

Science Communication in Ecology: Developing Country Perspectives

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Keywords: Science Communication, Ecology, Media, Publication, Developing Countries

Science communication in ecology is vital to dissemination of information about the biosphere and human well-being. To communicate therefore is to share information with others by speaking, writing, moving your body or using other signals. A review has been carried out on the "Science Communication in Ecology: Developing Country Perspectives". The various aspects of science communication in developing countries as it obtains in other parts of the world have been succinctly discussed. The article concludes that science education and science communication in particular need to be supported from diverse stakeholders given its funding and technological as well as policy challenges.

Introduction

The New Cambridge Advanced Learner's Dictionary defines communication as the act of communicating with people. To communicate therefore is to share information with others by speaking, writing, moving your body or using other signals (New Cambridge Advanced Learner's Dictionary, 2004). Udoakah (1998) defines communication as a process through which needs, emotions, desires, goals and sentiments are expressed among human beings using codes, symbols and languages understood by the parties involved in the dialogue. According to the deficit model, communication is a process of transmission which means popularizing and simplifying technical information that flows from experts to the public, whereas the public engagement model

defines it as dialogue and the two-way exchange of perspectives whereby both the public and experts learn from the process (Groffman et al, 2010). They proceed further that the definition of reaching the public implies increasing the amount and technical accuracy of science news coverage, focusing on traditional outlets such as newspaper science beat, popular science magazines and books or public television programming (Deficit model). On the other hand, public engagement model have it this way: Reframing a complex issue around relevant and familiar dimensions, engaging in local community forums and dialogue; partnering with opinion leaders and other societal groups; and complementing traditional science coverage with novel entertainment genres and social media initiatives. Overall the ultimate goal is to improve science literacy, empower the public with science information and to assist them to make wise decisions about their welfare.

Review of Modes of Communicating Ecology and Science in Developing Countries

Folklore and Policy

In diverse cultures, folklore has been used in disseminating applied science from prehistoric times. An example in developing countries can be found among the Tiv of North Central Nigeria. According to Tiv folklore, the green-grass snake *Ikyaren* (in Tiv), the snake stretched itself across a deep and wide river forming a bridge to enable

them to cross and escape annihilation in warfare thereby rescuing them. The legendary friendship is reciprocated by the Tiv who do not kill it to the present day. This is conservation biology that presents the opportunity to study its anatomy, taxonomy, physiology, ecology, behaviour and evolutionary history (Tyokumbur, 2010a). The *Ikyaren* snake is a slender non-poisonous reptile usually found gliding its way across tree branches, shrubs, herbs and under roofs of thatched buildings or houses in the guinea savannah ecological zone in Nigeria. Occasionally the award of traditional titles has often carried the marks of ecology and science as discussed by Tyokumbur (2010a, c, d)

Journals

Completed manuscripts that have been carefully prepared are usually sent to journals for peer review and publication. Journals are therefore suitable media for publishing results and conclusions of research or other carefully written articles. About a decade ago, this would have involved the use of a large envelope with up to 5 or more printed copies of the manuscript and a visit to the post office or courier for shipment at a cost or simply a stamp (Baker, 2008). However technology has made it easier these days. The question is: how are developing country scientists coping with this? Most especially in managing locally published journals or others based elsewhere using current trends in the publication process of communicating science. Arguably, not all journals in developing countries have adapted to or adopted the internationally-recognized system of

Manuscript Central, opting for other forms of electronic submission. Electronic submission abound but majority are not more than email attachments of manuscripts and data emailed directly to the editors for handling, who may receive it or not depending on electronic challenges and technicalities. However, be that as it may, their regularity in publishing is of great concern to all science communicators and the reading public in both developing and developed countries that subscribe to the journals. For example, quarterly journals may eventually be published once annually, albeit through sourcing or out sourcing for funds under challenging situations. The challenges of journal publication in most developing countries can be summarized into the following categories; meeting publication costs, quality of submitted manuscripts, electronic technicalities, peer-review biases, prolonged decision time, seemingly unfair decisions on manuscripts, politicized review in preference to scholarship, delayed production time, obvious evidence of a single open-ended review prone to bias, ambiguity in the submission process, expensive page payment, poor publicity of the journals, unclear ranking of local journals in terms of Impact factors (IF) and other bibliometric indices, a comparatively short publication life spans, near absence of the assessment of the impact of published article, occasional hibernation, accountability, circulation and market challenges, administrative challenges, poor reading culture and limited culture of book reviews and previews amongst other obstacles.

Books

This is another standard way of communicating scientific ideas. Based on the experience of the author, in developing countries, book publishing has the following challenges:

i. absence or lack of funding agencies to support book publication thereby leading to expensive self-publishing of ideas usually at a loss or at best one's personal cost or financial sacrifice to science scholarship.

ii. Poor reading culture or an evolving culture of readership in some developing countries as a result of which only very few appreciate and buy books.

iii. Low enthusiasm associated with applying the ideas read in books to practical life situations, even by colleagues.

iv. Emphasis on some other forms of information sources such as online free access to literature sources.

v. Lack of encouragement through discounts from the postal service and courier services for the shipment of books and other printed educational materials. Moreover the prices fluctuate for the parcel of weighed books shipped to different destinations.

vi. Absence of standard procedures in pre-shipment procedures thereby leading to suspicion and distrust of the customer during mass shipment of books to diverse locations.

vii. Absence of subsidies on printed materials especially costs associated with books in general.

viii. Scanty or absence of medium for advertise newly published books at moderate or reduced rates.

ix. A slowly evolving culture of appreciating emerging talents or authors in the communication of science ideas as most still rely on authority or established scholars as a way of bringing about new knowledge.

x. Evolving culture of appreciation of new ideas contained in books thereby creating gaps in developmental hierarchy proposed or suggested in the written information.

Television

Science communication through this medium is under the control of journalists in developing countries in most cases. They are from diverse professional callings; the challenges however include the following: funding which as a result programs in science are aired or broadcast for only a short while or within limited timing. Unlike *Natgeowild* and other wildlife series for instance poor funding options make it difficult for local producers to go into collaboration with wildlife experts, zoologists and scientists in general to

make productions of local interest.^{3D} (three-dimensional) animation remain expensive and sophisticated even though it has the capacity to motivate interest in wildlife, zoology and other sciences among adults and the youths or young ones through inspiration. Interestingly companies with interests in science application products have continued to advertise their products using innovative skills in science communication. In Nigeria for instance an antiseptic advert uses magnification of germs that appear in the shape of roundworms in order to pass the message to the public even though the scale of magnification is not included nor indicated. The most important aspect of the advert is passing the message to the would-be buyers of the antiseptic product which in itself is innovative. Other examples include the use of animated rabbits to sell fragrances as a form of communicating scientific products to the public to boost their market. It is therefore imperative to collaborate with television media experts and other professionals in order to communicate science effectively in developing countries; however collaborations require funding for motivation and to meet diverse costs.

Pre-Print Archives

These are databases where manuscripts are placed before publication for occasional peer-review purposes. Common with Nature Proceedings, it is submitted for comments before eventual submission to a journal of choice. Articles submitted in this category include presentations, posters, white papers; technical papers and supplementary findings (Holt and Webb, 2008). They provide rapid but not peer review way to pass or disseminate emerging results, new theories, solicit opinions and to record the provenance of ideas. By so doing, the materials become easy to archive, cite, share and delve into. Unfortunately this resource is lacking in most developing countries but for internet accessibility to other country's pre-print archives.

Video Publications or Video Science Communication

This offer rapid transfer of knowledge, materials or findings within the research community and the general public. This is popular these days because written words and static picture-based traditional print photos or pictures in the traditional format in journals are no longer sufficient to precisely transmit the ideas of modern research in some areas of study, hence the popularity of wildlife series and other allied video production on science disciplines. It takes advantage of hi-tech video technology using visualization and audio techniques to transmit nature in its real content through efficient reproductions of 3D and animated representations of complex scientific phenomenon, models and reality. As earlier highlighted, this aspect of science communication is evolving and other complex and spectacular aspects of video production as showcased by Holt and Webb (2008). Most productions are done by foreign concerns. The late King of Pop music Michael Jackson in his Earth Song I in a spectacular way drew attention and created awareness about protecting the environment and planet Earth using video production and a song.

Digital Media and Social Networks in Science Communication

One of the spectacular means of exchanging and transmitting information is through the use of digital media and avid networking online such as Facebook, Myspace, Twitter, Youtube, Google Buzz and a host of others. These are effective, rapid and efficient means of exchanging ideas and information. However, in developing countries most are still being accepted, used and evolving. The efficacy of online digital media as a means of social networking that can be used for science communication has been contributed by MacArthur Foundation in its publication titled Re-imagining learning in the 21st Century (MacArthur Foundation, 2010). In developing countries this is evolving

due to challenges in technology and technicalities of the infrastructure. Other aspects include blogs or blogging, goggling information, yahoo info twitting, you-tubing amongst other search engines applicable to science communication.

Radio Science Communication

Radio is one of the oldest means of mass communication of information or information dissemination (Ufuophu-Biri, 2006). Complexities associated with some technicalities in transmitting science may limit its communication through radio. However with overt simplification, this form of information dissemination remain very viable given the wide audience covered as radio sets come in diverse sizes that can be afforded by a significant proportion of the population thereby increasing the chances of a wider audience despite competition associated with the multiplicity of radio stations for wider coverage.

Newspapers, News magazines, Learned Society bulletins and other periodicals

These sources of newsprint of science communication or sources of dissemination of scientific information in developing countries are occasionally dominated by political stories as the case in developed societies. This is because politics and policy controls money and grants for all other aspects of human endeavour. Privately-owned media need to remain afloat while government owned media ought to promote government programs and policies which are usually political in content. As a result, science coverage is less attractive and scanty, often less than 5% of entire reportage except in core science periodicals and journals where it is at most 100% in content. Tracking into databases is therefore difficult for the scantily reported items on the pages of newspapers and other periodicals as science items hardly make headline articles due to the challenge of science education in developing countries

(Tyokumbur, 2010b). However, the problem is much more of a complex dimension than shown in the science reportage on the pages of newspapers, newsmagazines and periodicals in circulation. For instance due to tracking challenges, The Nation Newspaper in Nigeria (The Nation, 2010) on Saturday October 30, 2010 reported that the Nigeria Academy of Sciences requesting for science reporters of note for her annual awards.

Faith-Based Approaches

Nadkarni (2007) has explored the possibility of integrating ecological and religious values using formal religious groups as interface organizations through the use of sermons in places of worship by use of the Bible, Koran and Talmud to showcase the value of trees in the Holy Scriptures. It is expected that this would result in open communication about the overall importance of ecological resources and inspire conservation and environmental protection activities by individual organizations.

Conclusion

As highlighted by Tyokumbur (2010b, c, d) and elsewhere, science education and science communication in particular need to be supported from diverse stakeholders given its funding and technological as well as policy challenges. Research is required on the modes of communicating science and ecology in order to advance it to the next level. Traditional methods such as folklore and award of titles also need to be encouraged as a means of communicating science and ecology. More modern methods need to be improved upon as new ones also have to be evolved. With technological advancement in the area of communication, science and ecology must be part of the evolution in advancing knowledge in both developed and developing countries. ■



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