Sharing science: the state of research into science communication in sub-Saharan Africa.

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Abstract

This presentation examines science communication in an African context: what and where it is being researched, as well as the possible future of the field on the continent. There are a number of trends observed since PCST-2002 in South Africa: The majority of African contributions have been from South Africa; presentations regarding 'outreach' IKS and cultural diversity, 'promoting MST' and 'Academic studies' 'science journalism/communication' have dominated; with South Africa, Nigeria and Kenya identified as the three leading countries in Africa where science communication is both practiced and researched. Published academic articles show the following features: Scientific literacy is a topic that several researchers have investigated in the 1980s and 90s, although a number of African academics have contested whether a universal scientific literacy is appropriate for non-western audiences. Several surveys of public opinion of science were conducted over the period 1991 to 2006 in South Africa and are reported in the paper. While there is relatively little published literature available from other African countries, several countries have carried out surveys of the public's attitudes towards biotechnology, especially with respect to GMOs in both Nigeria and Kenya. These show the need for better communication so that the public can make informed decisions. The paper ends with suggestions regarding the future of the science communication field in sub-Saharan Africa so that it can contribute substantially to Africa's advancement, as well as contribute more fully to science communication worldwide.

Introduction

One of the main reasons given for the importance of science communication over the past half century has been to improve the scientific literacy of the world's population (Gregory & Miller, 1998). This in turn has two drivers: a more informed citizenry, who understands both scientific principles and scientific advances, and an increasing number of people who become scientists and engineers. Africa is not immune or insulated from such sentiments: there is general concern that African countries need to develop more rapidly, and their need for trained scientists and engineers is acute. Further, as new scientific and technological advances, such as mobile phone technology and genetically modified organisms, are used by ordinary citizens, those same citizens need to understand both their benefits and their drawbacks. Such understanding will be greatly enhanced if the general public is scientifically literate.

Within the field of science communication over the past twenty years a view has emerged which accepts that there are several 'publics' or audiences who are involved in science communication, and they can legitimately dialogue with scientists. It is not a one-way dissemination model but participatory conversation model, in which both parties shape the issue, the agenda and the discussion (Trench, 2008). Africa should be regarded as a key player in these conversations (although its voice has been seldom heard). Since the decolonisation of the 1950s and 1960s there has been an increased interest in an African worldview which is different from that of the Western view. In Southern Africa the philosophy of ubuntu has been promoted as being in contrast to the materialist Western scientific viewpoint. In the ubuntu view, all people live only in connection with other humans; the individual is only important in its connectedness to others. Similarly many scholars view indigenous knowledge (often referred to as Indigenous Knowledge Systems – IKS) as a legitimate kind of knowledge (Agrawal, 1995) which has the same value as western scientific knowledge. The discussion above would suggest that science communication in an African context would be focused on the need for modern science to be shared with the various publics in Africa, but with the proviso that African worldviews and IKS are part of the discussion. To what extent has this happened in recent years? The following discussion covers conference papers and published articles

which represents the current state of science communication in sub-Saharan Africa since the 1990s.

Conference papers

The Public Communication of Science and Technology (PCST) network consists of individuals and groups throughout the world who produce and study PCST. The biennial Public Communication of Science and Technology conferences have been held since 1989, when the inaugural one was held in Poitiers, France. Various conferences have included some papers by Africans or about Africa, while two recent African Science and Communication Conferences (ASCC) provide indications of topics of interest for Africa.

The first PCST conference held in Africa was in 2002, PCST-6 in Cape Town. The main conference theme was "Science Communication in a Diverse World", and preference was given to "papers giving perspectives from different cultures or comparing different cultural settings". Sub-themes included outreach and communication to rural communities, conceptual developments in communication of S & T, evaluation of communication and awareness programmes, and teaching/learning science communication. An analysis of presentations shows that participation in PCST conferences tends to be dominated by the host country (and neighbouring countries if in a densely populated area like Europe). Table 1 shows that this was true of PCST-6, with African presentations in the majority over those from Europe or elsewhere.

Table 1 Summary of presentations at PCST-2002

Continental area	**Presentations**
Africa	58
Europe	54
Americas	35
Asia/Oceania	31
Cross-continental	4

Of the African presentations, all but three were from South Africa (two from Lesotho and one from Uganda). An analysis of the topics of the African presentations, which gives an indication of the main science communication areas of interest (at least for South Africa) is shown in Figure 1. The dominant topic (19% presentations) was outreach and communication to communities, many of which were rural. As well as being a theme of the conference, this is a very pertinent focus for much science communication in Africa. Not only are many communities relatively isolated from mainstream science and technology, but in South Africa the legacy of apartheid has meant that many communities (even urban ones) have felt excluded from participation in science. Apartheid policies (particularly forced removals, the creation of 'homelands' for different cultural groups and low levels of education) specifically excluded the majority of the population from science-related activities and employment. The prevalence of 'outreach' presentations at the conference shows that the science communication community was trying to rectify the situation. Another topic of note was IKS and cultural diversity – a main theme for the conference which accounted for 12% of presentations, and which is discussed further below, at the African Science Communication Conferences. Academic studies (10%) were varied, and included 'Views of distance education science students on the social responsibility of scientists' and 'Medical Research Council scientists and the media - Attitudes to and experiences of reporting their findings to the public'. Such studies can be regarded as being part of the academic discipline of science communication, and although comprising only one tenth of the African presentations, indicates a potential kernel for the discipline to develop from. Similarly, presentations on science journalism/communication (9%) suggest that the study of science communication has a basis for subsequent growth.

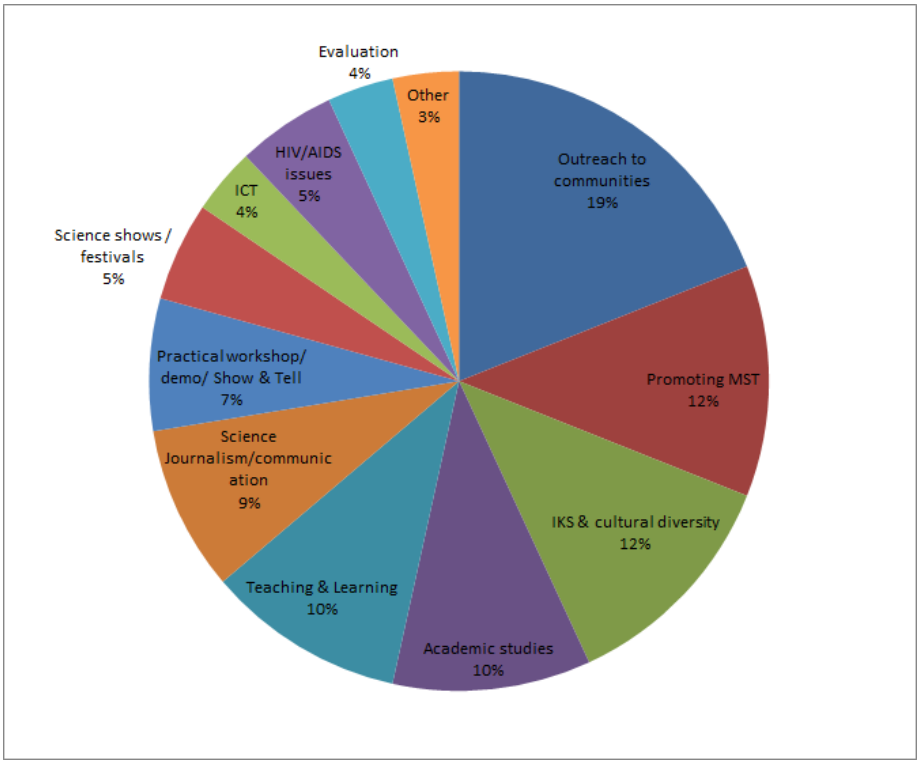

Figure 1 Topics of presentations from Africa at PCST-2002.

In subsequent years, an analysis of regional participation at PCST conferences has been difficult, as not all data is available on the PCST and conference websites. However, it appears that in 2006 (Seoul, Korea) there were 4 African presentations, 8 in 2010 (New Delhi, India), and 4 in 2012 (Florence, Italy). These focused on topics such as scientific rationality, inspiring students, interventions in science journalism, and communication within (and about) a science research institution. Although African participation at these international conferences has been disappointing, there have been two African Science Communication Conferences in South Africa. An analysis of the topics at these conferences provides further insight into the state of the field.

At ASCC 2006, there were over 70 plenary presentations, with over 40 by South Africans. Delegates from Nigeria and Kenya made 6 and 5 presentations respectively, while there was representation from a further 7 African countries (one or two presentations each). There were 9 presentations from India, and a few from Europe and the USA. The ASCC conference in 2009 was a much smaller affair, with only 43 presentations (30 from South Africans), and single sessions run by delegates from 7 other

African countries (and 5 from India). Few conclusions can be drawn from these figures, though it would appear that South Africa, Nigeria and Kenya are the three leading countries in Africa where science communication is both practiced and researched.

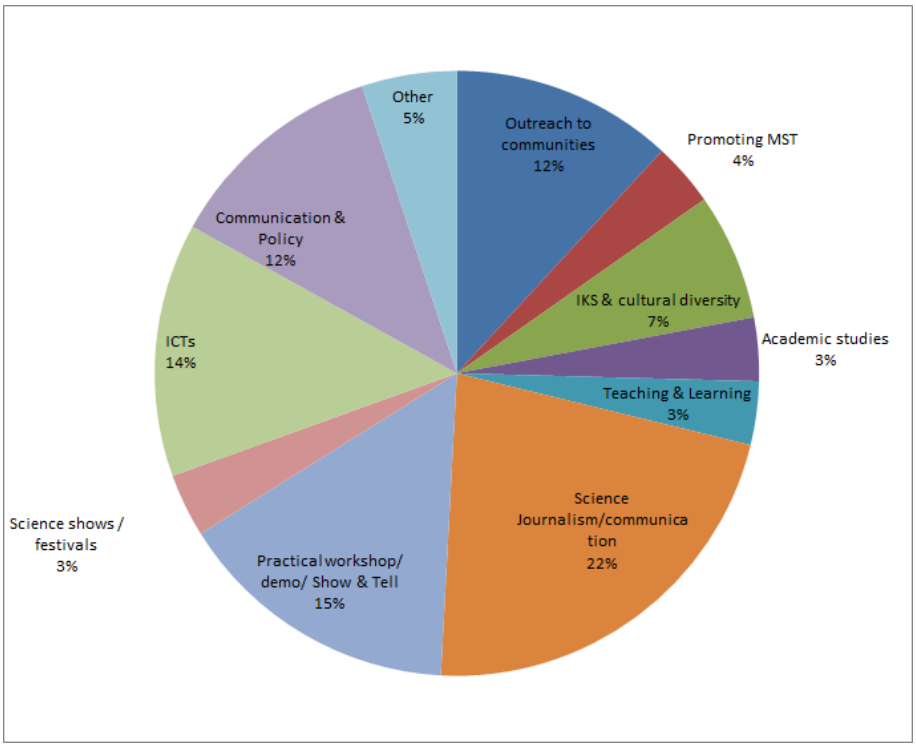

Figure 2 Topics of presentations from Africa at ASCC 2006.

Figures 2 and 3 provide a breakdown of topics at the two African conferences from which some trends can be discerned when compared with PCST 2002. . First, the topic of 'outreach to communities', so dominant at the PCST conference in 2002, decreased to 12% and 3% in the ASCC 2006 and 2009 conferences respectively. Instead, presentations involving science journalism dominated (22% and 31%), suggesting that a larger proportion of delegates came from the media industry. This may reflect the greater prominence given to science and technology issues in the media, at least in South Africa. Second, the category of practical workshop/ demonstration/show and tell increased from 7% in the PCST 2002 conference, to 15% at ASCC 2006 and 26% in 2009. This can probably be viewed as a positive development, as these presentations involved practical activities such as "Efficient and cost-effective science communication: 10 simple paper

activities" and an "Astronomy outreach workshop", as well as discussions such as "Communication through storytelling". Such presentations were participatory, and may have been more beneficial for delegates than passively listening to talks, thus helping to develop the field more effectively. Third, 'academic studies', remained at low levels across all three conferences (6, 2 and 3 presentations respectively), suggesting a limited presence of universities at the conferences (which is of concern). The academic community needs to be involved more effectively if the field of science communication is to develop in the region. Fourth, surprisingly, presentations involving IKS and cultural diversity dropped from 12% to 7% to zero across the three conferences. In South Africa, the Department of Science and Technology runs an IKS sub-programme and one would expect that there would have been an increasing area of interest rather than a decreasing one. Finally, it is interesting to note that presentations involving science communication and policy were both present in the ASCC conferences, yet absent from PCST 2002.

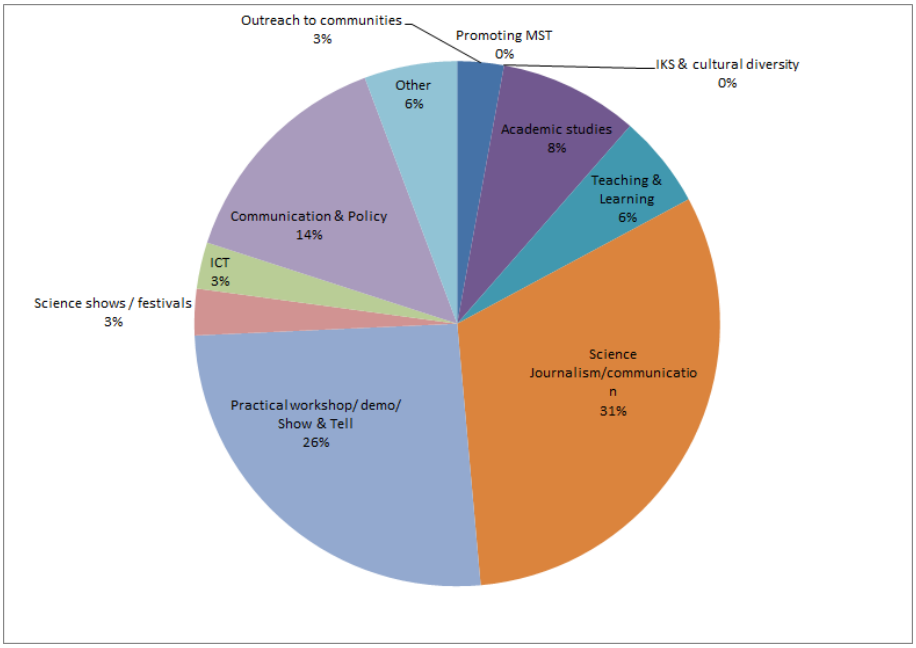

Figure 3 Topics of presentations from Africa at ASCC 2009.

This brief analysis of three science communication conferences in Africa in the 21st century suggests that the field of science communication is in the process of development, but still has a considerable way to go if its role is to become influential in

Africa. As in other fields such as science education, Southern Africa tends to dominate the scene, with relatively limited participation from other regions. An examination of published academic articles relating to science communication has a similar bias, and it is to these that we now turn.

Published Articles

Science communication research in Africa has been published in a few international journals over the past two decades. Joubert (2001) provided a useful summary of priorities for science communication in South Africa early in the new century. She suggested that the newly democratic country already had successes in the form of science festival and science centres, but needed to clearly define its role, and develop science and technology for current and future generations. Both Gastrow (2010) and du Plessis (2011) refer to several surveys of public opinion of science conducted by Pouris (former CEO of the Foundation for Education, Science and Technology, which later became SAASTA – South African Agency for Science and Technology Advancement) over the period 1991 to 2006 (Pouris, 1991, 2001). The 1991 survey was conducted on 1300 respondents, all of whom were ethnically white and is therefore of limited value given the small percentage of white members of the South African population. However, in his survey of 1000 participants (across all race groups) Pouris (2001) found that South Africans had comparable interest in new inventions and technologies to people in the USA and the European Union, and less interest in energy/nuclear power and space exploration. Overall, South African respondents did not consider themselves to be well-informed (less than 28%) about such issues. South Africans also appeared to be relatively optimistic about the benefits of science (in relation to other countries) while at the same time holding reservations that it may affect people's more traditional ways of life. Such surveys are valuable records, and efforts need to be made to make them more easily available to researchers.

There is relatively little available from other African countries regarding their citizens' understanding of, or attitudes towards, science and technology. As early as 1972 there was a survey on "the present position of the promotion of public understanding of science and technology in Africa" by UNESCO . This report of 17 countries shows great

variety, both in presentation of the reports and the organisation of and activities present in the countries. Some, such as Nigeria, Kenya and Zambia show considerable development in their PUST activities, listing science clubs and science councils responsible for the advancement of science and technology. It is interesting as a historical document and it reflects the aspirations of recently independent countries for their own development in the latter part of the 20th century. An Internet search of science communication and PUS in Africa mainly results in government policy documents promoting the concept, and university courses which train students in the field. In 2010 a workshop was held at the British Institute of East Africa in Nairobi with the title "Public Understanding of Science in Africa". It attracted participants from 7 African countries (and also international delegates), and the organisers aimed to 'reach beyond conventional academic discussions' about PUS. The programme consisted of an eclectic mix of presentations and discussions ranging across science journalism, ecotourism, climate change, IKS, science cafés and mobile technologies.

Several countries within sub-Saharan Africa have carried out surveys of the public's attitudes towards biotechnology, especially with respect to GMOs. For example, a national study (but with a sample of only 891, out of a population of about 130m) in the early 2000s by Ayanwale, Adekunle, Nwagbo, Alimi, and Adeoti (no date) found that Nigerians were only aware of biotechnology to a limited extent, that they had no clear understanding of it, confused it with standard breeding methods and had little idea of national biotechnology policies. The respondents' opinions on the use of biotechnology were mixed, with some being in favour and appreciating its potential for combating food security, and others being wary of its use and concerned about its safety. Only one third of the respondents were prepared to eat GM food, if given the opportunity. The researchers suggest that the ignorance of the sample regarding GMOs and their reluctance to embrace it are mainly due to poor communication and a lack of information. A similar small scale study in the South West of the country found limited awareness about GM crops, general acceptance of them if they are nutritious and safe, but concern about the government's preparedness for approval and release of GMOs (Adeoti & Adekunle, 2007). Similar surveys have been carried out in Kenya, with the conclusion that better communication by scientists and the governments needs to be instigated, so that the

public can make informed decisions and choices. Kimenju, Groote, Bett, and Wanyama (2011) surveyed over 3500 farmers, consumers and 'gatekeepers' (decision-makers or 'expert consumers) over the period 1999 to 2008 (Kenya's population was approximately 30m). They found that awareness amongst farmers was very low (12.7%) compared with consumers (31-38%). Like Nigerians, although respondents agreed with the potential benefits of GMOs, they were concerned about possible environmental and health risks. Gatekeepers were well informed about biotechnology (79-87%) but still had some concerns regarding their safety. A study by Shauri and colleagues suggests that a majority of their sample (n=700) had positive attitudes towards GM crops (Shauri, Njoka, & Anunda, no date).

Conclusion

So what is the future of science communication in sub-Saharan Africa? There are clearly pockets of activity of research into both fields, notably in Southern Africa, West Africa and East Africa. However, the activity in these regions needs to be both strengthened and spread to all parts of the continent. As in most of the rest of the world, but more urgently in sub-Saharan Africa (due to a lower knowledge base) there needs to be greater communication between scientists and their publics. This can be achieved by the promotion of science communication within industry and academia, by science journalists who interpret the science to the various publics and by the establishment of innovations such as science cafés. There are signs of real discussion around topics in biotechnology – probably due to their controversial nature. These conversations need to be extended to other areas of science relevant to the continent such as climate change, health issues and mobile technologies.

Regions within the continent need to define for themselves what constitutes science in their contexts. This is important so that their citizens can benefit from the improvements that science and technology advances bring (such as mobile technologies and the resulting 'mobile learning' that they can facilitate) while at the same time promoting relevant Indigenous Knowledge Systems. In this way, there can be a synthesis between western science, so vital for development, and IKS which is crucial for the continent's self-image and progress.

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