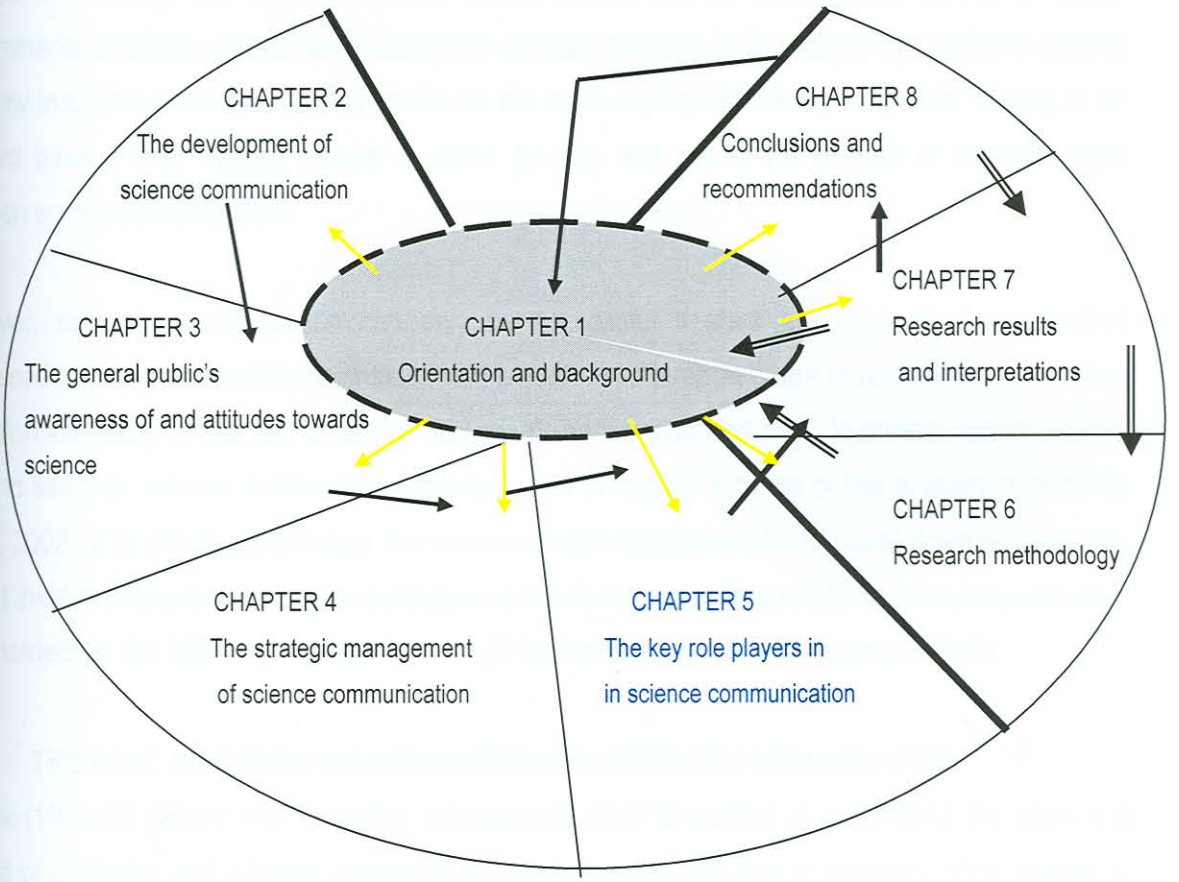
Chapter 5

The key role players in science communication

5.1 INTRODUCTION

In the previous chapters the concept of science communication, the awareness of SET, as well as the strategic management of science communication were described. The theories on which the theoretical framework is based in the previous chapters can be summarised as: science communication as information (information theory described in Chapter 2) that has to be communicated to stakeholders (stakeholder theory discussed in Chapter 3) through mediums, such as mass communication (mass communication theory described in Chapter 2). However, to achieve science communication successfully, strategic science communication planning is required. Therefore, the General theory of excellence in PR / corporate communication management and strategy were discussed in Chapter 4. To conclude the theoretical framework, the roles of the key role players in science communication are discussed, as well as the agenda setting theory and the gatekeeper theory. Figure 5.1 illustrates visually the position of Chapter 5 in relation to the other chapters in the theoretical component of the study, as well as to the empirical component.

Figure 5.1: Chapter 5 in relation to other theoretical chapters



As mentioned before, for the purpose of this study, the key role players in science communication include executive management, scientists and communication specialists at HEI, as well as journalists (an important stakeholder of HEI) in South Africa. Each role player has specific tasks and responsibilities to ensure that science is communicated effectively to the other stakeholders of HEI. These roles are important to acknowledge and understand one another, since a successful relationship between the role players can only be developed and maintained once the role players realise the valuable contribution they can make to successful science communication. To assist the role players, the mass media are imperative, since the mass media constitute an effective tool to reach all stakeholders timeously and effectively, as was pointed out in Chapter 2.

From the discussions in Chapter 3 it has become clear that the lay audience expresses a clear demand for scientific information, particularly when health and welfare are involved. For most people science is what they learn from the media. The need for good scientific journalism is pressing to

bridge the gap between the slow pace of science and the fast-moving and concise nature of successful mass communication. A complication that increases the barrier between science and the public is the practice of carrying out research behind closed doors, and of keeping the results a secret. Governments and large companies that spend enormous amounts in developing new defence projects and new industrial processes and materials are the main employers of scientists, either directly or on contract basis. Their secrecy serves to widen the gap and add to the barriers of communication between scientists and laymen.

However, science communication can only be successful if stars are involved. As committed ambassadors and role models, scientists must be willing to jump at every opportunity for a radio or television interview, to interrupt whatever they are doing if a journalist calls, to provide visuals of their work, to sell their science to television producers, and to engage with the public at every opportunity (Jaffe, 2002). It is with these activities that communication specialists should assist scientists and they should involve themselves acting as facilitators in introducing scientists at HEI to journalists and other stakeholders. In the following sections the roles of the various key role players are explored.

5.2 THE ROLE OF EXECUTIVE MANAGEMENT IN SCIENCE COMMUNICATION

Berzok (1993:25) argues that executive management must be guided to understand the value and benefit of credibility and effective communication; this is especially true in communicating science to stakeholders. The above statement implies the development of separate executive management communication strategies that are fused with the overall communication and business strategies. Many executive management teams remain unenlightened and unconvinced; therefore they hold the communication function at arm's length. However, as was described in Chapter 4, executive management at HEIs are responsible for the science communication strategies and strategic communication plan and should provide direction to communication specialists who should implement these strategies in communicating science to HEI's stakeholders. A key to sensitising executive management to the complexities and potential of their transformed communication role is to change the way they think about communication (Pincus & De Bonis, 1994:28). They should therefore be trained and educated about the importance of science communication.

The direct link and trust relationship between executive management and communication specialists is the umbilical cord that should ensure an open flow of information, intelligence and ideas. According to Ngcobo (2003:4), executive management sometimes need to leapfrog the line communication system and communicate directly to stakeholders. Not only do communication specialists manage the

channels their superiors would use for this purpose, but it is also their responsibility to alert executive members to potential pitfalls and advise them on the media so as to use a suitable style of presentation, a typical mediation function to be performed by communication specialists, especially in science communication. It is therefore required that executive management empower and trust communication specialists in fulfilling the facilitator's role between HEIs and their stakeholders.

However, to gain credibility with executive management, it is essential that communication specialists display a high level of skill, knowledge and experience. They need access to executive level information and be allowed to contribute to the enterprise's management planning process. For this crucial need to become a reality, executive management need to understand the important role of communication specialists in communicating science to all stakeholders.

5.3 THE ROLE OF SCIENTISTS IN SCIENCE COMMUNICATION

Traditionally working in a context where success is measured by the judgement of peers, scientists have long assumed that a record of accomplishment is sufficient to maintain research support. Therefore, information – the scientist's 'stock-in-trade' – has been directed primarily toward professional colleagues. Most scientists have not been interested in public visibility; on the contrary, they have feared it could result in external controls on their work (Nelkin, 1995:125). Scientists increasingly emphasise the pragmatic goals of science communication as the scientific and technical enterprise grow in complexity and importance. Science communication activities have become important and the role that communication specialists can play to enhance institutional prestige, encourage public support for research and influence public policy with respect to science and technology has increased tremendously since the 1990s.

Many of our day-to-day decisions are based on what we hear or see in the mass media, which for the majority of the population has become our only source of scientific information. The scientific community therefore can no longer afford to dismiss the importance of the mass media. Despite this, however, many young scientists complete their studies and embark on a career in research without any training in public speaking, interviewing or popular writing. It is not surprising then, that scientists often shy away from media interviews and public platforms. Scott (in Nelkin, 1995:136) remarks that "South African scientists are very creative and innovative in their work. They are often highly respected by their peers abroad. But, they have absolutely no idea how to communicate to a non-scientific audience". Therefore, communication specialists and scientists should have a relationship of trust and mutual understanding. Communication specialists should be allowed to act as facilitators between

scientists and stakeholders, not only to protect scientists, but also to ensure that stakeholders receive the correct science message.

It is obvious that scientists have built a barrier to understanding between themselves and laymen, simply because scientists use a special language. Because science is a specialised way of observing facts and of showing how they relate to one another, the scientist must train himself/herself to think clearly, to measure exactly and to devise experiments with a definite purpose. Then, she/he must describe his/her observations as precisely as possible. There must be no doubt in the mind of someone who reads his/her report about what a scientist means when she/he describes a particular event. The scientist must say exactly what he found, no more and no less. For this reason, scientists should attempt to write sentences that have one meaning and one meaning only (Barry *et al.*, 1965:176).

According to Dean (2002:26), for most scientists talking to the media is still a no-win proposition. Reputable scientists do not normally communicate their findings in the lay press; they report them in scientific journals or at scientific meetings. Newspaper articles do not necessarily help them with tenure decisions or grant applications; and, if the media describe their work inaccurately, it reflects badly on them, or their peers might dismiss them as public hounds. The result is that scientists have little incentive to speak to the media. Often they are also shocked that the journalists are not better informed about their research. However, when they are asked to explain their work in simple terms, they themselves are at a loss. It is here where communication specialists can be of great value to translate the message correctly to the media and other stakeholders.

Also, scientists have an ethical obligation to the public to account for their stewardship of the public funds used to support their work. In large part, they can meet this obligation by helping produce explanatory material such as news releases and by making themselves available to the public's representative, the media. Coverage of science and technology attracts not only more public and private support for research, but also interested, talented students to careers in science and engineering (National Environmental Research Council, 2001).

Scientists who use the media effectively see significant advantages in having a media presence for themselves, their projects, and their research institutions. It is regarded as an imperfect, but powerful means of reaching end users, research funders, bureaucrats and other scientists (Foundation for Education, Science and Technology, 2001). Scientists should realise that they are not communicating

to the media; they are using them to communicate with a variety of stakeholders. As educators in science, scientists have a responsibility to explain their research to communities, since these people are the taxpayers who contribute financially to the research efforts. Furthermore, communities are the receivers of new scientific and technological developments. Scientists should therefore avail themselves of every opportunity to participate in science activities aimed at enhancing an awareness of science in schools, among the public and even in government.

In order to achieve successful awareness among the public it is important for scientists to feel that their need to convey science to external stakeholders is taken care of by executive management and communication specialists, and that it is regarded as a priority of the institution.

5.4 THE ROLE OF COMMUNICATION SPECIALISTS IN SCIENCE COMMUNICATION

Some people are 'born communicators', while others can be made. Scientific staff and research managers often have little communication training or experience, yet need to serve as spokespeople because of their knowledge and expertise. Communication specialists can help formulate policy, coach from the wings, act as liaisons and train other staff, but they cannot replace the important interchange between the 'experts' and their stakeholders (Metcalfe, 2002). In situations where the expert needs to communicate directly with stakeholders, it should take place in conjunction with the communication specialist and preferably in his/her presence.

As described in Chapter 4, every university and technikon in South Africa has its own structured marketing and communication division whose major responsibility it is to market the institution and communicate important news to stakeholders of HEI. Regardless of how the division is structured, part of the role of communication specialists is to share research performed at the institution with the media who have to convey the message to other stakeholders. Symmetrical practices among communication specialists require that communication specialists act as advocates of their institutions' viewpoint when communicating with stakeholders, including the media, and as advocates of public interests when communicating with executive management. Communication specialists assist institutions, stakeholders and the media to negotiate mutually acceptable resolutions to disputes and to build long-term relationships.

The communication specialist is often called upon to guide and counsel management in determining its objectives, responsibilities, and the route it should take in designing its policies and procedures that affect public interest (Skinner & Von Essen, 1982:7). Communication specialists are supposed to

assist institutions in setting up newsrooms, arranging news conferences, setting release times and providing essential aids such as summaries or abstracts, photographs and videotapes to journalists. They should fill the translation gap between scientists and stakeholders asking questions. However, in most cases stakeholders and institution executives are not convinced that communication specialists have the expertise and sophistication to deliver their promises (National Association of Science Writers, 2000). Nelkin (1995:141) postulates that in the era of science, communication specialists do contribute in important ways to inform stakeholders about science. They are a useful source of information for journalists. By presenting complex material in a manageable form, they serve as liaisons between scientists and journalists, easing the reporting of science. It is therefore very important for communication specialists to have sufficient knowledge on science to formulate the correct messages targeted at HEI stakeholders. In this regard it is imperative that a good relationship should exist between communication specialists and scientists. Scientists should have trust and faith in communication specialists to ensure the correct scientific facts are communicated to stakeholders.

The role of communication specialists in the strategic management of science communication and the theory of environmental scanning were discussed in Chapter 4. However, in addition to the roles communication specialists play as managers, communication specialists in science communication also have an important task to fulfil as boundary spanners. The application of the concept of boundary spanners in science communication is discussed next.

What an institution needs most for its decisions is data on what occurs outside its borders. It is only outside business where there are opportunities and threats. And it is here where communication specialists as boundary spanners can play an important role in the management of science communication (Howard, 1995:15). It is his or her task to cross borders to survey the environment. Changes in the environment might cause the re-formulation of the vision, mission and corporate goals in the corporate strategy, which contains guidelines to how the goals and implementation plans for science communication activities might change.

Information is acquired from external sources and decisions are taken as to whom information should be provided in the institution, as well as when and what portions of such information, i.e. the facilitation/mediation function of communication specialists. In science communication this would involve the specific information to be provided to executive management and scientists in order to enable them to make decisions that will benefit the institution and its stakeholders. Information is

provided to others to create a favourable image of the institution and a willingness to accept the messages of science distributed by this institution.

Acquiring and integrating a large amount of information about the external environment offers a challenge to assess changes in relationships over time. A second procedural conclusion involves the presumption that relationships should be reflected in business landscapes. Although this requirement adds to the difficulty of the analysis, it also enhances the chances of finding win-win strategies (Ghemawat, 1999:39). Communication specialists are necessary contributors to the 'interface' between institution and environment. It is important that communication specialists should determine in conjunction with scientists where the message of science has not yet been received and to work out a plan on how to address these stakeholders, in other words communication specialists should act as facilitators between scientists and stakeholders of HEI.

Besides the important task of scanning the environment, communication specialists are also responsible for building relationships with internal and external stakeholders. HEI require a corporate communication manager who can undertake continuous research on stakeholders or publics. Without a thorough understanding of adversarial groups, the institution is at their mercy, especially in science communication where the risk of new scientific or technological developments has to be considered. Communication specialists can play a significant role in preventing or resolving fundamental conflicts with stakeholder groups. They can exacerbate or reduce the problem facing institutions pressured by outside constituencies (Steyn & Puth, 2000:204). As described in the stakeholder theory in Chapter 3, stakeholders have access to more information than in the past and since the value of information increases when it is shared, collaboration with stakeholders can result in increasing the HEI's store of valuable information on scientific developments.

In order to be successful in their role as facilitators, communication specialists need at least a basic training in science. Just as journalists, they need to be able to translate the messages received from scientists effectively to be understood by stakeholders of HEI.

5.5 THE ROLE OF JOURNALISTS IN SCIENCE COMMUNICATION

Journalists (a very important stakeholder of HEI), who use everyday language to report scientific discoveries, play an important role in any society. Although good journalists attempt 'intelligent fact-based journalism, honest in intent and effect, serving no cause but the discernible truth, and written clearly for readers whoever they may be', the reality is that journalists, willingly or not, occasionally do

print untruths or half-truths. Journalists realise that they have to gather the truth and present it to a public that supports the ideals of individual liberty and democratic government, but unfortunately the reality is usually driven by money and profit (Frost, 2002:4).

The mass media make profit only by attracting large audiences, and audiences are attracted by sensation, crime and 'too-good-to-be-true' articles. Journalists, therefore, are under pressure to make their reporting sensational – which nearly always means an oversimplification of scientific facts. Ever-increasing media output that tempts audiences to spend less and less time with any individual provider and persuades readers to spend a little longer with a specific newspaper has become one of the critical measures of performance for the media. Consequently, journalists rarely get the time or the encouragement to conduct proper investigations in order to educate and inform their publics. They are required to find entertaining and exciting articles quickly and with a minimum of research (Frost, 2002:5). Such reporting, in turn, portrays to the man in the street a distorted view of science. The result is the very opposite of what a scientist would wish for. The layman marvels at scientific progress, but at the same time she/he is bewildered by it. Often she/he ends up by mistrusting and even hating scientists.

Whereas scientists specialise in increasingly narrow fields, journalists have the responsibility to cover quite a broad field. On many occasions the same journalist has to report on science, sport as well as politics. This is an almost impossible task and certainly does not add to scientists's trust of journalists. Among the many kinds of specialised writers, the science journalist has a unique responsibility to the reader. Unlike the sports journalist, for example, whose reader already knows – often in extraordinary detail – the rules of the game and who the players are, science journalists must often introduce readers to a new 'game' in every article they write (National Association of Science Writers, 2001).

Journalists reporting on science must first and foremost understand the science, which is often the toughest part of being a science journalist. Then she/he must write the article and translate it accurately into a form that is both interesting and intelligible to the layman. However, these journalists are writers first and not scientists. Good science journalists do their best to report accurately, but they always keep in mind what they think would interest the public, which may not be what the scientist thinks should interest the public. This results in journalists retailing science and technology rather than investigating them, and identifying with their sources rather than challenging them (Hotz, 2002:6).

In South Africa many journalists are freelancers, making them dependent on corporate and university assignments. To survive, journalists rely on the daily cascade of embargoed research papers, e-mailed press releases, university tip sheets and conference abstracts. In many instances the sources despise the media for their many excesses and oversimplifications, resulting in many journalists being more ignorant of science and hostile toward it than the readers of their articles (Franklin, 2002:8). According to Rensberger (2002:11), every journalist should know the following about science and science journalism:

- Science demands evidence, and some forms of evidence are worth more than others. A scientist's authority should command attention.
- There is not a single scientific method, but all good science includes elaborate procedures to discover and avoid biases that might mislead.
- Uncertainty is a sign of honest science and reveals a need for further research before reaching a conclusion. Cutting-edge science is highly uncertain and often flat-out wrong.
- The pace of science, despite the hype, is usually slow, not fast. Breakthroughs are never the result of one experiment.
- Balanced coverage of science does not mean giving equal weight to both sides of an argument. It means apportioning weight according to the balance of evidence.
- Virtually all new technologies pose risks along with benefits. Thus 'safe' and effective, whether applied to drugs or new devices or processes, are always relative terms. It is irrational to ask whether something is safe or not. Nothing is 100% safe. Policy decisions involving science must therefore balance risks and benefits.
- Journalists and scientists espouse similar goals. Both seek truth and want to make it known. Both devote considerable energy to guard against being misled. Both observe a discipline of verifying information. Both insist that society allows them freedom to pursue investigations wherever they lead. Neither requires licensure or approval of an outside authority to practise their craft.
- News organisations usually attach too much importance to a scientific development and not nearly enough to the broader trends.

Science journalism is difficult and journalists have to cover everything from anthropology to astrophysics to atherosclerosis. At the same time, science is becoming increasingly specialised. So it is even more difficult for journalists, even those with advanced training, to know what is important and what not. Another complication of relatively recent origin is the intense widespread commercialisation of research, particularly medical research. These difficulties can be addressed only by scientists

committed to explaining their work to the lay public in clear and dispassionate terms (Dean, 2002:25,26). However, despite the difficulties and concerns, journalists remain a very important and powerful role player in science communication. Without journalists and the media, the message of science would not reach stakeholders effectively. Journalists and communication specialists, who are spokespeople of HEI and facilitators between scientists and journalists, need to engage in a relationship of trust and mutual understanding to ensure that stakeholders of HEI receive the correct science messages as was intended by scientists.

5.6 THE THEORIES APPLICABLE TO THE ROLE OF THE MASS MEDIA IN SCIENCE COMMUNICATION

Mass media can be defined as a means of communicating a message through a medium or channel to a mass or large number of people who are considered to be one large group, indistinguishable from one another. Modern mass media include television, radio, newspapers and magazines, books, films and recordings (Mersham & Skinner, 2001:3). Although the mass media is regarded as a major distribution channel for communicating science, it must be realised that not all stakeholders, i.e. literate and illiterate, urban and rural and young and old people, have access to these media. Most people in rural areas do not have access to computers, radio, television and newspapers and are therefore excluded from receiving news via the mass media. This problem can be addressed if the community centres in these areas are able to install equipment such as television and radio where local people can have access to these communication mediums. Unfortunately this creates problems of their own which fall outside the scope of this study and therefore, for the purposes of this study, it is recognised that the mass media cannot be used successfully in communicating to all identified stakeholders. However, although the mass media as such is not a key role player in science communication, the mass media as a channel by which messages are distributed, unavoidably fulfil an agenda setting function, as well as a gatekeeper function. These two functions as theories are therefore described, since they form part of the theoretical base of distribution of the message of science.

5.6.1 The agenda setting theory

In the same way that people set up their own agendas on matters that require attention, the mass media 'select and call to the public's attention both ideas and events' (De Vito, 1991:477). According to McQuail and Windahl (1981:62), the media inform their audience what is important and what is not. People also tend to think that news covered in the mass media may be more important than news not attended to by the media (Merrill, Lee & Freelander, 1990:89). Studies in America have found that there is considerable correlation between the amount of news coverage of a particular issue and the

importance that the general public attached to it (Tan, 1981:277). Agenda setting can thus be seen as the hypothesis that the mass media, through coverage of ideas and events, may have an influence on what the public regards as important (De Beer, 1998:21). McCombs and Shaw's agenda setting theory (in Griffin, 2003:391) boasted two attractive features, that is, it reaffirmed the power of the media while still maintaining that individuals were free to choose.

According to McCombs and Shaw (in Griffin, 2003:393) the hypothesised agenda-setting function of the media is responsible for the almost perfect correlation they found between the media and public ordering of priorities. However, results of another study by Funkhouser (in Severin & Tankard, 1992:210) were in line with the agenda setting hypothesis, although these results pointed out the question of causal direction. McCombs and Shaw conducted a further study, the Charlotte survey, in order to obtain evidence concerning the causal direction of agenda setting. Although the results were not as clear-cut as expected, the Charlotte study did provide evidence of causal direction, in other words, it is likely that the media do have a causal effect in shaping the public's agenda, rather than vice versa (Severin & Tankard, 1992:211).

According to Littlejohn and Foss (2005:280), agenda setting occurs because the media must be selective in reporting news. The agenda setting function is a three part linear process. Firstly the priority of issues that should be discussed in the media or media agenda; secondly, the public agenda is created by the effect or interaction of the media agenda on what the public's views are; and lastly, the public agenda affects or interacts in some way with what policy makers consider important, called the policy agenda. To some extent, the media agenda is set by the media passing on issues and events that are occurring in society. However, Westley (in Severin & Tankard, 1992:223), suggested that in some cases pressure groups or special interest groups are able to transfer an issue onto the media agenda. In other words, the media agenda is established by some combination of internal programming, editorial and managerial decisions and external influences from nonmedia sources, such as government officials and commercial sponsors, etcetera (Littlejohn & Foss, 2005:280). The degree, to which the media reflect the public agenda, is called representation, that is the public influences the media. If the same agenda is maintained by the public the entire time, it is called persistence and in such a case, the media may have little effect. When the media agenda influences the public agenda, it is called persuasion and this influence of the media on the public, is what the agenda setting theory predicts.

De Beer (1998:111) describes how the media team performs in setting the agenda. The editor is the executive responsible for the smooth running of the newspaper. The editorial team, assisting him, could be divided into three sections, i.e. those deciding on news, those gathering the news, and those processing it for publication or broadcasting. The combined team gathers the news, judges its importance, evaluates its meaning, and writes and displays it in ways that will attract and hold the attention of readers. These functions all form part of the agenda settting function, of which the editor is the team leader. The editorial team normaly consists of the editor, assistant editors and editors of the various news sections, such as the news editor, chief sub-editor, sports editor, financial editor, arts editor, chief photographer, etc. They have conferences at certain times during the day at which they decide on the news and its display, in other words the agenda setting (De Beer, 1998:111).

Since the South African government has made science communication a priority, science should be high on the priority list of editors when the agenda is set for a particular issue of the newspaper. Therefore, a relationship of trust and mutual understanding between scientists, communication specialists at HEI and the media is critical to ensure that scientific discoveries are regarded newsworthy by editors.

5.6.2 The gatekeeper theory

The concept of gatekeeper has been used frequently in studies of the mass communication process, especially with reference to any action within a media organisation that involves choosing or rejecting some potential item for publication (McQuail & Windahl, 1981:100).

The term 'gatekeeper' was coined by Lewin (in Windahl *et al.*, 1993:125) who used it to describe how food found its way into a household. It became a key concept in mass communication studies about news selection. A gatekeeper in a social system decides which of a certain commodity (materials, goods, information, etc.) may enter the system. Media gatekeeping studies have shown how a journalist's decision making may be based on a rich mixture of general principles of news values, organisational routines, input structure and plain idiosyncrasy (Windahl *et al.*, 1993:125). Kosicki (in Griffin, 2003:400) stated that the media as gatekeepers do not merely keep watch over information, shuffling it here and there, but they engage in active construction of the messages, emphasising certain aspects of an issue and not others.

Gatekeeping is vital in communication planning. Almost all communication-planning roles include some aspect of gatekeeping, for example:

- The agricultural consultant, who has to transform and reduce scientific news into practical advice intended for farmers.
- The leader of an environmental discussion group, who selects teaching materials to be used in the group.
- The planner of an anti-drug campaign, who must select among hundreds of arguments for quitting cocaine.
- The journalist of a daily newspaper, who chooses material coming from sources all over the world.

As a gatekeeper, the journalist undoubtedly can exercise some power over the communication process by deciding what information to discard and what to let pass. Nevertheless, as stated by Windahl *et al.* (1993:125), gatekeeping is often a routine, guided by some set of standard questions, such as:

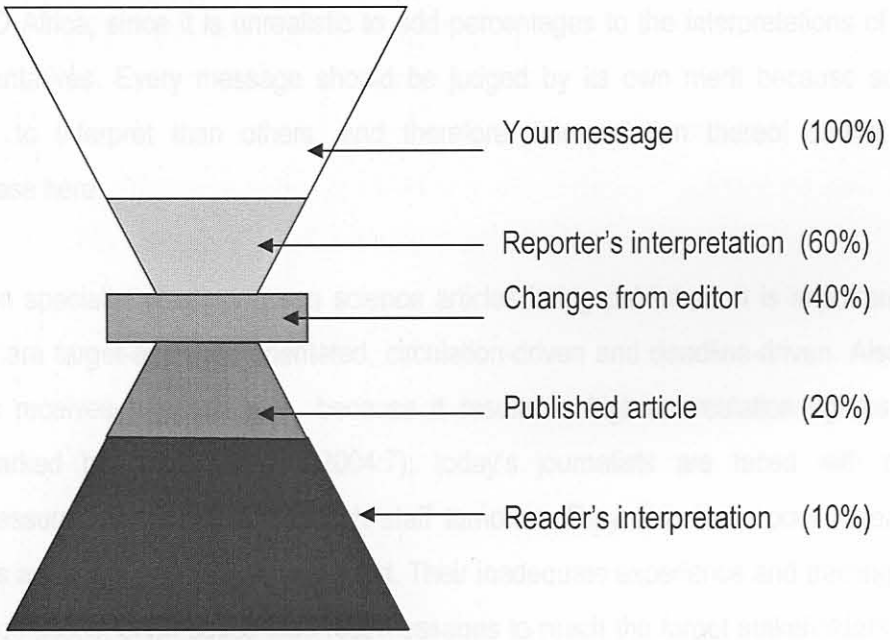
- What, from this material, do stakeholders need to know?
- What do they want to know?
- What do they know already?
- What will they understand?
- What will they refuse to accept?

Gatekeeping can become a means of reducing openness in a social system and may result in distrust. Gatekeeping might also be one of the reasons why science seldom receives attention in the media, since there seems to be always more important news to cover than scientific discoveries or results.

Every day journalists are being pressed 'to put it right'. Sometimes they are actually asked to correct a mistake of fact or an omission of importance. At other times, they are asked to excise or downplay a significant and uncomfortable truth. Journalists receive demands openly and surreptitiously from many powerful centres: government departments; political leaders; company bosses; service authorities; and any more who advertise in all the commercially funded media and who threaten sometimes to stop their funding. Because of these reasons, weak journalists change an article because somebody in power demands it, whereas strong journalists only change an article because they are convinced it deserves to be changed, irrespective of who demands it. The only acceptable way is for journalists to decide. This means isolating the point made and considering it fairly, regardless of whether the source is important or ordinary, accepting the point if it is reasonable, rejecting it if it is not – and tolerating the

scepticism or wrath, if applicable (Wilson, 1996:38). Figure 5.2 represents the interpretation of the gatekeeper theory as seen by APCO Africa.

Figure 5.2: The gatekeeper theory



Source: APCO Africa. (2004:7)

According to APCO (2004:8), the media see themselves as

- guardians of public safety;
- keepers of public morals;
- 'watch dogs';
- defenders of the 'little person';
- seekers of the truth;
- enemies of villains;
- sources of correct information, and
- a link between readers and news sources.

As can be seen from the model, only 10% of the original message in effect reaches the receiver of the message. In a relationship of trust and mutual understanding between scientists, communication specialists and journalists, the filtering process would be reduced, since the journalist (reporter) would have a better understanding and his/her interpretation of the message should be much higher. Even if

the relationship results in an interpretation of 80% of the original message and the editor only has to make changes of 10%, the published article should reflect a percentage of 50% and the end receiver or reader would receive at least 40% of the original message. The contribution of communication specialists would result in an increase of at least 30%, but the ideal would obviously be that the receiver should receive 100% of the message. However, the researcher does not agree with the model as presented by APCO Africa, since it is unrealistic to add percentages to the interpretations of the various media representatives. Every message should be judged by its own merit because some messages are easier to interpret than others, and therefore, interpretation thereof cannot be generalised as is the case here.

For any communication specialist wanting to see science articles being published, it is important to realise that the media are target-audience orientated, circulation-driven and deadline-driven. Also, a crisis situation always receives high attention, because it results in higher circulation figures for newspapers. As remarked by APCO Africa (2004:7), today's journalists are faced with poor remuneration, time pressures, limited staff and high staff turnover. They also have poor research facilities, outdated tools and often non-existent transport. Their inadequate experience and training, as well as government regulations, often cause incorrect messages to reach the target stakeholders. To counter these problems, it is therefore crucial for scientists and communication specialists to provide the journalist with relevant, accurate information and, most importantly, an interesting story.

5.7 THE ROLE OF THE MASS MEDIA IN SCIENCE COMMUNICATION

Reasons why science should be communicated to HEI stakeholders generally fall into five categories – economic, utilitarian, democratic, cultural and social. As far as the community is concerned, science is often invisible until such time as people perceive a need to use it (Bryant, 2002). Besides communication specialists, schoolteachers, scientists, government and organisations involved in promoting science, the media as a channel of distribution also plays an important role in distributing the science message.

The public learns about science news via many different routes, including newspapers, magazines, books, radio, television, the Internet, electronic news services and films. Communication specialists at HEI are the important link between scientists and the media, as well as between scientists and stakeholders of HEI. It should be the communication specialist's task to ensure that correct science messages are communicated to every non-scientist.

As mentioned in Chapter 1, science and technology affect the lives of everyone, not just those who are professionally involved, and no one can doubt the immense impact of SET on society today. People face the challenges of not only understanding the current multiple revolutions in SET, but also how they affect the future of humanity and of the Earth (Stempra, 2001). In the coverage of science, the media have encouraged the widely held belief that science is distinct from politics and beyond the clash of conflicting social values. Media articles seldom foster a discussion of deep-seated structural dilemmas, for instance, fundamental problems in the institution, the regulation of industry or distortions in the allocation of resources, that can lead to neglect of public safety (Nelkin, 1995:63). Seldom do science writers analyse the distribution of scientific resources, the social and political interests that control the use of science, or the limits of science as a basis for public decisions.

The images presented by the media are often inflated, but they vary in different types of media. According to Nelkin (1995:66), "... the ubiquitous 'advisory arts' are a source of inflated expectations about what science can do. The extraordinarily popular 'how to' books and syndicated health columns provide endless information (sometimes misinformation) about health and science. Readers are presented with promises of future technological marvels and images of science as the ultimate source of authority. Similar promises are to be found in television documentaries, idealising and explaining science with elegant visual images and starring authoritative scientists who assume the role of the 'host'".

Many readers come into contact with science through articles in the tabloids visible at the supermarket checkout counter. Scientists in the tabloids can "cure splitting headaches", "create human beings", "guarantee boy babies", "save brain-damaged victims", "cure impotence", "prevent cancer" and "find the key to long life". Tabloid images of science also appear in reports that border on pseudo science and superstition. Many newspapers not only run a daily horoscope feature, but give prominent attention to astrological and pseudoscientific claims that purport to predict elections, natural disasters, economic trends, or personal affairs. Although such claims may be played down or dismissed, their frequent appearance in the media lends them an aura of credibility (Nelkin, 1995:67). According to Patairiya (2001:5), misleading scientific information, a continuous decay of creativity in presentation, distortion in translation, inconsistency in organising the contents, lapses in the use of language, and many more deviations can be seen frequently not only in print, but in broadcast media also.

There are several different publics for science in the media. A minority of people have some professional training in science or engineering and are genuinely interested in many forms of

popularisation, sometimes because of family traditions or political convictions (Caro, 1997:123). These people read the prominent popularisation monthly magazines and attend conferences organised by museums or learned societies. But sometimes the lecturer is surprised to discover that even among this small sympathetic crowd there are from time to time demonstrations of strange beliefs, for instance in the paranormal. Science is reasonably understood as a language and a method by roughly 5% of the population of Europe. But in South Africa, at least, belief in the parascientific, the paranormal, astrology and the like is a mass phenomenon involving roughly 50% of the population. Parascientific or science fiction printed articles or television shows use literary tricks as the legitimate ('scientifically correct') media's science articles. Many people cannot tell the difference, especially because many parascientific articles mimic the scientific language.

5.8 COMMUNICATING SCIENCE THROUGH THE MEDIA

Public beliefs about SET tend to correspond with the messages conveyed in the media, though the direction of cause and effect is not clear. In part, the difficulty of assessing the influence of the media reflects the persistent contradictions in the public view of science. Major stumbling blocks involve the lack of expertise in science writing and the lack of commitment to science by editors who do not believe that science sells newspapers. South Africa is driven by politics, obsessed with sport, and plagued by crime; and such material dominates newspapers, radio and television (Joubert, 2001).

Few media outlets in South Africa have dedicated science desks. Junior or inexperienced general staff reporters without the skills, interest or experience to do justice to the content often handle science news. There is little room or time for sophisticated, investigative science journalism and no incentives to build a career in science writing. When a major breakthrough in science is made, locally or internationally, South African journalists are ill equipped to handle it (Joubert, 2001). As suggested by her, the South African media report on bread-and-butter science issues, mostly related to agriculture and the environment, and life-and-death issues such as malaria, HIV, tuberculosis, heart disease and cancer. A journalist writing about drinking water would focus for example on whether the water is safe to drink, rather than explore the advantages and disadvantages of adding fluoride for healthy teeth.

According to Joubert (2001), the South African media furthermore tend to view foreign science as always better than South African science; so, what little space goes to science news in the local media is often filled with straight downloads from international newswires. This is easier and cheaper than finding local science news. South African scientists and communication specialists have to realise that they are competing for media attention and space with the rest of the world. Ironically, much cutting-

edge scientific research from South Africa, published in journals like Nature, attracts media attention in London and New York, but is all but ignored in South Africa's media (Joubert, 2001).

Media coverage can also affect the financial support given to research, a fact well understood by scientists and their institutions. The extensive media coverage of biotechnology suggested its growth potential, increasing the availability of venture capital for new biotechnology firms during the 1980s. Later, in the 1990s, media reports of public concerns about biotechnology encouraged caution. By amplifying possibilities and calling attention to potential problems, the media can influence the dissemination of new products and shape the direction of scientific and technological priorities (Nelkin, 1995:76).

Furthermore, the mass media can impede cultural growth, since people tend more and more to speak the same way, dress the same way, think the same way and act and react the same way, due to the hours of media exposure – people tend to accept role models presented by the media (Severin & Tankard, 1982:214). The media content is probably most intended as entertainment, taking into consideration the many columns, features and fillers. The media also expose millions to a mass culture of art and music. According to Dilosothlhe (2002:4), the Department of Science and Technology in South Africa and the American Association for the Advancement of Science (AAAS) have formed a partnership to introduce a science radio journalism fellowship programme. In South Africa the general absence of scientific literacy and awareness, as well as the large sections of the population with little or no access to information about SET is a serious problem that needs to be addressed. The aim of the project is to build a critical mass of science radio journalists who can communicate science to the public in South Africa's indigenous languages. Radio was chosen as medium because

- it is a crucial means of communication;
- there is a radio in almost every home in South Africa;
- a radio is battery operated and available at low cost;
- listenership is across all age groups, social and economic classes;
- radio can engage the public (e.g. phone in).

According to Caro (1997:125), it is possible that the future position of science and scientists in society *will* depend in part on their ability to win the mediatic battle, that is, to engage themselves in an efficient 'literary' presentation of science. This is because the future depends on the decisions of the politicians, and the politicians usually follow public opinion. However, in a society where knowledge is a fragmented offer, spread over a large number of different media, scientists have to plan a strategy to

present their achievements to literate and illiterate, urban and rural and young and old people. They may try themselves to build the articles necessary to be listened to, but obviously one needs to see more and more journalists with a science background. Certainly this seductive trend would have to be extended to education at the primary and secondary levels. Many things need to be invented to bring contemporary research to a larger audience. It is a challenge for the current century.

Science forms an integral part of everyone's life and due to the impact of the mass media on society, it has become imperative for society to acknowledge the importance of science, to know the real facts and understand exactly what scientists have to communicate. In the understanding of what scientists wish to convey, the media play an important role, as was described, but without a relationship between scientists, communication specialists as facilitators and journalists, wrong messages would reach stakeholders. In the following section, the results of a study conducted on the relationship between scientists and the media are described.

5.9 RESULTS OF A SCIENTIST'S AND MEDIA RELATIONSHIP SURVEY CONDUCTED IN SOUTH AFRICA

In 2001, Gething (2001:6) conducted a study among researchers at the Medical Research Council (MRC) in South Africa to determine their attitudes and experiences with regard to communication to the public and the media. Results aimed to inform the development and implementation of strategies to fast track a turnaround at the MRC towards the promotion of science communication.

According to Gething (2001:40), the study found that although 48.9% of the scientists had each published over 30 articles in peer-reviewed journals, 38.9% had never had these articles mentioned in the lay media. Yet, the scientists regarded the public and policy makers as the most important groups they should communicate with. The scientists might not trust the media to provide accurate scientific information, but they felt that the general public did. The vast majority (92.8%) strongly agreed or tended to agree that they had a duty to communicate their research and its implications to the public, and 70.8% would have liked to spend more time on this.

However, the scientists also agreed that the requirements of their daily tasks left them with too little time to communicate the implications of their research to others (47.5%) or even to get on with research (36.4%). Most of the scientists had never had contact with the media, or only every few years. Many of their comments reflected unrealistic expectations, which can only be addressed by training in what the media are all about. Although most (86.9%) had never had any training in dealing

with the media, 80.8% would be interested in such training. Science communication and the development of links with the community and media should be seen as part and parcel of scientific research, and should be given due recognition and support. Policies about recognising, encouraging and rewarding such efforts should also be agreed and communicated with the scientists (Gething, 2001:84). The results of the study indicate that scientists generally want to communicate and see the potential benefits of their communication with the media and other stakeholders. Unfortunately, although the media cover a complete spectrum of topics, science is rarely to be seen or heard. But what are the trends? The science journalism trends are discussed next.

5.10 TRENDS IN SCIENCE JOURNALISM

The content and style of science reporting have adapted to the different agendas of science journalists and have changed to correlate with the shift in the audience's needs over the last couple of decades. The tone of science reporting also reflects the cycles of scientific development. Contrary to popular belief, a steady decline in the coverage of science and technology did not occur. According to a British study, however, the trend has been different in the quality media and in the popular media in Britain (Bauer, Durant, Ragnarsdottir & Rudolfsdottir, 1995:7,8).

From 1946 to the early 1960s the quality media demonstrated a 400% increase in the coverage of science and technology, whereas the popular media indicated a 300% increase. From the early 1960s to the mid-to-late 1970s the quality media demonstrated a 50% decrease in science coverage, while such coverage in the popular media stabilised. Towards the 1990s, the quality media made a 50% recovery, whereas the popular media presented a 60% decline in the coverage of science and technology. The general increase in science coverage during the 1970s and 1980s was reflected by similar results obtained from Australia and Germany over the same period (Bauer *et al.*, 1995:7). According to Nelkin (1995:7), in the 1970s the wonder of science was replaced by a concern for the environment, while the 1980s was once again characterised by a discourse on the benefits of science in the media. "The idea of progress was resurrected as innovation, and the celebration of technology turned to high-tech hype" (Nelkin, 1995:7). This 'hype' continued through to the 1990s, although the emphasis shifted from the biological to the physical sciences.

The growing competition in the media influenced the coverage of science in the 1990s. Yet, the degree of homogeneity between different publications increased. In that era of unprecedented scientific discovery, journalists seemed to be pulled in several directions by scientists, the industry advertisers and politicians (Van Rooyen, 2002a:15). However, science increasingly appeared in the coverage of

such global issues as climate change, environmental disasters and international economic affairs (Nelkin, 1995:2).

According to Weingart (2002:703), it is clear that the field of SET has taken on a whole new dimension over the last few decades, namely that of 'post-normal science' or science closely related to politics and social legitimisation. Weingart (2002:705) identifies another important trend: that of science that is increasingly commercialised and linked to the media as scientists use the media to gain funds. As a result, perhaps, science coverage is still more explanatory and adulatory than challenging or analytical. In too many newsrooms there might be time to report the quick hits of scientific discovery, but not to probe the more complex debates over theory or regulatory policy or the role of business in research (Hotz, 2002:6). Almost no literature could be found on trends in the South African media. However, it is obvious from the coverage in general magazines and newspapers that science always takes second place. The next section contains some results of the studies conducted in South Africa to explore the role of the media in distributing science news to stakeholders.

5.11 STUDY RESULTS ON HOW THE MEDIA WAS USED TO COMMUNICATE SCIENCE

According to Joubert (2001), hardly any science news is heard on the radio, except for very few interview broadcasts. She furthermore states that television coverage of science discoveries or explanation of new technology is also limited to one or two television programmes. The Internet has evolved as a tremendous breakthrough to reach mass publics almost as soon as an important event has occurred. Since the aim of the Internet as medium differs from that of printed media and television, the use of the Internet was discussed in Chapter 2.

South Africa needs high-level commitment and support to improve the quality and quantity of local science in local broadcasts. Science needs to be integrated into popular, peak-time programmes, such as local dramas, historical and other documentaries, talk shows and even soap operas. Regular science inserts on news broadcasts and science fillers between programmes could also enhance the communication of science (Joubert, 2001).

In a study conducted by Blankley and Arnold (1999:4), it was found that in the USA television is the leading source of information about new developments in SET, followed by books and newspapers. Patterns of media usage differ in South Africa, and the reach of some of the mass media in South Africa is as follows (figures should be considered in the context of an adult population of 25.7 million):

- African language radio services reach 19.3 million listeners

- 13.2 million South Africans watch television
- 1.82 million South Africans have access to the Internet
- 1.43 million South Africans receive a daily newspaper (although readership is indeterminable and known to be higher than newspaper distribution).

Radio, particularly African language radio, is altogether the most far-reaching of the mass media, and thus recommends itself for use in public understanding of science interventions. It is affordable and within reach of almost every member of the target audience (Blankley & Arnold, 1999:11).

In his study, Pouris (2001:3) also identified sources of information used by the public. Table 5.1 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 involved reading a magazine and watching television shows that focus on science and nature. The most frequently read category of magazines, namely family/actuality (e.g. *You, Bona, De Kat*), was mentioned by 58% of respondents, followed by women's magazines (*Fair Lady, Femina*, etc.), read by 29% of the respondents. The televion programme that was mentioned most frequently is 50/50 (61% of respondents), followed by Mnet Explore (59%).

SET museums, a relatively new activity in South Africa was mentioned by only 5% of the respondents. In contrast, 41% and 23% of the respondents mentioned visiting a library and a zoo or aquarium respectively (Pouris, 2001:11).

Table 5.1: Public sources of science information

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

Source: Pouris, (2001:11)

Considering the mediums that South African citizens use for news on science activities, it is clear that the little coverage of scientific issues by these mediums is far too insufficient to serve its purpose.

Van Rooyen (2002:15) conducted a survey on the media coverage of SET and found that only 1.8% of the 15 local publications that were included in the study devoted editorial space to science and technology. Of the published articles on SET, 38% were obtained from international broadcasters and 74% of the published material involved mere snippets and short articles. A very small percentage of the articles (only 0.2%) covered mathematics and physics. The reason for the shortage of science news articles for the period of the study (18 March to 17 June 2002) seemed to be a lack of devoted science writers. The study conducted by Van Rooyen is compared with the content analysis conducted in this study and the results are described in full detail in Chapters 7 and 8.

5.12 SCIENCE COVERAGE IN THE SOUTH AFRICAN MEDIA

The advent of electronic media has had an impact on newspaper readership. In the past a newspaper was a daily necessity for up-to-the-minute news, but nowadays Cable News Network (CNN), Sky and BBC World have eroded that stronghold. According to Mersham and Skinner (2001:37), the readership figures for newspapers are increasing despite the fact that the circulation figures for newspapers are decreasing. According to a study by All Media Product Survey (AMPS), adult readers increased from 8,3 million in 1997 to 9,5 million in 1999. Although the increase in younger readers in the age group 16 to 24 years old, where readership grew by 15%, is quite encouraging, figures over the last ten years since 1994 show a general downward circulation trend for newspapers. Nevertheless, despite circulation losses, newspapers remain viable and immediate.

Most of the larger publications have websites on the Internet, of which the on-line *Mail & Guardian* is considered to be one of the best on-line newspapers or magazines in South Africa. There are more than 600 magazines and newspapers listed as on-line publications in South Africa, with at least 16 of them specialising in daily news (Mersham & Skinner, 2001:42). The consequences that new media technologies such as the Internet have for communication specialists are described in the following section.

5.13 CONCLUSION

The agenda setting theory and the gatekeeper theory, which are two of the theories that are used as the framework for this study, were discussed in this chapter. Chapter 5 also described the specific roles of the key role players in science communication, as well as the role of the media.

It became evident from each theory described in Chapters 2 to 5 that science communication should be practised as excellent communication, taking into consideration the various stakeholders, i.e. literate and illiterate, urban and rural and young and old people. The mass media, as an important channel to convey the message of science, have to be convinced of the crucial nature of their role in conveying true and trustworthy messages to all stakeholders.

In light of the media's effect on public policy, the media today represent a battleground for political and economic interests seeking to convey their views to the public. As issues involving SET are increasingly at stake, scientists must also enter this arena. Their contacts with journalists are often strained, since the communities of science and journalism approach the problem of public communication from different professional perspectives, cultural frames, and political perspectives. In this regard, the role of communication specialists is very valuable and it should be their responsibility to act as facilitators between scientists and journalists. Without communication specialists the relationship between the other key role players in science communication cannot reach a stage of trust and mutual understanding. However, a lack of training is a limiting factor in communicating science effectively to stakeholders.

As can be seen from the results of studies conducted on the South African media, training for all role players in science communication is lacking. One of the reasons for the apparent lack of dedicated science writers within the South African context is probably economic restraint. Time can, however, also be a restraint, as well as a lack of experience and knowledge of science.

Chapters 2 to 5 focused on the theory on which this study is based. The next step will be to apply the theory to the empirical part of the study. Exploratory and descriptive research was conducted to investigate the role of role players in science communication. The objectives of exploratory research include the establishment of research priorities, the clarification of concepts and the development of questions or hypotheses for further research (Cooper & Schindler, 2001:134). Descriptive research aims to answer questions pertaining to who, what, where, when or how (Cooper & Schindler, 2001:136). Content analysis was conducted to investigate the coverage of science in the print media. Therefore, the empirical component of this study helps to describe the reality of the problem situation. It also supplements the broad theoretical framework within which future research can be conducted. The research methodology that was used is discussed in Chapter 6, while the results are presented and interpreted in Chapters 7 and 8.