18. Using Television to Promote Science and Technology

Professor Marian Addy
Department of Biochemistry, University of Ghana, Legon, Ghana

The National Science and Mathematics Quiz Programme, a weekly nationally televised quiz show in science and mathematics, debuted in 1994 and is now in its seventh consecutive year. The programme was initially intended to encourage and assist students in the country's Senior Secondary Schools (SSS) in their learning of mathematics and science. However, the audience includes practically everybody, both in and out of the formal school system. During the programme, which is approximately one hour long, two schools compete by answering questions in biology, chemistry, mathematics and physics. There are three contestants from each school and any of the contestants can answer the question put to the school.

It all started on a tennis court among members of the Legon Tennis Club. Club members discuss matters of importance to the welfare of the state when they gather after each practice for the 'second phase' of the tennis game. They also try to help one another. So when one member, now the Managing Director of Primetime Limited, producers of the televised programme, informed the club that he was starting an advertising company with education in mind, those of us who had ears to hear felt that we ought to try and help him become established. One way of helping was to come up with educational programmes that a company or a philanthropist might sponsor. But what type of educational programme and at what level? A few suggestions were made, including a quiz programme in science at the SSS level. One member of the club took upon himself to develop the concept into a programme. What we see on television now differs very little from his original design.

That the programme is sponsored by industry is worth noting because production of the programme is expensive. The title of the programme, when it was originally conceived, had the name of one of the products of the sponsor. The sponsor admitted an increase in sales of the product, even though its price kept going up. The Ministry of Education is pleased enough with the programme to send representative at the highest levels, including deputy ministers and directors of education, to recordings of the final programme. On one occasion, the Minister of Education himself came.

There are prizes for each contestant (cash and goods), and not only for those in the winning school. The teachers of the schools that enter the semi-final stage also receive prizes. The winning school and the runner-up receive handsome prizes in laboratory equipment or other supplies specified by the school and, finally, the winning school really feels proud. During the first three years of the competition, one school won twice, and the school had T-shirts printed to that effect, 'Two time winners of the Brilliant Science and Math Quiz Programme'. Old Boys or Old Girls Associations of the various secondary schools, which are often influential organisations, are eager to see their schools win and have contributed to the success of the programme.

The popularisation aspects have to do with what the out-of-school public learns from the programme, as well as what students learn. Students who do not compete also benefit. Some schools gather students around a television set, and particular students are detailed to take down certain questions and their answers so that these can be used as study guides. Of the five rounds of competition, one round is devoted to questions that relate to science in our daily lives. Viewers who are out of the formal school system appreciate this. Another round that seems to appeal to viewers out of the formal school system deals with 'riddles' during which both scientific and non-scientific clues are given, and the two schools compete as they try to be the first to come up with an answer to the riddle. This round is different because, unlike in the other rounds, the first school to come up with a solution to the riddle wins marks and the other school gets nothing. With the other rounds of competition, each school has its own questions and so the scores can be close.

Why the SSS level? We argued that primary school and JSS science was not at a level that would whip up enthusiasm among the general audience. Science at the university level was too advanced for the same general public. The choice was the second cycle of educational institutions. Many programmes were considered and the final choice was a weekly television quiz in science and mathematics.

I have always had an interest in encouraging females to excel in whatever they choose to do. I felt that this encouragement was necessary because societal pressures can easily influence their choices. If a female is interested in mathematics or science, she should be encouraged to pursue her interest in those fields. I cannot overemphasise the encouragement provided by role models of any kind. Unfortunately, there are not many female scientists to play that role in Ghana. Therefore, when I was asked to be the hostess of the programme, there was no way I could say 'no', even though I had not thought of being a television hostess.

Extracurricular activities necessarily take some of the time that I would normally devote to my work at the university, that is, teaching, and laboratory research. I cannot get away from teaching students, which is my primary responsibility, and invariably my laboratory research work suffers when I have to give up some of my time. I love the laboratory so I normally become grouchy when I am away from it. However, I have not regretted spending this time away from the laboratory because of the benefits and the success of the programme. I was not enthusiastic about being the quiz mistress. I preferred the term 'hostess', but I was ruled out and told, in no uncertain terms, that mistress was the proper terminology in these matters.

What were our expectations when we drew up the programme and finally got the 'green light' to go ahead? We did not know what to expect even after we had recorded all the contests for the first competition for schools in the southern sector of the country. We had to see the first contest on the television screen before we became sure that it was a good thing. We were all happy with the very first contest. The programme aimed to encourage the study of science by institutionalising a healthy competition between schools. We were also thinking of a type of programme that would educate the general public and help promote a public understanding of mathematics and science. We, that is the people involved in putting together the programme, were hoping that it would be successful. However, I must confess that the success of the programme has exceeded our expectations. Everybody watches it. By 'everybody' I mean scientists and non-scientists, the young and the old, the well-educated and not-so-well-educated, men and women, primary school boys and girls, and those out of school.

How do I know that everybody is watching? I am amazed at the number of school children in school uniform who point at me and shout or whisper to their friends, 'There goes Professor Ewurama Addy'. In the first year of the programme, I walked into my hairdresser's salon one day and one of the trainees there exclaimed, 'I was right after all. As soon as I saw her, I said to myself "our salon created this hairstyle"'.

My own colleagues in the university sometimes stop me, congratulate me and point out some imperfections when they do occur. I am reminded of the time when a physics colleague stopped me to let me know that I had given a raw deal to one of the schools in a contest. The answer the contestant had given was correct but because I was not familiar with the units that he used, I thought the answer was wrong and had passed the question on to the other school that used the units with which I was familiar. The situation was analogous to my saying 'no' to an answer of 36 inches and 'yes' to one of 3

feet! Unfortunately, my physics consultant was not present to help me. Fortunately, the contest was so one-sided that there was no argument as to who should have won. Such comments are extremely helpful as they help improve the quality of the programme. We cannot afford to give incorrect answers.

I have been stopped many times by people I do not know saying 'I know you from somewhere'. I ask them if they watch television and they congratulate me, bless me and ask for the good work to continue. Of course, there are those who stop me to tell me that I was responsible for their school losing a particular contest, but these are friends and therefore I do not think I need a danger allowance from the producers and sponsors of the programme. There have been occasions when people have approached me requesting that I help them to find a job because I have been urging them to stay in science, they have done so, they have obtained degrees and need science-based jobs. One student wanted me to be his guardian in school which meant commenting on his school report and helping him make progress. I was delighted at that request but not at another request from a student who wanted to be my son and was transferring to come and live with me (his parents had already approved his move, he wrote). I cannot even begin to write about the nature of the letters that I have received and the various sources from which they come.

Some lessons have come from the reactions of the public to the programme and my own observations. What are these?

People want their children to be educated. They want their children to learn mathematics and science. Students want to learn and to excel. The old boys and girls are very proud of their alma mater when their schools win or do well.

Some students are so bright that you cannot help but feel good when you are with them. So what do we do for the outstanding students? One of our sponsors has a programme that accepts students into any of its industrial establishments during the holiday period. Perhaps it would not be a bad idea for the Ministry of Education to think of mounting a programme that would challenge the brightest and the best of our youth during the school holidays.

Throughout the competition, the schools balloted for their opponents, as well as the order in which they would appear in the competition. They even balloted for which side of the quiz mistress they would sit. During the first year of competition, a woman stopped to tell me of her 7-year-old daughter's prediction of who was going to win a contest. The girl had noticed that

winning schools were the ones that sat on my left! Actually, for the first seven contests during the first year of competition, the schools on my left won consecutively. I guess the 'spell' was broken because the young girl talked about it. She should have kept the information to herself! The following week, the school on my right won.

Some schools won or lost because of their opponents; they could have lost or won if they had a different opponent. But that is life! Sometimes things appear to be unfair. Sometimes, I am accused of being biased and intentionally giving easy questions to contestants from some schools. I could not do that even if I wanted to, which is out of the question. All the questions for the competition are set before we start the competition. The questions for a contest are collated, enveloped and labelled with the number of the contest. We keep this arrangement so strictly that should a school not compete for whatever reason and we miss a contest, that envelope of questions is not used. There is no way that I, or anybody else, would know which questions are to go to which school. The comments from some of my schoolmates when my own school lost miserably were the most interesting: 'Marian, you mean you sat there and mediated a contest in which St. Monica lost so terribly? How could you? You mean you couldn't do ANYTHING about it? Come on!' No, I couldn't do anything about it. Even if I could, I would not. This programme is planned as a healthy competition to encourage our students to learn and stay with mathematics and science. Honesty is essential. There will be no unfairness and no cheating, and certainly not from any of the people responsible for putting together the meat of the competition for as long as we are associated with the programme.

The audience probably does not notice that the contestants argue with me when they have lost a point or two. I do not dismiss their claim to being right. I merely go over the question and answer, and explain to them why they are wrong, if they are wrong. A few times it has been my mistake, in which case I make the necessary correction. I have to be sure of what I am saying and the basis for my argument when I argue with contestants. So yes, for every contest I know the answers to all the questions and not only that, I know how the answers were arrived at. This is the only way that I can explain to students why they are wrong when they are wrong. It has been a lot of work but it has paid off because those young people out there are not merely going to accept that they are wrong because I say so. I think that is a good stand to take. I have to show them why I am right and they are wrong. Science has nothing to do with age; you should be able to show that your professor is wrong, if (s)he is wrong. In the same vein, I have to have a good reason for giving a school one or two out of three instead of the full mark.

It is interesting to note a few of the incredible things that some schools would go through just to win. Here is a confession from a headmaster who told me that he, together with some students and masters, were not present to cheer the contestants from their school in a final contest. Where were they? In 'prayer cells' during the whole period that their school was competing – they prayed for their school to win. Well, his school won that particular contest, but as to whether the victory was by divine intervention or the preparedness of the contestants, I will leave to the reader to decide. If I am asked, the God that I know will not let me win over someone who has been studying harder and is better prepared for an encounter than I am, merely because I pray and (s)he does not. We must keep body and soul together and not develop one at the expense of the other.

Overall, boys were much more confident than girls, and it did not matter to them who their opponents were. I remember our first competition for the northern sector schools. The very first contest was between Prempeh College, which won the national championship that year, and my old school, Saint Monica's Secondary School. The girls from Saint Monica's lost the contest even before it began, simply because they lacked confidence. As soon as they realised that they were going against the boys from Prempeh College, they gave up. They would not even put their fingers on the bell to try and ring it when they felt they knew the answers to the riddle! The boys from Prempeh just rolled over them. At the end of the contest I had to talk to them about being confident. The girls would probably have lost anyway, but at least, they should have put up a fight. Saint Louis Secondary School, a different girls' school, appeared to have a lot of confidence the first time we went to Kumasi, but it could be because they were certain that they would beat the school they were competing against.

That boys have more confidence than girls is nothing new. However, if we are to encourage all to excel in their chosen fields, then we may have to have programmes geared at building the confidence of girls who would like to pursue the sciences. Somehow, we have to let them know that they can do it, because they can do it. We need to develop the capabilities of all, including the females, to the fullest for the nation to derive maximum benefit from the expenditure on education. As has been pointed out, women are among the leading new forces on the international scene and the prospect of their full participation in society at all levels is one of the main hopes for a better order in world affairs. If we do not find ways for their full participation, we will be wasting close to 50 per cent of the human ingenuity that we require for our development.

Schools that participated in the programme were selected according to their performance in mathematics and science and in the examinations set by the West African Examination Council in the recent past, taking into consideration regional representation and gender balance.

The programme has done what it set out to do, arousing interest in mathematics and science and urging the students to learn. Students have been motivated to study and excel in mathematics and the sciences, but to what end? What good is it to have students studying and excelling in mathematics and science? Should we even encourage students to study the subjects?

Everybody recognises that economic growth and development depend on science and technology. This science and technology-led development requires innovation that is related to the local environment in such a way that value is added to what already exists. The time is past when economic growth and development depended on natural resources, or capital, or sheer numbers of an unskilled workforce. In today's world, technological innovation and economic growth are determined by the quality of human resources. Capacity building in mathematics and science will provide this quality in personnel that we require. We need qualified personnel for all our industries, small, medium and large scale, if we are to make any advances.

For every discipline, there are a critical number of people required to allow for the necessary interaction and benefit accruing from studying that discipline. We just do not have that critical number in mathematics and the sciences. We need to build capacity to benefit from it. As we enter the twenty-first century, especially now that the Cold War has ended, the distinction is no longer between first, second and third world countries. It is between countries that have science and technology (S&T) and those that do not. The gap between the haves and the have-nots keeps widening since the have-not countries have not put in place the necessary structures for capacity building in S&T locally.

It is important that capacity building is local because that is the only way to have peculiarities in both human and material resource development, peculiarities that give comparative advantage, another important rung in the ladder of development. Without trained personnel available locally, foreign investors, who are coming in through the 'globalisation' door, may come and establish their business but they will bring the skilled labour with them. If the only thing we can provide is unskilled labour in large numbers, we will not achieve development. Our people will still be at the bottom of the social structure. Let me stress again that it is human ingenuity that is important for

the development of a country, and not large amounts of unskilled labour, capital or even natural resources.

Putting the necessary structures in place is only one of the requirements for successful solutions to problems of capacity building and the development of our S&T. The other requirements are that scientists must be employed and paid well so that they have job satisfaction and stay in the job. Poorer remuneration compared to that of colleagues in other sectors is what compels science students to leave the sciences. They switch because they see their colleagues in other institutions in the service sector doing far better financially than themselves. We cannot blame them when they leave. We must use our scientists and pay them well.

But what should we use our scientists for? We need scientists for the development of improved ways of doing things in industry, as well as in the service sector. We need them in health care delivery, in nutrition and in agriculture. Development of a country may be measured by the quality of its goods and services. When quality assurance is part of an industrial establishment, the products are better and they sell, locally and abroad. Let us make it a part of our culture to employ scientists as quality control managers or consultants who demand quality products. We may also engage scientists in research and development to improve our products, be it increased production, new products, new processing technique, use of a different material base and even for basic science from which new ideas can proceed. We simply cannot continue to do things the way we have always done them and merely hope that one day we will develop.

The use of scientists should proceed in two ways in opposite directions. Industries and other organisations and institutions should be able to go to the scientists with their problems, potential problems or desire for improvements and request that these be addressed. The necessary resources must be put in place. On the other hand, scientists should be able to approach industry and similar organisations and institutions and present them with proposals about what they can do to help. Of course, the proposal must be of direct benefit to these organisations that are there primarily to make money. The relationship may start on a small scale and lead to better and bigger things for both parties.

In developing countries, scientists who are engaged in local industries ought to regard themselves as pioneers or ambassadors. They should therefore do their best to gain the trust and confidence of the few local organisations that can use scientists. If this happens, these organisations will feel confident about entrusting their research and development to local people instead of having it

done outside the country. The potential problem is that, because of the poor state of our laboratories, we tend to request quite substantial amounts from these potential funding sources. This tends to push the organisations into thinking that we only want money from them. There is, therefore, a need for our laboratories to be adequately equipped so that the request to these organisations will be of a supplementary nature, at least at the beginning of the relationship.

The National Science and Mathematics Quiz Programme is currently presented on Saturday mornings at 11am GMT. The television station claims that that is the best time for students. I have had quite a number of people complaining to me that they have many chores to do on Saturday mornings, not to mention funerals and weddings, and therefore miss the programme. The original time scheduled was on Wednesday at about 7.30pm – primetime. Since the programme also helps promote a public understanding of science, many viewers are not students. For the adult population, especially women, Saturday mornings are busy periods and many cannot reorganise their weekend programme. The time slot is an important issue to resolve.

Several schools send me word that they would like to participate in the competition. In order to accommodate as many schools as possible, we have made it a policy not to invite schools that lost during the preliminary rounds unless they did very well and lost with high marks, thus creating room for schools that have not participated to be able to do so. So many schools are keen to participate, not realising that it may not be as easy as it seems to score high marks on the programme. The only school from my home town to participate had no points at the end of the first round of their contest. I am sure the school is not in any hurry to come back to the television screen. You may think it is easy when you are sitting in the comfort of your home watching the programme. My people have a saying: 'annko bi a, ese woanko' ('because you were not among the fighters, you are saying they did not fight gallantly').

The success of the programme has been due to a number of reasons. I very much appreciate the togetherness, the co-operation, team spirit and keenness shown by my team of consultants. Any woman would welcome working with these respectful and respectable men. We have worked hard together and have had so much fun doing so. My seamstress and hairdresser should also be commended for making me appear in such fashion that some people watch the programme only to find out what the quiz mistress is wearing on her body or on her head. We want people to watch, for whatever reason. They will improve their scientific knowledge and be better for it.

Analysis

Though I have written a personal account of my part in the television competition, I think that there are more general lessons to learn. From our experience, nothing has been more important than the part played by those of us who participated in putting the programmes together. I could talk about our dedication and other worthy motives, but the truth is that we all have enormous fun doing it. I am not sure how others who want to replicate our project could ensure this fun, but it will be impossible to take mathematicians and scientists away from their research because of dedication alone, since we already feel that our research has the greatest importance to national development. However, contrary to popular belief, researchers love having fun. Whether in other situations the initiative for such programmes comes from academics who then persuade the media, or whether the initiative comes from the media who then persuade the academics, will depend on country contexts, but the appeal must include having fun.

Originally, we thought of students as the target audience. Luckily for us we realised early on that the programme had an enormous potential to promote an understanding of mathematics and science among a much larger audience. On reflection, I believe that this is another important underlying principle to which others desiring to replicate this use of television should adhere – that is, to use students to reach a much wider audience. Of course, I can think of no reason why radio producers who reach a much wider audience than television cannot use the same programme format.

It takes a long time to put a series of programmes together. A general principle that I wish that our production staff had adhered to was providing us with a comfortable retreat for a few days far from the reach of our offices and families so that we could work in peace.

Finally, I am not sure why we have not encouraged other firms to sponsor my coiffure, clothing and beauty products, and be acknowledged in the programme's end titles. Distasteful as I might find doing this at a personal level, just as I agreed to be 'mistress', so I would agree to be exploited in this way if it brought the programme more money. Then, perhaps, they would agree to send us on retreats, increase the prize money, even donate some funds to the Ghana Association of Science Teachers that conducts some excellent projects but are always short of funds.