and local sources. The magazines look by far the best, as there was an increase in usage of local sources for science information from 56% to 84%.

7.4.2.3 Coverage according to 'new discoveries' and 'feature' articles

Scientific articles were classified as either 'new discoveries' of 'feature' articles. New discoveries were identified by their current value and the use of the 'who, what, when, where and how' aspects in the scientific article. Feature articles were recognised by their longer format containing a more detailed analysis of the issue. An example of a 'new discovery' article was the discovery that bird influenza can also attack human beings and the results could cause death. An example of a 'feature' article was the discovery of deserts on Mars similar to those found on earth. The sampled print media published almost an equal number of new discoveries (45%) and feature (55%) articles. These marginals are displayed below in Figure 7.5.

Figure 7.5: New discoveries versus feature articles on science



As one would have expected, the daily newspapers publish the largest number of new discovery articles, compared to the opposite situation with weekly newspapers and magazines. Daily newspapers focused more on hard news and due to the large number of newsworthy events, they have to limit each article to include only the bare facts. Magazines on the other hand, investigate the 'story behind the story', they have more space to publish longer articles and are able to include more visuals with their articles, therefore the largest number of feature articles was published by magazines. The table below displays the frequency distribution data values of these variables.

Table 7.23: New scientific discoveries versus feature articles per print medium category

SOURCES	DAILY NEWSPAPERS		WEEKLY NEWSPAPERS		FAMILY MAGAZINES	
	Frequency	%	Frequency	%	Frequency	%
New discoveries	24	58.5	2	28.6	7	28
Feature articles	17	41.5	5	71.4	18	72
TOTAL	**n=41**	**100**	**n=7**	**100**	**n=25**	**100**

The daily newspapers published mostly new discoveries (58.5%) compared to 41.5% feature articles. An interesting fact is that the science coverage in the weekly newspapers was published mostly in feature format (71.4%). As can be expected, magazines also published more feature articles (72%). Articles in magazines are usually longer, in-depth type articles. In this study the *Huisgenoot* and *You* focused mostly on children, providing scientific facts to them. The relevant data values of this study are compared with the 2002 study in Table 7.24.

Table 7.24: New scientific discoveries versus feature articles per print medium category: 2002 and 2004

SOURCES	DAILY NEWSPAPERS		WEEKLY NEWSPAPERS		FAMILY MAGAZINES	
	2002 %	2004 %	2002 %	2004 %	2002 %	2004 %
New discoveries	75	58.5	79	28.6	33	28
Feature articles	25	41.5	21	71.4	67	72
TOTAL	**100**	**100**	**100**	**100**	**100**	**100**

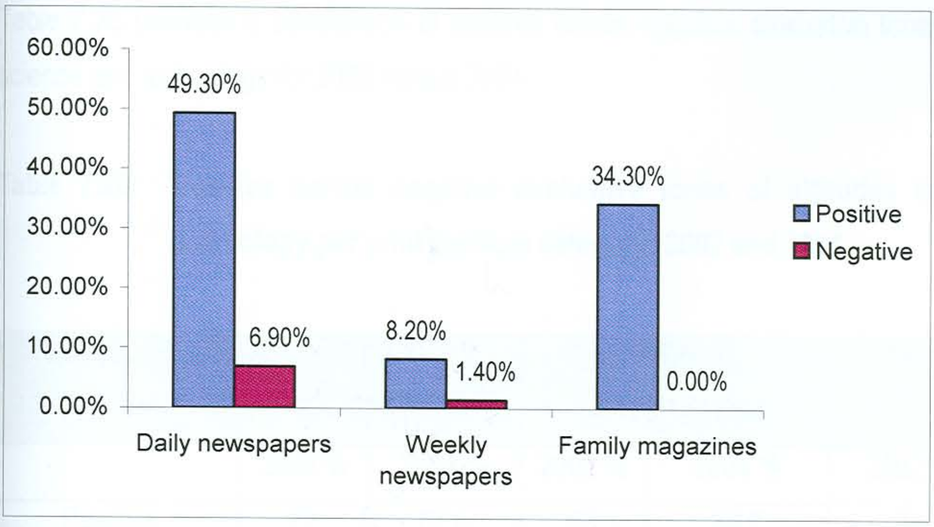
The data values of new discoveries between 2002 and 2004 decreased for the daily newspapers, weekly newspapers and magazines. Although it is positive to see more feature articles in the various printed media, the ideal would be that daily newspapers cover more new discoveries related to science and technology.

7.4.2.4 Evaluative tone of coverage

The evaluative tone of the scientific articles was monitored, since it is often claimed that media coverage of science and technology is "unduly negative" (Bauer *et al.*, 1995:32). An example of an "unduly negative" article is an article that was published critising scientists for using mice in their experiments in biochemisty. Scientists claim they only use a small number of mice (15 for the complete experiment), but the media critised them for using the animals at all.

In this study, the data values provide evidence that the South African media has a positive attitude towards science and technology. Overall, the evaluative tone of the coverage was more positive (92%) than negative (8%) in the sample of publications. These results are illustrated in Figure 7.6.

Figure 7.6: Evaluative tone of coverage in scientific articles



The low marginal of 8.2% of negative articles that appeared overall during the three-month period in the printed media made it evident that the printed media has a positive attitude towards science and technology. In Table 7.25 the individual frequency distribution of the data values of the variables is demonstrated.

Table 7.25: Positive versus negative evaluative tones of attitudes towards science and technology per print medium category

SOURCES	DAILY NEWSPAPERS		WEEKLY NEWSPAPERS		FAMILY MAGAZINES	
	Frequency	%	Frequency	%	Frequency	%
Positive	36	87.8	6	85.7	25	100
Negative	5	12.2	1	14.3	0	0
TOTAL	**n=41**	**100**	**n=7**	**100**	**n=25**	**100**

The daily newspapers published 87.8% positive articles; the weekly papers 85.7% and the magazines did not have one article with a negative attitude towards science and technology (i.e. 100% positive). Table 7.26 provides a comparison of positive versus negative evaluative tones of attitudes towards science and technology for 2002 versus 2004.

Table 7.26: Positive versus negative evaluative tones of attitudes towards science and technology per print medium category: 2002 and 2004

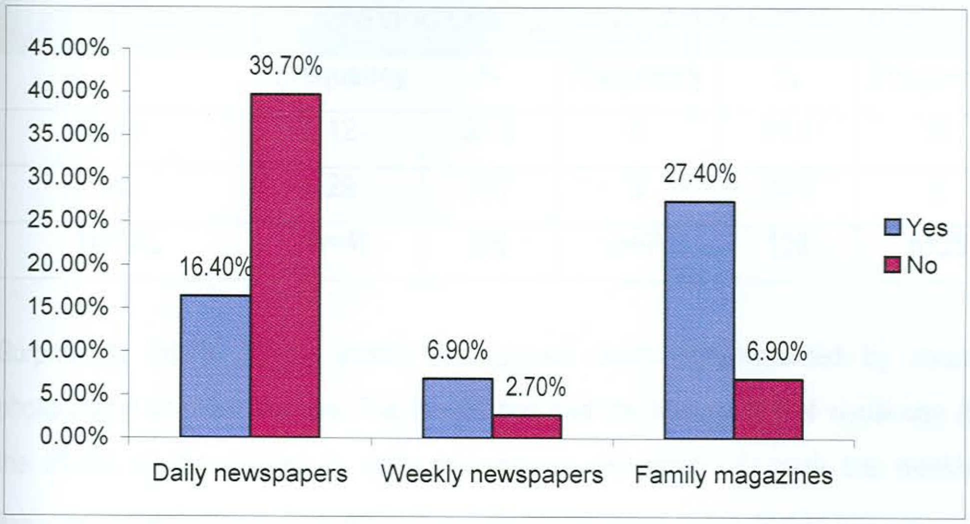
SOURCES	DAILY NEWSPAPERS		WEEKLY NEWSPAPERS		FAMILY MAGAZINES	
	2002 %	2004 %	2002 %	2004 %	2002 %	2004 %
Positive	71	87.8	63	85.7	78	100
Negative	29	12.2	37	14.3	22	0
TOTAL	**100**	**100**	**100**	**100**	**100**	**100**

The daily newspapers, weekly newspapers and magazines covered more positive articles in 2004 than in 2002. The reason for this may be found in the awareness campaigns conducted by the government of South Africa to enhance the understanding of science communication in South Africa.

7.4.2.5 Use of visuals and infographics

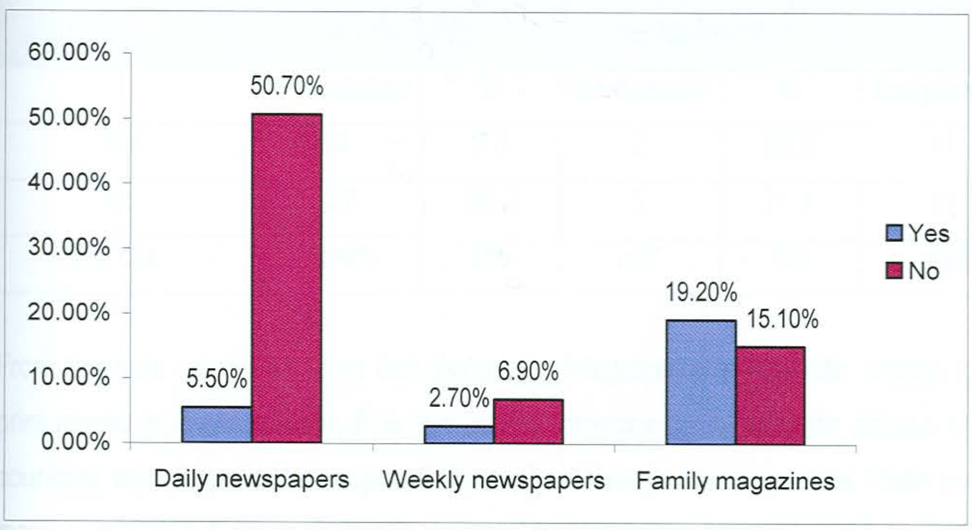
The classification of 'visuals' was awarded to any article that was accompanied by one or more photographs or graphic images. The term 'infographics' applied to any article accompanied by 'informative graphics' – visual displays with accompanying labels and text. In this study, only 27% of the studied articles were complemented by infographics, while 51% were accompanied by visuals. These results in this regard are illustrated in the next two figures.

Figure 7.7: Use of visuals with scientific articles



The percentage of use of visuals in both daily and weekly newspapers is rather low. Even magazines did not publish as many photographs as one would have expected.

Figure 7.8: Use of infographics with scientific articles



Overall, the use of infographics with science articles is extremely low for all three publications. Tables 7.27 and 7.28 display the frequency distribution of data values for visuals and infographics respectively.

Table 7.27: Usage of visuals in scientific articles per print medium category

SOURCES	DAILY NEWSPAPERS		WEEKLY NEWSPAPERS		FAMILY MAGAZINES	
	Frequency	%	Frequency	%	Frequency	%
Yes	12	29.3	5	71.4	20	80
No	29	70.7	2	28.6	5	20
TOTAL	**n=41**	**100**	**n=7**	**100**	**n=25**	**100**

Surprisingly 70.7% in the weekly newspapers were complemented by visuals in the form of photographs or other images. The magazines had the best record of visual use (80%), compared to the 29.3% of the articles in daily newspapers. However, although the weekly newspapers and magazines used visuals frequently, the daily newspapers could devote more space to photographs or images with their articles.

Table 7.28: Usage of infographics in scientific articles per print medium category

SOURCES	DAILY NEWSPAPERS		WEEKLY NEWSPAPERS		FAMILY MAGAZINES	
	Frequency	%	Frequency	%	Frequency	%
Yes	4	9.8	2	28.6	14	56
No	37	90.2	5	71.4	11	44
TOTAL	**n=41**	**100**	**n=7**	**100**	**n=25**	**100**

From the data values it seems that the use of infographics in scientific articles in the South African print media is low. However, how the use of infographics in scientific articles compares with other countries were beyond the scope of this study. Although the magazines made use of infographics in more than 50% of cases, it is still not the ideal situation. More use of infographics may appeal to readers, since infographics offer information colourfully and easy to read, but further research is required to determine the value of infographics to readers.

Table 7.29: Comparison of usage of visuals per print medium category: 2002 and 2004

SOURCES	DAILY NEWSPAPERS		WEEKLY NEWSPAPERS		FAMILY MAGAZINES	
	2002 %	2004 %	2002 %	2004 %	2002 %	2004 %
Yes	40	29.3	28	71.4	81	80
No	60	70.7	72	28.6	19	20
TOTAL	**100**	**100**	**100**	**100**	**100**	**100**

The comparison of this study with the study conducted in 2002 clearly provides evidence of the decrease in usage of visuals or images in scientific articles by daily newspapers. Surprisingly, the opposite occurred with the weekly newspapers, where the situation has been completely reversed, while the use of visuals in magazines stayed almost exactly the same as in 2002.

Table 7.30: Comparison of usage of infographics per print medium category: 2002 and 2004

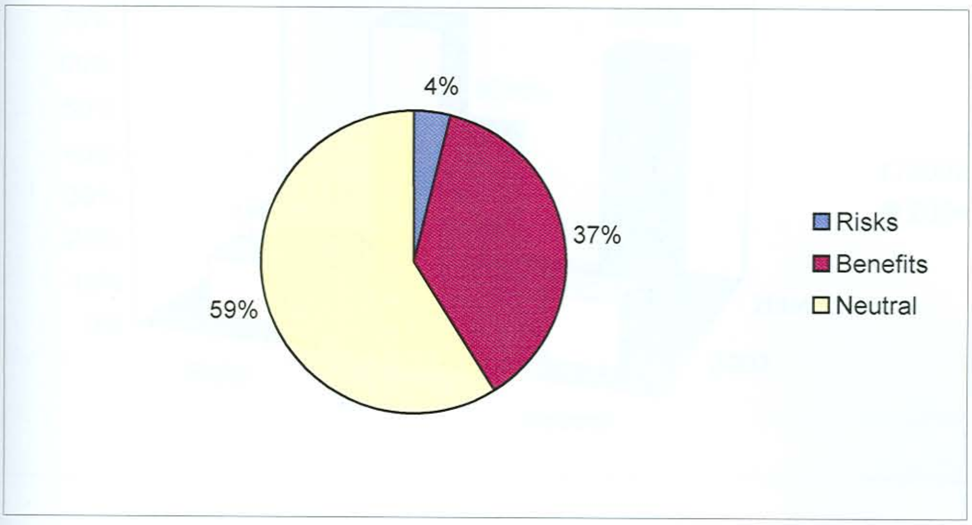
SOURCES	DAILY NEWSPAPERS		WEEKLY NEWSPAPERS		FAMILY MAGAZINES	
	2002 %	2004 %	2002 %	2004 %	2002 %	2004 %
Yes	9	9.8	5	28.6	4	56
No	91	90.2	95	71.4	96	44
TOTAL	**100**	**100**	**100**	**100**	**100**	**100**

The data values displayed in Table 7.30 imply the same usage of infographics for daily newspapers in both studies. However, the use of infographics in the weekly newspapers and especially in the magazines has increased significantly since 2002. This change can perhaps be attributed to the weekly newspapers and magazines realising that colour, and specifically photographs, catch readers' attention. People are constantly in a hurry, and reading an infographic saves readers' time. The use of infographics may even increase the circulation of the print media due to the reasons explained above.

7.4.2.6 Discourse of benefits and risks

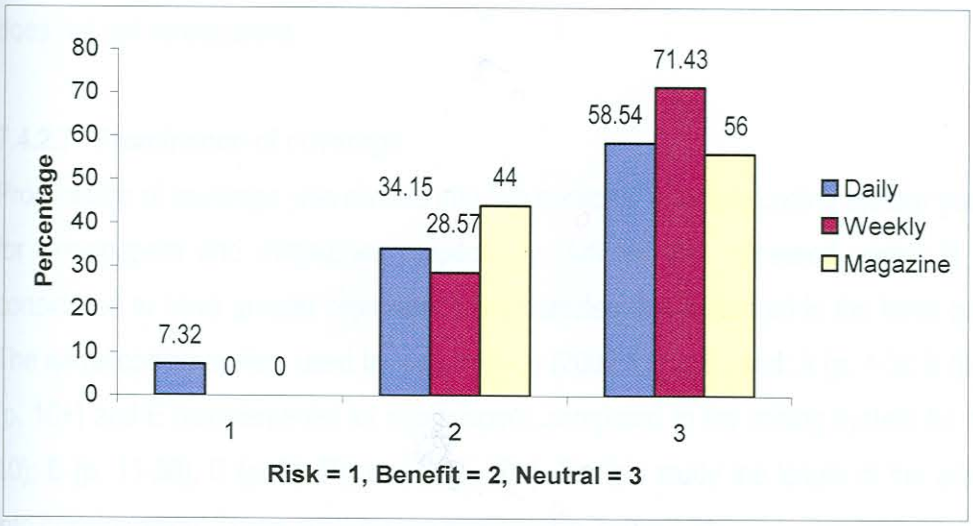
The largest proportion of articles (59%) did not indicate directly the benefits and/or risks pertaining to science and technology, while 37% seemed to promote the benefits of science and technology. There were no articles that equally supported the benefits and risks of science. The marginals of the three publications are demonstrated in Figure 7.9 below.

Figure 7.9: Marginal of Risks, Benefits and Neutral scientific articles in the total publications



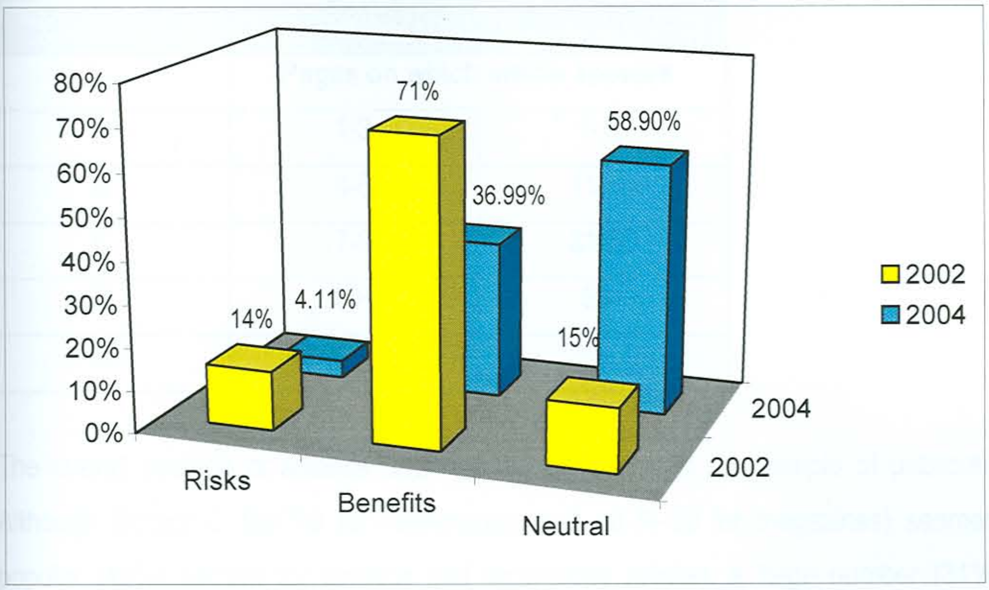
The daily and weekly newspapers, as well as the magazines all reflected the positive discourse trend in the coverage of science and technology. However, for all three publications the data values indicate that the articles appeared to be neutral. This finding is illustrated in Figure 7.10.

Figure 7.10: Discourse of benefits and risks



In the comparison of the current study with the 2002 study, the data values of articles pertaining to science risk or benefit appeared to be more positive, as is illustrated in Figure 7.11.

Figure 7.11: Comparison of Risks, Benefits and Neutral articles: 2002 and 2004



An interesting fact is that the articles about the risks of science and technology decreased from 14% to 4.11%. However, neutral articles increased, while articles about the benefits of science and technology also decreased. One of the reasons for this trend may be that the media are not prepared to report on the risks of science and technology and rather prefer to report by means of neutral articles. The fact that articles about the benefits of science and technology decreased, may be blamed on scientists not providing enough information for publication, or may result from the media's opinion that positive news does not sell newspapers.

7.4.2.7 Prominence of coverage

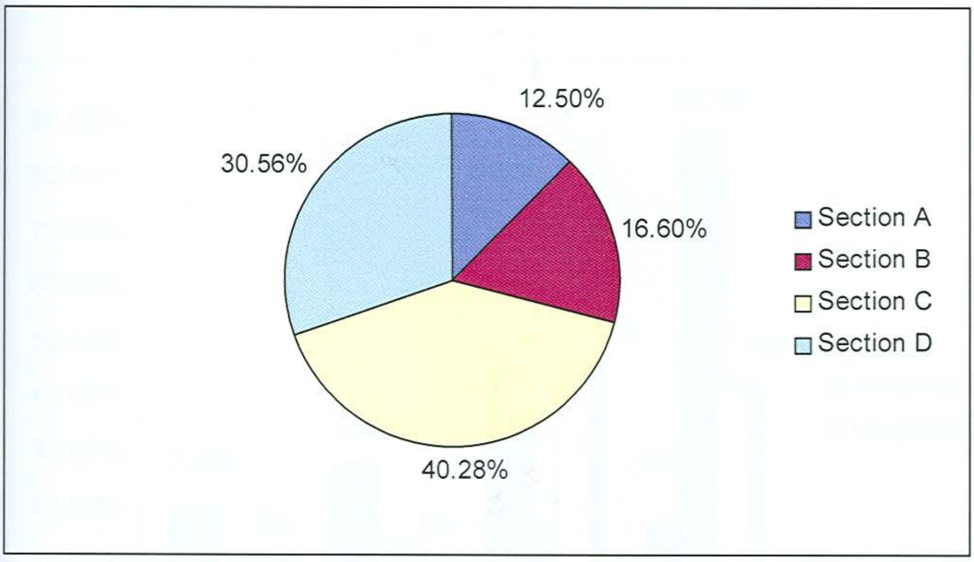
Prominence of coverage was divided into five sections. A simple coding system was used that differed for newspapers and magazines respectively. Articles that appeared earlier in a publication was considered to have greater prominence than articles that appeared in the latter part of a publication. The same coding system used by Van Rooyen (2002:11) was used: A (p. 1-3); B (p. 4-6); C (p. 7-9); D (p. 10+) and E (supplements) for newspapers, compared to the coding system for magazines: A (p. 1-10); B (p. 11-30); C (p. 31-50) and D (p. 50+). For this study the length of the articles was not taken into consideration. These sections are displayed in Table 7.31.

Table 7.31: Divisions of prominence of articles

SECTION	NEWSPAPERS	MAGAZINES
	Pages on which article appears	
A	1-3	1-10
B	4-6	11-30
C	7-9	31-50
D	10+	50+
E	Supplements	-

The overall position of science and technology articles in the sample of publications is conflicting. Although Section C (pp 7-9 for newspapers and pp 31-50 for magazines) seemed to be the most popular (40%) section for science and technology articles, a large number (31%) of articles also appeared in Section D (pp 10+ for newspapers and pp 50+ for magazines). A fair amount of coverage was, however, also positioned in Section B (pp 4-6 for newspapers and pp 11-30 for magazines). There were no scientific articles during the period of analysis that appeared in Section E. These results are illustrated in Figure 7.12.

Figure 7.12: Prominence of coverage in the total publications



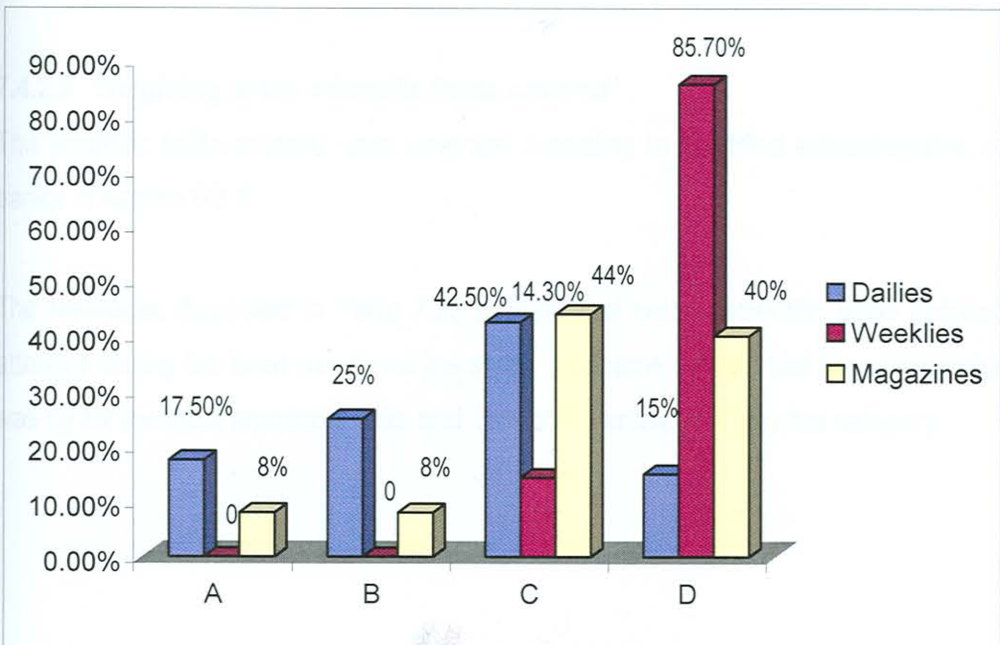
In Table 7.32 a breakdown of Sections A to E of the different print media is displayed.

Table 7.32: Prominence of science and technology articles

SECTION	DAILY NEWSPAPERS	WEEKLY NEWSPAPERS	MAGAZINES
A	17.5%	0	8%
B	25%	0	8%
C	42.5%	14.3%	44%
D	15%	85.7%	40%
E	-	-	-
TOTAL	**100%**	**100%**	**100%**

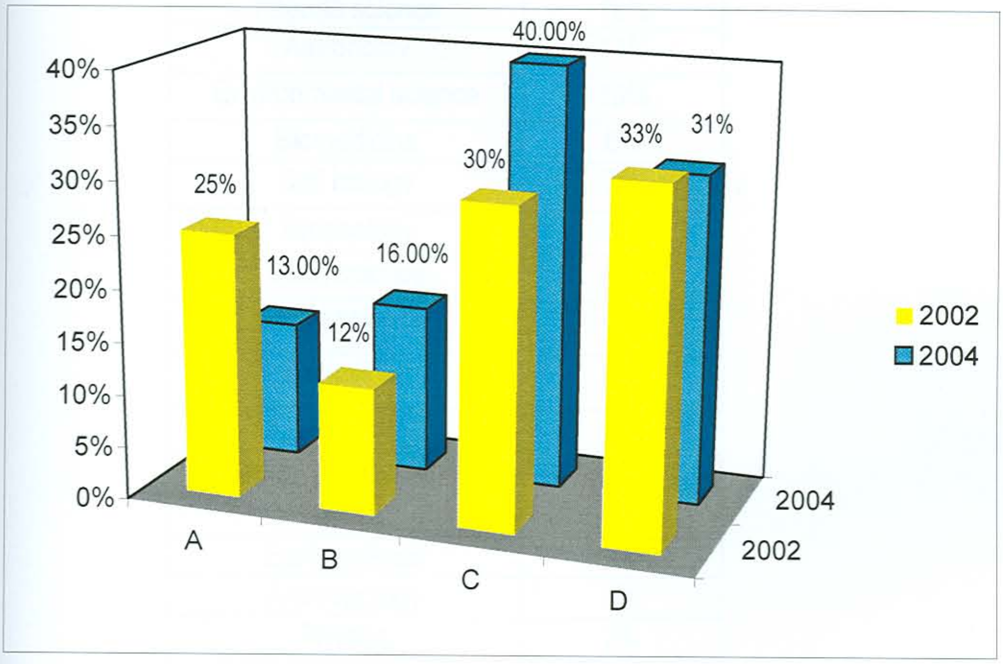
It was surprising to note that the weekly newspapers did not give prominence to science and technology articles, their highest coverage appears in Section D (85.7%), compared to the daily newspapers that had their highest appearance in Section C (42.5%). Magazines also have their highest appearance in Sections C (44%) and D (40%). Daily newspapers devoted the highest percentage to Section A (17.5%), which is on pages 1-3 in the newspaper. This may be because the weekly newspapers make use of more feature articles, and long and in-depth scientific articles would be more appropriate on later pages of the newspaper. The data values of Table 7.32 are demonstrated graphically in Figure 7.13.

Figure 7.13: Prominence of coverage of scientific articles



The comparison with 2002 is displayed in Figure 7.14 and discussed afterwards.

Figure 7.14: Comparison of prominence of coverage: 2002 and 2004



According to the data values of the studies of 2002 and 2004, science and technology articles certainly received less prominence in the front pages of publications in 2004. However, more articles appeared in Section C in 2004 than in 2002. The data values also revealed that the appearance of scientific articles in Sections B and D remained more or less the same.

7.4.2.8 Weighting of the scientific fields covered

The scientific fields covered were weighted according to identified sub-categories as was mentioned earlier in section 6.5.8.

The results as illustrated in Table 7.33 indicate that certain scientific fields definitely received more attention during the three months of the study. It became evident that the category for pseudo science was by far the most prominent field, and 18% of the articles fell into this category.

Table 7.33: Scientific fields covered in selected print media: 1 March to 31 May 2004

CATEGORY	PROPORTION
Pseudo science	18%
Astronomy	11%
Environmental science	10%
Biomedicine	8%
Cell biology	7%
Technology	6%
Sport science	6%
Food science	6%
Behaviour	6%
General	4%
Mathematical science	3%
HIV	3%
Earth science	3%
Anthropology	3%
Physics	2%
Zoology	1%
Paleobiology	1%
Computer science	1%
Chemistry	1%

The daily newspapers focused mostly on pseudo science (30%), followed by biomedicine (15%), while the weekly newspapers' strongest focus was on cell biology and food science (both 29%), followed by anthropology, HIV and pseudo science (all at 14%). In the case of the magazines the strongest focus fell on environmental science (24%), followed by astronomy (16%). It became evident that many of the articles that appeared in the newspapers were not based on solid scientific evidence or verified by scientists, but rather involved 'interesting to know' facts that the general public would like to read – therefore the high percentage of pseudo science coverage in articles. In the following table, the comparison between topics covered in 2002 and 2004 is displayed.

Table 7.34: Comparison of topics covered in selected print media: 2002 and 2004

Category	2002	2004
Anthropology	2%	3%
Astronomy	14%	11%
Behaviour	4%	6%
Biomedicine	18%	8%
Cell biology	5%	7%
Chemistry	1%	1%
Computer science	3%	1%
Earth science	1%	3%
Environmental science	9%	10%
Food science	6%	6%
HIV	12%	3%
Mathematical science	0.2%	3%
Paleobiology	1%	1%
Physics	0.4%	2%
Pseudo science	5%	18%
Sport science	-	6%
Technology	12%	6%
Zoology	5%	1%
General	1%	4%

In the Van Rooyen study (2002:18) it was explained that the high percentage of astronomy articles (14%), could perhaps be attributed to South African Mark Shuttleworth's travel to the international space station in April 2002. However, during the period of analysis for this study, other interesting astronomical discoveries were made, for example new deserts on Mars, which could not be linked up with some well-known person. Of concern is the fact that so many pseudo science articles were published. These articles might be of statistical value to readers, but they definitely do not enhance the benefits of science.

7.5 SIGNIFICANT DIFFERENCE IN THE USE OF INFOGRAPHICS

The statistical analysis of the data also yielded one significant difference. The Chi-square test was used to make categorical inferences about the relationship between the categorical variables studied. Only one significant difference occurred between the two categorical variables "yes" and "no" of making use of infographics in scientific articles. The data was skewed towards the daily newspapers and magazines.

This means that more magazines make use of infographics, compared with the large percentage of daily newspapers that do not make use of infographics in science and technology articles.

7.6 CONCLUSION

In this chapter the empirical results of the study were presented. First, there was a focus on the descriptive statistics of Phase 1 of the study. Results were presented, addressing the empirical component of Objectives 1 to 5 that were theoretically discussed in Chapters 2 to 5. Next, the empirical results of Objective 6 were discussed where the focus was on content analysis supported with descriptive statistics. Lastly, the results of the content analysis of this study were compared with the results of the study conducted by Van Rooyen in 2002.

In Chapter 8 detailed conclusions and recommendations based on the main results represented in this chapter will be discussed.